
LEADERSHIP FOR THE ARCTIC

CONFERENCE PROCEEDINGS



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U.S. COAST GUARD ACADEMY AND THE **LAW OF THE SEA INSTITUTE**
APRIL 12-13, 2012 • NEW LONDON, CONNECTICUT





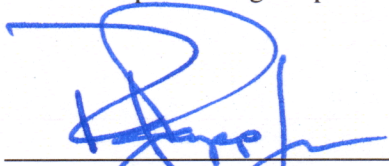
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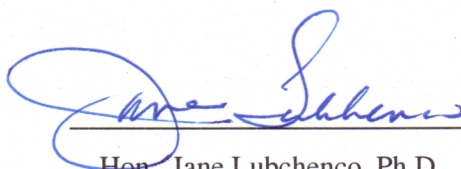


Leadership for the Arctic Conference Foreword to the Proceedings

The two-day *Leadership for the Arctic* Conference convened April 12-13, 2012 under the joint auspices of the U.S. Coast Guard Academy and the Law of the Sea Institute of the University of California Berkeley brought together more than 100 international maritime history, science, safety, stewardship, law and governance experts from the academic, government, diplomatic and non-governmental sectors. They met to discuss and debate key issues facing global leaders tasked with shaping and implementing policies to address the opportunities, threats and challenges posed by changing Arctic conditions and the rapidly emerging human activities in the Arctic. The co-sponsoring institutions' goal in convening this conference was to provide maritime affairs specialists with an opportunity to share their professional views with those charged with exercising leadership on Arctic policy formulation and implementation in the coming decade. Being familiar with the stellar reputation of the co-sponsoring institutions and the high caliber of the speakers, we came to the Conference with very high expectations. By every measure, our expectations were exceeded. We listened closely and came away much better informed and with a new sense of urgency and resolve. We thank Rear Admiral Stosz and her faculty, cadets and staff and Professor David Caron and his Law of the Sea Institute staff for convening this stimulating and informative intellectual summit and for preparing and disseminating these invaluable proceedings to preserve and pass on the experts' insights and recommendations.



Admiral Robert J. Papp, Jr.
Commandant, U.S. Coast Guard



Hon. Jane Lubchenco, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere
and NOAA Administrator



Preface

Proceedings of the Leadership for the Arctic Conference

As a newly-commissioned officer onboard the Coast Guard's storied icebreaker *Glacier*, I was first exposed to the planet's polar regions in 1982. Throughout my three decades of Coast Guard service, the Arctic — where the hydrosphere, atmosphere, cryosphere and biosphere all converge and present unique and oftentimes daunting opportunities and challenges—has captured my attention, while also instilling in me a profound sense of awe and respect. I was therefore delighted when presented with the opportunity to devote the tremendous interdisciplinary academic resources of the U.S. Coast Guard Academy to hosting the two-day long 2012 Leadership for the Arctic conference, an undertaking made possible only with the support of our co-sponsor, the Law of the Sea Institute of the University of California at Berkeley, and the generosity of the Coast Guard Foundation.

These Proceedings collect the views of six subject matter panels, comprising some forty panelists, together with three keynote speakers, as well as the research findings of over a dozen cadets who prepared and presented posters documenting their findings for the attendees. A number of the speakers prepared slide shows and referred to them during their presentations. Copies of those slides are available on the conference web site: <http://www.uscga.edu/arctic/>.

We are pleased to be able to share these Proceedings with you, to inform and perhaps even inspire you, and to facilitate your research. In making use of these Proceedings, however, please be respectful of the ground rules under which our speakers appeared in this academic conference: *unless otherwise indicated, all speakers presented their personal views.*

Thank you for your participation and for your concern for Arctic safety, security and stewardship.

Rear Admiral Sandra L. Stosz
Superintendent, U.S. Coast Guard Academy



Arctic Images

Images of the Arctic and the Directions in Leadership They Suggest

by

David D. Caron¹

Mystic, CT

April 11, 2012

¹ C. William Maxeiner Distinguished Professor of International Law, University of California at Berkeley. A complete set of the slides used in this presentation are posted on the Arctic Leadership Conference web site. <http://www.uscga.edu/arctic.aspx?id=19901>.



Images of the Arctic and the Directions in Leadership They Suggest

by

David D. Caron¹

April 11, 2012

Introduction

On behalf of my Co-Chair Cdr Russ Bowman, I welcome and thank our speakers, for their willingness to travel, in many cases long distances, to be here. The remarks I give this evening are brief. I draw on a presentation I gave about a year ago at the Library of Congress; that talk, and the accompanying slides, runs for about 50 minutes and can be viewed on the Library's website (<http://www.youtube.com/watch?v=88kqPcN3P3Y>). My intent tonight is to provide a frame into which you might situate your remarks and our discussion over the coming days. The animating idea behind the full lecture was we can understand a great deal about the changing Arctic in terms of three images. Tonight, I boil down each image to a few points and a few conclusions as to what each image suggests for leadership – the theme of this conference.



But before I start, I wish to mention that at last year's lecture a special guest of honor was Ariadna

¹ C. William Maxeiner Distinguished Professor of International Law, University of California at Berkeley. A complete set of the slides used in this presentation are posted on the Arctic Leadership Conference web site. <http://www.uscga.edu/arctic.aspx?id=19901>.



Miller, the widow of G. William Miller. I wish to dedicate tonight's remarks to them, a couple who served this nation with great distinction and who are at the center of the circles of the Coast Guard Academy, the University of California at Berkeley and international law. Bill Miller was born in 1925. He graduated from the Coast Guard Academy in 1945. While in Shanghai in 1946, he met the woman who would be his partner in all things – Ariadna, she having grown up in Manchuria -- her father being in the White Army -- and later having relocated to Shanghai. Together they would have many adventures. They lived in Alameda together while Bill studied at law at Berkeley. From there they rocketed forward.



This photo shows Bill, on the right at the Coast Guard Academy in 1972, at that time Bill was the CEO of Textron (the pretentious young man in the middle is me). He went on – with Ariadna always there - - to become, among other things, the Chairman of the Federal Reserve Bank as well as Secretary of the Treasury. A great American and citizen of the world, Bill passed from us in 2006, he is missed.

Bill Miller is one of the most distinguished graduates of both the Coast Guard Academy and the School of Law of the University of California – the two cosponsors of this conference. Bill would have welcomed the collaboration of these two institutions and the focus of this meeting.

I.

My main theme is that the many discussions of the Arctic that we hear can be approached, perhaps understood, in terms of three images. Like all of you, I have listened to numerous speeches regarding the Arctic and its future. In my experience, the speakers can be like ships passing in the dark – they come from different directions, they go different places, and they are concerned with themselves and somewhat unaware of the others. Some are optimistic about the opportunities that change brings; some fear such change. Needless to say this can be confusing, if not dissatisfying. But in reflecting on these speeches, I find each speaker's thoughts are animated by an image of the Arctic and my suggestion to you is that we



can identify these images, they tell us something about the politics and law of the Arctic, something about the Arctic as a region and something about the strands of leadership demanded by the Arctic's future.

So let us turn to the images

II. The First Image – The Impassable Area



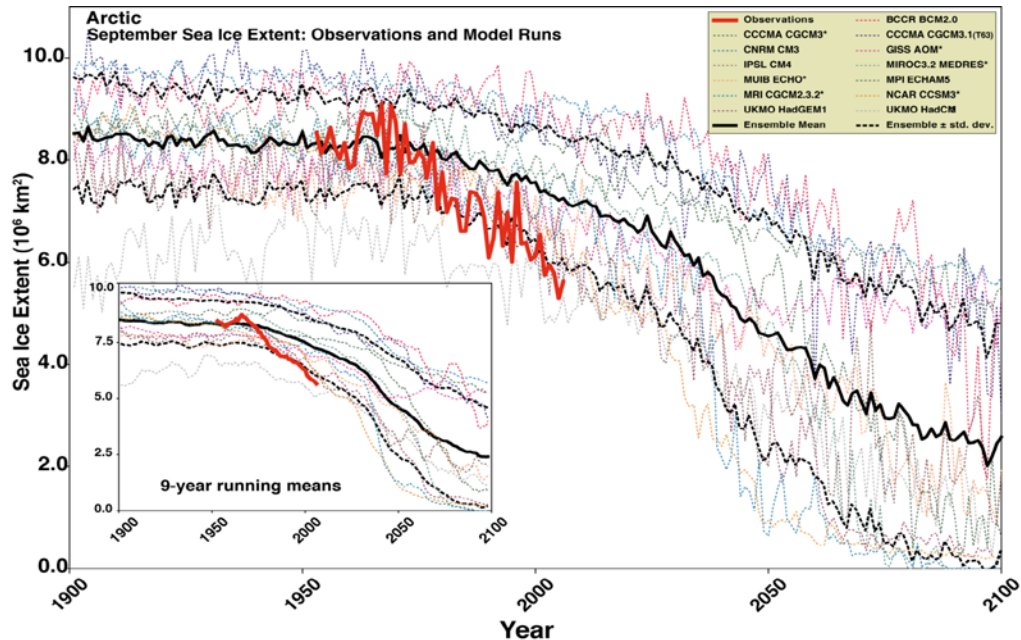
The first image of the Arctic is the image that has dominated our vision for centuries. This is the image certainly of our parents and it (in the true sense of this image) is gone. It is gone even though as I will explain it persists in a different way. This image is in black and white. (although one thing I love about this photo is that it is in color) In it, pack ice – apparently empty of life, extends to the distant horizon beneath a slate grey sky. In this image the Arctic is inhospitable and impassable.

Here, the threat that the USSR and the USA posed for each other during the Cold War was not that they would come across the ice, but rather that their missiles would come over the ice. Indeed, here one does not think of crossing the Arctic Ocean, but rather one imagines heroic explorers reaching the North Pole only to quickly return. (I found it interesting recently when as I looked for arctic books in an antiquarian bookstore near here in Georgetown where I found they were placed next to mountains – indeed how appropriate because the Arctic in this image is like a flat mountain with the peak being the pole and explores racing to it and back.)

It was only in 1908 that Robert Perry, along with Mathew Henson and four Inuits, were the first people to reach the North Pole. It was only in 1926 that first Amundsen and then Byrd were the first individuals to fly over the North Pole.



I sailed to the Arctic as Navigator and Ship Salvage Diving Officer aboard the USCGC *Polar Star* in June of 1976 and, even then, we met the seasonal ice of the Arctic south of the Bering Straits and the permanent pack ice just North of Alaska. Even then, no American surface vessel had broken ice through to the North Pole. I have wonderful stories from my time in the Arctic, but I raise this personal point for a different reason.



Stroeve et al. Fig 1

That point can be seen in a graph that I simply find fascinating. The graph is from a 2007 study that appeared in *Geophysical Research Letters*. The y axis is the extent of sea ice coverage in square kilometers in the Arctic in September while the x axis indicates the year. I will return to this graph later, but I want to note two things now to set up my point. If you exclude the bright red line for a moment, you will see some 13 others lines of declining sea ice coverage based on computer models, the deep black line represents the mean of those 13 lines. Now note that none of the models predict as fast a drop as has occurred in fact – where the observed actual drop in ice coverage being indicated by the red line. The point of this?

When I was diving amidst the ice, we were located significantly north of Alaska, and we had broken pack ice for a significant amount of time to reach that spot. Today in September of any given year, that area is ice-free. All this to emphasize that it is in our living memory, the image of an impassable area (in its full sense) has passed, is gone.

In this image, both law and politics are dormant, asleep. As a noted Canadian scholar of the region, Douglas Johnston, wrote in 1970, “[t]he Arctic is largely hypothetical.” Boundaries with neighbors are sketchy and unclear, but there is no urgency to resolving them. In general, the citizens of the circumpolar states live in the southern regions and if the native peoples that live in the North wish to move about as if these unclear boundaries do not exist at all, there is little harm in their doing so.

In this image, it may very well be that valuable resources exist in the region, but their exploitation, like the exploitation of the manganese nodules of the deep seabed, may not be technically possible and, even if possible, do not yet make commercial sense. It may be possible to refer to an Arctic region, and it



certainly is a region for the indigenous peoples populating the rim of the Arctic, but in another sense it is a region delineated more by its absence rather than by its presence. Let me repeat for this is the deep sense of this image it is a region delineated more by its absence rather than by its presence.

This deep sense of the image is gone. Our grandchildren may think of the Arctic as a tough environment much of the year, but it is not an impassable area. So a lesser sense of the image (what we might call the “difficult area of the world to operate” image) will continue.

If you haven’t noticed I have not asserted thus far a cause for the warming in Arctic yet. The 13 models in the graph I showed a moment ago assume the cause is human induced change in climate. But in one sense it does not matter yet because the red line shows what in fact is happening and no one – I repeat no one -- disputes the red line.

As far as climate change, assuming that it is the cause of a warming of the Earth’s atmosphere that is sufficient to reduce ice coverage, it is important to remember that the mechanism of climate change has nothing to do with and does not alter the angle of the Earth. Thus, this lesser first image remains in the winter season. The Arctic may be getting warmer and more ice free in summer, but it is no less dark in winter. The winter ice may become an annual, rather than perennial, ice coverage and therefore not as formidable, but it will not disappear. Indeed, one estimate is that it would take an average global 30 degree temperature rise to render the Arctic ice free in winter.

Recognition of the persistence of winter is crucial because the warmer visions we will find in the second and third images must be seen in seasonal terms. Shipping routes will be used for only certain months of the year, not the entire year, and there may be transition periods where the risks of such use increase.

Likewise, the anticipated expansion of offshore oil and gas activities must be seen in terms of the ability of such structures to withstand the structural demands of the winter season. The remnant of the image of an inhospitable place is one that calls for caution. In this sense, the call of many for development of the infrastructure for safety in the Arctic – a perspective that comes naturally to the Coast Guard -- is a critical point.

Images are always seen from a certain point of view. This means that we need pay attention to our own point of perspective, and need recognize that seeing the first image as one of an impassable area is to see the Arctic from the outside. To those inside, the indigenous peoples of the Arctic, it is home. Here I do not use the word ‘home’ in a southern romanticized sense, but merely as a fact. This ice-covered area is home to the Arctic peoples. For the indigenous peoples of the Arctic, law and politics are not dormant. Rather, the law and politics is theirs, it is particularly local, and it is primarily delineated by the extent of their particular community.

In a sense, the warming that leads to the loss of the first image presents a situation with parallels to the age of discovery, but with a twist. In the past, Europe did not know of the Americas. Today, the world knew of the Arctic but was not particularly interested because it was for most inhospitable. In the past, the Americas were discovered. Today, the Arctic becomes less inhospitable and as a new Arctic emerges it is, in a sense, also discovered. In the past, the peoples of the Americas awoke to find European peoples



claiming their lands. Today, the peoples of the Arctic awake to find the peoples of the South more interested in their lands where their homes are.

The key thing to recognize here is that not only the first image of an impassable area is gone, but the pristine isolation of home seen in the mirror of the first image is also gone. Thus challenge to the indigenous peoples is twofold - their lands are changing and others are now more interested in those lands. But stories are always more complex, so a bright note: I was at a meeting in Alaska where the elder of a tribe was telling his story and addressing in a sense the loss of image 1 and he said that it was perhaps not so difficult for his people because the oral history of his tribe reaching back generations spoke of a time when the Arctic was green and that that time would come again.

So what do we take away from the first image?

First, whether you see it as inhospitable or as home, the deep unchanging sense of this image is gone.

Second, what takes its place is an image of a region not delineated by its absence from the map but rather thought of as a region that is changing and that remains for most of the year an area that is difficult both to live and operate in. This difficulty reminds us to approach this region with caution.

Third and last, the awakening of interest in the Arctic involves a transition. It means a transition for those outside and for those who call it home, a transition to be approached with sensitivity. It also means – and this is important for any leader -- that we should not assume that we have fully awakened from our long dormancy yet to the full range of issues present. Let me give you an example by drawing your attention to Greenland. Greenland is an autonomous political unit of Denmark. The dormant question is what is US policy -- long term -- regarding economic and political relations with Greenland, for example should Greenland be invited through Denmark to have some relationship with NAFTA, is Greenland only a subunit of Denmark or of Europe, what should its concurrent relationship be with Northern America?

In the dormancy of the first image, if I brought up Greenland within, for example, the State Department, the reaction most often would be puzzlement. Yet Greenland has the largest reservoir of fresh water in the world, it has an unknown, but in all likelihood significant, amount of oil and minerals. It is five times larger than California, or to put it in East Coast terms, it is 12 and a half times larger than Florida. Yet it has a population of only 55,000 people. And at a conference in Germany, a Chinese scholar predicted that China in time will invest heavily in Greenland. Again I raise this only to emphasize that we should not assume that we have fully awakened from our long dormancy yet to the full range of issues present in a changing Arctic.

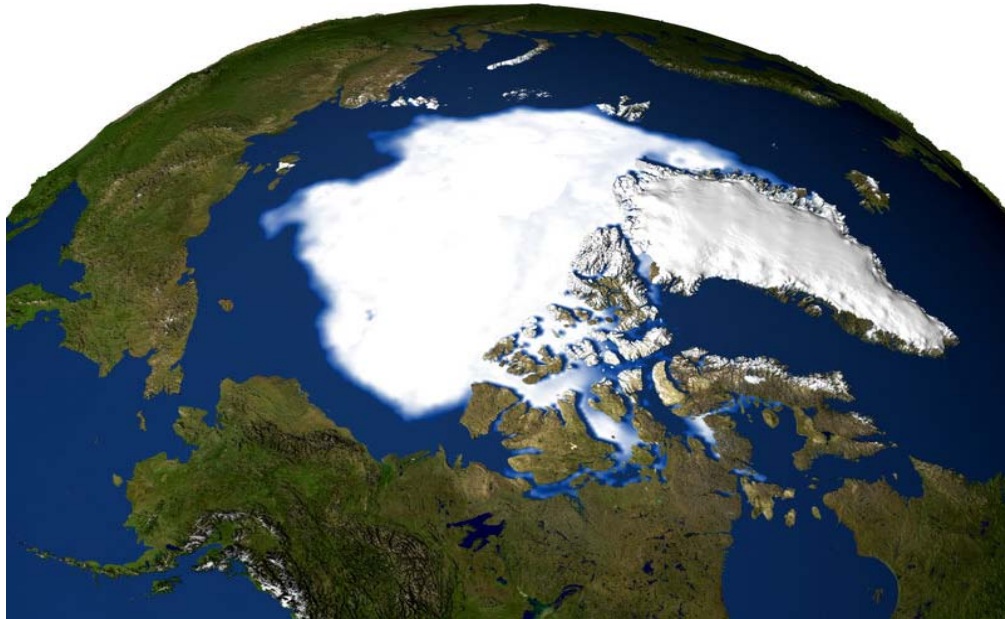
Lastly, all this leads to three insights a leader should take away:

- A leader takes away an appreciation for the danger and harshness of even a warmer Arctic;
- a leader appreciates that some stakeholders see only loss in a changing Arctic even as others may see gain; and



- a leader is always ready to be surprised by and adapt to a changing Arctic, and with intentionality exercises imagination so as to overcome our collective dormancy *vis-à-vis* the Arctic.

III. The Second Image – The Ring



The second image is that of a 2005 NASA composite photograph depicting the extent to which summer ice has retreated in recent years. Here the center of the Arctic remains impassable to all but icebreakers. And even for icebreakers such passages take time, consume fuel, and involve some risk. But although the center remains impassable, there is now a ring of water around the Arctic Ocean. In contrast to the impassable sense of the first image, there is now the possibility of following the coastline skirting the land on one side and the ice on the other.

In this image, the arctic nations are more aware of the Arctic, and they speak of their Arctic policy. But the crucial twist is to appreciate that this image, and the law and politics implicit in it, are actually deeply nationalistic, deeply inward looking. Why do they focus inward? Warming has resulted in the reduced ice, but it is oil that drives attention.

In this image each coastal state looks inward and asks what value – what oil or gas, what fish -- is in its portion of the accessible ring. In this image, each Arctic state focuses on its portion of the ring and as a result each in turn focuses on its borders with its immediate neighbors. It is in this sense of a focus on one's *immediate* neighbors, that I say this image involves not only involves the bilateral, but emphasizes *proximate* bilateralism.

If one looks inward, then quite immediately, each Arctic state becomes more concerned with the location of its borders with its neighbors, its immediate neighbors, so that it might understand what belongs



to it. These boundaries are more complicated than they might seem. And this is because in the oceans there are multiple zones and therefore multiple boundaries to consider. These zones range from the outer boundary of the 12 mile territorial sea to the outer boundary of the 200 mile exclusive economic zone to the outer boundary of the extended continental shelf. Much is said about these boundaries. Let me simply offer a few observations as to the net result of all these boundaries.

First, these boundaries essentially place the majority of the living and non-living resources in the Arctic under national authority. Almost all of the seabed of the Arctic will be allocated to one of the Arctic basin states, while the exclusive economic zones place much of the living resources under the authority of one of the Arctic basin states.

Second, these boundaries do not substantially limit the right of navigation within the Arctic basin. Maps often only depict how boundaries enclose the Arctic with regard to oil and fish. Far less often do such maps show the large range in which ships may navigate.

Third, it is often said in the press that there is a land rush underway in the Arctic with potential for conflict. This is an overstatement, if not incorrect. The oil that is known about is close to shore, not at the outer limits. What we more see taking place in the Arctic is the staking out of one's claim, the diplomatic resolution of most boundaries, and indeed joint exploration of the Arctic seabed. If one's surveys the Arctic basin, one finds that most boundary questions have been substantially resolved with the notable exception of the Beaufort Sea boundary between the United States and Canada

Fundamentally, the second image is nationalistic and inward looking. States look outward but only to understand what is within. But secondarily, in this image there also is an emerging Arctic region, that more properly should be thought of as two emerging Arctic arcs – that along the Northwest Passage and that along the Northern Route.

One driver in the second image is oil as mentioned. A second driver, but secondary, is shipping, the possibility of avoiding thousands of miles in passage. As the Northwest Passage opens up, the recurring discussion between Canada and the United States takes on a new sense of seriousness. For Russia whose coastline encompasses almost all of the Northern Route, the previously limited Russian practice regarding the right of such passage is examined more closely.

And in looking at these two routes, a few more words are required. First, these routes are seasonal -- yes, the summer ice is retreating, but every winter, it returns. Second, the routes are not equal because even if the ice is retreating for both routes, its persistence is greater on Canadian side of the Arctic because the Arctic gyre turns the ice towards the Canadian Archipelago. Third, the potential conflict in the Arctic requiring attention is not, as I said a moment ago, boundaries allocating oil, Rather attention need be given to the focal point of shipping and development generally – the Bering Strait.

So what do we take away from this image?

Two major things are happening. The primary dynamic is that the reduced ice coverage and the possibility particularly of oil leads the five arctic states to look inward and to stake out their claims as to the edges of what is theirs. The rules to do this by are relatively clear, the disputes are not many, actual



exploitation is still some ways off particularly along the outer edges. The second dynamic is driven by savings in shipping and this dynamic leads to the emergence of two arcs - the Northwest Passage and the Northern Route. The Northern Route is the more open; it is almost entirely above Russia. The Northwest Passage is more difficult and Canada raises questions concerning it. These routes will be seasonal, there are serious questions of safety and more and more focus needs to be paid to the Bering Strait.

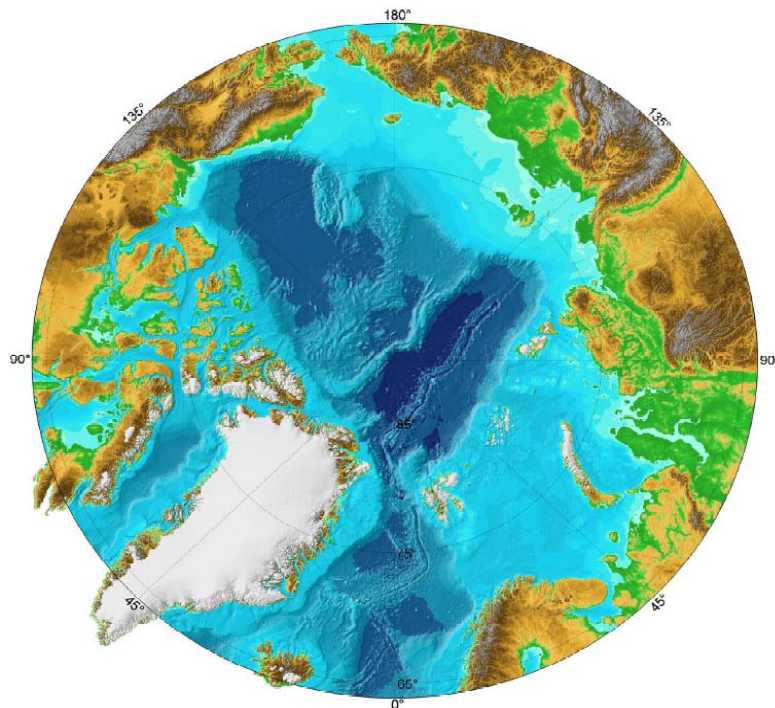
All this leads to three insights for leaders.

First, economics drives the second image. The issue for leadership is how to channel this development safely and wisely. And particularly difficult in this regard is how can the leader stay ahead of development in terms of knowing what the issues are and what the dangers are.

Second, the leader needs always bear in mind that the second image tends to focus on oil and resource development, sometimes over shadowing freedom of the high seas and navigation. For example, news headlines coming in my view will involve the presence in the Arctic of non-arctic basin warships and fishing fleets.

Third, the leader in my view needs to be clear in language used, in particular always making clear that in referencing for example the 200 mile zone, one is not speaking about territory but rather a range of jurisdiction and sovereign rights as to living and non-living resources.

IV. The Third Image – The Semi Enclosed Ocean





The third image is one of the Arctic in the not too distant future, perhaps by 2030, perhaps earlier. In the summer of that year, for the first time, there is no summer ice. It is an image of a semi enclosed ocean. (Note I am purposefully using a non legal term) It is important to appreciate that this semi enclosed ocean is five times larger than the Mediterranean. Likewise, it is important to appreciate that even if the seabed of the Arctic was substantially divided up between the circumpolar states, a significant part of the superjacent waters of the Arctic Ocean will be high seas open to fishing and almost all of it will be open to navigation.

This image leads to two significant shifts from the second image.

First, the circumpolar state look not only to one's neighbors on each side so as to define themselves, but each looks outward across the sea as each state recognizes that it is a inseparable part of the larger arctic region (and here the word "region" is used in its full sense). Similarly this shift in focus outward leads the circumpolar states to see their respective places in the Arctic. In the second image, each state is looking in and in this sense each is equal. But as one looks outward at the region each state sees that in terms of area some are more equal than others. For example, you are in school as a child and all the desks have a lock. The teacher throws a switch and they all open. Each child looks in to find what they have. Each is equal as they count the number of pencils and erasers. But eventually, they look up and find not only that some have more and some have less they do, but they also see that some have far deeper and far more elaborate desks.

The second shift is that, like all semi enclosed areas, the states inside will become concerned with the states outside the sea entirely and the states outside will become increasingly interested in asserting their interests in the semi enclosed ocean.

Because of both of these shifts, in the third image, law and politics are concerned with governance of a shared (again in a non legal sense) area.

In the third image, many of the coastal development projects viewed as possible in the second image have come about. There are many more people in the Arctic and significantly more activity.

Over the past few years, several scholars and activists, anticipating the changes I've talked about have called for the Arctic to be an international zone, often make comparisons to the treaty governing Antarctica. Others see the analogy to Antarctica. The five arctic states endorse the division of Arctic waters and jurisdiction seen in this slide. For them this region is basically no different than other coastal areas and that the 1982 Convention on the Law of the Sea provides the basic framework of authority for the Arctic. As a practical matter, the five arctic states have defined the situation.

Nonetheless, it is not entirely under national authority and we may expect that the states of the rest of the globe will become increasingly interested in the Arctic. In particular, there can be little doubt absent an agreed ban that the fishing fleets of East Asia and Northern Europe in time will begin to operate on the Arctic high seas, perhaps in significant numbers. Recall that fish are particularly sensitive to the temperature of water and have already been observed to be moving northward. Again governance will become important and, at a minimum, one will see, for example, the creation of one or more regional fisheries organizations in the Arctic. Simultaneously, as regional efforts at governance advance, we can



expect that states outside the region will ask why the Arctic Ocean should be the province of a handful of states and seek to globalize such efforts at governance at least for those areas beyond national jurisdiction. But again the choice in fact has already occurred.

But if the Arctic is heavily under national authority, then there is an absolutely crucial point to be made: the centrality of Russia

If one focuses on governance, then the critically important point to recognize is that successful governance of the Arctic depends greatly on Russia. It is often said that the policy choices of the United States, China and India are central to the question of climate change. So too will it be the choices of Russia that are central to the future of the Arctic.



The Arctic as a semi enclosed ocean is dominated in terms of coastline by Russia and Canada. The United States is a powerful state with only a small percentage of the coastline of the Arctic. Canada has a long coastline but relatively less power as a state. Russia has both the longest coastline of any state in the Arctic and significant power as a state. As Mikhaylichenko observes: "Russia's Arctic zone embraces almost one half of the Earth's circumference in these latitudes."

And if one broadens the criteria of presence, it is quickly apparent that in terms of population, economic activity, number of natural ports and watershed emptying into the Arctic Ocean, it is Russia that is most present in the Arctic. For example, as far as watershed Russia has significant water basins (examples include the Ob, Yenisei and Lena) that discharge five times the amount of fresh water into the



Arctic than the two basins in Canada. Similarly, although population distribution was more difficult to calculate, if one looks to the number of people above the Arctic circle, we find in Alaska 15,000, in Canada 65,000, and in Russia 3 million.

The centrality of Russia to shared governance of the Arctic is a challenge in that the possibilities of successful shared governance are highly dependent on the regulatory capacities of the states involved. And in this regard, the reality on the ground is that the Russian regulatory state is a work in progress; a circumstance probably greater in the Russian hinterland. Having given described the challenge of Russia, it simultaneously is important to emphasize that Russia in its strategic documents clearly values the Arctic as a central part of Russia's future.

Given these differences and the centrality of Russia, how are the five different Arctic states to work together at regional governance? The main institutional effort at Arctic governance at present is the Arctic Council. But although the Council has an innovative structure and has produced important studies in its short existence, it is also an institution of limited capacities with certain issues beyond its mandate.

So what should we take away from the third image and what conclusions would I draw generally about the Arctic's future. Let me emphasize two –

First, I have spent some time to emphasize that Russia will govern a substantial portion of the Arctic but it is important also to recognize that Russia will go first in virtually every activity in the Arctic. We must remember that the tragedy surrounding Japan's nuclear reactors damaged by the tsunami will affect the use of nuclear power elsewhere. So too will the experience of Russia in the Arctic affect domestic debates in all other arctic states, including the United States. In this sense it is essential that all work with Russia to ensure its success in the Arctic.

Second, the leader needs appreciate that while warming drives the first image and economics drives the second image, the good governance required in the third image will be the result of focused leadership.

Conclusions

Finally, let me close with the observation that these three images exist concurrently and the belief that it is important that we attempt to hold them simultaneously. The general effect of warming is to give more influence to the issues present in the second and third images, and in essence to accelerate our moving from the first image toward the second image, and to a lesser degree, toward the third image.

But each image contributes an essential part of the Arctic's future. The first image gives us a respect for nature in the Arctic, it reminds the leader to be cautious, and it carries in it a sense of loss that is appropriate. The second image in contrast illuminates for leaders a sense of opportunity and of excitement that is appropriate; it gives us frontiers and challenges. Finally the third image reminds leaders that the excitement that goes with frontiers and challenges can come at a great a price, it reminds them that change brings both development and destruction and it instructs leaders that the first and foremost challenge is that we govern our affairs responsibly.



Welcoming Remarks (I)

Welcoming Remarks
and
Opening Keynote Address
by
Vice Admiral Brian M. Salerno, U.S. Coast Guard
Deputy Command for Operations

U.S. Coast Guard Academy
New London, CT

April 12, 2012



Welcoming Remarks

Welcoming Remarks: Conference Co-Chair: Commander Russ Bowman



Good morning. Welcome to the United States Coast Guard Academy. In cooperation with our co-sponsor, the Law of the Sea Institute from the University of California's Berkeley School of Law, we are pleased to welcome you to The Leadership for the Arctic Conference. I'm Commander Russ Bowman and it's my honor and privilege to serve as one of your two conference Co-Chairs and Masters of Ceremonies' over the next day and a half.

We are elated to have assembled so many distinguished presenters and panelists in what is admittedly an ambitious series of interdisciplinary discussions over the next day and a half. But we are also delighted to have attracted such a diverse and impressive group of you for this event. Sitting among you are numerous representatives of academia, non-governmental organizations, think-tanks, industry, federal agencies, maritime professionals, regional representatives, indigenous peoples, selected members of the Coast Guard, and of course, academy faculty, staff and cadets.

One of the hardest things has been to characterize succinctly the caliber and experience represented here today. We have Admirals. We have ambassadors. We have presidents of universities, former foreign ministers. We have senior scientists, senior executives from industry and beyond. And we truly thank you for making Leadership for the Arctic a priority by your presence here today.

We also extend a special welcome to all of those joining us live via the web, including many of the men and women of the 17th Coast Guard District throughout Alaska, members of the National Science Foundation, the Brookings Institution among many, many others. We thank you for joining us.

Before we introduce my conference co-Chair, the Superintendent and the Deputy Commandant for Operations for more formal welcoming remarks, please allow me just a moment for some general housekeeping matters. Location – we welcome you to the Coast Guard Academy Alumni Center overlooking the beautiful Thames River; one of the three venues that we will be using for the conference today. We could



not resist the opportunity to show off your Coast Guard Academy a little bit, so after our welcoming remarks and morning panels we will transition to the Officers Club. And later this evening we'll have some events in Leamy Hall, the building that you were dropped off near this morning.

Breaks – we have, as I've said, a very ambitious schedule. We have scheduled breaks and we ask your assistance in keeping to the timing to the greatest extent possible. It is very difficult for us to limit all of the experts we have gathered to the short time periods they have, but keeping to the scheduled breaks will help us to provide maximum opportunity for their presentations.

And with that, it is my honor to introduce my conference Co-Chair. We are thrilled to be working with the Law of the Sea Institute at the Berkeley School of Law. We are even more thrilled to have Professor David Caron and his personal contributions to this event. Professor Caron is a 1974 graduate of this institution, of the Coast Guard Academy, and its first Fulbright Scholar. He serves as the Co-Director of the Law of the Sea Institute, and is a distinguished Professor of Law at the Berkeley School of Law. Ladies and gentlemen, please help me in welcoming Professor Caron.

Welcoming Remarks Conference Co-Chair: Professor David Caron



Thank you, Russ, for that introduction. Good morning everyone, it's really a pleasure to be back at the Academy. It's a privilege for the Law of the Sea Institute to be co-hosting, co-chairing this event. Let me just say the Law of the Sea Institute was founded in 1970. It's an international consortium of scholars who have dedicated their scholarly agenda to all issues of ocean law and policy. It was first founded at the University of Rhode Island. It's our pleasure, meaning the University of California, to be the host of it at present.

My Co-Director, Professor Harry N. Scheiber, sends his regrets that he couldn't be here for this event. And I wanted to acknowledge in particular two long standing leaders of the Law of the Sea Institute who are here with us. One is Professor Bernard Oxman of the University of Miami, who is a former director of the Institute. And the other is



Welcoming Remarks I – 3

Professor Tullio Treves of Milan, who has been a leader in the Institute all these years. So thank you for coming to both of you.

I would just like to add on a personal note that it's really a pleasure to come back to the Coast Guard Academy. In the war years a graduate of this academy was G. William Miller. When he graduated, he went to Shanghai. The war was just ending, and he met his wife there, [Ariadna] Miller. He returned to the United States, left the Coast Guard and studied law at Berkeley. So there is a long history of a connection between Berkeley and the Coast Guard Academy.

G. William Miller went on to be Chairman of Textron, Chairman of the Federal Reserve Board, and then Secretary of the Treasury. His widow, Ariadna, and he gave a great deal to both Berkeley and the Coast Guard Academy. They are loyal alums of both and when I saw Ariadna only a few weeks ago and told her of this event she said she couldn't be more delighted. So it's a very special event on many levels, and we're very happy to be a part of it.

Let me introduce our next welcome, and that's Captain Glenn Sulmasy, a friend of Berkeley and the Chair of the Humanities Department here at the Coast Guard Academy. Please join me in welcoming Glenn Sulmasy.

Welcoming Remarks CAPT Glenn Sulmasy – Chair, Department of Humanities, US Coast Guard Academy



Thank you all and welcome. What a great start to what is sure to be a superb event. Last night started off wonderfully with a speakers' reception at an appropriately maritime setting in Mystic Seaport where we listened to an informative and inspiring presentation by you, Professor Caron. It was the perfect setting and presentation to start things off.

I'm really here to thank people. First, thank all of you for coming. Second, thanks to the Law of the Sea Institute, and to Harry Scheiber [its Co-Director], who couldn't be here. He and Jane – we hope to welcome you back in the future to the Coast Guard Academy. I also extend special thanks to the Coast Guard Foundation who made this



entire event possible. We can't thank the Coast Guard Foundation enough for their support.

As all of you who have put on these sorts of events before know, there are always a multitude of people to thank for their hard work. First of which is Commander Bowman and his team, as well as the other members of the Academy faculty. If you see faculty members around the Academy there are people from the Science Department, Management Department, Engineering and Math Departments. So I thank all the faculty and Academy staff for their great contributions towards making this a success, which I'm certain it will be.

Also, as you know, it's not just the workers – to make an event like this successful, you need support at the top. Without Dean [Kurt] Colella's and the Superintendent's support we could not have done this, and it's therefore my pleasure to introduce Rear Admiral Sandra Stosz. She is a 1982 graduate of the Coast Guard Academy and a 1994 graduate of the Kellogg School [of Management, Northwestern University] with an MBA. She also received a Master's degree in National Security Studies from the National War College, and served an Executive Fellowship at MIT. Without any further ado I'd like to introduce the 40th Superintendent of the U.S. Coast Guard Academy, Admiral Stosz.





Welcoming Remarks: RADM Sandra L Stosz – Superintendent, U.S. Coast Guard Academy



Thank you Captain Sulmasy. And to all our distinguished guests, attendees and presenters, welcome aboard the Coast Guard Academy. Just look to your left. That's what we see every day: a Maritime Service Academy on the Thames River. And we have a national treasure in the waterfront down there, so this is a fitting place to host this conference.

Thank you so much for traveling from all around the United States and the world to participate in this historic event for us. We're honored to have you all here. I know folks came in late last night they've traveled from all over the United States, Canada, and the international realm. So, thank you so much for making that great effort, with busy spring schedules to come here. There is so much energy in the room, and we're hoping to harness that energy today.

It's no accident that the theme for this multi-disciplinary academic conference is leadership, and I want to focus on that for a minute and our mission here at the Coast Guard Academy. This is where we develop leaders of character who, as commissioned officers, will take on the challenges and opportunities that we're going to be facing in the Arctic. We're the home of the Coast Guard's Leadership Development Center, and of world class academics, many of whom are engaged in interdisciplinary teaching and research. We are also standing up a new Center for Maritime Policy and Strategy, and we hope this conference will deliver the kind of value that we hope to see from that center in the future. We're very excited about that.

It is also fitting that the University Of California at Berkeley should co-sponsor this event. We're honored and privileged. We thank Professor Caron for being here, and for partnering as a graduate institution with an undergraduate entity. We're thrilled to have that kind of a strong partnership for the future.

Last night we enjoyed a captivating Arctic Images presentation by Professor Caron. We held it at Latitude 41, and I know some of you



came in too late to join us. I thought Arctic Images; okay this is going to be great slideshow. I personally am a Polar Icebreaker sailor. I spent time on *Polar Star* and *Glacier* and went to the Arctic and the Antarctic a couple of times. So, I'm thinking I'm going to see polar bears again; I'm going to see walruses, and all this. Instead, it was this fascinating presentation that racked out the issues for senior leaders. I hardly remember the content because I was so fascinated with the sequence of events, and to look to the future and see where we need to focus our efforts in this new realm.

I am going to borrow some of the words he used last night, and he gave me permission. Professor Caron mentioned that "law and politics are dormant in the Arctic, and leaders need imagination to end that dormancy." I was struck by that. I thought that was a fabulous way to set the stage. And today and tomorrow we need to have the stimulating conversations in this room that will bring that imagination, and change that dynamic of dormancy to one of active pursuit forward.

The US Coast Guard has a clear and present need to operate now in the Arctic. You're going to hear from Admiral Ostebo at lunch today. He's our District Commander in that realm. He will tell us that we have a need right now to begin to operate in uncertain Arctic conditions. Your work will inform the policy and decision makers today. We can't afford to wait; the time is now. We need you to provide the intellectual products to inform leadership in its approach to addressing Arctic challenges and opportunities, and we need to know what you would like to see from leadership to more effectively address those same challenges and opportunities.

This is also your opportunity to ask some of us in the panels and around the room what we can do as leaders and policy makers to assist you in your research and to get your findings and recommendations factored into the decisions that are going to be made over the next several years.

The panelists you'll be hearing from over the next few days have been selected from the local to the international realm in the fields of science, history, law and governance. I believe this is an amazing opportunity. I know we heard Commander Bowman ask us to keep the breaks short, but in addition to delivering the intellectual material for us to use as decision makers, we really need you—from all of those different interdisciplinary realms—to share with us your energy, to help us capture that stray voltage, bring it all together, discover where the gaps and overlaps are, and focus that energy into a laser beam, a laser beam to guide our future characterized by responsible governance in the Arctic.

With that said I would like introduce Vice Admiral Brian Salerno, who's going to provide the context for our panel discussion. Vice Admiral Salerno is one of our most senior officers in the Coast Guard. As Deputy Commandant for Operations he oversees the strategic integration of operational missions and optimization of policy development and mission execution for the Coast Guard—in short, the perfect person to kick off this conference and put it in context.



Vice Admiral Salerno is a 2000 graduate of the US Army War College where he earned a Masters Degree in Strategic Studies. He is also a graduate of the Naval War College non-resident program and holds a Masters Degree in Management from the Johns Hopkins University. He is licensed as a master of small passenger vessels, and was recently awarded the prestigious [Rear Admiral Halert C.] Shephard Award by the Chamber of Shipping of America, in recognition of his achievements in merchant marine safety, security and environmental protection. Welcome Vice Admiral Salerno.

Welcoming Remarks VADM Brian M. Salerno – Deputy Commandant for Operations, U.S. Coast Guard



Thank you, Sandy, and good morning everybody. It's really great to see you all here. First of all, thanks for coming here to participate in this symposium on leadership challenges in the Arctic. And before I go any further let me just thank our co-hosts, Admiral Stosz, Superintendent of the Academy, and Professor Caron of UC Berkeley School of Law. Thank you for hosting this and Professor, welcome home. It's great to have you back here. And I'm really intrigued by the connection between UC Berkeley and the Coast Guard Academy, and I think, wow! What a great venue to have this discussion. This is an academic environment. I think it really lends itself to the kind of discussion that we need to have over the next day and a half.

It's also a very timely discussion. You know, more and more our attention is being drawn to the Arctic issues, at least among policy makers and those in the academic community and the think-tanks. We're looking at that more and more. And with good reason, the range of concerns is really quite broad. For one thing, changing conditions in the Arctic raise significant questions about national security. This is an area where not only Arctic Nations will operate, but many non-Arctic Nations will operate. So what are the implications of that?

The Arctic also clearly animates our discussions about national energy policy. And as Professor Caron mentioned last night in his presentation, there are vast reserves of oil and natural gas in the Arctic region. Many nations, and again not only Arctic Nations, but non-Arctic Nations, are looking at the availability and their ability to access



those resources. And then with equal passion, as you're talking about things like national security and industrialization, there other points of view equally concerned about management of living marine resources, the sustainment of traditional lifestyles in the region, and environmental preservation overall.

It also raises some interesting questions about how we in the United States interact with our Arctic neighbors. Such as, what type of a construct we have for constructive collaboration. And many of these other countries, and I say all the Arctic ones, are wrestling with some of the same implications of the changing conditions that we are in the United States.

I was doing a little reading over the weekend, and it occurred to me that it's now over 100 years since Norwegian explorer Roald Amundsen became the first westerner to sail through the Northwest Passage. It was an expedition that took three years to complete. It occurred from 1903 to 1906. And he succeeded where many people before him had failed. And many of those names are commonly known; names you would all recognize, Henry Hudson, James Cooke, and of course the ill-fated Franklin expedition, many, many others, all looking for that passage-way between the Atlantic and the Pacific over the North American continent.

But even so, you know a three year passage is not what anyone would call commercially viable. What a difference 100 years makes. And in fact it's not really 100 years; the changes have occurred mostly within our lifetimes to make that even thinkable. Although we are not at the point where the Northwest Passage is a commercially profitable route, such a possibility can be credibly foreseen in the coming years. Meanwhile, the Northern Sea Route over Russia has seen an increase in the amount of traffic. And the Russian Federation is making plans and executing plans to make it even more viable.

Why do we care about the Northern Sea Route? Well, we share a body of water between Russia and the United States—the Bering Strait—and there are maritime safety implications there; so all of this is interconnected. While we may look in future years towards the emergence of the Arctic as a transit route, at least over North America, there are immediate challenges, as Admiral Stosz pointed out. It's not so much as a transit route; it's the Arctic as a destination. It's a destination that is drawing increasing amounts of human activity, in the form of energy exploration, mining, adventure tourism, and fishing.

And along with all of those come risks. So these activities are not future phenomena they are right now. And out of necessity federal agencies like the Coast Guard, like Department of Interior, like NOAA, and like DoD, are all looking at what do we need to do to plan for these risks now.

Meanwhile, in the United States we are in a very curious position. We are an Arctic nation, and we have been ever since Alaska became US territory in 1867. And while we're here at the Coast Guard Academy,



I'll just point out there's a very interesting mural up near the Superintendent's office in Hamilton Hall, of a very famous Coast Guard rescue that occurred in the Arctic. It was in the 1860s. It involved the Revenue Cutter *Bear*, which sent a team over the ice to rescue a trapped whaling fleet at Point Barrow. And they brought in desperately needed food, supplies, and medical care. Had they not reached those whalers they would have perished.

So our history, our national history really goes back that far, and it's a very proud history. Yet, despite this national history, we have a lot of unresolved issues, as well as some opportunities. One of the issues is that, although we have a very clear articulation of national policy interest in the region, and this was put out just a few years ago in a National Security Presidential Document, we have no real clear path to achieve them. In effect we have no national Arctic strategy. We have an articulation of interests, but that's not a strategy.



In addition, the very governance structure that we use, we rely upon, in our discussions about the Arctic on resource management, on navigation rights; on how we might resolve differences with other Arctic nations—we have not signed onto that. And I'm referring of course to the Law of the Sea Convention.

I think that's brings us to why we're here. This is really about shaping the way ahead. Individual agencies and departments are doing their planning. The Coast Guard has a plan. NOAA has a plan. Navy has a plan. But they're not connected in some overarching holistic structure. And what we need is to get the confluence of opinion to help forge that way ahead.

So we're holding these panel discussions here at the Coast Guard Academy, but you'll notice that the way the panel discussions are structured, there are actually relatively few Coast Guard voices on those panels. That is by design. It would serve nobody's purpose if this were a Coast Guard-centric discussion. Make no mistake, we're vitally interested in this topic, however for us to interact more meaningfully with our colleagues in government, who also share considerable responsibilities for planning in the Arctic, and for the government overall to fully represent the nation's interest, it's essential to tap into



the thought that has been given to the Arctic in think-tanks and academic institutions and in research bodies. So what we hope to get out of this conference is a clear sense of direction, of prioritization, inclusive of all perspectives, which we in government can then use to shape the way forward as we continue our interagency work.

So as mentioned this is very important to the Coast Guard, I know Admiral Ostebo, our District Commander in Alaska, will speak to us at lunch today. He will very articulately and passionately explain the operations he has planned for this coming summer, which are being driven by expected drilling activity. But it's beyond just this summer, this is the beginning of what we expect will be a steady increase in human activity in the region.

For the Coast Guard overall, the Arctic is another maritime operating area. We have the same mission responsibilities in the Arctic that we shoulder in any other Maritime operating area. We're responsible for saving and protecting people on the sea, for protecting the country from threats from the sea, and for protecting the sea itself. The same roles we carry out in other maritime areas. But what's different is the extremely harsh environment, the vast distances between points for refueling and operating, and the absence of critical infrastructure on shore to support operations. That's not only true for the US and the Alaska, that's true for all Arctic Nations. So it really represents an opportunity for how we share resources and coordinate on common interest. I know that our many colleagues in Federal Government will be equally passionate about their needs, and about the difficulties they are facing in addressing their shortfalls.

There are no hard boundaries in these agency priorities. And just to give you an example, I think we have some folks from NOAA here. NOAA is very concerned about its ability to predict the weather. We think a lot about Maritime Domain Awareness. It covers a lot of different areas. One of the most basic is can we even predict the weather? And given the satellite structure that we have, the constellation, it's not very easy to even predict what will occur tomorrow in the Arctic from a weather perspective. How does that affect other agencies? Well, if you're with the Department of Interior and you're going to be overseeing drilling operations this summer, you probably need to know from a safety prospective what the weather is going to do. From a Coast Guard perspective, in case of a maritime accident, we need good information on the weather. So all these things connect and that's just one example.

But the discussion today is not really about agency needs. We're looking for the broader prospective because our national interests are so very broad. We need the benefit of your wisdom, and I know that many of you have given the Arctic quite a bit of thought in your individual lines of work and inquiry.

So, to help draw out your expertise, we've structured this symposium into six panels, each of them with the leadership theme. There is a panel on the history of leadership in the Arctic, and also panels on



Arctic science and research, maritime safety, maritime stewardship, Arctic legal issues, and then Arctic governance. So, as we launch into what I think will be some very lively, very informative discussions, I would just like to propose a few questions that you might keep in mind. These are rhetorical now, but I think they might help inform the tenor of the discussions in each of the panels. And here they are.

How do we best approach Arctic governance? Is the Law of the Sea, that convention, essential to governance? Or are we satisfied with other bodies such as the Arctic Council?

Is there a role for NATO? Is there a role for the European Union?

What's the role for non-Arctic states, in Arctic governance?

How do we manage a “whole of society” approach to Arctic governance recognizing that there will be many divergent viewpoints on our priorities?

How do we approach ecosystem based management into the Arctic region? And I use that term, because that's the way we are approaching management of marine areas around the country under the National Ocean Council. How does that apply to the Arctic?

How do we best pool our national and international resources to achieve common objectives? And think there of some of the ways we have worked internationally with search and rescue and what we're currently doing with pollution response through the Arctic Council.

And how do we capture the attention of the public? Does it take a catastrophic event to come to grips with the fact that we have national interest in the Arctic? We were at a CSIS [Center for Strategic and International Studies] event two weeks ago, and I made the observation that for our colleagues in Canada, I think if you were to approach a person on the street and ask them, “Are we an Arctic Nation?” I think the average Canadian would say “Absolutely, no question.” If you approach the average American, and ask if we are an Arctic nation: I think you might just get a shrug and “I don't know.” Unless of course you're in Alaska, then I think the chances are higher. But the average person in heartland of the country probably does not think of us as an Arctic Nation. And yet we are and we have very real interest there. So what does it take to come to that realization, and to harness national will on Arctic issues?

Those are just a couple of thoughts and questions. They are not meant to be all inclusive, just to suggest the kinds of discussions we may have over the next day and a half. So, I think it's time to get to the fun part. Thank you in advance for the wisdom you will share, and for devoting your energy and time to what I think is a very important event.

Thank you.



History of Leadership in the Arctic (II)

Panel 1:

History of Leadership in the Arctic:

When Leadership Mattered: Opportunities Seized and Missed

Moderator: CDR Brigid Pavilonis –Department of Humanities, U.S. Coast Guard Academy

Panelists:

- Dr. Elizabeth Elliot-Meisel – Chair, Department of History, Creighton University, Omaha, Nebraska
- Professor Shelagh D. Grant – Author and Adjunct Professor, Trent University, Ontario, Canada
- Dr. Dennis Noble – Coast Guard and Maritime Historian and Author



**Panel 1: History of Leadership in the Arctic:
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CDR Russ Bowman:

Since the days of the Arctic's early inhabitants, leadership and sovereignty have been of critical importance to the region. As the path-breaking work of scholars such as Canada's Robert McGhee has demonstrated, the Arctic's indigenous people have always been active innovators, engaged in global networks of resources and trade and constant struggles to maintain their sovereignty.

Beginning with the early Viking settlements of the 10th Century in Greenland, active leadership shaped the colonial race to claim the Arctic. Since the second half of the 19th Century, it has been a key factor in international sovereignty disputes and negotiations, like those between the United States and Canada.

The United States Coast Guard, as Admiral Salerno mentioned, has a long history of leadership in the Arctic, exemplified by Captain "Hell Roaring" Mike Healy, a former slave and Revenue Cutter Service commanding officer, who is known not only for his daring exploits in both law enforcement and search and rescue, but also for his genuine respect and compassion for Alaska's native peoples.

History then, both of the recent and more distant past, has many lessons to offer for the present and the future. The presenters of our first panel will offer insights into the history of leadership in the Arctic; of opportunities seized and missed, regarding topics including conflicting sovereignty claims and the rights of indigenous peoples. They will draw connections to the present, and demonstrate how an awareness of past history can inform current policy debates in the areas including resource exploration and challenges of global climate change.

To help us provide this important context, a way-point, from which we will chart a way forward for the next day and a half, if you will.



History of Leadership in the Arctic II – 2

It is my pleasure to introduce our first panel moderator, Commander Brigid Pavilonis. Commander Pavilonis is Chief of the Government, History and Ethics Section and an Associate Professor of International Relations here at the Coast Guard Academy, where she has been teaching, mentoring and advising cadets since 1999.

She is a 1991 graduate of the U.S. Coast Guard Academy. She earned both her Master's and Doctorate in International Relations from the Fletcher School of Law and Diplomacy at Tufts University. Her most recent work focuses on protection of the homeland as a key national security issue. Ladies and gentlemen, Commander Pavilonis.



CDR Brigid Pavilonis:

Thank you very much, Russ. I certainly do appreciate it. It is my honor to be here with you today, and to be a part of this distinguished panel.

First, I wish a very good morning to the distinguished academics, to industry officials, executive agency heads, Coast Guard leadership, and the Academy faculty, and of course, our cadets. I am pleased to be chairing this first panel, where we will be discussing the history of the Arctic. The title for our panel, for those of you who are reading your programs, is *When Leadership Mattered; Opportunities Missed and Opportunities Seized*.

I am truly honored to be joined by three of the foremost scholars of Arctic history today. Before we begin our conversation, I would like to share a bit with you about their background and experience.



Dr. Shelagh Grant is an historian, researcher and author. Currently teaching at the Trent University in Ontario, Canada, her focus has been on polar history. She's conducted numerous oral history projects, which have resulted in academic papers, conference presentations and several books. Dr. Grant's presentation today will span several thousand years of Arctic history, and we're doing it all in 15 minutes too by the way; focusing on the impacts by the British, Canadians, Norwegians, Russians and Americans. And of course her work is very important to us as those interested in the Arctic, because clearly this history impacts sovereignty today.

Next we will hear from Dr. Dennis Noble, a U.S. Coast Guard veteran who began his Coast Guard career in the enlisted ranks, retiring as a Senior Chief after 21 years of honored service. After retirement he earned his Ph.D. from the Purdue University, and is the prolific author of 15 books and numerous articles - all on Coast Guard history. Today Dr. Noble will be sharing with us the absolutely fascinating story of Captain "Hell Roaring" Mike Healy. Captain Healy patrolled the Alaskan waters for a period of about 20 years. And he has long been noted as a model for his respect for indigenous rights of the peoples living in the region. Dr. Noble is here to help bring that story alive for us today.

Our third panelist is Dr. Betsy Elliot-Meisel. She chairs the History Department at Creighton University in Omaha, Nebraska. Dr. Elliot-Meisel specializes in U.S.-Canadian relations, U.S.-Russian relations and 20th Century U.S. history. Dr. Elliot-Meisel has published numerous book chapters and journal articles on the Northwest Passage, and multilateral Arctic cooperation. Her presentation focuses on Arctic



History of Leadership in the Arctic II – 4

history from the 1930s until the present; challenging us to think about the unique opportunities that exist for us in the Arctic, regardless of our agency affiliation, academic discipline or strategic perspective.

At this point I would like to turn to Dr. Grant, who is going to be speaking to us about that glorious history of the Arctic. Shelagh.

Professor Shelagh D. Grant:

Thank you Brigid for the introduction, and thanks everybody for the opportunity to participate in this conference. I've always had the greatest respect for Coast Guard, whether U.S. or Canadian, and I sincerely believe it's neglected in mainstream Arctic history.



This presentation is derived from my book *Polar Imperative: A History of Arctic Sovereignty in North America*. It shows how certain events, and this is key, actually influence changes in occupation or authority in the Arctic. Notably, climate change, new technologies, increasing demand for resources, wars and economic diversity all are present today. Given the time constraints, I'm going to focus only on a few key points and I'm warning you, this is going to be a race to the finish.

The first to inhabit the North American Arctic crossed the Bering Strait around 5,000 years ago and gradually moved eastward until reaching Greenland. Referred to as the Paleo-Eskimos, they were followed by waves of further migrations, each with distinctive characteristics. The last to arrive were the Thule whale hunters who reached northern Greenland around 1200 AD. Because of their sophisticated weapons, large skin boats and use of dog sleds, they were better able to survive the Ice Age, thus they are the ancestors of today's Alaskan Eskimos and Canadian Inuit and Greenlanders, and they consider the Arctic their homeland.



History of Leadership in the Arctic II – 5

Yet, few are aware that Europeans had settled in southern Greenland long before the Thule Inuit. Almost 500 years before Columbus allegedly discovered America. There were Norwegian Vikings led by Eric the Red, who had been exiled from Iceland and it was in 986 AD that he arrived at Greenland with 14 ships, similar to the long boat ships, carrying cattle, sheep, supplies and roughly 300 men, women and children. They were joined by families from Scandinavia and they established two settlements, major settlements, supported by trade with Norway.

At their peak, the population was estimated to be 3000 or more, which was large by New World standards. Moreover, the colony survived for 400 years. These were Christian communities with a resident bishop, who reported to Rome. The farmers adopted a sophisticated form of government and they were paying taxes by 1300 AD to the King of Norway.

The eastern settlement, as shown on that map here, was by far the largest and the oldest. Yet, by 1480 the farmers had completely disappeared and left no clues as to why. Scholars suggest it was a combination of the little Ice Age, decline in trade, loss of their own trading vessel and attacks by Portuguese fisherman, possibly even the Inuit.

Relatively little was known of the Arctic for the next three centuries. Even though European monarchs and merchants financed numerous expeditions in search of the Northern Sea Route to China, fisherman sailed the area in search of cod and whales, but competition was fierce. And I'm talking about Spanish, English, Dutch, Portuguese, Basques, Norwegians and Danes.

There was also an era of larger ships, new technologies and sophisticated national aid. And when whalers began trading with the natives for furs and ivory, royal charters were granted till they claimed to land in waters. And continuous European took their toll. We see the Basque, Spanish and Portuguese fisherman leaving the Northern waters, and followed by the Napoleonic wars, the Dutch and the French leave. American whalers showed little interest in the Arctic until later.

The history of Greenland bears closer scrutiny. After unsuccessful attempts to find the lost Norsemen, the Kings of Norway and Denmark left them to the Greenland and English whalers. Then, in 1719, a young Norwegian missionary, Hans Egede, seen here on your left, presented King Frederick IV with a plan to reclaim Greenland by creating settlements. Thus, in 1721 he set out, assisted by the Burger



History of Leadership in the Arctic II – 6

merchants, the Lutheran Church and the Imperial Navy, for Greenland with a royal charter. In spite of hardships and frequent attacks by Dutch and English whalers, the settlements grew in size. Finally, in 1782, the Danish Government took direct control of the Royal Greenland Trading Company, retaining its trade monopoly that isolated the native Greenlanders from foreign influence.



The 19th century witnessed the last major changes in the map of the Arctic. At the end of the Napoleonic wars, the British Admiralty launched a number of expeditions with two objectives – one, to be the first to reach the North Pole, and second, to find a way through the Northwest Passage. In the process they chartered the map here and laid claim to a large portion of the Arctic. But as you see here, the Arctic was still relatively unknown.

Franklin's [English explorer, Captain Sir John Franklin] disappearance brought ships from other nations to join the search, including the United States. The two Granal expeditions, and later C.F. [Charles Frances) Hall's, were responsible for new discoveries, but the United States did not register any official claim. Moreover, after the disastrous Greeley expedition 1884, Congress announced it would no longer finance Arctic expeditions.

So the origins of the next major change in that map, I have to go back to the 1700s and Peter the Great, and his founding of the Russian Imperial Navy and his great Northern expeditions, with the objective to extend the Russian empire to include Siberia and eastward. Vitus Bering landed on the shores of Alaska in 1741, Russian traders followed. Catherine the Great encouraged the Alaskan fur trade and sent the Imperial Navy to protect them from the English, but she did not believe in monopolies.



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So, it wasn't until her death that an Imperial Charter was granted in 1799 to the Russian Trading Company. Baranof was appointed manager and with headquarters in Sitka, he added to existing settlements all the way south to California. In an attempt to avoid conflict Russia negotiated two treaties which defined Alaska's boundaries – not California, they sold that one – with the United States in 1824 and Britain in 1825. But the situation deteriorated mid-century with the Crimean War.

In spite of neutrality agreement for the company, Britain blockaded their ships in Russian ports and seized them on high seas. Thus, the trading company's losses were huge, and Russia was not in much better condition. Reluctantly, Alexander II decided to sell Alaska to the U.S. so it wouldn't fall into the hands of the British. This is where history matters. They had to wait until the end of the Civil War.

When approached by the Russian ambassador in March 1867, the U.S. Secretary of State, William Seward, did not hesitate and a tentative agreement was signed within hours, the details worked out over the week; so it is seen here, seated by the globe. In spite of criticism, he gained Congressional approval and it was no coincidence that the secession of Alaska was officially declared on June 20th, just 11 days before the new Dominion of Canada came into being.

Aside from economic benefit, Seward believed that the purchase would provide incentive for the annexation movement in British Columbia, which had yet to join Canada. He also proposed to the Senate that the U.S. purchase Alaska, in hopes that it would encourage all Canadians to join the United States. This was the vision at the time. I don't think it's here anymore. It was the United States Manifest Destiny to sometime control the whole of North American continent. This time his proposal fell on deaf ears.

But, just quickly note the boundaries of the map issued by the U.S. State Department in December 1967. The boundaries look slightly different than were argued at the Alaskan Boundary Tribunal, just a thought. You can go back to it if you want. Well, economic benefits proved greater than Seward predicted. Instead of encouraging British Columbia to join the U.S., however, the purchase of Alaska actually served for British action, who did not want the remaining part of their North American possessions to fall in the hands of the Americans.

In 1870, Canada was pressured into annexing the Hudson Bay Company lands, with Britain loaning the company to fund the deal.



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Then, just four years later, in 1874, Britain again approached Canada, this time with the offer of the Arctic Islands. The Colonial Secretary, on the advice of the Admiralty who said they didn't have complete maps, refused Canada's request that the transfer be legislated by an act of Parliament and boundaries clearly defined.

Instead, in 1880 the transfer was made by a simple order of Canada and only vague boundaries and no approval by British Parliament. As a consequence, when in 13 years Canada had become one of the world's largest countries in size, but with a miniscule population, no Navy or even a government ship capable of sailing in the Arctic waters to monitor the newly acquired lands.

A quarter of a century would pass before Canadian officials actually learned of a potential weakness to their title. And in spite of warnings, the American whalers were occupying lands belonging to Canada. It was not until the Alaska boundary dispute that Canadian political leaders became seriously concerned. Were their fears justified or was this Canadians just being overly sensitive to the threats of Americans?

Well, this is Herschel Island 1896. I think they were justified. Seven years earlier in 1889, officers of the USS Thetis had charted the waters and surveyed the island for the American whalers. Once again the U.S. Government made no attempt to register a claim to Alaska – was this a missed opportunity? Perhaps. But Alaska offered far greater opportunities than Herschel Island.

Even before the discovery of gold, geologists had found oil in Alaska. Claims were filed in 1890 and in 1910 the first oil was produced in Katalla, Alaska and used locally. Meanwhile, in 1903 the Canadian Government established police detachments, two in the Western Arctic, one in Hudson Bay, and sent expeditions to the Arctic islands to map the coast, collect customs duties from foreign whalers, the whole bit, official ceremonies in key locations. After the Great War, Canada resumed the expeditions on an annual basis and established six new police posts in the Eastern Arctic.

Advances in aviation as a result of the war, had a major impact on the Arctic, making it more accessible and for longer periods of time and had prompted an American expedition in 1925 in which Lt. Commander Richard Byrd of the U.S. Navy with two amphibian planes, one of them seen here, set out to explore portions of Ellesmere Island and islands east. Fearing that the United States intended to lay claim to previously undiscovered or uncharted lands, the Canadian Government took further action, addition to diplomatic and



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administrative measures, more police detachments were about to service the ever increasing trading posts.

Of all the Arctic countries, Norway - dating back to the Vikings and Peter the Great - has the longest historical ties to the Arctic, and Canada and the U.S. the most recent. Long histories create deep loyalties and popular public support by the way. Norwegians, for instance, although separated from Denmark in 1814, may have lost their ties to Greenland but not their interest. It was not surprising, after gaining sovereign authority over the Faroe Islands. In 1933, Norway would attempt to lay claim to Greenland, but not their interest.

Denmark protested and in 1933 the Permanent International Court of Justice handed down a landmark decision that gave Denmark title to all of Greenland. But Europe was still unsettled. We had German aggression, and the American military strategists laid out plans for a continental defense. Thus, after Denmark fell to the Germans in April of 1940 the United States assumed protection of Greenland, citing the Monroe Doctrine. The first initiative was the Greenland Patrol and you see here the *Bear*, refitted without its mast and a helicopter pad at the back. It was one of the ships on the Greenland Patrol.

Cryolite, which had been mined by the Danes since the 1880s, was essential for the production of aluminum used in war planes. Some members of the Coast Guard were released from service and supplied with arms to protect the mine. And after entry into the war in December of '41, the United States built air fields, weather stations and radar facilities. But the work of the Greenland Patrol intensified. And with assistance of the U.S. Army Air Force, it discovered and destroyed German weather stations and radio communications thus preventing the spread of the war into Canada.

So in summary, throughout the years it was strong leadership, vision and commitment that were critical, not only to establish Arctic sovereignty but to maintain it. Its success did not necessarily depend on military might, but on the speed at which a country responded to a potential threat. Thank you.

CDR Pavilonis:

Thank you very much Shelagh. I would like to now turn to Dr. Dennis Noble presenting to us on Captain “Hell Roaring” Mike Healy – I just like saying that actually.

Dr. Dennis Noble:

He would love to hear it too.



I'd like to talk to you about one aspect of a very complex man. Michael A. Healy came from an amazing family. Healy's father came from Athlone, Ireland. Healy Sr. established a plantation near Grays County, Georgia. Michael Healy Sr. took as his common law wife a slave by the name of Eliza. Georgia at the time had laws against interracial marriages. Healy never left Eliza. They had nine children, six males and three females that lived to adulthood.



Of the nine children, three of the males and two of the females entered the Catholic Church. The oldest of the children, James, became the Bishop of Portland, Maine. The third son, Patrick, entered the Jesuit order, becoming the second President of Georgetown University in Washington, DC.

Then we come to Michael A. Healy, the fifth child, who was born on September 22, 1839. His parents sent all the children to the North hoping they would pass for white. This they accomplished very well. As did all the males of the family, Michael entered what is now Holy Cross College. Michael did not conform to the wishes of his older brother. To instill discipline and study, Michael was sent to Donai, France. Pardon my French. That has a double meaning doesn't it?

This did not work, and at the age of 15, he ran away to sea and he never returned. Michael entered the tough sailing merchant marines. Healy sailed before the mast and worked his way up through the hawse pipe to officer status as a Second Mate. I thought I'd throw in some nautical language.

In 1865, Michael entered the U.S. Revenue Cutter Service, the predecessor of the U.S. Coast Guard, as a Third Lieutenant. Michael



rose steadily up through the officer ranks. In 1880, he gained his first experience in Arctic waters during a search for a missing expedition. In 1879, Lieutenant George W. DeLong, U.S. Navy left San Francisco commanding the 140 foot *Bering Strait* in search of a supposed land-bridge to the North Pole.

The expedition's goal was to reach Wrangell Island, which was supposed to stretch to the Pole. Of course, all they found was lonely Wrangell Island. Chosen to command the rescue expedition was Captain Calvin L. Hooper. Captain Hooper chose First Lieutenant Michael A. Healy as his executive officer. This is the earliest photograph I've ever been able to find of Healy. The cutter chosen for the mission was the *Corwin*.

On their way northward, Hooper and Healy stopped at St. Lawrence Island. There they discovered the deaths of many natives due to starvation. Both officers felt the deaths were brought on by traders wanting furs and ivory, which caused the natives to not prepare for winter. Furthermore, the traders usually gave the natives illegal liquor in payment. The sight of the deaths remained with Healy.

The search for the *Jeannette* did not discover the expedition. It was not until the next year, 1881, that the fate of the expedition was learned. The *Jeannette* had been crushed in the ice far to the east of Wrangell Island. The crew of 33 took to their boats, 21 perished including DeLong.

First Lieutenant Michael A. Healy eventually was promoted to Captain and in the spring of every year until 1896, Healy sailed northward from the San Francisco Bay region to take part in the Bering Sea patrol. Because of his experiences Healy's areas of operations were in the Bering Strait region and northward.

Captain Healy commanded the cutter *Bear* for 10 years in this area of operations. Healy produced some very good reports of his work, including describing the native people in his areas of operations. This drawing of a native woman of St. Lawrence Island is an example. Healy also provided medical care for the natives of the far north. Healy also enforced the law in his area. It should be noted that Healy was not a gentle man, hence one part of the reason for this nickname "Hell Roaring Mike." I hope you believe me when I say no one mentioned that nickname to his face.

As the years passed, the harsh environment began showing on the man. You see Healy to the left in 1880 and in 1896 you can see how he's



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aged. Healy continued to think about the deaths he observed on St. Lawrence Island; eventually a plan shaped itself in his mind. Others signed on to the idea. The plan called for the introduction of reindeer from Siberia to Alaska. The Chikchi of Siberia herded the animals. Why not buy the animals from the Chikchi and then bring them to Alaska? Once in Alaska, the natives would be taught how to herd animals, thus providing a constant source of food.

Here are some of the people who played a role in the first successful transportation of reindeer in Alaska. From the left to the right – Sheldon Jackson, a missionary who was the Superintendent of Education in Alaska, and is actually in charge of the program. The second man is Lieutenant David Jarvis who helped in the negotiations with the natives and played a part in the early history of Alaska. And the third is the XO of the *Bear*. And in the shadows, probably for the first time in his career is Healy.

Captain Healy had good relationships with the natives of Siberia and Alaska. It was natural for him to take his cutter to Siberia and do the bargaining for the animals. He would then transport them to Teller, Alaska where the Alaska natives would be trained. I'm now going to take you on a normal routine.

Healy would locate a village; this is in St. Lawrence, Siberia. Healy would go ashore to bargain with the natives; Healy is to the left. Again the reindeer. The selection of the reindeer – in the left are two members of the Revenue Cutter Service wrestling a deer down. In the center are two Revenue Cutter Service officers and an official of the Imperial Russian Government.

The deer were taken down to the water edge, tied up, put in small boats and hoisted aboard the *Bear*. You can see the date; it's 1891. The *Bear* then went to Alaska and offloaded at the Teller reindeer station. The reindeer project ran from 1891 until 1906 when the Imperial Russian Government withdrew its permission to purchase the reindeer. Other cutters besides the *Bear* also did the transportation.

Captain Healy died in 1904. He served for 38 years with nine plus years in Alaskan waters. He never lost a ship in that time. Over the years since his death, Captain Healy has gained a reputation for his humane treatment of the natives of the far north. Usually the reindeer program is pointed out as the example for this reputation. And it is a good example of leadership in the Arctic.



What can the leadership of today learn from the story of Captain Michael A. Healy? Looking objectively at the results of the program, it was not a success. Only a few Alaska natives actually began herding reindeer. In 1975 Dorothy Jean Ray published *The Eskimos of Bering Strait: 1650-1898*. Ray said “The premise of both Captains Hooper and Healy and others were wrong. The starvation they saw was not the result of European intervention, but a natural recurrence in the history of the people of the region.” Ray felt the program was doomed to failure because among other things it presumed the natives would immediately give up their traditional culture.

Since Dr. Ray’s study some have argued her book tarnishes Healy’s reputation. However, Healy operated on what he perceived was taking place and he cannot be faulted for this as there were very few, if any, studies of the people of the Arctic-Alaska region. When going into a region that has native people, one should study them closely. Not only study them, but have everyone working for you know about the people.

I have made at least six trips to the Arctic of varying lengths of time. During 1961 and 1962, I said “19” not “18,” my cutter the icebreaker *Northwind*, performed traditional Bering Sea Patrol duties. We performed the medical care at almost every village bordering the Bering Sea and up to as far as Point Barrow. I can never remember at any time receiving any information on the native people we would interact with.

In short, leaders of military and civilian agencies and companies operating in areas where there are native people should conduct professional studies of the people and have everyone, no matter what their position, know something about the people they will encounter.



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Even if what I outline comes true, Captain Michael A. Healy will remain a good example of leadership in the Arctic. Thank you.

CDR Pavilonis:

Thank you so much Dr. Noble. We are now going to turn to our third panelist, Dr. Elliot-Meisel.

Dr. Elizabeth Elliot-Meisel:

Thank you very much for inviting me to be here today, I'm really quite honored to be here.

I have the luxury of only covering about 70 years as opposed to 700 plus years. I'm going to look at leadership in the Arctic, both the U.S. and Canada. And I thought a good place to start was taking your own competencies from the Coast Guard. [Pointing to a slide]:

U.S. Coast Guard Leadership Competencies:

Leading the Coast Guard

- Political Savvy
- Partnering
- Financial Management
- Stewardship
- Strategic Thinking

These were five that I chose that I think have relevance today. I want to stress that leadership is not always unilateral. It in fact can be demonstrated in a team, bilaterally, multilaterally. And it's not always being out front. Sometimes a support role is a very important component of leadership. I chose the Coast Guard from both countries in this case, because those are the true experts of the Arctic. As much as we can talk about the navies, neither navy, certainly not surface ships, has the ability to operate in the north the way the Coast Guards do.





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Political savvy, the idea that there are internal and external politics at work in the Coast Guard, well that's true for any government. And taking the era of World War II, FDR [Franklin Roosevelt] was actually ahead of his military leaders in realizing that we had to worry about continental defense. And yet politics, we really do have to be savvy. Both FDR and Mackenzie King, who was Prime Minister of Canada at the time, were very aware of both external and internal forces that affected their decisions on what to do in continental defense.

For Canada, there was always that connection to Britain; it was part of the Commonwealth. And certainly many Anglophiles never wanted to see that connection in any way hurt by connections with the United States. They didn't want to see the dilution of that relationship. Canada also had worries about its own sovereignty. Having Americans up in Canada could be problematic to sovereignty claims, and FDR was very aware of an isolationist mentality that existed in the United States and how to form any kind of cooperation, in terms of continental defense, not taking us into war in Asia or Europe.

Partnering, this idea of building alliances was very true. And a good example of that was the opportunity that FDR to Mackenzie King in Ogdensburg in 1940 in which they got together, they issued the Ogdensburg Declaration; one very important component of which was the Permanent Joint Board on Defense. Now this Permanent Joint Board on Defense exists even today. At the bottom, historian C.P. Stacey talked about this as being a very effective model, and I would be one who would argue that it is very relevant today.

In the meeting, there were just six members from each of the two countries, both civilian and military with a direct line to the heads of state. Now what was important was that Canada and the U.S., disparate in size and power, operated as equals in this forum on the Board. And decisions were made by collaboration. This was nothing top-down about it. And in the setting ideas were put out there, discussions were very honestly aired, and recommendations were made. 31 of the 33 were accepted by both governments during the war.

These opportunities that were seized include such things as the Alaska Highway. There were very important air routes, the Northwest Staging Route, Crimson Route, Mackenzie River Route. Very important for allied flights were the weather and communication stations that went across the Atlantic. And then there was the very unique First Special Service Force that operated in the Aleutian Islands, in Italy and in France and it was a joint command.



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I want to point out here [pointing to slide] the before and the after; the idea that in leadership you have changing conditions. You had 33,000 Americans in Canada during the war. At one point – well it was arrogant – we actually answered the phone “Army of Occupation”; that didn’t go over really well with the Canadians.

So, as the war wound down, the Canadians wanted us to leave, understandably. But one of the Permanent Joint Board recommendations was post-war collaboration. So you had to figure out how to bring the Americans back, and the Canadians needed to assert their sovereignty in some ways, but they also had to take responsibility. You can’t just make a claim and do nothing about it.

So, as Chairman LaGuardia, the American Chairman, said - it was unscrambling the eggs. And it was very difficult, but it went very smoothly. Then the Canadians, after the war, demonstrated their leadership as they brought the Americans back in.

Truman talked about this time as being between a war that was over and a peace that was not yet secure. Some of the early cooperative arrangements were the DEW Line [Distant Early Warning Line], which is now the Northern Warning System, and the Joint Arctic Weather Stations [JAWS].



Early on, collaboration and leadership was demonstrated by the U.S. Navy, because the re-supply couldn’t be done by the Canadians. So Canadian observers would be on board as the re-supply was done to both JAWS and the DEW Line until the Canadians were able to take it over for themselves. But neither country – well both countries were up there unilaterally too. Canada has to be careful. You can’t assert sovereignty and do nothing there. You have to have effective occupation and a presence.



So, in 1948, which in history would be between the end of the war and the beginning of NATO, Canada sent its Northern Cruise in 1948 up into the Arctic waters, which is the farthest that Royal Navy ships had ever gone up until that point. The reality for Canada was that it could not sustain both an Arctic presence and a NATO commitment and it had to make a choice.

So, in the late 1950s, very controversial among the RCN [Royal Canadian Navy], within the RCN excuse me, was the decision to turn RCN's Labrador over to the Department of Transport. Ever since 1958, the Canadian military has not been able to have a year round presence in the Arctic waters it claims.

The Americans for their part were also up in the Arctic. You can see both Coast Guard cutter and naval submarines. Now what's interesting when it comes to sovereignty is early on the Americans asked the Canadians for permission to go up to re-supply the DEW Line and JAWS. By the end of the 1950s we're not asking permission anymore. Sometimes we would inform the Canadians that we were there, and as we all know that after the 1960s, we didn't always tell the Canadians when we were in waters that they claimed.

Financial management, you have to look at cost-effective approaches. Now, I would argue that the number-one objective is continental security and defense. So the reality is that there are limited budgets in both countries. In Canada, you have a population of just about 34 million people and we've got 311 million people, and there's the largest coastline in the world, a three ocean Navy, lots of commitments for NORAD and NATO, and a population that is very committed to a generous social safety net. Tax dollars can only go so far.

For the U.S., the Arctic is not our only theatre. The U.S. has worldwide commitments, and as we all know, limited budgets too. So the question is how do you effectively take care of continental defense? Well I would argue that you go back to a tried and true arrangement of cooperation, collaboration and cost sharing. And we have multiple examples that are there.

But what I want to point out is that leadership is demonstrated by both fiscal responsibility and accountability. It's not just having the name out there saying "Here is the U.S." or "Here is Canada in continental defense." I would argue that it has to be very much more collaborative.



The biggest point of contention, not the only one but the biggest is the Northwest Passage. You can see on the map there, it's actually five different routes, two which are best for deep draft ships. Canada claims this is internal waters. Canada was very late to use sovereignty based on indigenous peoples as part of its claim to sovereignty, but by now Canada has asserted the fact that its indigenous people have been there since millennia.

The U.S. says that the Northwest Passage is an international strait; therefore there is the right of transit passage. It all comes back down to whether or not the Northwest Passage was an international strait prior to the Canadians drawing straight baselines around it in 1985 and went into effect in January 1986. Because, if it was based on actual use prior to the straight baselines have been very few transits through the passage to be able to call it an international strait, but the Americans use the criteria of "potential use" and certainly with Arctic ice melt there is the potential for more and more use of the passage.

But you can see some of the early transits: the first one already previously mentioned was the beginning of the 20th Century. The Canadians didn't go through their passage until during WWII and the Americans you've already seen started going up in the '50s the '60s and continuing till today.

Your perception and reality and delivery and commitment – two very controversial transits of the Northwest Passage – 1969 you have the SS *Manhattan*, a privately-owned ship that asked the Canadian Government for permission to test the feasibility of oil transport through the passage. The Canadian Government said "Yes," and if you look at the record in the House of Commons debates, it was without controversy. But the public and the press saw this as sovereignty; the Trudeau government went back on its heels and had to respond with the Arctic Waters Pollution Prevention Act that was instituted as a way of protecting the Arctic. This of course was part of functional jurisdiction and not a sovereign jurisdiction.

Everything laid dormant for 16 years until the U.S. Coast Guard Cutter *Polar Sea* needed to go from Greenland to the West Coast. Again, the Mulroney government said "Fine"; Canadian public and press did not, and Mulroney government was also thrown back on its heels and had to respond. It responded by saying it would close the commitment capability gap – all these great projects all of which ended up on the cutting room floor.



Now Harper has resubmitted some of these, but he's also finding real problems with budgets right now. There were two important effects of the *Polar Sea*. One was the straight baselines, and the other is the 1988 Canada/U.S. Arctic Cooperation Agreement. This is a functioning pragmatic solution, an "agree to disagree." The U.S. agrees to ask permission. The Canadians agree to say yes as you go through the passage. It works. Maybe you need to put sovereignty aside a little bit and maybe precedent a little bit aside, because you have something that operates very well, no pun intended, up in the passage.

Stewardship is the keyword in the Arctic today. You have got to protect that environment. The idea of getting something done at any cost is not going to be acceptable up in the Arctic. That ecosystem is much too fragile. Where is the UN in all of this? It's out there [in] front and instead of saying "opportunities missed," I'd rather say "it is leadership unfulfilled at this moment by the U.S."

The U.S. has not ratified the Law of the Sea Convention. I would argue that this is something that cannot stay that way. Most importantly, states can now claim the outer continental shelf. Well, if the U.S. doesn't sign the U.S. can't make its claims. If it can't make its claims it also can't be at the table to look at disputes. And [pointing to slide] the map at the top right hand corner there is where there are some overlapping claims. So it's hugely important for the U.S., I would argue, to ratify the convention.

I think there is a real history of cooperation, collaboration and cost-sharing. I think that there are different forums in which the U.S. and Canada can assert responsibility without having to assert sovereignty and worry about precedent. The Arctic is unique and we have a role in the Arctic. We are an Arctic nation, and it's at our peril that we ignore our responsibilities to the north. Thank you.

CDR Pavilonis:

Thank you so much Dr. Elliot-Meisel. We can now take a couple of moments for questions. Yes please?

Question:

A question for Professor Grant. You stated that Norway along with Russia were sort of the dominant European countries at least through the history of the Arctic. On the other hand, Norway was dominated for many, many years by both Denmark and Sweden. So how did that work out? Was Norway doing these things essentially as a province of Denmark or Sweden or how did that work out historically?

Professor. Grant:

Norway lost the right to Greenland in 1814 by the Treaty of Kiel (Kieltraktaten), but they never – I mean their coastline is on the Arctic



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and their explorers [Robert Wilhelm] Bunsen and [Fridtjof Nansen], they've probably been just as much of an Arctic country as Russia. And fortunately Denmark, Sweden and Norway and Finland at the moment get along very well. Their cooperation has increased between Norway and Russia. They settled a maritime boundary like they thought it would go on forever, but nope, it's settled. They're outspoken with each other, but the cooperation and joint sharing of different projects are really quite unique. I would like to see as strong between Canada and the U.S. actually.



Question:

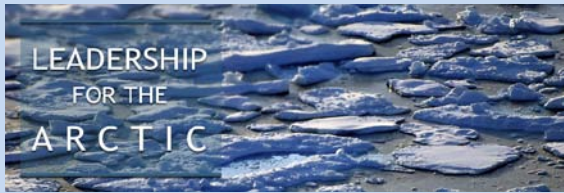
Well I understand the present, but I was referring to back in history did Denmark and Sweden keep saying "Go on; keep doing this stuff" or?

Professor Grant:

No, it was Denmark and Norway that were together and they were the ones that the Vikings were there and it was still Denmark and Norway when they established – Greenland was really an economic resource for them; both for fish trade and furs. But Norway lost that right in 1814.

CDR Pavilonis:

Well thank you so much for your attention. We are going to have to unfortunately conclude this first panel, just due to time constraints, but certainly a wonderful kick-off. And a special thank you again to our panelists. Thank you so much.



Leadership in Arctic Science (III)

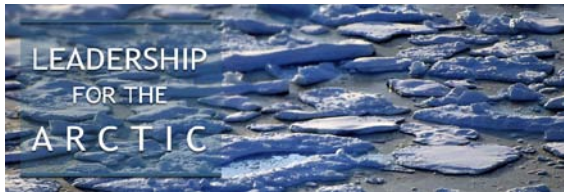
Panel 2

Leadership in Arctic Science and Research: Perspective on Change

Moderator: Dr. Martha McConnell – Department of Science, U.S. Coast Guard Academy

Panelists:

- Dr. John Walsh – International Arctic Research Center, University of Alaska, Fairbanks
- Dr. Donald K. Perovich – Research Geophysicist, U.S. Army Corps of Engineers
- Dr. Donald L. Gautier – Research Geologist, U.S. Geological Survey
- Dr. Larry Mayer – Professor of Earth Science and Ocean Engineering, University of New Hampshire
- Dr. George Hunt – Research Professor, Aquatic and Fisheries Sciences, University of Washington



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CDR Russ Bowman:

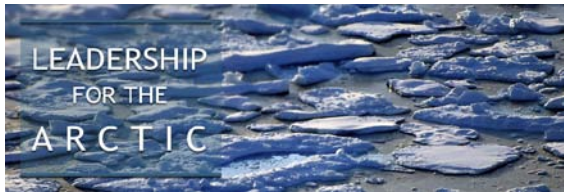
Ladies and gentlemen, thank you. Scientific research and monitoring of the Arctic have documented ongoing changes in sea ice, marine and terrestrial ecosystems and ocean chemistry such as ocean acidification. These changes are also opening opportunities for exploration. Our next panel of speakers will offer insights into Arctic process studies, instrumental observations, traditional knowledge and historical and geological records to provide a better understanding of this changing polar system. An essential outgrowth of the discussion will be to highlight what science to provide to leadership and what leadership is needed to advance science.

To moderate this truly diverse and interdisciplinary discussion it is my honor to introduce Dr. Martha McConnell. Dr. McConnell teaches Marine Science at the Coast Guard Academy. Prior to joining the Academy faculty, she was a study director for the Ocean Studies Board and Polar Resource Board at the National Academy of Science, working on International Polar Year projects and assessing how to perform decisions in a changing climate.

Dr. McConnell has served as a congressional fellow for Senator Lautenberg working on ocean and climate issues with a focus on ocean acidification legislation. She has spent time teaching on sailing school vessels at the Sea Education Association, and has participated in two field seasons in Antarctica for aerogeophysical research projects. Dr. McConnell holds a Bachelor of Arts in Geography from Colgate University, and a Masters and Ph.D. in Paleoceanography and Paleoclimatology from the University of South Carolina. Ladies and Gentlemen Dr. McConnell.

Dr. Martha McConnell:

Thank you, Russ. This is a spectacular spring day here on the Thames River and welcome everyone to the session on Arctic Science and



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Research, Prospective on Change. Special thanks to my co-organizer, Lieutenant Victoria Futch.

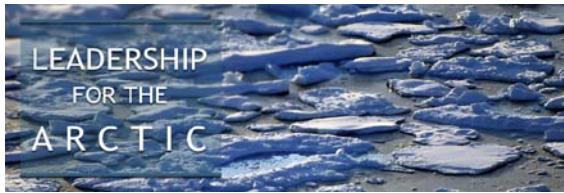


When we were designing this session last fall, one of the first things that came to mind was the theme of change. Arctic change has been on the minds of many of you in this room for quite some time. But for some of you, it's a new issue. And Arctic science itself has been undergoing a lot of change.

The U.S. participation - including the U.S. Coast Guard - in the International Polar Year 2007-2008, represented a surge of scientific activities across disciplines. But there was also a special focus on education and outreach, communication with the public and stakeholder engagement on the changes in the Arctic.

Our goal today is to lay that groundwork to aid your discussions over the next two days and beyond, towards - and if I can quote Admiral Stosz - "The responsible governance for the Arctic." Our distinguished speakers will be presenting material on their observations and research of a changing Arctic in its physical environment, the ecology of the northern seas. We'll also have a presentation on the characteristics of the continental shelf as well as energy resources in the region.

Before we get started, I want to pose a question to the audience to think about during this session. As you listen to and learn about the science of a changing Arctic, think about how this information may inform your decisions in the future. The amount of decisions, there's a



spectrum of decisions that's going to be made through this diverse audience, those decisions could be coming at the Federal level, they could be coming at the local level. They'll be political and some personal. The structure of the session, there will be five talks back to back, intermittent with some questions if we have some time, followed by an open Q&A and panel discussion

So first, I'm delighted to introduce our first speaker, Dr. John Walsh from the University of Alaska, Fairbanks, International Arctic Research Center. And John Walsh also serves as chief scientist for the Alaska Center for Climate Assessment. Welcome, John.

Dr. John Walsh:

Thank you Martha. I'd also like to thank Commander Bowman and the sponsors. I think this conference is unique and it's certainly an honor to be here. I'd like to give a brief survey of some of the Arctic's environmental changes. Martha mentioned the changes, and I'd like to try to place some of these ongoing changes into context. This includes a temporal context, as well as a geographical context. And I'll try to focus on the variables that matter; temperature, ice and weather.



I'll begin with this longer temporal perspective. [Pointing to slide] this is a reconstruction of summer Arctic temperatures that was done just a few years by the group at the University of Arizona. It's a reconstruction based on proxy records, tree rings, lake sediments, ice cores. It shows that the Arctic summer temperatures have really moved into a new regime just in the last hundred years or so.



For most of the record that's in this graph, the Arctic was slowly cooling. The thinking is that was due to the Earth Sun orbital parameters, but we in the last hundred years have moved into this period of rapid warming. The red on that diagram represents the instrumental data, and it corresponds for the most part with the proxy records, where they overlap. So we are in unique times, as far as Arctic temperatures go.

The pattern of this warming has the Arctic front and center. This summary here [pointing to slide] shows the temperature changes of the past 50 years, mapped out over the Arctic, and the deeper orange and the red are the areas of strongest warming. And this warming has been centered over the Arctic. This is known as "polar amplification." That's a characteristic of climate changes. We know at least one of the factors involved which is the feedback involving the reflectivity of snow and ice, and Don Perovich will be mentioning that one in a few minutes.

There are some other factors that we don't understand quite as well, [like] water vapor changes when temperature changes and water vapor is a powerful greenhouse gas. There are also changes in the polar heat transports from middle latitudes that go with the change in climate. The relative contributions of those factors aren't so clear, but the polar amplification is a fact according to the data. This diagram drives it home.

If we turn to sea ice for just a minute and try to place sea ice into that thousand year time-frame, like we looked at the temperature summary a minute ago, there is a recent reconstruction of Arctic sea ice for the past 1,400 years, this came out about a year ago. [Pointing to slide] the upper curve there, the red one with the range of uncertainty in pink is for the Arctic ocean as a whole, and you'll notice that extreme drop off in the last – at the end of the time series there, which is once again pointing to the fact that we're into unique times, at least relative to this thousand year time scale. There is also a graph on there for ice extent in the Chukchi Sea and in the Fram Strait Region. And the Fram Strait ice also shows a rapid drop off. The Chukchi is a little less dramatic in its change over the last 50 to 100 years.

Now I'll just briefly the more recent record, Don is going to go into this in more detail. This is a summary of the Arctic sea ice extent over the last 30 years from the satellite record. They have a strong seasonal cycle dominates and you notice the last five summers, the bottoms of those curves for the last five cycles are down at new lows. That brings



us to one of the main points I want to make, which is the seasonality of the changes in Arctic ice.

[Pointing to slide] This time series is the summary of the departures from normal. The departure from the normal seasonal cycle, and what stands out in the last five years is a new regime in a sense, more ups and downs, seasonally. The summer retreat is impressive. The minima in these curves for the last few years occurred during the summer, but you'll notice that the ice does bounce back reasonably well in the winter time. The departures from normal even in the last month or so are not too large. They're fairly close to zero. And the area where that really strikes home is the Bering Sea. This is a time series of ice coverage for this past 30 years in the Bering Sea. The black curve is the actual ice covered area. And the red is the departure from normal.

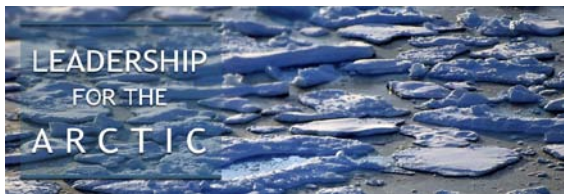
What I want to highlight here is two-fold. One the absence of a trend, there is no meaningful trend in that record. The other thing I wanted to point out is this past winter's ice cover in the Bering. We actually had a record maximum ice coverage in the Bering, just a month ago, and that's shown by that upward swing and the curve at the far right.

So here in a time of retreating ice cover, the Bering has just set a record for its maximum ice coverage, at least in the period of satellite coverage going back to 1979. So the message is that at least in the North American Arctic ice is not going away in the wintertime.

[Pointing to slide] This is a satellite image of the Bering ice edge just last month. And the ice comes down essentially to the Pribilof Islands in the Bering, this is a visible image, and it's within a week of the time when the Bering did reach its record maximum.

This seasonality is consistent with climate model simulations. We have in this graph a summary of climate model simulations of ice coverage in March and September. This is based on the models used in the IPCC assessment. The present regime is the top pair of panels. The bottom ones go progressively farther into the time.

So, the end of the century is down at the bottom, and what you see is essentially a loss of the ice in the summertime. September is the time of the minimum. But the March ice cover, the wintertime ice cover stays for the most part close to its present levels. So, what we're seeing here is the ability of models to capture what is actually going on, and to take the picture a step further into the future. But even late in the



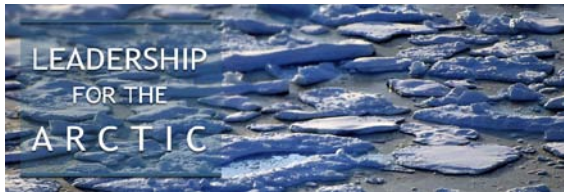
century, models are saying that sea ice will be a fact of life in the Bering Sea in the winter part of the year.

The last topic I want to cover is one that's related to weather and its linkage to sea ice. Those same models that we just looked at in the sea ice depiction predict changes in temperature and pressure, which is one proxy for storminess. [Pointing to slide] This diagram is a projection of the changes in sea level pressure in the Arctic by the end of the century. The greens and the blues are decreases. Blues are the largest decreases of all. What this figure is saying is that the Arctic and in particular the U.S. Arctic, the Bering and Chukchi Sea region is Ground Zero for the projected changes in pressure, deepening of pressure in this case which is implying that storminess may well increase in this region where ice is retreating in the warm part of the year.

[Pointing to slide] This is a satellite image of a storm entering the Chukchi Sea. Alaska's coastline is towards the bottom of that diagram. The point here is that there are strong storms even in the Arctic Ocean, this is a summer storm several years ago, it's really wound up and it can affect the northern and western coasts of Alaska. The reason this storm issue takes on significance is at least in the warm part of the year, we are losing the ice cover. This is a comparison of the ice cover in the late autumn, late October of two different years, 1980 and 2011, last October.



You can see the difference in the amount of open water in recent years, such as last year compared with just 30 years ago. Storms feed off open water, they get their latent energy and their sensible heat from the open water, so it's not surprising that storms are tied with a retreat of sea ice, and just last fall here you probably saw in the news, there was a major storm that came through the Bering Sea region, through Bering



Sea Strait, this was in early November just two weeks after that satellite depiction of the ice cover.

This storm had a central pressure of 949 millibars. It's comparable to a lot of hurricanes, the central pressure in a lot of hurricanes, and this storm did damage to the western coast of Alaska, flooding and erosion. [Slide] This is a photo of the main street in Nome, Front Street in Nome, it was under water, and in fact it's been under water in storms of this type fairly often in the last decade.

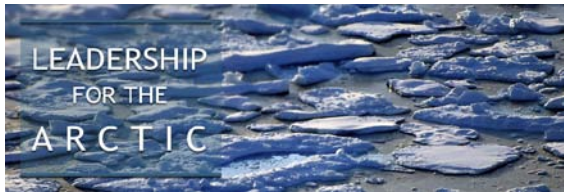
The point we're trying to make here is that the absence of a protective sea ice cover makes the coastal communities and the coast line in general more vulnerable to storm activity. [Slide] this is the last graphic slide. It's a summary of the storm activity and how it has varied over the past six centuries.

There are two curves, two sets of curves on there. The black bars represent the actual number of intense storms based on a consistent criterion and there's a separate bar for each decade. The red bars represent the numbers of storms that occurred without a protective ice cover. In this case, it's along the northwestern coast of Alaska. So the criterion here was that if there was at least 100 kilometers of open water off shore, the storm was put into the category of an open water storm.

This summary of the storm activity for the northern and northwestern coast of Alaska for the autumn seasons does show that there's variability in the number of storms. You could argue about whether the overall storm count is increasing or not, but the red bars, the storms that really matter because they occur with the vulnerable coastline, are showing a fairly systematic increase pointing to this increased vulnerability of the coastline tied in with not just the changes in storminess, but the loss of sea ice.

In summary, I have four main points. One is that the Arctic system is changing. We've taken a look here at temperature and sea ice. If we were to get into other components, that we don't have time for glaciers and permafrost, there are consistent changes showing up at least over the timeframe of the past half century to a century.

Sea ice is becoming highly seasonal, but one of the implications of that seasonality is that we do have and most likely will have large amounts of winter sea ice, that ice cover will be thinner, but it will be more deformable because it's thinner, and it's going to be a continued



presence in at least the Bering Sea sector, and possibly other areas of the Arctic during the winter season.

And the last point is that storm activities in coastal areas, storm activity seems to be changing in a way that together with the sea ice retreat puts the coastal areas at increasing risks, the implication there is that marine activity in the coastal waters is going to have to contend with storm activities in ways perhaps that it might not have over the last 50 to 100 years. So thank you for your attention.

Dr. McConnell:

Thank you. We have time for one or two questions.

Question:

I wonder if you could address the issue of the production of multi-year ice and what that might mean over time.

Dr. Walsh:

Yes, the reduction in multi-year ice is tied fairly closely with the summer ice loss, because by definition what makes it through the summer is multi-year ice. And in terms of a percentage loss over the last few decades, the multi-year loss, the ice volume as well is much greater than the loss of the actual coverage, the aerial coverage. In fact you could argue we're down to alarmingly low levels of multi-year ice at this stage. I think Don may be commenting on that one as well.

Dr. Donald Perovich:

A little bit.

Dr. Walsh:

So there is that third dimension, which actually enhances the changes of the recent few decades.

Question:

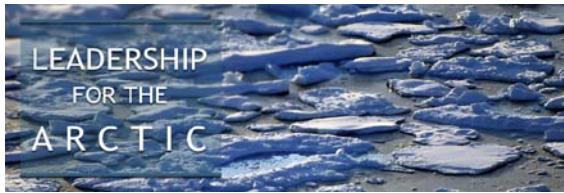
Do you know if, for the new exploration, the [vital] exploration they're going to do up in the area, this information's been analyzed when they're doing the ESA's or EIS on the potential you know it looks like it's a potential for a disaster if you have these severe hurricane-like storms up in the Arctic.

Dr. Walsh:

I know there's been a permitting process that's pretty thorough. And in fact there are some constraints put on the period of drilling that are related to the duration of the ice cover and the expected freeze-up dates. I don't know that storm activity has been factored real heavily into that analysis, but I have not been directly involved in the nuts and bolts of the permitting process. I'm probably not the best one to comment on that one.

Question:

Your map over the lower depression over the Chukchi Sea also had a much higher pressure over Greenland. What effect will that have?



Dr. Walsh:

Those model projections for Greenland I think need to be taken with a grain of salt, because the sea level pressures are adjusted from the actual surface elevation down to sea level, which is a pretty major adjustment over a place like Greenland. The adjustment is temperature dependent as well. So my hunch is that that increase of pressure over Greenland might be a little bit misleading.

Now there are other areas where pressure is projected to increase down at mid-latitudes and drought is projected to accompany that one, and I think those do have a more meaningful basis.

Dr. McConnell:

With respect to increased storminess, do we know enough about where the most vulnerable coastal regions may be or predicting these storms if we want to better understand where coastal infrastructure may be planned?

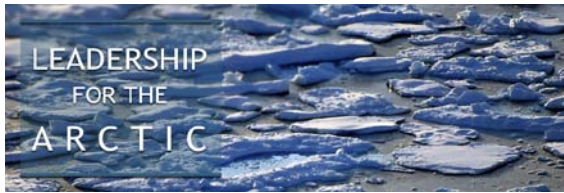
Dr. Walsh:

The topography is one indicator of vulnerability, and the Alaskan coastline is in many areas fairly flat, so I think that the vulnerability can be mapped in terms of the area below certain elevation thresholds. The other factor is the presence of permafrost to the extent that permafrost thaws with the increasing temperatures you have vulnerability that might be over and above what we would have without the permafrost factor.

Dr. McConnell:

Thank you very much. Our second speaker is no stranger to telling the sea ice story in high latitudes. Don Perovich is a research geophysicist at the U.S. Army Cold Region's Research and Engineering Lab, and an adjunct Professor at Dartmouth College. Welcome Don.





Dr. Perovich:

Arctic Ocean, so when you hear the words Arctic Ocean, what do you think of? And I can see, I can see people start to cringe and maybe shiver a little bit, because when you think of Arctic Ocean, probably the first thing you think of is the Arctic Ocean is a place that's harsh. That's a pretty good first impression, because it is a harsh place.

It's a place of extremes, of months of unrelenting darkness, of cold temperatures, minus 40, minus 50, temperatures so cold that the ocean freezes forming sea ice, of high winds and blowing, snowing, and shifting ice moved by the winds where a crack can open up in seconds and you can have mountain range of ice blocks forming in a matter of minutes.

So indeed the Arctic Ocean is a harsh place. But that's not its only characteristic. It's also a very productive place, from phytoplankton to seals to walrus to bears to whales; it's an incredibly rich ecosystem. And it's a productive place in terms of potential economic resources.

So what we have in the Arctic Ocean is a rich ecosystem that's on the front lines of climate change. So it's harsh, it's productive. And there's another attribute that's worth mentioning about the Arctic Ocean, because it's counter-intuitive. The Arctic Ocean is fragile, and it's fragile because its defining characteristic, the presence of a sea ice cover is a material that's close to its melting point.

You've got a sea ice cover that's vast in aerial extent, covering millions of square kilometers that is really just a thin veneer, a few meters thick. And in a warming climate we would expect that ice to melt. So the sea ice cover then becomes important for two reasons. One it will be greatly affected by climate change, which could have an impact on a number of other things. Two, because of this fragility this sensitivity, it's an indicator of climate change. We can look at the extent of the ice cover and get an idea whether or not there is warming.

We're fortunate for the past 30 years, we've been looking at the ice cover, very carefully from satellites that can easily distinguish between ice and ocean and determine what the ice extent is. And what we have is a number of snapshots of different ice extents for this month and this year.

We can put those altogether and we can get a time series, a time series of sea ice extent, and what's plotted on the Y axis is just sea ice extent



in millions of square kilometers, as a function of time for the past 30 years.

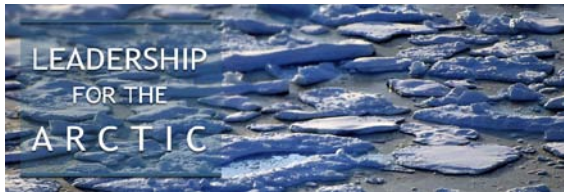
[Pointing to slide] What you see first of all is these tremendous oscillations. Certainly there must be a great scientific finding in those oscillations. And there is, but it's kind of an old one. It's the seasons. It reaches a maximum in March, at the end of winter, and goes down and reaches a minimum in September at the end of summer. And that's reassuring because our premise is the ice cover is sensitive to temperature and this confirms it.

It also brings out a point of some of the difficulty of climate change studies because often you're trying to tease out a fairly subtle climate change signal from the background noise of seasonal changes and then their annual variability. And so what we're going to do with this record is we're going to improve it by throwing away over 90% of the data. Instead of looking at every month, we're just going to look at September. September is the end of the summer when the ice is at its minimum, and when it's most – the climate change signal should be the greatest.

So when we do that, we see this, and we see even here there is still a lot of variability, it jumps from year to year. There is a minimum followed by a maximum. That reaffirms an important point that there is inner annual variability. We're not talking about a monotonic process that is always going in one direction. But if we look at that long enough, we fuzz our eyes out a little bit, it does seem like there is a trend there, and we can explore that just by drawing a straight line through it. And we see that yes, indeed for all the up and down fluctuations there is a trend to this of around 10% per decade decline; one percent a year. Kind of like bank interest rates these days, only over a longer time period.

If we look at that a little bit more closely, we can say it almost looks like there's two parts to this. There is the beginning part and then there is the end part. And what we can do is we can break this dataset into two parts. We can look at the first part, and we see that has a decrease of only 3% per decade. But the second part, the past 15 years, things speed up. We have a steeper decline of 15% per decade.

If you're looking at things from a climate change perspective, or if you're looking at how you'll have to respond to that climate change, this is the kind of figure that gets your attention, because it's not just that there's a downward trend, but that downward trend is accelerating. And so that really is something that makes a strong point about it.



While we're talking about millions of square kilometers, points on the graph, let's try to make it a little bit more real. Let's look at the special extent of these changes. And so the way we're going to do that is we're going to pick two years and compare them; September of 1980, back when things were up pretty high, and September of 2007, the all-time record minimum summer sea ice extent.



If we look at September of 1980, even at the end of summer, sea ice pretty much completely filled up the Arctic basin, there is a big tongue of sea ice that came down around Greenland, the Canadian Archipelago was also full of sea ice. You add it all up you had 7.8 million square kilometers of sea ice.

We jump forward 27 years to September of 2007 and you can see the large decrease. There's been a huge retreat off the continental shelves, large retreat off Siberia, another big retreat off the coast of Alaska. And if you look the Canadian Archipelago was ice free. That route that took [Aimenson] three years to do, you could have sailed it easily at the end of September in 2007.

There is a decrease from 7.8 million square kilometers in 1980 to 4.2 million square kilometers, that's 3.6 million square kilometers, and I really don't have any sense what a million square kilometers is. I tried to put into terms of football fields and that didn't make any sense either.

So let's try to put this into perspective. Are these changes really a big deal? Well, it turns out that 7.8 million square kilometers, that's



around the same size as the continental United States. So we can pose the question, how much of the United States has melted between 1980 and 2007? And Connecticut has melted, and not just Connecticut's melted but the entire United States east of the Mississippi is melted, plus the band of states from Minnesota all the way down to Louisiana, plus North Dakota, plus part of South Dakota. These are significant changes. There's been a huge decline in the ice extent during this period.

Now the ice extent is only part of the story, because if you think about it, if you think about the volume of sea ice, *extent* is part of it, but there's another part of it, and that's *thickness*. And our thickness record isn't nearly as good as our ice extent record, because ice extent we can see easily from satellites. It's only been in recent years we've developed satellites that can give us an idea of ice thickness.

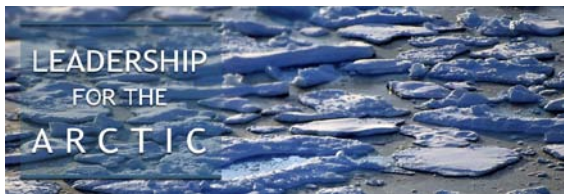
But there is a record that goes back to the 1950s with submarine cruises in the Arctic with upper looking sonars, mapping the underside of the ice. There have been satellites that use radar and laser altimetry to see how high the ice is floating and from that estimate how thick it is, just in the past few years on various aircraft missions.

So, while we don't have this wonderful movie that we have for ice extent, we do have pieces of data. Those pieces researchers have put those data together and say let's define seven regions in the Arctic as denoted by the letters, A through G. And for those seven regions, we're going to collect the data into three time periods, the good old days, 1958 to 1976; the 1990s and the 2000s.

[Pointing to slide] what you see in this bar chart are bars that represent the average thickness for that particular region for that particular time period. And when you look at that, it's pretty clear that there has been a significant decrease everywhere in ice thickness during that time.

If you average it all together, all the different regions, there has been a 40% decrease in ice thickness. We've gone from ice that on average was three meters thick to just under two meters thick. So we've gone from ice that was as thick as a basketball hoop to ice that really is just a bit thicker than I am tall. So we see there has been a large decline in the ice cover, both in terms of its extent and in terms of its thickness.

Now, it's important that we know, we make these observations that see that the ice declined, but it's also important that we begin to understand what are the forces that are causing it to decline, because until we



understand what's happened, we really can't predict what's going to happen. We have to work on the mystery of the massive melt, what's causing this to melt. And like any good mystery, there is a long list of suspects, there's warmer air temperatures as John has shown. There are longer melt seasons. There are clouds that can come in and warm the surface. There are winds that drive the ice motion that lead to more ice being exported. There can also be the import of ocean heat from lower latitudes.

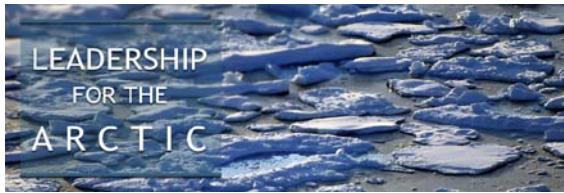
There are also feedback processes, such as the ice albedo feedback, and that's just simply you have a surface, the ice surface which is bright, reflects most of the sunlight, as it melts, it reflects less sunlight which means it absorbs more and melts more and gets darker and absorbs more. And it's a positive feedback process. If you want to be able to predict what's going to happen, you need to get those feedbacks right.

So all this has been presented in the context of this incredible scientific puzzle. But it's really more than that. This is more than just an intellectual exercise. Changes in the sea ice cover are affecting people now. They're affecting people in a number of different ways, which I think we'll be hearing a lot more about in the rest of today and then tomorrow. They're affecting people in terms of endangered species, and terms of coastal erosion as we saw and terms of territorial claims, in terms of increased tourism and marine transportation, and resource exploration and extraction.

And then the possibility of an ice-free Arctic Ocean in summertime, there will still be ice in the winter. Even if we don't have an ice-free Arctic Ocean, the ice reduction has been enough that it's impacting things now. So there are consequences today.

But what about the future? Well, at this stage it's very difficult to predict precisely what's going to happen in this region or that region next year or the year after. But there are certain trends that are clear. There is a clear trend that there will be less ice and as there is less ice, there will be increased activity.

There will be increased tourism, increased research exploration, increased resource extraction. There will be increased activities. There will be more challenges and more opportunities. To face those challenges leadership is going to be needed. Leadership from the Coast Guard will be needed as there is more and more activity in these Alaskan coastal waters. Thank you.



Dr. McConnell:

We have an opportunity for a couple questions.

Question:

One of your slides showing the dramatic decline - there seemed to be a tipping point around 1995. Was there a tipping point in the mid 90's that we can identify, or was it just an accumulation of impacts that resulted in that steady decline?

Dr. Perovich:

It's hard to say, but the transition is really clear. One of the things and what we have now as John mentioned the five lowest September sea ice extents for the past five years. So whether or not that's a tipping point that there's no recovery from is hard to say, but we can say that we're in the new normal, that the conditions we've had the past few years are what we can expect in the immediate future.

There's a lot of scientific discussion about whether or not it was just an accumulation of many different things happening to weaken the ice extent. Someone asked earlier about from multi-year ice to first year ice. Sea ice has different ages, first year ice is ice that formed that year, it never gets real old; five years would be pretty old. Ten years is extraordinary, but the multi-year ice it's older and it's thicker and it's more resistant to say an extraordinary summer where there was a lot of melting.

First year ice though is thinner and responds more to just a fluctuation in that particular season. So as we go from multi-year ice to first year ice, if we look at the parameter like ice extent, we expect it will bounce around a lot more, because it will have increased sensitivity.

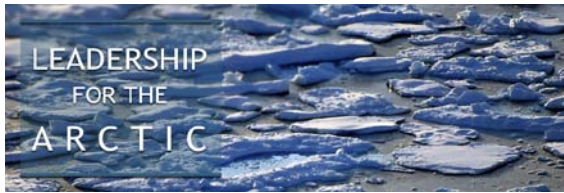
Question:

Your research showed in the last three years the drastic decrease in Arctic, but that has actually showed an Antarctic that it's been increasing. I was wondering if you could comment on the difference in what may be causing that difference in our polar Arctic sea ice.

Dr. Perovich:

Yes, I mean that's really an interesting thing. There are a lot of people that are working on that. I think part of it - if we look at the Antarctic - the boundaries in the Antarctic you have the continents surrounded by an ocean, so you have a band of sea ice and its extent is governed in large part by the ocean, that there is in the Antarctic there is huge flexes of heat from the ocean that help define where that boundary is.

Whereas in the Arctic, the ocean contribution is smaller, because there aren't that many passageways and it's more influenced by the atmosphere. So I think one thing that we could hypothesize is what



we're seeing in the Arctic is more influenced by the atmosphere and the Antarctic more by the ocean.

Dr. McConnell:

Thank you. Switching gears from air/sea interface, our next speaker will be taking us to the sea floor. Dr. Larry Mayer is Director of the Center for Coastal and Ocean Mapping at the University of New Hampshire, welcome Larry.

Dr. Larry Mayer:

Thank you and I want to join my colleagues in thanking the conveners for the invitation for this very, very exciting and actually very important meeting. It's a particular pleasure for me to be at the Coast Guard Academy. I've had the privilege of sailing on seven [Coast Guard Cutter] *Healy* trips, it might be more than many of you out there, I suspect. I have benefitted, as the nation has benefitted, from the wonderful training that the officers on the *Healy* received here.



So I really feel a personal tie to that, and I think as the Admiral said, it's a spectacular venue, the only thing that would make it better would be if the Thames was frozen. I think it would give us a much more fitting scene here.

In a sense, the combination of the sponsorship by both the Coast Guard Academy and the Law of the Sea Institute is really an epitome of the theme of my talk, which is going to be mapping in support of Law of the Sea in a changing Arctic environment. That's because, as Professor Carron so elegantly and eloquently described to us last night, a lot of the sea in the Arctic represents this remarkable nexus of science, law and policy.



And we map for many, many reasons. We map to explore; we map to discover; we map to understand as we've heard a lot about lately and we map to establish sovereign rights. The Arctic has been this unbelievable magnet for all of those things. And as we've heard this morning, the history of trying to map the Arctic, at least on the periphery, has been extensive, but all the time that little thin cover Don talks about got in the way of mapping what's *under* the Arctic and what's on the Arctic sea floor.

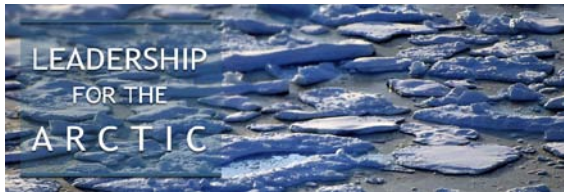
That is what I want to look at now. I want to look at those efforts to map the sea floor; how we get through that cover to see what's down there, to address all these same issues. [Pointing to slide] Professor Grant showed us this map, probably the earliest map of what people suspected was under that ice cover. It was pure imagination, nobody had any idea. Mercator drew many, many hunks of continent and an island right in the middle of the North Pole.

We see that concept basically continued for quite some time, for hundreds of years. If we look at a map from 1868, Augustus Peterman still contended, again at least here they were honest enough to say that the regions outside of most of that white area is listed as unknown or unstudied, but there was still the contention that there was a long land bridge continuing up from Greenland, across the Arctic. I'm sure Denmark would love that within the context of the Law of the Sea Treaty.

If we go even into the 20th Century, a 1906 map still shows this big bulls-eye in the middle of the Arctic as unknown regions. Although on this map, we do see and it's probably hard to see some red lines there which were the track of Fridtjof Nansen with his [ship] *Fram*, this phenomenal experiment that he did freezing a vessel in trying to get across the North Pole through the Polar Drift.

He actually missed it, and he got off and decided to walk there, or try to walk there, on his own. Didn't quite make it there, but survived anyway to tell the story. During that expedition, he took in the deep end of the expedition, seven deep water soundings and I'll show you equipment he used in a minute.

From those seven soundings, all of them above 3,000 meters deep, he miraculously, and it's truly a miracle, drew this map which showed the Arctic as a deep ocean basin, and that's the first indication and it was just absolute intuition on his part that that's what the Arctic sea floor looked like.



The technology at that time was the lead line. How many people here have actually tossed a lead line? Wow, I am impressed, that's probably the largest response I've ever seen for that. On the *Fram* itself he didn't use a hand-held lead line, he used what's called a sounding engine, a little more sophisticated but still very, very time consuming, very, very inaccurate, to send a heavy weight to the bottom. Hopefully, it hits the bottom, [you then] measure the length of the line to see how deep it was.

From the time of the *Fram* expedition which was from 1893 to 1896, to about the time of the Second World War through people on sledges, people freezing themselves into the ice, there were probably about 2,000 individual soundings in the Arctic Ocean. Our entire knowledge of the depth and shape of the Arctic Ocean was based on that.

With the Second World War, acoustic techniques, echo sounders were developed, much, much more rapid way to measure the depth of the ocean, much more accurate, if we know the speed of sound in the water column. But the problem then is how do we get through that thick cover of ice? So here, particularly with the Cold War after the end of the Second World War, there was a tremendous amount of Soviet activity, a tremendous amount of U.S. activity, but really individual measurements, flying a helicopter, flying a plane out, drilling a hole, making an individual depth measurement.

Also a tremendous amount of information was collected from ice islands that had the equipment locked into the island and the island would just drift wherever it went, one of the longer record ones, the Fletcher's Ice Island, T3, 12 years and you can see his track in the lower left corner of the Canadian with their large ice lands, and again the Soviets with a long history, continuing on today with the Russian Federation of establishing ice islands and working from those.

But again individual measurements. The Canadian Hydrographic Service in the late 60s collected as much of that information as they could at the time, and put together really what was our first picture of what is a much closer reflection of the true shape of the sea floor in the Arctic, indicating the major ridges, the Lomonosov Ridge, the Gakkel Ridge, Alpha and Mendeleev Ridge and the Chukchi Cap. That evolved into the GEBCO product in 1979, which really became the very first globally distributed maps of Arctic floor morphology.



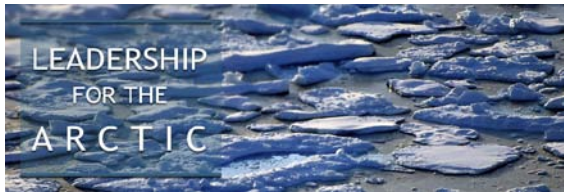
Through the 50s and 60s, U.S. and British submarines would transit under the ice, they would collect bathymetric data. That data certainly was not public until and I think, George Newton sitting here worked very hard to declassify much of that data slowly coming out. We're still having that out. Addition of the submarine data led to the compilation of a product in the late 1990s, called the IBCAO Chart, International Bathymetric Chart of the Arctic Ocean is really the work of Martin Jakobsson from the University of Stockholm who came then to work with us.

And that really made this transformation from the GEBCO product which was connecting a lot of little dots to a product that had this phenomenal three dimensional look to it. I think we've all seen these IBCAO maps; they're beautiful, beautiful products. They give us a very good feel for the general features of the Arctic Ocean, but I guarantee it's not right. Be very, very careful - it's based on very, very sparse information, and that's no reflection on Martin. It's just that you have sparse information and to a fault almost we create such a beautiful product that it looks believable, but be careful.



Since that time, we've had some tremendous drivers for the collection of more data, more bathymetric, more mapping data in the Arctic, and we've heard about several of them, that's climate change and both John and Don described that beautifully. The Arctic is really the canary in the mine, the first indications of climate change usually show up there in the Arctic, and then of course, the Treaty on the Law of the Sea which again gives us an incentive to map, particularly in the Arctic, and I'll come back to that in a minute.

With respect to the climate change, we've had a wonderful introduction to it. With respect to the bathymetry and climate change, we need to understand the shape of the sea floor because the heat that's transferred



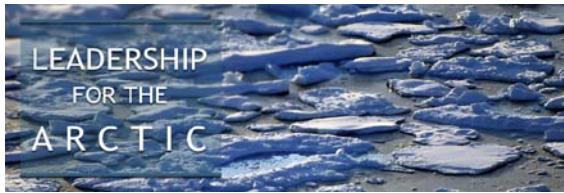
to the oceans is transferred by deep currents. The path that those currents flow are constrained by ridges and saddles and so we need to understand the shape of the sea floor to be able to understand the distribution of heat in the Arctic and build that into climate models.

With respect to the other drive, the Law of the Sea Treaty, I think most of you here know that it provides an opportunity for a coastal state to extend its continental shelf beyond 200 nautical miles from its baseline if there are certain morphological criteria that are met, and they're quite specific in Article 76 of the Treaty. They are the result of the depth and the shape of the sea floor, the foot of the slope as it's called, and the 2,500 meter contour to things that we can measure with bathymetry, the thickness of the underlying sediment that we have to use seismic equipment to measure, and finally distances from the territorial sea baselines, which is the only easy thing to measure in that. The bottom-line is that to address Article 76 issues, we have to map the sea floor.

The technologies evolved to do that too. For the last 20 years or so, we've had a new technology to map the sea floor instead of that single-beam echo sounder that puts out one big wide spot on the sea floor; we now have systems called multi-beam echo sounders that can put out many fine laser-like beams of sounds across a wide swath. It's a tremendous opportunity to get a much more accurate picture of the sea floor. But the Arctic faces us with this remarkable challenge, how do we map in that.

We've been very fortunate in the U.S. and several nations, there's a growing fleet now of icebreakers that have been equipped with this multi-beam echo sounders, the most recent one being the *Akademik Fedorov*. So we are slowly accumulating data from these multi-beam echo sounders but in a very slow and difficult way. None of this would have been possible if we haven't had the changes that we've heard about described by John and Don over the last 20 to 30 years.

We've seen the general decrease in the extent device that allows us to get much further into the ice. We try to map in September, so much further up into the Arctic as the extent pulls back, but as Don brought up just recently, it's really the age of the sea ice, the thickness of the ice that's the big constraint. Thin first-year ice is relatively simple to maneuver through for a good icebreaker, as Captain Havlik [C.O. of *Healy*] will attest to; it's that thick multi-year ice that catches us up all the time. The less of that thick multi-year ice, the easier it is to map.



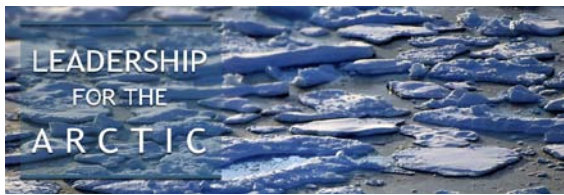
The U.S. has really focused on its mapping efforts in the Arctic. You can see from even the old maps, and I start with the old IBCAO representation, the Chukchi plateau, the Chukchi Cap clearly a natural prolongation of the U.S. margin, and so we set out in 2003 with the *Healy* to basically see if it's feasible to map with a multi-beam echo sounder in an area you don't know and you have to follow a particular target. The problem is breaking ice is a very noisy venture, and we're trying to depend on sound coming back bouncing from the sea floor and those two are mutually exclusive almost.

So could we do it? We set out with a desktop study and our first notion of what it might mean to an extended continental shelf in the U.S., based again on the early IBCAO maps, [pointing to slide] we can see in grey I think you see there the U.S. EEZ, we thought the foot of the slope, this change in slope that everything is measured from with respect to extending the continental shelf would wrap around the top of Chukchi Cap there and we would have an extended shelf, very, very thick sediment we assumed in the Canada basin, we would have an extended shelf that would be limited by the 350 nautical mile line in the Canada basin and then using another cut off line, the 2,500 meter plus 100 nautical mile line and look something like that.

You can see, quite a large extension, that red area now as opposed to the grey area, where the U.S. would have sovereign rights over resources of the sea floor, and subsurface.

Again, we're very, very fortunate to have the *Healy* and the skill of the crew of the *Healy*, take us up with one of these multi-beam sonars always operating in the ice. We started in 2003, and I'm showing you that general decline of the ice extent in September that was the experiment. Could it be done? We had lots of nice first-year ice; it turned out to be very feasible.

We had planned the cruise at three knots; we were actually able to operate at about six knots. We found out that the IBCAO chart was somewhat accurate but not really enough for certainly purposes of the Law of the Sea exercise. In this ten day cruise headed up to the negotiated boundary line with the Russian Federation and tried to map the 2,500 meter contour along the top of the Chukchi Cap there. As again the white line is what we actually did maneuvering through the ice as we go along. The red line was where IBCAO thought it was and these are differences of 10 or 20 miles in terms of the position of the 2,500 meter contour.



On this very first adventure, we also came across an uncharted sea mount rising 3,100 meters off the sea floor from 4,000 meters of water to less than 900, and the most interesting thing is that this sea mount turned out as the submarine data was declassified to have been in the path of two trips of actually a submarine equipped with a swath mapping system, one of the SCICEX, part of the SCICEX experiment, and yet this submarine never reported that sea mount.

It's not that the submarine couldn't see it, its sonar system could see it, it's that the navigation and positioning of the submarine submerged, the navigation system is such that the position it has is quite inaccurate. So we actually forensically were able to set this off about five miles from where the submarine thought it was. And there are many, many more of those sea mounts.

We went back based on that success in 2004, we said we have no problem, we'll get the rest of the 2,500 meter contour and look for the foot of the slope, but despite the fact that this general curve, ice curve was the same in 2003 and 2004, in 2004, we ran into thick multi-year ice and the lesson there is that no matter how much the ice extent is decreasing, if there is any ice there, your operation is going to depend on the local wind and ice conditions.

Anybody that tells me we're not going to need more icebreakers to operate in the Arctic in the near future is crazy. I don't want to go on a vessel that doesn't have that capability, because even if there is a small amount of ice, if you have to operate in it, if there is no accommodation, the wind is blowing it at you, you need an icebreaker to operate there.

We got stuck that year, 18 hours of backing and ramming, a little more than we had even last year, and finally came down and our back up to map along the Barrow Margin, or kind of more traditional multi-beam mapping.

Back in 2007 - and that was the year of the record low, the record low minimum, it was visceral to change. Here we had multi-year ice broken up into large pieces. Those pieces of ice you see are two, three meters thick, but very, very easy to map into because the breaker pushes it aside, doesn't scrape along the bottom, doesn't interfere with the sonar. We were able to explore the foot of the slope along the top of Chukchi and discovered something very interesting and that's that it wasn't at all where we thought it would be.



We kept moving, I can show you here, back and forth looking for the foot of the slope, and we just couldn't find it. And finally because the conditions allowed up, we headed much further north and back here we would just find these shallow slopes and something we call conformable sediments, just moving over. Way, way up north here, we found a very, very different relationship with a steep slope and the deep sea sediment butting up against the margin, there you can see a longer picture of it, unquestionably what the foot of the slope is. And so it was much, much further north than we thought, having large ramifications on where U.S. – extend the continental shelf may be.

We came back the next year and actually tried a very primitive technique of dredging with a bag at the end of a rope through the ice, a very difficult operation, but again through the skill of the *Healy* crew we were able to have very successful dredges and I'm not going to talk about the nature of these rocks, except to tell you they were nothing what anybody expected, nothing like – totally re-changing the thinking about what the Arctic geology is.

This was mentioned earlier today 2009, 2010, 2011, we had joint exercises with the Canadians, [Canadian icebreaker] *Louis St-Laurent*, they collected seismic data, we need seismic data, they do that better than us, we collect better bathymetric data; very, very close cooperation with them focusing on the Canada basin and again terribly flat plain in the Canada basin, yet the original IBCAO map every once in a while sea mounts pop up, there again many, many more of those we don't know about.

Focusing again seismic 2010 until finally this last season with Captain Havlik a remarkable expedition up to 88.5 degrees north. I guarantee the two vessels had the record for two ships coming the closest to the North Pole without going there, and over a beer or two we can talk about why we didn't go there, but we didn't. This dataset has allowed us to really change our view of what we think the foot of the slope is; tremendous ramifications for the extended continental shelf. We originally thought it looked something like that, stepping through this extended area that we found, we now think the foot of the slope goes way, way north, this is where all the extension for continental shelf is measured from, so a critical change in our view.

We originally thought it looked like that, and we had an extended continental shelf that looks like that. We now think the foot of the slope goes at least that far and we'll be going back this summer to see where else, and I'm not going to speculate how far an extended



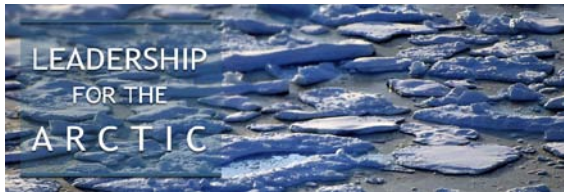
continental shelf may be, but it will inevitably overlap with the Canadian continental shelf, and yet we're still working very closely and very collaboratively with them in terms of collecting the data, and then we'll leave it to the diplomats and the lawyers to negotiate the boundary.

Inevitably, when you go to someplace like that, we make new discoveries, scientific discoveries, we're seeing things that were unexpected, pockmarks evidence of gas coming out on the Chukchi plateau, amazing grooves, ice grooves that are not iceberg scours, individual iceberg scours, but indicating an ice sheet, a grounded ice sheet that's set high on the Chukchi Plateau totally changing our vision of ice models, and I don't know Don knows about this, but we have to explain this, what an ice sheet was doing out there, and so if we look at the seven years or so of data collection, we've really expanded our knowledge of the Arctic.

We started with Nansen's map and his seven or eight soundings in 1907. We had the beautiful and spectacular IBCAO chart of 2008. But I warned everybody that there are problem with that, the reason is, it represents only 6% of the Arctic being mapped with this technology. [Pointing to slide] what I'm going to show here for the first time today is the new iteration of the IBCAO map. We're hoping to get that published by the end of this year, so it will be publically available.

A phenomenal new accumulation of data, all the data I just showed you, the Japanese have up there mapping, their data has been contributed. Norwegians - it's a very sad story if you look at the distribution of the data that's gone into it, all multi-beam data now, and that you see the blank spot on the other side of the Arctic. I know our Russian colleagues are out there mapping, we speak to them, they always say yes, they'll contribute their data, but it hasn't yet been contributed to the IPCAO product, and we hope that we can continue to pressure them to do that, it would really enhance the product for all of us.

So, there is the new Arctic map, and I'm just going to take one second, because this is no way to look at it, we're going to just look at it like this and what we can see is in those areas where we have multi-beam data, the definition is just spectacular, almost to the point where you can maybe start believing it. But it really will be a new step forward. I just want to end with reminding you that despite this new map, now only 11% of the Arctic has been mapped.



So there is still much, much more to discover. Thank you and I usually end an oceanographic talk with a sunset, but being the Arctic that's both a sunrise and a sunset.

Dr. McConnell:

We'll take one brief question. Yes.

Question:

John Finney with NOAA. I'm curious, was the sample that you dredged in the deep ocean, the Canadian basin there, does that say anything about the resource potential of that particular basin? I'm trying to get some more information.

Dr. Mayer:

No, the dredging samples, we aim our dredge targets for steep slopes of outcropping material and that's really to try to get a feel for the continuity, the geologic continuity of the features. And these are mostly volcanic materials which really aren't going to address the resource potential which Don will talk about much more, which is usually in the basins, in the sedimentary basins.

Dr. McConnell:

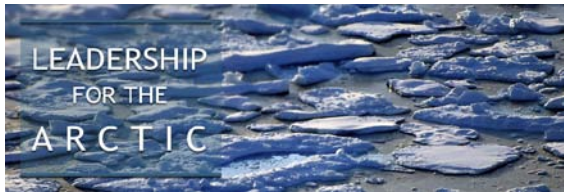
Okay, thank you. Well, if you haven't seen it before, then that record of sea ice for the last 30 years should now be burned into your memory from those last three presentations which were fantastic.

Our next talk, we're going actually even deeper into the sea floor, Don Gautier with the United States Geological Survey will present his results on the Circum-Arctic Resource Appraisal. Welcome Don.

Dr. Donald Gautier:

Thank you very much. It's great pleasure to be here today. For the next 15 minutes or so, I'm going to summarize for you the results of geologically-based international study that intended to put constraints on the potential for undiscovered petroleum north of the Arctic Circle.

I think this matters a lot to the present and future leadership of the Coast Guard, because it has to a first approximation, the location and intensity of future exploration and development of petroleum north of the Arctic Circle off shore in the Arctic will be where these petroleum resources are.



I'm going to sprinkle in my talk a few of these scenic shots that I won't really talk about very much, but I thought because of the date, I will say a word or two about this one. 100 years ago today, the pride of the White Star Line, the Titanic was steaming westward at 21 knots having weighed anchor for the last time. Three days later it would have a catastrophic encounter with an iceberg in deep water off the banks, not too far from here, but the iceberg that it encountered almost certainly began here in the beautiful [Illulusad] ice fjord south of – just on the west coast of Greenland, a little south of little Disco Island, and it had probably traveled three years or so for its rendezvous with the Titanic.

Well during this talk, I'm going to say a few words about energy resource and interpretation, just so we're all on the same page, because words matter in this case. I'll summarize a little bit about what is already known about Arctic petroleum, then I'll summarize the results of our study, this so-called undiscovered technically recoverable oil and gas north of the Arctic Circle. I'll say a few words about cost and uncertainty, because in the Arctic that really matters from the point of view of where and what, and what kind of development will take place, then I'll try to draw a few conclusions.

Let me begin with a metaphor. There are a lot of metaphors about resources, about petroleum in particular - the Hubbard's, [M.T.] Hubbard's logistic equations peak oil - or you see maybe a barrel with a straw in it or something like it's a finite resource being drawn down. We all know, geologists for sure all know, that at some level oil and gas molecules are finite.



But what we know is that the number of those molecules is very large, and so large that what really matters at least right now and over the few next decades is how they're distributed and what are the costs and consequence of trying to extract them. So if you might imagine how that up at the top of this pyramid you have the easiest to find, cheapest, least environmentally damaging energy resources and as you go steadily down the pyramid, you get into those resources that are more expensive, carry with them a lot more consequences. But they're greatly abundant, and it matters a lot.

“Resource interpretation” - these words are used quite casually, but when I talk about the endowment, I talk about the geological state of nature, or you hear somebody talk about oil in place, this is the number of molecules in the crust of the earth. It is really interesting, geologists love that sort of thing, it's great fun to work on, but it has very little to do with what humans do and what activities will be encountered.

What matters is what can be technically recovered, recoverable resources and then what actually ends up in the marketplace. So I'm going to be talking about technically recoverable petroleum, this is the basis of this study that I'm doing, that is what part of that physical endowment can be recovered with the best practice industry technology today. I'll say a few words at the end about so-called *deliverable, technically recoverable resources*, those where you actually have attached capital and operating cost to their development. We're still not down in the marketplace where true proved reserves actually rely.

So, what do we know about the Arctic already? Well, you've seen a version of a picture like this already [pointing to slide]. From a petroleum geology point of view, I like to think of the Arctic as consisting of three parts really. Roughly equal thirds. One third of the Arctic is dry land, and on the dry land it would be exaggerating to say that it's been intensively and exhaustively explored for petroleum, but virtually everywhere all of the largest structures have been tested. There are probably few or no super giant, or giant oil or gas fields remaining to be found on land north of the Arctic Circle.

The deep ocean basins we just heard Larry and other speakers talking about shown here in the deep blue color, are really interesting, but from a geological perspective, they don't really work for petroleum. This isn't the sort of place where the geologist says you can find it. That leaves the continental shelves shown here in the light blue, the areas under less than 500 meters of water; they're basically, continental geology covered by shallow water. In the Arctic, only something like



270 or 280 wells exploratory wells have been drilled in an area of some 700 million square kilometers, that means that for all practical purposes, these continental shelves are untested petroleum frontiers that are of intense interest.

The drive for exploration of the Arctic is sometimes you get the impression that the exploration is going on there perhaps because of the ice going away and to an extent that's true, but the principal drivers are this relentless rising demand for petroleum worldwide, especially in India and China, and elsewhere in the developing countries. And the sort of diminishing opportunities for exploration companies elsewhere. So the expectation is we're going to see more intense interest in the Arctic rather than less.

So far, about 400 oil and gas fields have been found north of the Arctic Circle almost all of those on shore in West Siberia and Russia and on the north slope of Alaska. About 40 billion barrels of recoverable oil have been found in about 1,100 to 1,200 trillion cubic feet of natural gas. Just for reference the world uses about 30 billion barrels of oil a year and it used about 110 trillion cubic feet of natural gas.

Well, the Arctic is already rich in Russian gas. Here, just for fun, I've plotted the 25 largest conventional gas fields known in the world. So there are just rank order. On the right hand side of the graph though are these two high-standing yellow or orange circles. Those are actually two parts of a ridiculously large gas field on the border of Iran and Qatar called North Field and South Pars depending where you're sitting. The remainder of these, all of the squares represent gas fields super giant gas fields in Russian territory and all of those squares that are colored blue represent super giant gas fields in Russian territory north of the Arctic Circle.

All of these with the exception of Shtokman shown here are in the west Siberian basin on shore. With respect to oil, most of the oil found so far in the Arctic has been in northern Alaska in a small area around Prudhoe Bay Oil Field right here where something like 22 billion barrels of oil has either been produced or is currently carried as reserves. That's more than half of all the oil that's been found and developed north of the Arctic Circle.

The question is what remains? So this multinational group that we headed up did this geologically based study, and what did we find? Well the first question is because this is real uncertain stuff we're



talking about here; the first question is there any recoverable petroleum at all?

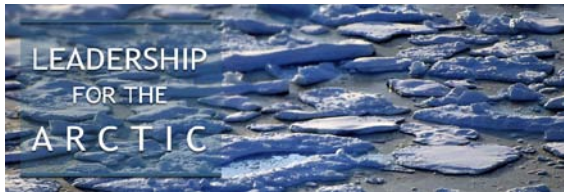
In this case, we've subdivided the Arctic into what we call assessment units, that's just geological subdivisions. They are geologically defined because of their properties with respect to undiscovered oil and gas accumulations. They're then color coded with respect to the probability that there may be petroleum there. Any place other than where the color is its deepest blue there is a genuine uncertainty of absolute real failure, meaning there might not be any recoverable petroleum there at all.

Color coding those same assessment units for mean estimated technically recoverable oil; you'll see here that there are many places in the Arctic where it seems very geologically plausible that additional oil accumulations may be found widespread possibilities. That said, the geological possibilities are greatly enhanced in a few areas. In particular, I point to the Alaska platform, the Mackenzie Delta, the northwest Greenland, the Baffin Bay, northeast Greenland, the South Barents basin and the Yenisey-Katanga which is basically the extension of the west Siberian Basin.

If you add all these up, if you had all these uncertain quantities, each one of these assessment units is evaluated probabilistically when you add those together and look at the resource potential for the entire Arctic, which was our real question that we started to work on it, looks something like this [pointing to slide] and I should caution that when you add up uncertain quantities, the range depends very much on your assumptions about correlation. But it says to us that there is somewhere *between 40 and 160 billion barrels of technically recoverable conventional oil*; most of that off shore, most of that under less than 500 meters of water on the continental shelves.

We get a mean estimate of about 900 billion barrels and again, the world uses about 30 billion barrels a year. Size really matters in the Arctic and it really matters from the point of view of Arctic leadership, it really matters from the point of view of where oil and gas development is going to take place. Development will not be random. It will not be uniform. It will be concentrated very heavily on those places where the geology says great, big fields are most likely. Well, where are those?

It's the Barents basins, mostly in Russian territory. It's northeast Greenland, it's Baffin Bay, but for our money the most – the single



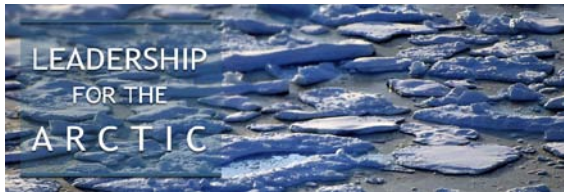
most prospective area in the entire Arctic is this quite narrow shelf of the Chukchi and the Beaufort Sea off shore, northwestern Canada and northern Alaska. That means that at current oil prices of \$110 that means that this intensity of desire at least for development and exploration will fall most intensely on this area of the Beaufort and Chukchi Seas.

Natural gas is another story. Conventional natural gas we think is widespread, north of the Arctic Circle, but it's heavily concentrated in Russia, very heavily concentrated in Russia. We already know that Russia is rich in gas in the Arctic and the expectation here is that even more so undiscovered resource of the South Kara as shown here is basically the off shore extension of the west Siberian basin. This is the most prospective place for hydrocarbons anywhere in the Arctic. Our mean estimate was about 650 trillion cubic feet. Other areas, the South Barents Basin, the North Barents Basin and the Alaska Platform all promise to have significant undiscovered conventional gas.

When you add up the resources for undiscovered gas north of the Arctic Circle it looks very different than oil. The Arctic is very much gas prone. The expectation here is that the undiscovered conventional gas north of the Arctic Circle could significantly change gas resources worldwide. That said, in contrast to oil, which is currently selling for I don't know whatever it is, \$100 or \$110 a barrel, the energy equivalent of gas is selling for about \$15, there's been a great decoupling. So right now, *Arctic gas is essentially worth nothing*, or it's virtually undevelopable right now. That could easily change. There is nothing to say that these prices won't change dramatically in the future.

Again, size matters. Here are the places where we think there is at least a 50/50 chance of a super-giant conventional gas field north of the Arctic Circle. I would point to off shore northern Alaska, there once again, the Laner River Delta, the Yanisey-Katanga, the South Kara Sea the North and South Barents Basins and the coastal continental shelves of Greenland are all places where super giant gas fields might be expected.

Cost really matters and from the point of view of leadership the question is not just where these resources are, it's how easy will they be to get. So we have taken a look at this recently, we've looked at these undiscovered conventional resources from the point of view of capital and operating cost required to develop them. We developed acute methodology to do that, I'd be happy to talk to you about, but this isn't really the forum for that. But look at the result here, what we've done



here is basically to that plot I showed you earlier that was the histogram of probability versus recoverable resources; here, we've added another dimension which is cost.

So if you look at this black line over here which is the 95% fractal it says the quantities of undiscovered oil that might be extracted at a particular price. It says, for example, at \$100 a barrel, which is roughly the current selling price for oil, there is somewhere between five and about, well what would we say, say between about 15 and about 80 billion barrels of conventionally recoverable oil might be recoverable at costs comparable what it sells for today. It says that the oil up here is finite, it tells us that the oil that's going to be developed will be the places where it is cheapest and easiest first, it's going to be those places where the fields are the largest and if these oil prices continue that means it will very much be the pressure right on the Chukchi Sea and the Beaufort Sea. Thank you very much.

Dr. McConnell:

We have time for a question.

Question:

You didn't touch on methane hydrates at all, but I'm just curious if there is a distribution of those in the (inaudible).

Dr. Gautier:

Yes, hydrates are present in kind of thermodynamically unstable condition on shore over much of the Arctic. They are also present underlying much of the off shore areas. In almost cosmological abundances, if you start adding up the molecules, but that wasn't really part of this study, but yes, absolutely, especially well known – quite well known in northern Alaska in northwestern Canada.

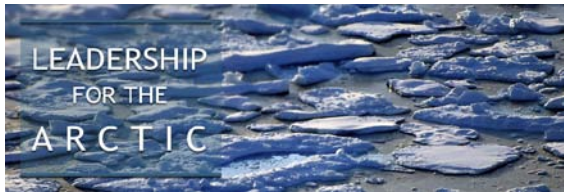
Dr. McConnell:

Thank you. Our final speaker is Dr. George Hunt. He's formerly from the University of California Irvine, but during his retirement, he has chosen to be a research profession of aquatic and fishery science at the University of Washington. Welcome, George.

Dr. George Hunt:

Thank you very much for a very nice introduction, Martha and thanks to Commander Bowman for lots of work getting the logistics taken care of for this meeting.

I'd like to talk a little bit about the natural environment, and I'm going first of all break the rules and go outside the Arctic, because as somebody who works with [National Science Foundation] NSF, our Arctic starts a little bit further south. I think it's important because the Coast Guard has been very much involved with helping manage fisheries in the Bering Sea, and so I think that's an issue that the Coast



Guard should be interested in, because there will be changes in the way fisheries are promulgated there.



I think there are going to be some very interesting issues on winners and losers. I won't spend a lot of time on that, but that's going to be things about what happens in the Arctic, up in the areas that you may be more interested in. Finally, because the format of the Arctic involves a lot of endangered or threatened species, place starts to matter. You need to know where these animals, be they marine mammals or marine birds are likely to be aggregating, where they're likely to be very vulnerable to oil, and where their protection will become part of the charge I am quite sure of the Coast Guard in the long haul.

[Pointing to slide] So this is the traditional view. We've seen a variety of versions of this. This is one that deals with depth as opposed to in a general sense showing that we've got these big shelves up there, but I want to bring up this set of shelves. The Eastern Bering Sea - it's home to some of the biggest fisheries in the United States, on the order of a billion dollars or more a year, and these are really important resources. It's also full of organisms that are threatened or endangered and that throw the fisheries around, create incredible headaches in terms of management, and enforcement of management and so those sorts of issues become of interest.

I'd like to start with just an introduction to Bering Sea fisheries. And you can look at the fish catches in the Bering Sea, Eastern Bering Sea



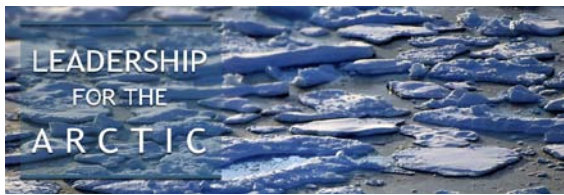
and you can see that they jumped rather remarkably in the mid-1990s and have been fairly steady since. The good news is of course that those fisheries were originally done by foreign fleets, they were fished unsustainably, and we got in with the Magnuson-Stevens or the Magnuson Act extending our EEZ to 200 miles, we actually shifted from a foreign dominated fisheries to a joint fishery and then eventually to essentially a U.S. fishery.

The value then comes to us, but the other thing is the responsibility for doing a good job managing it comes to us. I think something that a combination of NOAA and the Coast Guard can be very proud of is that this is one of the most important fisheries in the U.S. dollar wise and tonnage wise, and it's been sustainable from the time we took over. We haven't trashed the Bering Sea. And it's had a lot of value. You can see down there, value by dollars and the red is Walleye pollock, blue are various salmons and so there is a lot of value there, there is a lot of crab there, a lot of those super special seafoods you like come from there.

In the recent past, and I mean really since 2000, we saw a really extraordinary drop in the number of pollock out in the Bering Sea, and fortunately since then those numbers have come back. The multiple lines are generated each year you do a new model of what was there in the past based on what fish were in the ocean, their age classes, their growth rates, and so you should be getting over time closer and closer with the more recent lines to what the real truth was in the past. And you can see earlier on there were periods where we were quite shaky in our estimates, but in the recent past, for this region in here, it's clear that we're getting pretty close to what we expect. And it's a big drop.

The reason for the drop in biomass is twofold. One, part of fishing is to take fish out of the ocean and we manage that, I say we because I'm on the Scientific and Statistical Committee of the North Pacific [Fishery Management] Council. We measure the amount of fish and we assume that on average we should be taking about 30% of that biomass each year.

As the [lake] gets smaller the assumption is that as long as you're leaving some biomass there, there will be enough spawning at some point and what has been interesting is when you look at the year class strength, this is one year old fish, how many are there compared to the long haul, you can see since 2000 between 2000 and 2005 there were very few one year old fish being produced. The implication there is



that a large part of that drop that we saw came from the lack of production of fish.

So we now have a bottom up issue and it also happens that those first five years of this century were extraordinarily warm. I decided not to show you ice, but to show you something we call the cold pool. This cold pool is the temperature of the water essentially at the bottom as determined by temperature sensing instruments put on the nets that are used for surveying the distribution and abundance of all kinds of fish and crabs in the Eastern Bering Sea.

The blue means the temperature is down around minus 1.5, 1.7 centigrade. We call it cold when it's in the light blue, the lightest blue, that's around 2 degrees centigrade. There are a couple of things to think about there. Fish have temperature preferences, so if it's cold they can get moved out of certain areas, because it's too cold for them, and you will notice, and we'll come back to this that at the northern portion of that, even in the warm years at the beginning of the decade, there was a cold pool. And even further north there was a lot more cold.

In that period, those first five years, when we look at the zooplankton, the energy converters, the things that take energy that is in such small packets that it's not usable by a fish, and not because of they are trying to do this, but they inevitably take this energy and make a larger organism loaded with lipids that then is good fuel for fish. The [key] in this is something that was a real surprise to us; one is that things that we thought were going to be abundant in the warm period were essentially absent.

We thought that warm was going to be good. It wasn't. For certain classes of a particularly large lipid rich zooplankton on the Southern Bering Sea Shelf, when it was warm, they essentially disappeared. When it turned cold and as of 2006 we've had essentially record cold, record heavy ice cover in the southeastern Bering Sea. This is a marvelous, absolutely stupendous natural experiment.

What's the Bering Sea like when it's cold? What's it like when it's warm and what are the implications even for further north? And the implication here is when it's really warm, we lose these large, cold-adapted species of zooplankton which are essential for the fish. They are important for the age one fish to get big enough and strong enough to get through the first winter.



They're used by the adult fish, adult pollock, they're used by salmon, and making a long story short, if these large zooplankton aren't there all the fish eat age zero pollock. So you've got two things; one, the age zeros that are growing are skinny, they go into the winter with much less energy than they should have. And when they go in with much less energy, we'll say it's winter starvation, in that warm period the energy content of age zero pollock going into winter was the same as the energy content of age zero pollock coming out of winter when food would be available in a place like the southeastern Bering Sea. So we have a smoking gun here that if you aren't fat and happy when you go into hibernation essentially you're in trouble.

The second thing is everybody eats you. So if have in the top bracket there, if you have a situation with not very much zooplankton then a lot of the little fish – the little fish are not only small but they're eaten by big fish, and you get very few surviving here to become part of the fishery. On the other hand, when there's plenty there, you do well.

Okay, northern Bering Sea fisheries. I suspect that we all believed when things got warmer in the Bering Sea we would see all of these fisheries moving up into the northern Bering and maybe even to the Chukchi. And in fact several papers showed early movements northward. And we all said okay, we're going to be opening a whole new fishery, we're going to have new fishing ports, a whole new set of challenges to work up there.

Well, as I was saying earlier and mentioned, and we heard earlier from the other speakers, the foreseeable future there will always be ice cover in the northern Bering Sea in winter. For that ice to form, the ocean temperature has to get to the freezing point of salt water which is about minus 1.7 degrees centigrade.

There's a hitch for fish. Fish have blood and flesh that has a lower salt content than salt water. The lower the salt content, the closer your freezing point is to that of fresh water, i.e., zero degrees. So if you put a pollock or a cod-fish that's grown up living in normal for four degrees centigrade and above water, and you toss them into minus 1.7, they're frozen, they will form ice crystals in their flesh, they will not survive.

So, as long as that ice forms up there in that shallow water, it means that all the way to the bottom there's cold water and it's a barrier. So that's what I have to say about what is going on there. I don't expect to see now, and I think it's agreed in most circles that we will not see a



mass movement of these boreal important fisheries up into the northern Bering Sea.

If the southern Bering Sea gets really warm, we may lose the zooplankton that require cold water or reasonably cold water to supply the food that the fish need; so that may mean that not only do we not move the fish north, we may lose in the south, or at least have a major change. If that happens all bets are off as to who will come in to replace pollock, what fish species will be in three, and what the fishery will look like.

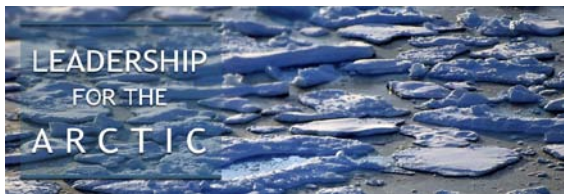
But I'm sure no matter what happens the Coast Guard is going to have a lot to think about in terms of how you help the NOAA Fisheries folks manage this. Because the Coast Guard is always involved with the enforcement, boarding vessels making sure they're using the right kinds of nets, keeping the right kinds of fish and so forth.

Okay, a little more up north. Chukchi Sea, boy there are a lot of people saying "It's a rich place, there is a lot of primary production there, there is a lot of zooplankton we're going to have all these fish." The water coming into the Chukchi Sea, this gives you a sense of what that northern Bering Sea is doing. The top graph in here is the water temperature at a series of moorings that you can see by name over there, or a letter. The same color is over here.

From October through May, the water is mostly zero degrees. You're not putting in warm water. If you go to the Barents Sea there is North Atlantic water coming in and it's really warm and nice, but not so up there. So I don't think we're going to see huge fisheries coming up in the Chukchi or Beaufort. The Beaufort Sea at the moment, the Chukchi Sea at the moment, lots of little fishing efforts, they're almost all subsistence and those may be affected. Subsistence is a very important issue up there; but in terms of big commercial fisheries, no.

Okay, possible winners and losers. Anything that likes open water and we have this pull back of the ice that we've been hearing about sets up the possibility to expand their range in the Arctic. They can go up there; they can take advantage of the rich zooplankton. In the gray whale case, they can go down and get things from the benthos.

So we may well see more whales up there, more species of whales in more areas, again creating challenges in terms of protecting them, they are sensitive to disturbance, they're sensitive to sound and they really



don't enjoy oil spills, especially if they're baleen whales and need the baleen clean.

There are going to be losers. Anything that has to live on the ice is going to have a lot less ice to live on, and the particularly tough losses will be for those species that have to use ice over shallow water or close to the mainland. Polar bears like to den on the mainland, but they need to forage on the ice. They're going to be in trouble. Walrus, we already see cases where walrus are carried on the floating ice over the shelf edge and at that point, the females can't get to the bottom to get food, they leave their pups, go further inland or south to get to the shallow water, and then they can't find their pups and the pups starve. So these are really intractable problems that we can't solve, but we're going to see.

Finally, there are some things that it's less clear how well they'll do, and I put the Gray whale in there again, because it's not clear how much good benthic foraging there is, but the Bowhead and the Belugas are both important species up there now. They're very important for subsistence. They may be much further north following ice edges, so they may not be as available for subsistence. But they also have this problem that they may now have a whole bunch of competitors or predators.

If the Killer whales decide to go up into the Beaufort and follow around, this is not going to be happy news if you're a Beluga whale, and if all of those other large baleen whales choose to go up and forage, then the Bowheads, which are uniquely designed to be able to break ice from below and get at the air and feed up there without any competitors will have challenges.

So, we're not likely to have new fisheries up there, going to be an interesting problem for sea birds and mammals, or particularly mammals, and there will be real trouble for anything that thinks they really need to have ice in order to make their home or do their foraging.

Finally I want to just mention - because this again comes into environment protection issue - the idea of hot spots. Where do you get aggregations of animals that are predictable? And these stars are from my head about where you're likely to have major colonies of sea birds or rookeries of marine mammals right now. I didn't try to go back and find every one, I know there are tons more, but those are really big ones.



We're talking hundreds of thousands to millions of birds, major portions of world population of fur seals. I'm not even getting into Stellar sea lions which are in real trouble up there, but anywhere there's a star if there's spilled oil, it's going to be a real mess, because these birds and mammals are going through the surface layer of the ocean time and time again getting air on the one hand and food on the other.

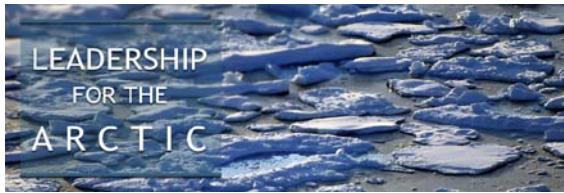
And they can't move because they're tied, they're central place foragers, they've got to go back to these colonies to feed their young and take care of their young. They will not be able to move out of the areas that are marked there.

The other thing is there are some places where those of us who have the good fun to go up there on whatever sorts of vessels, have found what we call aggregation hot spots, where there's just buckets full, uncountable numbers of animals. And when that happens you've got a place where, and I'll show you a slide at the very end when I'm through, where you've got perhaps a third of the world's population of a sea bird, a tenth or more of the Alaskan population of Humpback whales in a mile by a mile square.

Think about what that would mean if you had an oil spill. Now, guess where that place is? Just north of Unimak Pass. Think about all of this exploration material we've been talking about, how do those ships get from the west coast of North America to the Arctic? Unimak Pass. How do all the vessels get from the west coast of North America on the great circle route to Asia, at least in most of the year Unimak Pass?

Where is one of the better pollock fishing grounds that boats that have to deliver prey or their fish to Dutch Harbor fish? Unimak Pass. You've got boats going back and forth across the shelf fishing; you've got all sorts of things, the barges and other vessels going through there. As far as I know we do not have any serious control rules about how those vessels will transit that area and if there were a spill there, we've already heard yesterday the nearest place is Kodiak, that's the nearest major supply depot for the Coast Guard. And yet not much is going to happen around Kodiak, you will rescue fishermen there, a few, but you've got a huge fishing fleet down in the southern Bering Sea, but you've also got the potential for huge spills.

So that's my summary there, perhaps less productive Bering Sea, probably not more fish going north. Some very important winners and losers. And those winners and losers are going to be nature's winners and losers, they're not things that we're going to control, but as they get



scarce, then they fall into endangered, threatened, and the public eyeballs. And as those things become more important, the loss of them through a spill or collisions becomes a bigger and bigger issue, and so that's what it looks like when the action is on. Thank you.

Dr. McConnell:

We have time for one question specifically for Dr. Hunt. And then we'll open the floor for the panel.

Question:

Yes I'd like to take you more into the Chukchi and Beaufort [Seas] for a minute and specifically about Bowhead whales, their favorite food are copepods and zooplankton and as the ice recedes far off shore, that water has to be warming, even though there are currents underneath obviously, and I'm just wondering whether what you said about zooplankton further south is likely to be true for copepods. A number of observers have said oh, well the warming will be good for the Bowhead whales, because there will more open water, they'll have more places to go feed, but from my understanding, they're very selective about where they feed, because they want the concentrations of those copepods.

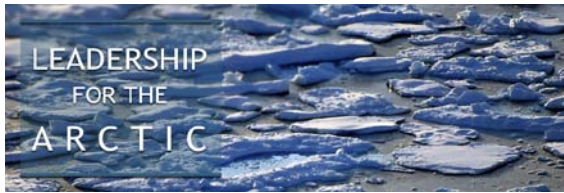
Dr. Hunt

They put almost all their foraging effort into perhaps two species of copepods, both of which have multi-year life cycles and both of which store immense amounts of lipid to get through the winters between years when they're feeding. Those are species that do initially early in the spring need ice, and they feed on ice algae or they feed on the very strong spring bloom that's associated with ice. They also need cold water so they don't burn their metabolic rate is low, so they don't burn up all their fat.

And because the Arctic will freeze every winter, as long as it stays dark up there, until the tilt or rotation of the earth changes, we will have cold, dark winters and we will have ice. And so up there I don't worry about the copepods, but if you get to the southern Bering Sea and you go three years – one year without ice, no big problem, because these things over winter, you've got two year generations, three, four years without ice then the water gets too warm and there's no food and they don't reproduce.

Question:

I just have a quick question. I was in the [Callouette] last week, both the government and a number of the [Inuit] representatives were reporting that they had already sighted three pods of Orca whales going through the Hudson Straits into the bay and even going further north.



Now I know you've been dealing more with the westerly Bering Sea, but the big question that came up in those discussions was what do you do about it, because they probably are the world's worst predators and for the Belugas coming out of the Churchill River and to that area, it will have a disastrous effect on the fishing system of that entire eastern part of the Arctic.

So I first would be interested in your verification that those kind of northern movements are beginning to take place of the Orcas; and secondly the questions that the officials at [Nunavut] asked what can you do about it?

Dr. Hunt:

I guess that one falls to me. I'm not surprised that they're moving up. There are lots of seals to eat, and if the seals can't get out on the ice, then they're vulnerable. If there's not much ice, the Orcas can go where they could not otherwise go, so that things like Narwhal which are very good at using very thin leads in the ice, they won't have the refuges they have.



So yes, it's going to be a problem for not just fish. It depends if you've got the fish eating or the mammal eating Killer whales up there, but they will do a fair bit of damage. And as what you can do about it? It depends on the law of the land. I don't know what the rules are up there. But Killer whales are protected. So you can't go and mess with them in any way, shape or form.

Question:

How important is it that we have much less ice in the summer to reflect the sun's radiation, and is that a compounding effect?



Dr. Perovich:

Yes, that is an important effect, it's a feedback process called the ice albedo feedback, and it's my favorite thing. So basically the albedo is just a fraction of sunlight that's reflected by a surface, and what we have with ice there is a pretty good reflector; snow covered ice reflects some of the instant sunlight, whereas open ocean reflects less than 10%.

So you're going for a really good reflector to a really poor reflector. You're putting more sunlight in and that will accelerate melting in the summer. Also it will store more heat in the ocean, which will slow down freezing in the fall. So it really can have a major impact, and it's one of the feedback processes that you need to get right in models in order to predict things.

And when you look at that big melt back in 2007, at least for the part of it that was in the Chukchi and Beaufort Seas, there was strong evidence that the ice albedo feedback played an important role in that.

Question:

Thank you, I've been working at the International Maritime Organization on the Polar Code and there's been a lot of talk about black carbon impacting the albedo in the Arctic. What kind of research do you show or have showing the black carbon effect vis-à-vis the albedo effect that you've been talking about?

Answer:

Yes, there's been a lot of recent interest in black carbon. In terms of the sea ice cover and again this is still, I'll work this under way, my feeling is that it has perhaps a modest impact early in the year when there is still snow cover on it, because then a little bit of black carbon can cause a noticeable reduction in the albedo of a couple percent.

Once the snow begins to melt, and you have an ice surface that's only reflecting 60%, 65% of the light, the black carbon isn't going to make much of a difference. But during that early stage in spring when it's snow covered, it could have an impact that would be equivalent to moving up a starting melt by a few days, which is significant.

Question:

This is a question for Dr. Gautier. A previous assessment for the USGS from I think 2007 has been quoted a lot of hydrocarbons in the Arctic, and I'm wondering with this new assessment, what kind of changes you've seen, is the information very different?

Dr. Gautier:

I'm sorry, what we're talking about here is that study and the main publication on this study; we actually put a fact sheet out in 2008 with preliminary results, which I think is what you're referring to. The



principle study here was published in Science in May of 2009, and then there was a big volume that came out last summer with a lot of the technical back up put out by the Geological Society of London.

Question:

So the information that's been out since 2009 or so has not changed significantly in your mind.

Dr. Gautier:

No, I mean if I were doing the study again, maybe that would be a way of talking about it. A few things have happened, there has been exploratory drilling off shore of west Greenland, and they put down a couple of holes out there were unsuccessful. That happens in that kind of business and so what it would do is you tend, you know if I were doing it again, it might change the risk slightly you know, it certainly would not be seen as making oil and gas discoveries more likely, but it certainly doesn't rule out exploration and discoveries off shore of west Greenland.

Dr. McConnell:

Okay, thank you. In the interest of time, we're actually going to have to wrap up, but I do encourage further one on one discussion with our panelists for the next couple days. I do have one final question for each panelist, and in less than 20 seconds each, and I mean it, offer suggestions on priorities for future scientific research. We can start with John.

Dr. Walsh:

I have to say a priority is the role of the oceans and what's happening with sea ice. I think we need to get a better handle on how much heat the Atlantic and the Pacific are transporting into the Arctic, what the variability is and what that may mean for ice conditions down the road. I think the ocean is the one sort of poorly understood wild card in this sea ice retreat.

Dr. Perovich:

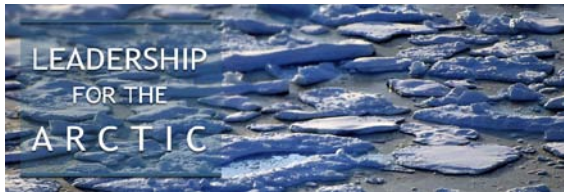
For the past 40 or 50 years, we've done a really good job of understanding the mechanical properties, the optical environment you can imagine with multi-year ice, and now we're shifting from a multi-year ice cover to a first year seasonal ice cover, and there's a lot we need to learn about that.

Dr. Mayer:

I bet you guess I'll say mapping, but I'll actually agree with John to say that the basic understanding of the heat transfer mechanisms is critical and of course part of understanding that is understanding the actual bathymetry in terms of the distribution of deep currents.

Dr. Gautier:

From the point of view of geology, there is an enormous and probably other disciplines as well, an enormous asymmetry in data density, and



in particular roughly half of the Arctic which is Russian territory, much of that *terra-incognita*. There are basic things about what the crust of the earth is there that is not known. And I don't know if that constitutes a research objective, but if there were any way to somehow develop collaborative work that would somehow bring some of that information to light or gather it for the first time, that would be an enormous improvement.

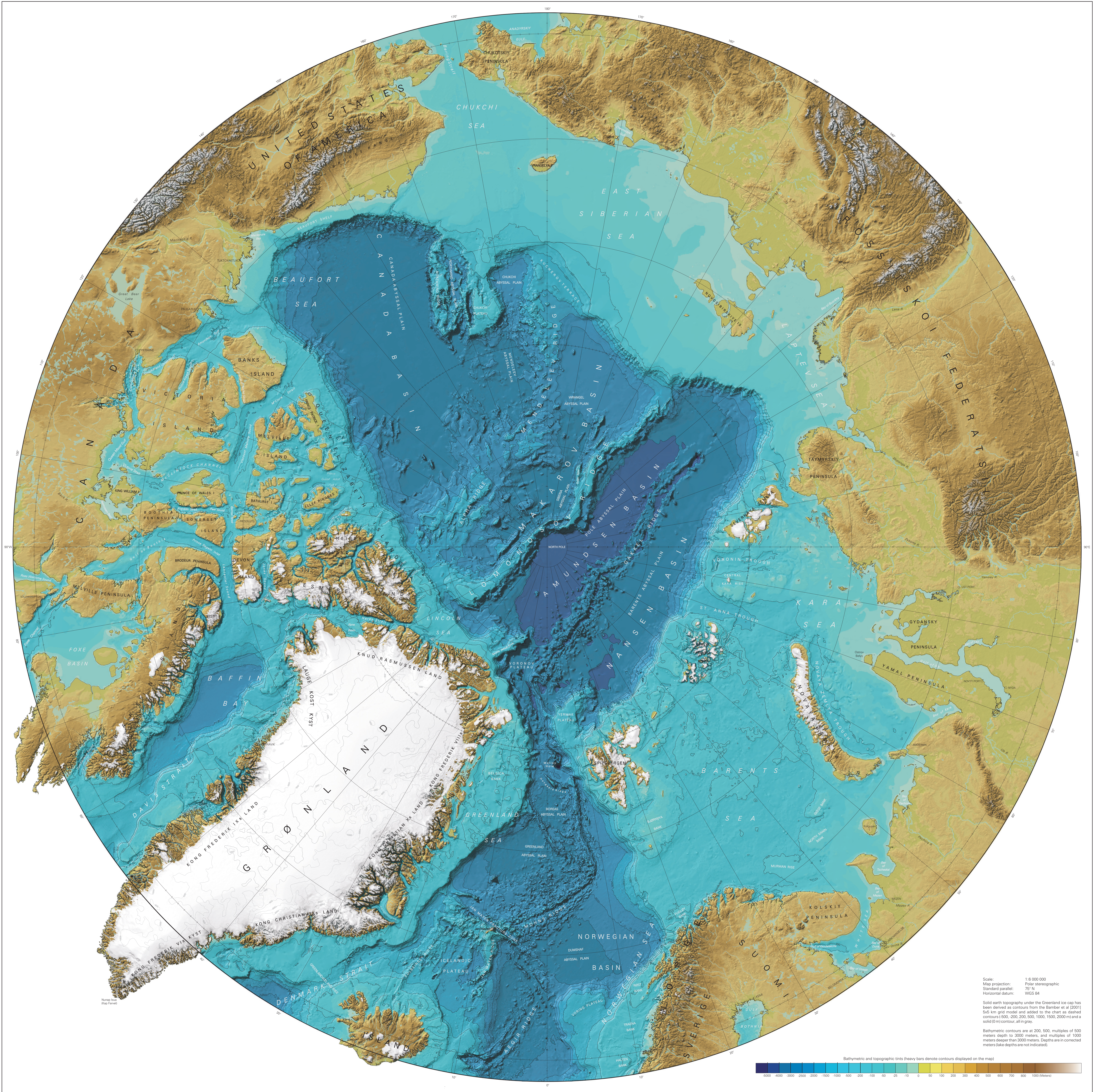
Dr. Hunt:

Well, I think in terms of what we do in the natural ecological side, we have a tremendous data gap from the dark months, we really don't know what's there, where it is in the water column throughout the winter. And part of the reason for that is that we don't have the icebreaker capability and the number of icebreakers we need to do the job. And I think that if there is any one plea I would have to this audience is anything you can do to get us multiple icebreakers would be nice, not just one, but a couple more that are really able to go up into the ice and not worry about being caught there in December or January, because we don't know what's going on there. And oil spills will happen, and we'd better know how oil will behave in that time period and what will be at risk.

Dr. McConnell:

Okay, thank you, well this session covered a lot of ground, and I hope each of you has a better understanding of the environment of the Arctic from the air to the sea, to the sea floor, and my personal thanks to this panel, but on behalf of the U.S. Coast Guard Academy as well as the Law of the Sea Institute, here is our token of appreciation for each one of you.





THE INTERNATIONAL BATHYMETRIC CHART OF THE ARCTIC OCEAN (IBCAO)

Map Production
Constructed from an assemblage of digital and analog information, this map is a modern version of Sheet 5.17 of the General Bathymetric Chart of the Oceans (GEBCO) (Canadian Hydrographic Service, 1979).

Bathymetric and other information
The information used in the construction of this map consisted of: historic and recent under-ice soundings collected by submarines of the United States and the United Kingdom; historic and recent observations collected by submarines and drifting ice stations; and information published in published navigation and compilation charts. The locations of these data sets are shown in separate source distribution maps, while data contributors and relevant references are listed in this legend under "Data Contributors".

Although extensive, in some areas the database of digital tracklines and spot observations contained critical gaps that had to be augmented with information that was only available on paper maps and charts. In the central Arctic Ocean, original observations were augmented with contour information derived from a map published by the Russian Federation Navy (Head Department of Navigation and Oceanography et al., 1999). Similarly, contours extracted from maps published by the Geological Society of America (Perry et al., 1988; Cherkis et al., 1991; Matishov et al., 1995) were used in Bering Strait and in the Barents and Kara Seas. On the continental shelf adjacent to Siberia, soundings were extracted from a suite of navigational charts published by the Russian Federation Navy, and used to develop contours. Bathymetry in the Gulf of Bothnia was derived from a compilation by Seifert and Kayser (1986). Contours were extracted from the GEBCO Digital Atlas (GDA) (IOC, IHO, and IBCAO, 1997) to supplement the database in the southern Norwegian-Greenland Seas, in Baffin Bay, and in some areas of the Canadian Arctic.

Land relief was derived from the USGS GTOPO30 topographic model (U.S. Geological Survey, 1987), with the exception of Greenland, where the model developed by the Danish National Survey and Cadastre (DMS) was used (Eklund, 1986), and Alaska, where release 1.1 of the GLOBE topographic model was used (GLOBE Task Team, 1999). Coastline definition was provided by the World Vector Shoreline (WVS) in all areas except Greenland and northern Ellesmere Island, where an updated coastline was available from KMS.

Methods
Original soundings were corrected for sound velocity using Carter's Tables, or CTD (Conductivity, Temperature and Depth) profiles where available. Subsequently, all data (digital soundings, land and marine relief grids, point, profile and swath observations, and vector shorelines) were imported into Intergraph's Geomatica Professional, with projection parameters set to polar stereographic on the WGS-84 ellipsoid, and with true scale at 75° N. Outliers, cross-track errors, and the fit between isobaths and original observation

data were checked. Suspicious soundings were removed and, where contours showed major discrepancies with soundings, the contours were adjusted manually to agree with trackline data.

After inspection all data sets were exported to an XYZ coordinate system for further manipulation with GMT (Generic Mapping Tools) public domain software (Wessel and Smith, 1988). Initially, the data sets were processed with the GMT blockmedian filter, after which they were gridded at a cell size of 2.5 x 2.5 km by fitting a surface of continuous contours to all points with a tension parameter set to 0.35. The resulting grid was exported to Intergraph's MGE Terrain Analyst (MTA) for detailed inspection, and for the identification of discrepancies that had to be addressed in the input data set. The data were then regridded and reprocessed for residual discrepancies. This process was repeated until the results were judged to be satisfactory.

Final visualization of the gridded data was performed by means of the Fiedermass software for three-dimensional visualization. Artificial illumination was applied to the grid in order to produce a realistic rendering of relief on the seafloor and on the surrounding land. This procedure also emphasized minor data problems that had escaped previous corrections, such as isolated observation errors and mis-located track segments. These were eliminated from the map image.

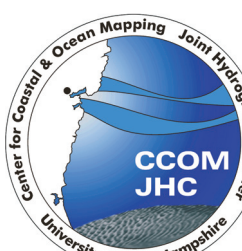
Grid Availability and Format
The grid that was used for the construction of this map can be obtained in two forms: Cartesian with a cell size of 2.5 x 2.5 km at 75°N, and Geographic with a cell size of one minute of latitude by one minute of longitude. These grids, along with detailed descriptions of their formats and the techniques employed in their preparation, can be downloaded at: <http://www.ngdc.noaa.gov/mg/bathymetry/ibcaocentric.html>

Acknowledgments
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Luncheon Keynote Address (IV)

Keynote Luncheon Address

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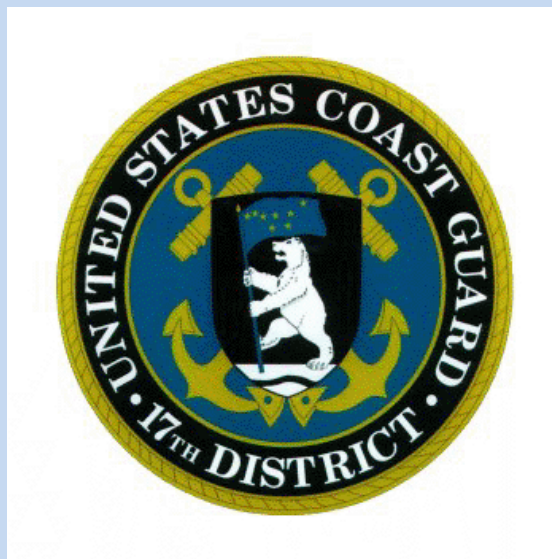
Rear Admiral Thomas P. Ostebo,

Commander, U.S. Coast Guard District Seventeen

Juneau, Alaska

U.S. Coast Guard Academy
New London, CT

April 12, 2012





**Keynote Luncheon Address: Rear Admiral Thomas Ostebo
Commander, Seventeenth Coast Guard District, Juneau, AK**

Introduction, by Dr. Kurt Colella, Dean of Academics, U.S. Coast Guard Academy



Kurt Colella:

Good afternoon everyone. My name is Kurt Colella and I'm the Dean of Academics here at the US Coast Guard Academy, and it is a wonderful day. Don't be too concerned about the weather if you're not from around here. Just wait a little bit longer and we'll be fine.

I certainly want to thank everyone here for making the trip to New London. You have come from far and wide, literally from around the world to have this very important series of discussions. Certainly a special thank you to the co-Chairs, Commander Russ Bowman and Professor David Caron for all their work, and all the others here at the Academy. I want to take the opportunity – to the Department of Humanities, the faculty and staff and the cadets here, thank you for all your support.

I also wanted to take just a second to – I met Professor Caron last night for the first time, just prior to his presentation I promised him something, so I want to make sure I give that to him. This [presenting a lapel pin] is a small "Welcome Home" gift from the United States Coast Guard Academy. We're very, very proud of you. And Susan, thank you for coming. It's been great conversing with you as well. David is certainly one of our most distinguished graduates even though he is an even class; it's not that big of a deal.

Already we have a great deal to reflect upon after this morning's panels. The History in the Arctic panel certainly set the stage for some of the thought as we transferred into the wonderful panel on Science and Research activities in that region. Certainly these discussions give us all a lot to think about. As the slides were going by I was writing



down the number of things I really do need to read to get more conversant in this. And that's part of the inspiration piece that's really important for all of us. The idea is to learn more.

And with that, I want to introduce our luncheon speaker, Rear Admiral Thomas Ostebo, who assumed the duties as the Commander of 17th Coast Guard District in May 2011. He's responsible for all Coast Guard operations throughout Alaska, which includes protecting life and property, enforcing federal laws and treaties, preserving living marine resources and promoting national security.

In his previous assignments, Admiral Ostebo was the Coast Guard's Assistant Commandant for Engineering and Logistics. He also served as the Commanding Officer of air Stations in Cape Cod [MA] and Traverse City [MI], Chief Engineer at air stations in Clearwater [FL] and Sitka [AK]. During his career he logged 4000 or more flight hours in virtually all Coast Guard aircraft. He is a 1981 graduate of the Coast Guard Academy, the great class of '81 with a Bachelor of Science Degree in Mathematics and Computer Science. In 1993 he earned a Master of Science in Industrial Administration from Purdue University's Krannert School of Business.

He completed a Senior Fellowship in National Security at Harvard University in 2002, and a Senior Fellowship at the Naval War College in 2005. Ladies and gentlemen I yield the floor to my classmate, my shipmate, my roommate and my friend, Rear Admiral Thomas Ostebo.



RADM Thomas Ostebo:

First I want to thank everybody for being here and giving me the opportunity to speak. Although I'm not happy to be out of Alaska, the weather up there has been nice as well and I prefer to be there. There's a great amount of intelligent brain power in this room. This morning I really enjoyed listening to the panels and I'm looking forward to hearing more this afternoon. I've actually tailored some of my



comments around what I've already heard and I've shortened my comments here a bit.

In keeping with Calvin Coolidge who said "Nothing I never said hurt me," I'll try to keep my comments even shorter. And especially being from New York I'm always likely to say something outrageous. So what I'd like to do is start out by passing on the way I view the Arctic and what it means to me. First of all, you can't ignore it. You can't control it. Nobody owns it. It's huge, but it's small enough that a problem for one nation is a problem for everybody. It possesses sustainable and unsustainable riches. And it's 100% maritime. This issue is a maritime issue and very specific to the Coast Guard.



As you heard in some of the comments this morning, "The genie is out of the bottle" on some of the riches that are up there. The payoff for not only oil and gas exploration but other activities is in the thousands of billions of dollars, and the Gold Rush is on. Moreover for me, there's zero tolerance for failure in everything we do in the Arctic. The Coast Guard is in the middle of it and we have to be successful.

I believe it's going to fundamentally change the Coast Guard and our nation, just as the Magnuson-Stevens Act did, just like the Mariel Boatlift did in the '80s, just like the war on drugs did in the late '80s and '90s and then as 9/11 did. This is a watershed event and what's going on in the Arctic cannot be ignored.

A few years ago, most people couldn't even spell Arctic, but today you can barely open up a magazine, a newspaper, a TV show, reality series, you name it, and you find something there on the Arctic. Yet I think most Americans would be challenged to fully understand why the Arctic is that important. But it will only be a few years before people begin to realize the impact that the Arctic is going to have on not only the people of Alaska but the rest of this nation.

Today's problem is that industry, tourism, energy developers, the Maritime Transportation System, Naval forces and the Coast Guard have already discovered the Arctic and it's a real problem for us today. It's a real challenge for us today. For those of you who are cadets in the room, this is going to be something you'll deal with for the rest of your career and beyond. We'll need a lot of great Coast Guard personnel as well as other smart folks to take on the challenge of delivering the Arctic in a way that is responsible yet pragmatic enough to address the real interest that the entire world has in the region.



So whether you're a sailor, an aviator, a logistician or an engineer, or even a lawyer or whatever it is you want to be after the Coast Guard Academy, there's a place for you in the Arctic and there's work to be done up there and I hope you consider it.

Moreover we can't operate in the Arctic with less deference and less professionalism than we do everywhere else. You take into account the pristine environment, the unique traditions and culture of the indigenous people, and you take into account the logistics problems up there; we have to work with additional acumen and additional skill in everything we do.

When I first came into the Coast Guard, our operations were laser focused on D7 [Coast Guard District Seven] down in Florida. That was the place to be. You had the drug war going on, you just came off a Mariel Boatlift and interdiction of illegal migration, search and rescue operations – everything was laser focused down towards the 7th Coast Guard District in the Caribbean. When that first started we had very little in the Coast Guard to respond to that demand for Coast Guard services.

We had very few Spanish speakers in the Coast Guard. Our diversity wasn't right for that operation down there. We had very little capability to address the ever-changing and ever-dynamic adaptation of our adversaries in the drug war. Today, 30 years later, we have done a lot. The problems are still there, but we've spent the last 30 years leveraging partnerships, building arrangements, exploiting intelligence like Panama Express, and building out commands such as the JIATF [Joint Interagency Task Force South, Key West, FL] to address that problem.

I dare say that if you look around the Coast Guard today, wherever you are in the Coast Guard, you can see the fallout from our reaction to D7: the 110 foot patrol cutter, which is ubiquitous not only in the US, but over in the North Arabian Gulf, is a direct result of the requirements from the drug war. The 270's [270 foot "Bear" Class Medium Endurance Cutters], the SPC 33's [33 foot Special Purpose Craft], capabilities like airborne use of force, and much more are the legacies of the drug mission.





Moreover if you look at the way those capabilities have been used in operations such as Hurricane *Katrina* and *Deepwater Horizon*, the Coast Guard gets a tool to address a problem and we use it in all of our mission sets. And I think Alaska is going to be the same way. We're going to have to take the same approach to the opening up of the Arctic and how we develop capabilities to work in the Arctic, but also be used around the country and across the Coast Guard. And not only for things like oil pollution or search and rescue, but for all missions and all threats, all hazards and all threats for the Coast Guard.

As the leader for the Coast Guard's Alaskan AOR, I can speak with experience that the Arctic is the Coast Guard's new challenge. We've already addressed some of those, and as you heard this morning through the first panels, you've got an appreciation for the physical, the environmental challenges that are going on up there. You also heard a lot about the Coast Guard's history. The Coast Guard has operated successfully in Alaska, as we heard this morning, for 150 years going back to Mike Healy.

I won't go back over that history. But it's important to realize, the main takeaway I get from Mike Healy is that he was the federal government, he was law enforcement, he was the federal presence in Alaska. And today, it's still that way. The Coast Guard, not me but the Coast Guard, is the federal presence that's ubiquitous around the state. It's the one that you can go into almost any venue and you're greeted with a smile and a handshake. It's also one that has, in my opinion, touched a greater percentage of the population than any place else.

I go to all these small towns, whether it's on the North Slope or Ketchikan, and I could not go to a function like this without having a half a dozen people come up to me and tell me how the Coast Guard personally saved their parents, personally saved their loved ones, or personally impacted their lives.

I met with the head of [the Department of] Fish and Game for Alaska a couple of months ago, and we'd been talking on and off, and she told me how the Coast Guard, when she was 13, saved her life by rescuing her, doing a Medevac with a helicopter, an H-3 helicopter out of Sitka. And the only reason she's here today is because she was rescued by the Coast Guard. My point is that the interaction between the Coast Guard and the folks in Alaska, whether it's the indigenous population or the general population of Alaska, is tight.

We have a rich tradition in Alaska, it started with search and rescue, but it goes well beyond search and rescue. It's fisheries, it's all the missions that we've done in the lower 48 going back – I'm sorry – in the lower part of the state going back to *Exxon Valdez* and the early days of the seal trade operations in the state.

I want to talk about some of the current realities that we face today. As we look to the Arctic, I look to the Arctic with all 11 Coast Guard



missions. I look to the problems that we're going to have with increased traffic, increased activity like we've seen around the rest of the world. Arctic cruise ship tourism is growing. I was in Canada a couple of weeks ago and I got the list of all the cruise ships that are going to be transiting along the North Slope of Canada and want to make adventure tourism trade up there. Just a few years ago you would find a tourism charter that might have a dozen people or 24 people or 50 people on it. We're up to 500 people on these cruise ships now.



Last year we had one in Richard's [Richard Glenn, from the North Slope Borough] backyard with about 300 or 400 German folks show up unexpected in Barrow, lightening their folks onto the town. That's a huge impact on a town with 300 people and very little infrastructure. I mean they can wipe out that town in milk and cookies and everything else in a heartbeat. That's an impact. And oh by the way, they want to know who these folks are that aren't speaking English or Inuit up there. They want to know why we have German folks on their soil. And we should know that, we should have visibility on that.

When I look at the way that traffic is growing—and I had a couple of slides that I would have put up but I'm trying to spare y'all the PowerPoint—the amount of traffic that we see in the Arctic – and when I talk about the Arctic I look at everything from the Aleutian chain, north. So the entire Bering Sea is the Arctic, by definition, by not only US definition but by international definition.

I look at the things that we are doing in the Arctic, clearly the *Healy* mission this year [ice-breaking escort for the tanker *Renda* passage to Nome], but I look at the amount of SAR [search and rescue] cases, I look at places like Unimak Pass, which most people probably couldn't find on a map. Unimak Pass sees four or five thousand vessels a year travelling through an extremely small strait, which some of the folks here didn't even realize, is an international passage. Going back to events like *Selendang Ayu* [see below] it would make the hair on the



back of your head stand up if you knew how many *Selendang Ayu* events we narrowly avoid there each month, or out towards Shemya [Island] when it reenters the North Pacific.



M/V *Selendang Ayu*, December 2004

There's a lot to do. There's a lot of search and rescue activity, but there's also law enforcement, migration, illicit activity as I mentioned that comes with the growth in commerce. Our service is leaning forward, and in particular D17 is leaning forward, to address all the issues of the Arctic. And if you haven't seen that show *Coast Guard Alaska*, it's interesting to me, not the show so much, but that it's on the Weather Channel. It's on the Weather Channel because what makes Alaska different as we look to approach the challenges that we have up there from say D7, it's the weather. And it's the weather every day.

We had a nice brief this morning on the low [pressure system] that went through—the 949 [millibar] low, and I remember that from last year when I got a call from senior folks at FEMA [Federal Emergency Management Agency], and everybody was amped up over this big low is coming, big storm that's coming and I was like “What? That's the third one we've had this year; what are you talking about?” Some saw that as a big deal when it's a normal occurrence in Alaska. Usually it comes with a blizzard, it comes with darkness, and it comes in a number of ways that are truly life threatening, particularly during the crab season which we're just ending up now.

The other thing about Alaska, and I alluded to it earlier, and this is pretty critical, is more than anything else operations in Alaska are a logistics problem. It's a logistics problem. If you look at simply the number of air stations from New York north and airfacs [air facilities]



that you have on the New England coast, they exceed everything that we have in Alaska in total.



When you figured we have 33,000 miles of coastline up there and we have a growing industry that brings all the hazards that you have in the lower 48, it's all being done with SAR stations, small boat stations, that average 800 miles apart around the state. And I'll tell you right now, having visited a lot of people in our state, the State of Alaska, they expect the same services from the Coast Guard in Barrow that you expect in New London. They believe they should have that and we're leaning forward in creative ways to try to provide the same kind of capability throughout the state, particularly as the Arctic opens up and the risks grow.

This summer we'll be kicking off an operation, and I was originally just going to give you my operation *Arctic Shield 2012* brief, but I didn't want to just limit this talk to that. But I will speak a little bit about it. *Operation Arctic Shield* this summer will be the largest Coast Guard expedition of operational forces outside the lower 48 since the Second World War. It's a big event.

We have a two cutter presence in the Arctic. We've got the National Security Cutter that will be up there, a 378 [foot high endurance cutter], a 225 [foot buoy tender] and a medium endurance cutter. We're opening up a seasonal air facility in Barrow that will have two MH-60 [helicopters]. It'll be the first airfac [air facility] that's strictly MH-60 bound and we'll be doing that in Barrow this summer.

Having opened up air facilities on Lake Michigan, I can tell you they're really hard when you can drive there and they're really hard when you can call them up on the phone and when you have internet connections. It's extremely difficult to open up a 24 by 7, two-helicopter-unit in



Barrow; especially when we're still trying to figure out where we're going to put them for a hanger.

But we're leaning forward. We're leaning forward with an MSST out to Dutch Harbor, at Unalaska, to provide support for the Shell exploration equipment when it moves into that city. And we're doing all this kind of as the Coast Guard always does. We're kind of somewhere between a cluster and a pickup game, if you will. We're grabbing people from around the country. We're moving them where we can. We have people working outside of rate. We've got folks that have pretty much cancelled all their leave plans for the summer as we look to surge forward several hundred people in those two AORs.

In addition, we're looking for bandwidth. One of the big problems that we're having, every place we operate, and we saw it even during *Deepwater Horizon* and Hurricane *Katrina*, is trying to find bandwidth. How do you keep people connected? How do you provide situational awareness around the country? Try to do that in a town like Wainwright, where last time I was there with the Whaling Commission, everybody pulls out their cell phone and you bring the whole system to a grinding halt, and that's only 12 of us.

So now you figure that's going to be Ground Zero for the Chukchi Operation for Shell and as soon as somebody pulls out their iPad and tries to get online phone calls will stop going out somewhere else. So we're looking to manage all those infrastructure issues around this summer's operations.



Last winter, just this past winter, we had our first test of what it would be like to do an exigent situation or deliver an exigent operation on short notice with our operation between cutter *Healy* and *Renda* in the city of Nome. First I do want to acknowledge Bev, if you wouldn't mind standing up real quick. Captain Bev Havlik. She's a hero in my mind. Not because she's just a great sea captain, ship captain, but she's the most patient person I've ever met in my entire life. When we tried to do this operation the word of the day was *hastino lente* – make haste



slowly and take things quietly. And of course, I'm the least patient person you've ever met in your entire life.

And I would call up Bev all amped up about something, and icebreaking's a slow, patient business and she did a wonderful job delivering that fuel in there without a single injury and without a single drop of oil being spilled, and doing it under the pressure of the national media, which at one point had over 1000 articles a week being written about *Renda* and *Healy* and all the gloom and doom about "what if they break down" and "what if a hose breaks" and what if, what if, what if. But the Coast Guard leaned forward smartly and the work was done well.

Do you still have the travelling gnome? Good. The thing that I think that we learned from *Healy* was not how great everybody was on *Healy* and how successful, we knew that already. It's really how hard that mission was to pull off behind the scenes. That was a mission that we planned out, we thought about, there was no real immediacy – in other words, nobody was going to die tomorrow if this thing didn't happen. We had the opportunity to be thoughtful about it.

By the time we brought in the international community, other federal agencies, the State of Alaska, the mayor of Nome, NOAA, the Weather Service, DoD, DHS, got Jones Act waivers [to permit a foreign tanker to transport the oil between two U.S. ports], found out where the fuel was, had *Renda* break down on Day One and had to turn around and go back into Dutch Harbor to get her engine fixed; National Guard snowmobiles, dogsleds, everything else that we needed to get this thing done and the coordination behind it. It was amazing, but it also kind of scared the hell out of me.





If we have a real problem, and we had a ship bound in the ice with a few hundred people on it that was in danger of going down, if we had had a vessel bound in the ice with a couple million gallons of bunker [oil] on it and it was going to end up on Point Hope in the next 48 hours, what *Healy* taught me is we've got a lot of work to do to be prepared and to be able to respond to all the events that could possibly take place in the Arctic.

To that extent, I think as far as the oil drilling operations for this summer and Shell's work, believe it or not I'm not staying up late at night worried about the hole in the ground. We've got 22 vessels from Shell; we've got all the Coast Guard resources up there. Admiral [retired] Watson's staff at BSEE [Department of Interior, Bureau of Safety and Environmental Enforcement] is going to have people 24-7 on board monitoring the entire operation. What I've begun to tell people is from a drilling a hole in the ground perspective, this is going to be the most highly regulated, most overseen, most heavily monitored and most technologically advanced drilling operation that's ever taken place on the planet.

I think that's a good thing and I think that's where we should be and I think we've set the standard for the rest of the world. I met with the Russians last week and my counterpart, Lieutenant General Daerbaev [of the Russian Border Guard], a great guy – I spent a week with them signing some agreements and working out some issues with them. But on the side he asked me “Admiral, you're setting the standard for drilling operations in the Arctic that I don't think anybody else is ever going to be able to meet. The bar is so high with what you're doing, my seniors and our industry over here is trying to figure out how we're going to meet that same bar.”

And I heard a similar comment from my Canadian friends when I was there about two months ago. So that's a good thing. What we're not paying enough attention to, I believe, is all the other activity that's going on. What happens when a vessel that's supporting the drilling activity runs into a cruise ship and it's 200 miles south of the Bering Strait, or in the Bering Strait where we have no vessel traffic separation scheme or means of response? It's all the other activity that goes on when you have a large amount of offshore industry taking place.

If you look at down in the Gulf of Mexico where we spend our time, it's garden variety search and rescue, it's garden variety marine disaster, it's airplane crashes, helicopter crashes, all associated with the activity that goes offshore. So I'm worried a lot about that. I'm particularly worried about it in a community like Barrow, which has typically two flights a day in the summer and is now going to go to like 10 flights a day. It typically has 100 people move through the airport and it's going to have 400 people a day moving through the airport. It's going to have three or four hundred people going offshore in helicopters every day.



All that activity, and I think about things like TWA 800 [a Boeing 747 airliner that crashed off Long Island in 1996, killing all 230 souls aboard], I think about the Miracle on the Hudson [a U.S. Airways airliner that crash landed in the Hudson River with no loss of life] and I think about what happens when Alaskan Airlines or some chartered airplane from Louisiana sucks a couple of King Eider [birds] going off of Barrow on the 360 runway and ends up a half a mile offshore in the water. And I see Richard's [Richard Glenn, from the North Slope Borough] head going up and down because we've talked a lot about that. That's the activity that I'm worried about and that is a Coast Guard activity because it's all maritime and it's all real.



So what does the Coast Guard need to do about it? Well we're leaning forward, as I said, this summer to respond. We're going to take everybody's temperature at the end of the summer. Hopefully it will be a non-event; that's the goal that we're trying to pull off. And we'll take a look if we got it right with the assets we put up there, with the amount of air crews we put up there, with the way we've run this operation through the hot wash on *Arctic Shield 2012* at the end of the season.

But we do need to look at the fact that the Arctic isn't going away at all for us, and what are the real requirements for the Coast Guard. And real requirements, I think, are embedded in our ship building acquisition plan. We need to have that go forward. The Coast Guard needs to recapitalize. All the assets that we're looking to purchase: aircraft and ships, FRCs [Fast Response Cutters], NSCs [National Security Cutters]; they're all of extreme value to the D17 AOR [area of operations]. And first and foremost we need to have all eight National Security Cutters to be successful, not only in Alaska, but in the North Pacific as well.



We're also looking to leverage, as much as we can, our friends in DoD. I can't say enough about our friends at NORTHCOM [U.S. Northern Command] and at SUPSALV [U.S. Navy Superintendent of Salvage] who are helping us out this summer with some oil spill recovery training. With actually lifting a lot of the operation with real dollars that they're bringing to the table to help us be prepared with oil skimming capability and oil transferring capability in the event of a spill off the North Slope. I can't thank NORTHCOM enough for that. I can't thank DoD and my partners in Alaska enough for helping us out, as well as the State of Alaska.

I was the federal member of the Alaskan Northern Waters Task Force, which went on for about nine months this past year, and we just released our report a couple of months ago. If you haven't read the Alaskan Northern Waters Task Force Final Report I highly suggest you do so. I kept my pen out of it, since I was the federal member there, but if you read through that it talks about infrastructure, it talks about maritime transportation networks, it talks about Coast Guard capability specifically that is needed by the State of Alaska to be prepared for all hazards and all threats in their AOR.

This coming summer is going to be a busy one and it's not a one-off. It's just the beginning. It's the inflection point in history where whatever we do this summer will continue in perpetuity until the ice comes back and the resources run out and the technology to operate in the Arctic is over.

Our Canadian partners are looking north as well. And I spend a lot of time with them going through exercises and this year's, Canada's north exercises is no exception. This year we'll be looking at what happens in a cross-boundary oil spill; how does that manage out. That will be a great place for the State Department to try to figure out how that plays out when we're trying to do a *Deepwater Horizon* event or an *Exxon Valdez* that actually involves two different countries in a dynamic way.

Finally, because Alaska is part of the United States, the U.S. is part of the Arctic Council. And we've been doing a lot of work with the Arctic Council lately and most recently, just two or three weeks ago, [David Balton] and I were up in Anchorage for a beautiful setting at Alyeska where we had the Arctic Council meeting. The eight Arctic Nations came together to look at oil spills and oil spill response and what can be done there.

As you recall last year Secretary Clinton signed a SAR agreement with the other Arctic Council nations. The charge that we have now, going forward, is to produce by May of 2013, a charter to go forward on oil spill cooperation in the Arctic amongst all the Arctic nations. That's already underway. The Coast Guard is a co-chair on that and with Ambassador Balton's leadership we're moving forward quite well.



As you can probably tell, there's a lot going on in the Arctic and I could speak all day about it, but I do want to leave a few minutes for some questions. But before I close, I'd just like to say a few words for the cadets in this audience. If you're interested in being one of our future strategic leaders you should learn the skills necessary to be exceptional in your specialty. But you should also already be thinking about the big picture. How do you make a difference in our service? Where do you see the future of the Coast Guard? Where can we improve?

This starts with thinking about what you can bring to the table, and how you can best serve the Coast Guard and our Nation. It's never too soon to start thinking about how you can shape that future and participate. If the spirit moves you, I strongly suggest that you take a look north. Take a look at Alaska. Take a look at the experience and the personal benefits and rewards you can gain from being at the tip of the spear, the tip of the new spear in Alaska.

This is going to be an area of responsibility that shapes the Coast Guard during your tenure, and it's a place that you'll be able to exercise all the skills that you bring from your specialty and your leadership and I highly recommend you take a look at Alaska as a place for your first assignment. If you want to know more about that call me. I'd be happy to get you a set of orders up there.

For everybody else, it's a pleasure to be here. I did want to allow some questions if we have time for that. I really appreciate everybody. The work that you did to put this on, there's a great amount of brain power in the room. And thank you for giving me an opportunity to speak to you here today. Thank you.

I'm happy to take a few questions. Yes, sir.

Question:

Thank you very much. During the presentations this morning we heard about the importance of cultural understanding and I was wondering if you could address that.





RADM Ostebo:

Thanks. Actually that's a great question. If you look at the political makeup, if you look at the cultural makeup of Alaska, the indigenous folks up there, the native population is extremely important. Not only have they lived there for thousands of years, but long after all this kerfuffle that we're doing now is over they'll still be living there. And they still make their living on subsistence and traditional knowledge, which is extremely important to them.

For the Coast Guard they also provide us a huge competitive advantage. By listening to the native populations we're gaining that local knowledge. It's funny, when I have some fuzzy eared scientist guy tell me that something is going on, and I heard six months earlier from an Eskimo "Oh yeah that happens all the time. We know exactly; why didn't you ask me? I would have told you."

So when I look at the rich amount of knowledge that they bring to the table, it's critically important. We've put together, and I have on my staff, a member and a team of folks that specifically do outreach to the native folks in Alaska. And Joel [Casto], some of you may know him, does a fantastic job. And I daresay provides the best cultural awareness training for native folks anywhere in our service.

So we do a lot of outreach with them. I spend a lot of time in the communities. And this summer, as part of *Operation Arctic Shield*, we've put aside a tremendous amount of money and effort to visit somewhere around 50 different communities and bring veterinary service, bring dental service, bring Coast Guard docs and bring a general awareness, things like *Kids Don't Float* activities that the Coast Guard Auxiliary goes with us and provides.

So I think we provide a lot of great interaction and a lot of great opportunity for those folks. What I'm working really hard on is to try to get somebody from Barrow and somebody from Nome and somebody from Katovik into this institution. That's what I've chartered my course to be. Yes ma'am?

Question:

Thank you so much for a great presentation. The last speaker this morning mentioned concern about the traffic, vessel traffic going through sensitive areas and you brought that up as well. What is the Coast Guard doing about developing something along the lines of a VTS [vessel traffic system/service] for those sensitive areas?

RADM Ostebo:

That's a great question. When you look at a couple of things here there's "nth" order effects that are taking place. One, which you may not realize, but when the decision was made to kick the can down the road on the Keystone Pipeline a few months ago – you've heard that – there's a strong interest that that oil is going to make it to market. And I just checked by the way, it's \$103.45 a barrel at the start of this meeting. Someone asked that earlier.



That oil is going to come to market one way or another. Now if we don't build a pipeline across the U.S. where is that oil going to go? I'll tell you where it's going to go; it's going to end up in Dixon Entrance. Because the oil terminus for oil Canada on the west coast is right there at Prince Rupert, just south of Prince Rupert. And all of that oil, a million to two million barrels a day, is going to go out of Dixon Entrance to markets in Asia.

Where that goes in Asia is through Unimak Pass. And Unimak Pass today is already experiencing, we see somewhere around 400 or 500 ships a month going through Unimak Pass. That's the famous Pass where *Selendang Ayu* took place a few years ago, but like I said not a week or a day goes by where they don't have a ship breaking down somewhere around there.

So you look at what keeps me up at night, it's Dixon Entrance with a million people a year on cruise ship traffic going north and south, and then you have the fourth largest port on the west coast of the U.S., which is going to be next year they predict to be Prince Rupert. And you have two million TEU's going out of there, plus you add oil to that and all that's going through Unimak Pass.

You go back to Teddy Roosevelt, who made the entire Aleutian chain a wildlife preserve. Unimak Pass is an international strait, and there's only so much we can do to regulate the flow of traffic through there without violating international maritime law. So things like double hull tankers and pilots and those types of things are hard to regulate in Unimak Pass, and will become just as crazy in the Bering Strait going forward.

What we have done, a couple of things. One is we're getting the Coast Guard to continue to bring those issues up in the IMO [International Maritime Organization]. So we could put in place a vessel traffic separation scheme. My priority list for that would be Unimak Pass one, Dixon Entrance two, and the Bering Strait three, as the places that need an official vessel traffic separation scheme with response regimes in place internationally to address that, and with responsible party oversight like we have in a lot of other places in the nation.





So that's the long hard road through IMO. Not that they don't work hard or anything, but it's just that's a long hard slog. The easier slog is what I'm working on with Meade Treadwell, the [Alaska] Lt Governor, to see if there are voluntary schemes that we can put in place that would shame, for lack of a better word, or through the insurance companies require people to do voluntary notification of arrival, or north/south notifications going through the Bering for example 24 hours out, 12 hours out. "Where are you going? What's your cargo? What is your crew makeup?" And try to put those schemas in place.

My legal staff, working with the state and working with Coast Guard headquarters, are beginning to shape what that would look like in both the Bering Strait and Unimak Pass to start with. We do have some alternate compliance regulations, those of you who know Ed Page [a retired Coast Guard Captain who now heads the Marine Exchange of Alaska], just got through with a real nice set of alternate compliance rules for Unimak Pass in the Aleutians based on the Aleutian Risk Assessment and how to get folks to behave in a way that really drives down the potential from a prevention perspective on a mishap.

At the end of the day though, a ship goes to ground, fire on board, collision, grounding, or breakdown and they're washing up on Unimak Island or any of the other thousand island that are out there, and the response capability is practically zero. We have to rely on a good Samaritan or in the summertime when we have some assets out there we can rely on them to do that. It's tough nut to crack. There's the IMO official one, that's what we're doing on a voluntary basis, and then we're leaning forward with commercial activity as best we can.

So yeah, that's the worry. I kind of quipped earlier about the hole in the ground. We're all looking at that 5th graders in a soccer game, all looking at the ball here and meanwhile there's something else going on, and that something else going on is the Aleutian Islands in my opinion. Thank you very much for that question. Yes sir.

Question:

For *Arctic Shield* this summer you were talking about sending two large cutters up, and I'm not sure if you're going to send them around the corner. What's your expectation of the effectiveness of those non-ice capable ships?

RADM Ostebo:

Last year we went out, I sent one of our captains [Captain Craig "Bark" Lloyd, USCG (ret.)] out on a Russian icebreaker, a nuclear icebreaker [Yamal] to go break ice, and he was in the Northern Sea Route. He steamed around for 10 days and never found any ice. So if you look at the projection, what I think is going to happen is early in the season we'll move our 225 [foot] buoy tender up there and allow her to get in as close as she can. And then we're going to use [Coast Guard Cutter] *Alex Haley*, which has got a little stronger hull. So the buoy tender will go out to the Beaufort, and the Chukchi will be serviced by *Alex Haley*. And then, I may be wrong, but the way I read the tea leaves, by August, we're going to have no problems sailing the 378 [foot] high endurance



cutter] around, at least in the Chukchi Sea. I think the projection and the thin ice is going to play out and is going to be gone.

So that's the way we're going to run it. We have to have the cutters out there, we need to have the flight equipped cutter out there for a whole host of reasons, not the least of which is there are a lot of folks that don't want drilling to take place and so we expect to see perhaps significant protest activity on both sites. The drill window is real small and I could go all day about that. But there's not a lot of slack time in that drill schedule.

So I have to have a flight deck equipped ship out there so I can project, under the Outer Continental Shelf Management Act, our laws to manage the safety zones around both of those drill rigs. And that's going to involve, I predict that we're going to end up taking kayaks, impounding kayaks and arresting folks and figuring how to get them out of there. And I have to have a flight deck equipped cutter to do that.

So it's critical that they're there. Well thank you all. I did provide Dean Colella a copy of my latest brief that I gave to Lieutenant General Hooge last week that has some of the traffic slides in it. And Kurt you're free to share those with whoever you want. That's public knowledge.

Thank you very much everybody for your time.





Panel 3

Leadership in Arctic Maritime Safety: *Providing Leadership in Maritime Risk*

Reduction and Mitigation Measures for a Vast and Challenging Environment

Moderator: Professor Craig Allen Sr. – Distinguished Visiting Professor of Maritime Studies, U.S. Coast Guard Academy (2011-2012); Judson Falknor Professor of Law, University of Washington

Panelists:

- Dr. Lawson Brigham – Captain, U.S. Coast Guard (retired), Distinguished Professor of Geography and Arctic Policy, University of Alaska, Fairbanks
- Ross MacDonald – Captain, Canadian Coast Guard (retired), Manager, Special Projects and Arctic Shipping Marine Safety, Transport Canada
- James A Watson IV – Rear Admiral, U.S. Coast Guard (retired). Director, Bureau of Safety and Environmental Enforcement, U.S. Department of Interior
- Professor Thomas M. Leschine – Director and Ben Rabinowitz Endowed Professor of Human Dimensions of the Environment, School of Marine and Environmental Affairs, University of Washington; Vice-Chair, Marine Board of the National Academies' Transportation Research Board



Panel 3: Leadership in Arctic Maritime Safety: Providing Leadership in Maritime Risk Reduction and Mitigation Measures for a Vast and Challenging Environment

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Panelists:

- Dr. Lawson Brigham – Distinguished Professor of Geography and Arctic Policy, University of Alaska, Fairbanks; Captain, U.S. Coast Guard (retired)
- Captain Ross MacDonald – Manager, Special Projects & Arctic Shipping Marine Safety, Transport Canada; Captain, Canadian Coast Guard (retired)
- James A Watson IV – Director, Bureau of Safety and Environmental Enforcement, U.S. Department of Interior; Rear Admiral, U.S. Coast Guard (retired)
- Professor Thomas M. Leschine – Director, School of Marine and Environmental Affairs, University of Washington; Vice-Chair, Marine Board of the National Academies' Transportation Research Board

CDR Russ Bowman:

Ladies and gentlemen, we resume this afternoon with a safety discussion. Arguably the most basic responsibility of the U.S. or any government is to protect the lives and safety of its citizens. In addition to the value of lives saved, Maritime Safety Activities, the topic of our next panel, minimize damage to property, the environment and the economy. But how does the changing Arctic environment challenge our traditional risk management and reduction strategies? Our next panel explores this important question.

To help it do so it is my honor to introduce Professor Craig Allen. Professor Allen is a tenured member of the University of Washington faculty Law School and the School of Marine and Environmental Affairs. He currently serves as our Distinguished Visiting Professor of Maritime Studies and as a Visiting Professor at Yale Law School. Ladies and gentleman it is my honor to introduce, Professor Allen.

Professor Craig Allen:

Thank you Russ. And welcome. It is my privilege to moderate a panel of four such distinguished experts. Some of you have heard that we held a small reception for speakers and moderators last night at Latitude 41, where Professor David Caron inspired us with his *Arctic Images* presentation; one that he has given around the nation and even the world.

Professor Caron labeled his Image Two of the Arctic “The Ring.” If you picture in your mind the Arctic as the ice recedes away from the continental masses, you begin to see a ring of navigable waters between the Arctic ice cap and the northern shores of the contiguous countries.



That opens up those waters to navigation, and also to off-shore economic activities, including oil and gas and potentially fishing in some of those regions. That raises maritime safety questions. At this point, I would like to call your attention to the Coast Guard's signature strategic document, which describes its principal missions.



This is the 2007 *U.S. Coast Guard Strategy for Maritime Safety, Security and Stewardship*. Our panel is going to focus on the first of those S's - Maritime Safety. More specifically, and consistent with the theme of the conference, and the theme that runs throughout the Academy, we're going to focus on the Arctic maritime safety leadership issues. To do that, we have not only four experts on maritime safety, but also four leaders in the study and development of both national and international approaches promoting and developing maritime safety and response.

I would also like to invite your attention to a second leadership benchmark. Last year, on April 26, 2011, the Coast Guard published its *U.S. Coast Guard Arctic Strategic Approach*. To punctuate for you how important leadership is to the U.S. Coast Guard, and the service's commitment to leadership, I would like to read the first sentence of the "vision" statement to you.

Arctic Strategic Vision: as the nation's lead agency for ensuring maritime safety, security, and stewardship, the U.S. Coast Guard will lead our nations maritime engagement in the Arctic, and be a leader in advancement of U.S. national interest of the Arctic maritime domain.

I don't think it was an accident that some version of the word "lead" appears three times in a single sentence.



So, consistent with the mission of the Coast Guard Academy and Admiral Stosz's charge, we now turn to the business of maritime safety, and to help us do that we have four very distinguished experts.

I'm time constrained, so I will provide only a brief introduction for each - but these are really exceptional people with remarkable backgrounds and I really encourage you to peruse their biographies in your binders. I plan to introduce them individually, perhaps pose an opening question and then allow them to make their presentations.

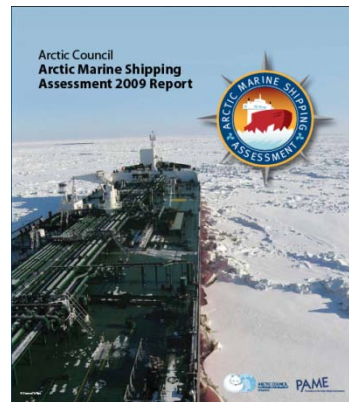
Our first speaker is known to many of you. He is the Distinguished Professor of Geography and Arctic Policy at the University of Alaska Fairbanks and retired Coast Guard Captain Lawson Brigham. As many of you know, he's a veteran icebreaker sailor and cutter commanding officer. Perhaps more germane to this panel, he recently led efforts in the Arctic Maritime Shipping Assessment, which he will talk about today. He's commanded four different Coast Guard cutters, including the *Polar Sea*. During his service on icebreakers he completed more than 15 Arctic and Antarctic expeditions. Please join me in welcoming Captain Lawson Brigham.

Prof. Lawson Brigham:

Thank you Craig. Admiral Stosz, distinguished ladies and gentleman and members of the cadet corps, good afternoon. Thanks Admiral Ostebo, for the good overview of what's going on in Alaska, my take might be a bit more circumpolar, since I work in the Arctic Council affairs, and have in the recent past anyway. Before I give my talk about this Arctic Marine shipping Assessment, I would say that one of the most entertaining and fun jobs I had in my whole career, and it's not in my bio either, I was head sailing coach here at the Coast Guard Academy. I was a faculty member but I think in my whole career I probably influenced and touched more future officers than in the rest of my career, because I probably touched 600, 700 of the cadets that were here and we had great times.



And Vice Admiral Welling is in the audience, and he and I ran this big sailing program for a number of years, right Admiral? And he was the boss, I was a lieutenant. And you know 34 years ago I met, at least out on the water a fourth class cadet named Sandra Stosz. So here we are, Sandy, 34 years later. Tremendous that you're the Superintendent and I congratulate you on your career, but also tremendous that as faculty member at the academy in the past, bringing intellectual effort like this to the Academy; so I applaud you.



The Arctic Marine Shipping Assessment work by the Arctic Council, [pointing to slide] you can see that I'm going to use some props and images, and one of the challenges of course in doing this with the diplomats of The Arctic Council is explaining complicated maritime presence in the commercial world. Lots of ships in the Arctic, beginning of the 21st Century, you heard that a little bit this morning. Satellite images and this one happen to be the least extent in the satellite record in September of '07.



[Pointing to slide] I show you this image, which is a satellite image of the Arctic Ocean that preceded the minimum extent image I showed you before, to remind everyone that the place is ice-covered fully or partially eight to ten months out of the year through the century and beyond. We heard a little about that, that the ice cover is not disappearing. It's thinner, it's less extensive, and maybe more dynamic might not be of course all assuming that fast ice might be moving, so it might not be an easy place to navigate. But, nonetheless, taking my hat off as a scientist and looking at putting on a regulatory hat, the place is ice covered. And that's an important implication for Polar Codes in navigation, etc. I believe all the ships in the future in the Arctic will be Polar class ships for most of the year, highly regulated, with strong enforcement of those regulations by the coastal states. So I think there's this notion that the ice-free shipping enterprises are coming to the Arctic to create some sort of Panama Canal, or Suez. Think again, when we think through the economics of shipping.

I show you this image because it's kind of a poster child for globalization of the Arctic. In the Arctic Marine Shipping Assessment all the work we did told us that its global economics, the economic connection of the Arctic to the rest of the planet through natural resources, which is driving marine transportation. That's a little counter to the notion that is the disappearance of sea ice. Disappearance of sea ice gives us slightly longer seasons of navigation, somewhat greater access to places still ice-covered. And so we think, and I think my colleagues who worked on the AMSA would say that it's really economics driving almost all of the activity, marine activity in the future.

This is a rig in the Pechora Sea, in the southeast corner of the Barents Sea. Conoco-Philips and Luke-Oil invested and brought the technology to this off-shore terminal. Now the oil, in a wild card scenario, is covering from the beach, out to the terminal, it's carried by icebreaking carriers to Murmansk from this rig. So even the notion - it's not off-shore itself drilling for oil; it's the oil being piped off-shore to be carried by ship, then stored in Murmansk and then to world markets.

So we have Luke-Oil, and Conoco-Philips, the ship itself is operated by Sovkomflot, the largest shipping company in Russia, but it was built by Samsung, in Korea, using Finnish technology. Now when you couple all those things together, I would suggest to you all this is the new maritime Arctic, and that's a good picture for it. And that's what's coming to the Arctic today and in the future.



LEADERSHIP
FOR THE
ARCTIC

Leadership in Arctic Maritime Safety V – 6

[Pointing to slide] A little bit of a spaghetti diagram of the activity in the Arctic, only to say that all the sectors on this map, cruise ship activity in the summertime at the beginning of the 21st century, there were marine operations across very square kilometer of the Arctic Ocean. Including in the central Arctic Ocean, stuff that Larry does in mapping the sea floor and exploring the central Arctic Ocean, not only the seabed, but all the oceanography, the sea ice etc. Lots of activity, today, so we're well beyond the proprietary principle, and we have an ocean that's being used more than anytime in history without regulation or without many national seamless integrated nondiscriminatory regulations. So, a lot to be done in the future, and that's one of the reason, of course, we conducted this AMSA.

Of course we're mindful in the Arctic Council, we have, and we'll talk about this I'm sure, the participants we call the "six indigenous groups" at the table with us. This is marine transportation in the West Coast to Greenland for this particular sealer, and you wonder what this sealer thinks of the cruise ships that are sailing in the same waters in the new usage, and of course this is millennium usage.

But at the table we have the Inuit, the Aleuts, the Gwich'in, the Saami and the Athabaskan, and also the Russian indigenous people - peoples of the north. So the six groups sit there with us and of course when we're conducting a big assessment like this of course we have to bring in that huge and important indigenous perspective.

Large assessment, took five years to do, lots of players. But I'd say here today if it wasn't for Canada, and the United States, and some support from Finland as a third partner, this would never had taken place. So we can thank the leadership of both countries, both ministries, all the agencies, my colleagues, colleague Ross MacDonald here as one of the prime movers also, in orchestrating this on behalf of the Arctic states. Now all the Arctic states played and the recommendations were negotiated. So this is a consensus document, so that's its leverage, that's its power. It's a strategy document, policy document of the Arctic Council, where actually the Arctic countries agreed to the recommendations which I'll get to.

So it's somewhat historic. We've had other documents in the Arctic Council, of course the Ottawa Declaration in establishing the Arctic Council is a negotiated document, but very few of the assessments in the studies we got to negotiated recommendations. But on this one we did, and I think it's become a useful framework for the Arctic Council to together, the eight Arctic states, to move forward in these areas of marine safety and environmental protection.



You can see one of the key challenges on my little slide there is most of the world is coming to the Arctic, most of those players, shipbuilders, the insurers, the investors, have little experience in the Arctic. So that's one of our challenges, is how to handle all of those inexperienced people in the Arctic. We had lots of workshops, as you can see, but we had very important workshops out in the field, in Arctic communities, and we reached out to about 3000 people. Not many, but enough to get a good feel and a good sense for the indigenous perspective with regard to marine transportation.

Copy of the cover, the ship and the cover of this document is a Russian icebreaking ship that goes between Murmansk and this Pechora Rig, an offshore development and so we had a, but you can't tell it's Russian, so we negotiated the cover for this. You can see the topics. We had scenarios, and futures, plausible futures, environmental impact, and the last term there that all of us are familiar with, this kind of complex term called infrastructure, and since there isn't much infrastructure, maritime infrastructure, in the Arctic, huge issue. 6% of the Arctic Ocean is charted to international standards. I think Larry said 11% is mapped. So there isn't much charted, to take ships. So if you're taking large ships to the west coast of Greenland, or wherever, there aren't any charts there are very few soundings.

So that's one of the huge challenges. When you're a mariner, the first concern is that you don't have charts. I think we have somewhat of a problem. Having graduated from this place, charts are pretty integral, even though they're electronic today. I have lots of words on this. We ran a scenario's, "plausible futures" exercise for about a year, about 70 people. Some of the people in the room were part of it. And it was really designed to tease out the drivers, the major uncertainties. The driver to most of the people in the Arctic Council was the ice is going away everyone's coming. Well there are a few more uncertainties and challenges there. And you can see them. One of the interesting things during the course of the study, oil prices were at \$147 a barrel, by the end of the study \$55 a barrel. So just that dynamic will affect investment and oil and gas development in the offshore.

You can see that I started the shift to nuclear energy. So it tells you when you're doing scenario planning, it could be fuzzy. So do you think today we'll be shifting all to nuclear energy? Probably not Germany, probably not Japan, maybe us still, but still we thought that maybe that shift in nuclear energy might tease away the oil, and gas industry from the Arctic, so you know in thinking about the future, all of it's not perfect in this scenario stuff. But the next one we had strong



discussion, I think Ross, we said if a major accident happened in the Arctic it would be a game changer.



Well, during the course of this AMSA and briefing the diplomats, and we had the *Explorer* sink in the Antarctic, had been in the Arctic six months previous in the Canadian and the Atlantic waters. So here's a good example. It has to do with pilot competency, bridge competency. I'll leave it at that. But the loss of the *Explorer* is a pretty good example. Since the AMSA was released in the Canadian Arctic, you don't see much ice here, but that clipper is aground on a charted reef actually. So again there is the question of the competency of the people in the pilot house. And a tanker aground in the Canadian Arctic; sand and gravel I guess bottom, thankfully. Neither one a complete disaster, but could have been.

Then we need to have one slide here of this [slide of the cruise ship *Costa Concordia*]. We could leave that up there for the rest of the day. It's searing, it's iconic to believe that the 21st century, 100 years after the Titanic, we have this. And I think all of us would agree there are implications for these types of ships that sail in the polar waters. So it's a huge issue, no longer plausible or possible, but real. We have this now somewhat iconic diagram of the futures and how we teased out the actual narratives. But the important part, there are two major drivers and uncertainties; one is governance, lot of governance, lack of governance, and governance really in marine shipping in IMO. And the other axis is natural resources and development. So those are the two uncertainties we wrote the scenarios around.

Admiral Ostebo's famous, complex place that you talked about, Bering Strait, international strait, chokepoint etc – a hugely complex array of issues. It did come out in the AMSA that this is probably the most complex marine environment in all of the Arctic. Just to sum up with a



few of the recommendations. A number of us in the room tried to figure out a scheme to market the 17 recommendations. And this is our scheme and it's a pretty good one. It's kind of holistic; it's talking about safety and protecting people in the place. But we thought that the infrastructure question deserved equal place in this little schematic here.

We have a number of these 17 recommendations we've made progress on. The ones in red we've made a lot of progress on. The ones in black we've probably made no progress on, and most of those are related to prevention in IMO and working through the very complex system there at IMO. But we've made a lot of progress, the Arctic states, in interacting with other bodies beside IMO, like IHO. The International Hydrographic Organization has a special body now that's dealing with Arctic. And the SAR agreement, Ambassador Balton and his colleague from Russia negotiated on behalf of the Arctic states a new SAR agreement. The SAR agreement among the eight Arctic states and I guess I would characterize it as facilitated, by the Arctic Council.

More recommendations that we made some headway on engaging with communities, I think there's a lot more engagement even since the AMSA. We've identified with a scientific team NRDC and IUC and a team of scientists, the eco-sensitive areas, biological eco-sensitive areas I think Lisa Speer might speak to that, at least a little bit, so that there's headway made there. But again there are a few gaps.

And then finally this infrastructure question. One of the real recommendations was, well we've got to start addressing this huge deficit. The only places in the Arctic today where there is really world class infrastructure are the coast of Norway and the northwest coast of Russia. The rest of the place has virtually no infrastructure for response, communications, ports, salvage, and a long list of things. And so where does that investment come from; probably public-private partnerships in the future.

You can see we called for a marine traffic system. I think we've made headway there, because now we have AIS, and some satellite capability. There's an Environmental Response Capacity Agreement underway in the Arctic Council. So I'm going to end here with this slide, just summarizing. This AMSA's a strategic guide, it's a policy document, and there's a baseline assessment.

And if you give me 30 seconds more – I was just in Wollongong Australia 8 days ago at a governance institute. And I bring the topic



up, and I'm not embarrassed to say all of this because it's a very interesting perspective on what we're doing in the Arctic and about the Coast Guard. And one of the ministers was there from the government, and he said "We talk occasionally who does what world, who has capability," and he said directly to me that the three institutions in America that they're always impressed with and would like to model, and it's the not the Marines in Darwin and our pivot to China, because it was an education minister it was probably slanted, NIH, whom we all know and the great things they do around the world. The National Science Foundation and the United States Coast Guard, and they'd love to have Coast Guard like ours. So that's my message that I bring for the Education Minister of Australia to this meeting. And I guess I'm allowed to say Semper Paratus to all of you, always ready. Thank you.

Professor Allen:

Thank you, Professor Brigham. We now turn to a veteran of a different Coast Guard, Captain Ross MacDonald. Currently based in Ottawa, Captain MacDonald is manager of Arctic Shipping and Special Projects for the Marine Safety Division of Transport Canada, the national regulator for marine safety in Canada. In that role Ross is responsible for Canadian legislation and regulations governing Arctic shipping, safety, and pollution prevention.

Ross has over 30 years experience in Arctic shipping safety, operations and policy matters. He began his sea career in the Arctic, where he served aboard Canadian Coast Guard ships and eventually rose to the position of captain. Since coming ashore, Ross has been responsible for Coast Guard and Government of Canada marine programs in the Arctic. Ross is a member of Canada's Arctic Council delegation and was part of the Canadian team that led the Council's Arctic Marine Shipping Assessment. He leads Canada's delegation at the IMO working group that is developing the Mandatory Polar Code for Shipping. Ross, I'd like to lead off with this question - what worries you most about the lack of a mandatory Polar Code?

Captain Ross McDonald:

Thank you Craig. Thanks for the invitation to be here, and thanks for the invitation to be the second speaker after lunch. So wake up everyone, we're going try to do this at a very light-hearted but serious matter. Before I dive into this I want to say that a comment on the Arctic Marine Shipping Assessment, what I found one of the most valuable aspects of it, is it got, eight Arctic countries talking about shipping and allowed me a chance to work with Lawson and Malcolm Williams, others from the U.S. Coast Guard, and others from around the circum-Arctic community.



It was a great project if for no other reason than we started this dialogue that continues today. So, I'm going to try to keep this narrowly focused on Polar Code. I'm going to show a few obligatory slides of shipping disasters. Every marine safety presentation needs those. But pretty much it's on the topic of leadership, a leadership opportunity and in particular on prevention. And there's a subtle sales pitch or maybe not so subtle sales pitch in here. So please do listen.



So, not knowing what the audience knows, I'll cover a bit of history of the Code or the background for the Code. It may surprise some, not others, that there are no international requirements for ships that sail on the Arctic, or the Antarctic above open ocean requirements. Clearly the risks are different, you would think the requirements would be different, but they're not.

We've heard a lot today about traffic projections. I think it's safe to say that it will get busier up there. Four projects that are shipping destination; ships will go to a port, and the Port State Program can do its business to ensure that the ship is meeting whatever the national or international requirements are. If we start seeing trans-Arctic shipping that's no longer the case, just keep that in mind.

Lawson spoke about the *Explorer*, a number of incidents in the Antarctic in recent years and the Arctic, the Canadian Arctic. But, it wasn't until the countries of the southern hemisphere really began to take notice of their SAR requirements and the challenges to rescuing passengers or responding to spills, that the Arctic, the IMO, put the Polar Code back on the burner.



So, prevention is a substitute for expensive response infrastructure. There's no towing. There's no salvage; very little spill cleanup equipment, and if there were those resources in the Arctic, deploying them, the logistics of deploying them, extremely difficult. Also we heard this morning from the second panel that there is something unique about the Arctic environment, whether it's pristine or fragile or whatever adjective you use to describe it. There is a sense that both the Arctic and the Antarctic require some extra degree of protection.

So, more Arctic shipping history – a polar code has been under development for two decades, it's somewhat of an embarrassment to admit that, but that's the speed of international rules. And things go along relatively quickly, if you can call two decades quickly, towards a code that's not mandatory, a recommendatory code or guidelines. As soon as you start to try to make them mandatory things gum up. And that's where we are today. In 2009 we had a renewed set of Arctic guidelines and immediately moved to make those mandatory. The plan was to have that work complete by 2012. The Polar Code Working Group has just renewed its own mandate for another two years. And I wouldn't take a bet on the code being completed by 2014. The small island states and non Arctic players are now looking at this seriously because it will affect ships under their flag. And their interest may not be aligned with the Arctic country interest.

So we've heard a lot of this today, it's pretty clear with a world of natural resources we're going to see more traffic. My message if you haven't got it yet, or one of them is, let's try to prevent the accidents, response is extremely difficult. We also know that Canada and the U.S. have very small international fleets, so it's pretty clear that the ships that will sail in the North American Arctic won't be from Canada or the U.S. So an international code only makes sense, if nothing else but to give us more access to international shipping. Also it makes sense because if we don't know the standard the ships are built to, and today there are a dozen or more class requirements for vessels, it's hard to assess one class set of rules against another rule.

So quickly running through what we have today in the Arctic for regulatory regimes. The Baltic countries have a set of rules for the prevention of accidents, prevention of spills in the Baltic countries. It's well established, but it deals only with first year ice. It's also an economic regime in that it has minimum power requirements. And minimum power is almost a contrary to safety. In fact a lower power ship may be less likely to damage itself, so there's a push and tug on the whole notion of power requirements in the polar code.



There's a very well entrenched Russian system and it's unique, it's fee based. With apologies to our Russian colleagues here, it sometimes lacks transparency. You may not know what your fee's going to be. You need to apply to navigate the Northern Sea Route two months in advance. It requires ice pilots. But it's based on UNCLOS 234, so we think the Russians are right.

In Canada we also have a unique national regulatory regime. It's 40 years old, and in many respects out of date. It's quite expensive to us to develop or try to stay on top of new regulatory of standards. So we would prefer to harmonize with an international system.

Denmark has some simple rules for navigation around Greenland; essentially they're to deal with the safety of passenger ships. In fact Denmark is fixated on the priority of passenger vessels. And I guess until you have a significant spill, it's hard to have the same sense of priority for spill prevention.

Norway has requirements around Svalbard. They have ordinary open ocean requirements around the Norwegian mainland. But their priority is the carriage and use of heavy fuel oil. They'd like to make some progress there; in fact they'd like to ban it. And the U.S. at this point as far as I know has no special requirements for Arctic shipping.



So where do we want to go? We want to harmonize, have one set of global rules. It's going to be a challenge because the Arctic and the Antarctic are, and I hate to use it, but they're poles apart in how they view the environment. The Antarctic wants to preserve, conserve and



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the Arctic, we're considering, well we want to promote sustainable development.

At lunch today we heard a little about the *Renda*, a fantastically successful operation. We were watching it with great interest because it is drama on the seas, but also it was done successfully and we have also faced challenges getting fuel to small communities. The ship that delivered the cargo was Russian. Built to, or the equivalent to a Baltic Ice Class, which means it doesn't have double hull everywhere. And we're left wondering how do you assess the adequacy, the safety of that vessel in that environment? Did it go beyond its design strength, how do you calculate that? If we had one set of global rules for Arctic shipping or polar shipping that would not be a difficult question to answer.

So a Polar Code status – there's a working draft. There's a ban of any talk of environmental provisions for a year. MEPC [the IMO Marine Environment Protection Committee] has weighed in on the ways to implement the code in a mandatory way. And well, the new deadline is 2014 for the working group to complete its work. I hope it happens. So, questions that we need answered in order to develop an adequate code all revolve around what is the required level of safety and environmental protection. Until Canada, the U.S. and the other Arctic States can articulate what level of protection is necessary, it's really hard for us to convince Cyprus, and Bahamas and Panama that there should be requirements for Arctic shipping.

To sum up, prevention is preferable to response. Let's try to get rules in place before we have an accident. Otherwise I'm pretty sure that we'll go too far in our regulations. There's an opportunity for the U.S. and Canada to look at what's reasonable and what's appropriate for regulation of Arctic shipping and to convey that to the rest of the world. We need to set our own agenda, rather than have other states do that for us. So I guess the final, the closing of my sales pitch is here. The IMO delegations have technical experts. They have architects, master, chief engineers and so on, they even allow lawyers on the delegation. But we need the policy advice behind us to effectively negotiate our appropriate polar code. Thank you.

Professor Allen:

We have time for one or two questions to Captain MacDonald - yes?

Question:

Professor Wainwright from the Academy. I'm just curious with the long period to develop this code of rules, there must be sticking points. And I wonder what's to prevent parts of the rules to be developed, and then parts later?



CAPT MacDonald:

20 years isn't fast enough? There are some concerns that new rules increase costs for shipping, and the resistance to extra cost is palpable at IMO. Ship owners don't want to see that. But also there's a sense that if you do put additional requirements for coastal navigation or central Arctic or even fringes of the Antarctic navigation, then you've put some kind of restriction on the navigation of those areas. So a polar code will require some kind of surveillance or monitoring to show that vessels going into those areas are complying with those extra requirements. And that is a tremendously sensitive area.

Question:

You mentioned that recently there was a decision to separate or segregate the departmental issues in Polar Code. What's your opinion about that? Was that useful stuff or is controversial by now and do you see this coming back together?

CAPT MacDonald:

The Canadian position is to keep safety and environmental protection together in the development of the code, and there are some practical reasons for that. First is that, if you completed the safety part first which some countries Denmark in particular espousing, we may never get back to an environmental section. But more on a technical note, some requirements that you might put in place for safety could be counterproductive for the environment. You could design a propeller for safety that makes a whole lot of noise, and is of concern to sea mammals; that sort of thing. And then some of the provisions are common so it doesn't make sense to deal with them uniquely. Double hulling for example is a safety and an environmental protection, provision.

[inaudible audience question]

CAPT McDonald:

That is a technical nuance in the regulatory development so far. I didn't mention that the requirements for ship design, the structure and



equipment, have been developed and are ready to go under IACS, the International Association of Classification Societies. And the IMO is supposed to be looking after the operation and the navigational elements of the Polar Code and it will incorporate those ship design requirements. But you're right; there are no specific requirements for icebreakers even though the higher polar classes do have ramming as part of their consideration for their design so.

Professor Allen:

Thank you. We have heard from two broadly experienced mariners with considerable time in Arctic waters, who have been exercising leadership, both in the development of the five year AMSA study and then the follow on work on the Polar Code. A 20 year incubation period suggests that we clearly need greater leadership in this area, and we appreciate the leadership you two have provided.

We're going to shift gears. So far, we have focused mostly on shipping safety, safety of life and property at sea, a traditional Coast Guard mission under the maritime safety rubric. We're now going to shift to the offshore oil and gas industry. Our next speaker is known to many of you, he is retired Rear Admiral James A. Watson IV. Admiral Watson was sworn in as the first Director of DOI's Bureau of Safety and Environmental Enforcement on December 1, 2011. In that capacity he is responsible for promoting safety, protecting the environment, and conserving resources through vigorous regulatory oversight and enforcement of offshore operations on the U.S. outer continental shelf.

Prior to his appointment as the BSEE Director he served as the U.S. Coast Guard's Director of Prevention Policy for Marine Safety, Security, and Stewardship, where he was responsible for maritime casualty investigations, traveling inspectors, water-waste management, boating safety, commercial vessel safety and security and cargo safety and security.

Admiral Watson also served as Deputy Commander of the Coast Guard Atlantic Area Command in April 2010, then on June 1, 2010 was designated as the Federal On-scene Coordinator for the government-wide response to the *Deepwater Horizon* oil spill in the Gulf of Mexico. Admiral Watson is a 1978 graduate of the U.S. Coast Guard Academy with a Bachelor of Science Degree in Marine Engineering, and holds two masters degrees in engineering from the University of Michigan.

My question for Admiral Watson is prompted by Vice Admiral Brian Salerno's comments this morning. Vice Admiral Salerno remarked that "while we do have a clear articulation of strategic national policy



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interest in the region,” and he’s referring to National Security Presidential Directive 66, “We have no clear path to achieving them. We lack a national strategy to guide our way.” So, Rear Admiral Watson, I ask you - do you agree, and if so does it worry you that we don’t have a national strategy for the Arctic. Please join me in welcoming Rear Admiral Watson.

Director James Watson:

Thanks, Craig. It sounds like I have been set up by Brian Salerno again. But, no, it’s a real pleasure to be here and I will take on that question. I have basically three segments - and I have to do a little BSEE branding here - then I’m going to touch on some of the pending things going on in the Arctic relating to oil and gas exploration. Then I’ll get to that question from a Department of Interior perspective at the end.

First I wanted to point out that we are at the 100th anniversary of the *Titanic* sinking and this is the Coast Guard Academy. I was just reflecting on the remarks here about the Codes. We have a great history in the U.S. Coast Guard, particularly with people who have come from the Coast Guard Academy, and following the *Titanic* there was the creation of the modern Coast Guard. Almost immediately, Coast Guard Officers began development of the safety or life at sea -- the standards and the codes that we now have as a result of that accident.

I was recalling - and I wanted to point out to the cadets that are here - when I was here there had been no liquefied natural gas ships coming into the United States. So, as a marine engineering major, we had a three semester design project, and I got thrown right into that. “Figure this one out Cadet Watson.” So I jumped right into it, and I’ve since sort of spent a whole career. We did develop a code, internationally, the Liquefied Gas Code, and so there is always a wonderful opportunity ahead. Whether you were in the original Coast Guard in 1915, or you’re just graduating from the Coast Guard Academy in 2012.



I think the Arctic is not passenger vessels, not the LNG ships, but a whole new area for Coast Guard Academy engineering graduates, and other majors. Because in the case of the Arctic it's as Lawson touched on, it's about the environment up there, the native peoples, the challenges of different activities going on in the same ocean, and the fact that what happens in one part of the Arctic that might be in one country's EEZ is probably going to affect another and so on. So those challenges, I think are even greater than some of the one's we faced in the past. But we have a great history of doing that as Coast Guardsmen, and women.

So, let me take a moment to do my BSSE branding here. [Pointing to schematic slide] These are our primary functions. It's a function that was part of the old Minerals Management Service (MMS), which is no longer as a result of the *Deepwater Horizon* incident. This is an organizational structure, which I'm a lot more familiar with having come from the Coast Guard, because the focus is purely on safety and environmental protection. Those other functions, like doing the five-year strategy for developing the outer continental shelf for oil and gas and now renewables, that's done in The Bureau of Ocean Energy Management, and then there's a Collection of Revenues function that's done by the Office of Natural Resources Revenue. So that's the "new MMS," and my responsibility is to promote the safe and environmentally sound development of our outer continental shelf resources.

The activities that we're all here today to learn more about have to do with the Chukchi Sea and the Beaufort Sea, and there are some



particular challenges with regard to spill response, containment, infrastructure, logistics and response. I've brought with me some information that will provide a little bit of a detail about the response plans that BSSE has approved just recently for the Shell operations in the Chukchi and the Beaufort Sea.

Before I move on - and I have a lot of detail on response - I was really glad to hear Admiral Ostebo express such high confidence in the hole-in-the-ground. But I really have a lot of confidence in the hole-in-the-ground as well. In this area there is going to be unprecedented oversight of that. So, from a prevention perspective, as Ross mentioned, that's got to be where you focus here, despite every effort to put as much into this response planning and equipment and training and exercising as we will be doing. The key is the prevention, and keeping the oil in the pipe.

I look at that as a challenge, but I also look back at my experience with those LNG ships where there was a lot of nay-sayers and I'll be happy to say that I'm not aware that we've lost containment in all those years in that LNG shipping industry. So, I am very confident that we are going to be able to do that in this case of drilling. Not just in the Arctic, by the way - I'm committed to keeping the oil fully contained no matter where we're drilling in our exclusive economic zone.



Here you see a picture of the *Kulluk*, which will be in the Beaufort Sea. That is an ice strengthened platform. Among other things, there is an extensive plan for what's labeled "ice management" in the plans, but it



amounts to a warning system, in my view, that appears very much like our hurricane warning system in the Gulf of Mexico. It's actually a color-coded system that's based on number of hours that this threat might occur, that would exceed the safety limits the *Kulluk* or the other vessel, which is called the *Noble Discoverer*. There's actually a very confident plan for unmooring these vessels and just simply getting them out of the way. Temporarily plugging the well and moving them out of the way that is very similar to what you would find in the Gulf of Mexico when hurricanes come through.

This is something the industry does in lots of places in the world. The only difference is that ice is the threat instead of a typhoon or hurricane. As Tom [RADM Ostebo] mentioned, we do have a commitment to put the BSSE inspector on board 24-7. There is a little bit more to this as well. Shell and a number of the oil companies now have quite a capability to do remote monitoring of the information that can be gained from the wellbore itself. Information that comes directly from right behind the drill-bit, as well as devices that monitor the condition of the blow out preventer, the mud weights, the cement, all of the critical aspects of drilling a well.

In the case of the operations in the Arctic - and I want to make sure that you all don't quote me - these particular activities have not yet been permitted. We're still in the process of reviewing that. But were they to get permitted, we already have an agreement with Shell, not only to have an inspector on the rig 24-7, but also have continuous remote monitoring that BSEE engineers back in Anchorage will be using to guide the inspector in their activities onboard each of these rigs.

Some of these activities may call for getting the inspector up in the middle of the night and validating that some particular aspect of the operation, that is being conducted exactly how it was intended to be in the permitting process. This is a new concept and that's one of the advantages, in my opinion, of having a new area for oil and gas exploration as we can do these things, we can move the bar up, and then when we can show successfully that these things don't break the bank of the operators, they do improve safety, we can accommodate that within the federal government as regulators. Then we can move on and expand that elsewhere in the industry.

[Pointing to slide] These are some details about the oils spill response plan for the Beaufort Sea that you wouldn't find in any rules or regulations. These are the things that we have reached agreement on between BSSE and Shell. Their old Beaufort Sea plan - and there have been a lot of wells already drilled in the Beaufort Sea actually, both in



Canada and the U.S. There are at least 60 U.S. wells that have been drilled, mostly back in the late '80s and '90s, and a handful in the Chukchi. So this isn't entirely new.

In the Beaufort, there will be a closed window because of the migration of the Bowhead whales up there. And we did dramatically increase the size of the worst-case discharge scenario for the purpose of our planners to have to put into the plan a very robust response. As well as causing the company to do trajectories in a variety of different wind and weather conditions for 30 day periods. So we're requiring that they have equipment for dispersing application *in situ* burning, as well as logistics for a response that would be for a 30 day period of oil flow.

Those last two bullets [on the slide] shouldn't ever happen. In fact, the whole thing should never happen, but there's a planning factor that calls for mechanical response capability for 100% of the worst-case scenario. So you shouldn't ever see those things and I'll show you that picture in just a minute.

There is no infrastructure in the Arctic, so we basically are bringing it. This is going to be, when I say "we" this is the BSSE imploring and then holding Shell accountable for a response plan that is totally from the sea and not from shore. There will be small vessels and some booms staged ashore, again, that shouldn't ever be needed.

The primary response is that there is a fleet of vessels, ice strengthened vessels, barges, a containment system that you would find for deep-water wells in the Gulf of Mexico, this is a shallow-water well, but there is a new containment system that will be coming to the Arctic, it's in Seattle right now, it will be inspected first. The volume and the capacity of this floating ready response equals our worse-case scenario. I can show you how that works.

In the first two hours, you get the "Task Force One," which is the task force that's immediately next, and this for the Chukchi example. And these two operations - it's critical that they both be permitted. If you don't have permits for both then neither will happen, because one is the provider for the other in any kind of emergency. So, you have a certain level of response within two hours. There's the four hours, and you can see this includes transit time for those vessels which are by permit not going to be immediately in the area because you would overload the air emissions in a concentrated area. So they stand-off by reason of the air permitting.



At 24 hours - now you've got quite a capacity there, between four different task forces on-site. And then you're starting to move in, by this time you've shut down the *Kulluk* operation over in the Beaufort and you're using just about everything from the *Kulluk's* operation over at Chukchi, including ultimately the *Kulluk* itself for the purpose of drilling a relief well, like what we saw at for the *Deepwater Horizon* incident. And so now you've got all those task forces, and they're still coming and there goes the *Kulluk* itself to actually drill the relief well. In the case Chukchi, the drilling season was shortened by these 34 days and that would ensure that the relief well was completed before the ice season occurred. The ice season is assumed to be on November 1st.

I'm going to wrap up. There's the *Discover Enterprise* that's in Seattle now. It's being inspected by the Coast Guard and BSSE and then it will head up for the Chukchi.

Shifting to the question of strategic planning. I think the issue for the Interior Department is not one that we are quite as critically in need of a national strategy that will support large budgetary expenditures, and build out of force structure, and ships, and planes, and all of that. In the case of Interior, for a new frontier like area like this, what's critical is interagency coordination, and we've accomplished that and are actually in the process of these oil spill response plans. I'm looking at [U.S. Coast Guard Captain] Bill Burns; he had a lot to do with that.



I think that that has probably been a pretty good success, because for the first time we did have a lot of interagency collaboration, we even had public input to these oil spill response plans. So the way ahead is that they, as I mentioned before, Shell needs to have approved drilling permits, we're in the process of doing that. The difference between what they have now as a leaseholder is that the permit is actually a very detailed engineering plan that is going to be gone over with a fine toothed comb by BSSE petroleum engineers and structural engineers and so on.



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Projecting out, I think what we heard this morning is that there are big numbers for the estimates of undiscovered but technically achievable oil reserves in the Arctic, but this could change the distinction of undiscovered to discovered. When that happens, we're projecting that we could have to have a much bigger office in the area; our office is currently in Anchorage. We really quite frankly haven't figured out how to project ourselves. We're very sensitive to the limitations of place like Barrow and so on. So, those things will still have to be determined. But we do continue to want to leverage the interagency workgroup concept, the eco-system base management concept, and I think most importantly, going back to my comments to the cadets, I think we'll be working through the Arctic Council as we look at what we learned from this and how that might be applied in a more international way. Thank you very much.

Professor Allen:

We have a time for one or two questions for Director Watson.

Question:

You mentioned the permitting process and I think what one of the lessons learned from *Deepwater Horizon* was that there appears to be a consensus there that one of the issues was really a prescriptive permitting process as opposed to performance-based. I got very concerned when you started talking about all the suspicion you're hearing. Can you just advise me of any iteration of a prescriptive process when the technologies involved are not necessarily known that well (inaudible)? Have we evolved at all to a performance-based process?

Director Watson:

This is a huge area that I'm taking on as a new director. You don't just change your regulations overnight, you don't just change your way of ensuring safety and security overnight. But we are introducing this concept of performance-based review and oversight. This goes to the concept of actually having an inspector there using the real-time information. And that is a more performance-based oversight, and yet we can still use all of our authorities as regulators. It's going to take a little bit more time to inject that into the permitting process, in the meantime, I would suggest there never has been a totally just checklist kind of plan review for these wells.

I've learned a lot about the business of drilling wells and doing production in the offshore just in the few months since I've been in this job. And the one thing that's just been made very clear to me, it's much different than building a ship, or an airplane, or a bridge, or a building. The conditions that you actually see in the field might not



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ever be exactly like the engineers reviewed on paper. Nobody knows what's down there for sure until you get down there.

What we experienced during the *Deepwater Horizon* was a dramatic change in the geology that caused the drillers to lose well control. And so that, as much as you would do, even if you used a performance-based standard during the permitting process, you have to focus on performance during the actual operations. So we're going to be looking at things, one of the first areas I'm going to focus is the blow-out preventers quite frankly. We've also got a rule making that is due to come out very soon; that is about - we call it the safety rule for the cementing, and the casings, and the mud control, and well control itself. But we have a long way to go to really get there.

Question:

We heard this morning about the cold water temperatures in the Arctic, and as I understand it one of the consequences of the cold water temperature is you don't get a lot of bacterial activity that would help in the degradation of the oil spill. There's a big difference between a minus 1.5 Celsius and 25 Celsius, between the Chukchi Sea and the Gulf of Mexico, in terms of how much you can rely on those natural phenomena to assist you. Has that factor been put into the calculations as to what kind of human response you would need if you couldn't have that bacteria back-up like you had with *Deepwater Horizon*?

Direct Watson:

In oil spill response planning, we use these gross numbers. In fact, we've been criticized by putting safety factors, upon safety factors, on the amount of oil that you would need to plan to recover mechanically. So, I would say that the answer to your question is there's a lot of interest in the scientific world to get the answer to your question regarding what would happen in the real-world. In the planning world we just assume there's very little dispersion and bio-degradation of the oil, that's just the way have to deal with it right now. And I think there's going to be some real interests as more drilling were to occur out there, to try to refine, I'm already hearing that from the industry.

One of the points I'd like to make is that we do have in our authorities the allowance for us to compel a company to use the best available and safest technology. So, once this bar is established, that is the best available and safest technology until something better comes along. So, I think that we will have set a high standard and we intend to maintain that, we have the authority to maintain that. And I think that will be good not only for the United States but ultimately for the world.

Professor Allen:

Thank you, Admiral. I now want to introduce our last speaker. Once again we're going to shift gears. We're now going to enlist the aid of



one of the nation's if not the world's foremost experts on risk-based management.

Our next speaker comes from the University of Washington. Tom Leschine is the Director of what is now known as the School of Marine And Environmental Affairs. He is also the Ben A. Rabinovitz Professor of Human Dimensions of the Environment. Tom has served on numerous National Research Council panels and is currently Vice-Chair of the NRC Marine Board. In Washington State, he serves on the Near-Shore Science Team. He was also deeply involved in the Aleutian Risk Management Study we have already heard so much about, and was also involved in the Federal On-Scene Coordinator's report following the 1989 tank vessel *Exxon Valdez* oil spill.

I want to open with a question for Tom: National Security Presidential Directive 66 mandates a risk-based approach to the Arctic. Having heard about AMSA, about efforts to develop a mandatory Polar Code, and about BSSE's approach to risk assessment and management, are you satisfied that we have a prudent approach to risk management for the Arctic? Please join me in welcoming Tom Leschine.

Professor Thomas Leschine:

Can I just say "No?" We haven't used the word 'risk' very much this morning, and I am here to talk about that.



I'm going to try to serve as the panel's discussant and summarizer and also talk a bit about what the NRC is doing in risk. I should mention, by the way, that I'm feeling a little bad. I'm glad Craig said the nice kind things he said, because I'm the only one with no Coast Guard experience either Canadian or American. Although my best friend and



I used to sit on the banks watching the coal barges go by outside of Pittsburgh, and we talked about running away to Canada, it was never with the thought of joining the Canadian Coast Guard, and it was before the Vietnam War, so let's just get that out of the way.

So, in wearing as couple different hats here, I'd like to start with the central task - to talk a little bit about risk, and I guess what I'll call Analytics fit into this game. Risk has come up, and lots of threats and challenges have been mentioned, but risk analysis hasn't been brought in, even though one of the best examples of a comprehensive risk analysis is underway in the Aleutian Islands right now, and Admiral Ostebo alluded to it a little bit.

As I was thinking about a title for my talk and taking notes I thought "Arctic Analytics," wouldn't be bad. Then I thought that could be the name of a future research firm, and I bet there's going to be one something like that pretty soon. In fact, there's an organization in Alaska now called NUUKA Research and a lot of risk analysis work is coming their way. What was interesting about this - and really David Caron said it very eloquently last night - it brought me up short because I started thinking, my god, I don't think of the Arctic this way. I think of the Arctic in terms of his "image one." You know, the trackless wilderness, the place of great challenge, the final frontier, that's the Arctic. My imagination was fueled by reading Barry Lopez's *Arctic Dreams* - a sensational book, its poetry; it's not anything about reality. So we're bringing this reality into this world of maybe poetry up until now. But yet it's also a world that's lived in, that has one of the most remarkable accomplishments of humans on the planet - to survive in that environment for thousands of years; the people that have been able to do that, the indigenous peoples.

I heard a couple of things that lead into talking about risk. I liked what Dr. Elliot-Meisel said. She said "leaders seek cost-effective approaches." I think that was toward the end of her talk. Good point, and one of the main things that analysis can do for you is help you decide what's cost-effective and worth doing and what's not. We're in a position where we're moving fast and we don't always know the most cost-effective thing to do. I also liked the thought about the hole-in-the-ground versus everything else. Because I'm kind of on the side Admiral Ostebo, that the hole-in-the-ground is probably pretty well under control, but the hole-in-the-ground is the starting point for a whole lot that is going to follow. So we don't want to trivialize it when we look at the current problem of risk.



I am worried about Unimak Pass more than I'm worried about the hole-in-the-ground right now. So, another facet of risk management is that you are often driven to do the things that the public is concerned about, that the press is worrying about, and it's very difficult to go against those trends, and look more dispassionately as analysts are supposed to do at problems of risk.

But planning and preparation go on, so I liked to hear about the Arctic Shield. In other words, let's just test readiness in every way we know how to test because we have to be ready. And that Aleutian Islands Risk Assessment is taking a longer time to complete than many of us thought it would. It's large, comprehensive, and expensive, and you can't do too many of those before you're in the theater of operations as it were. Also a lot of attention is being given to native communities and this is very important, in fact I could come to another point, risk assessment is often a black box. The gift we're getting is referred to as a black box.

Black box analysis is less useful than analysts like to think. Because we don't understand the basis for conclusions about what's best to manage risk. We don't tend to believe them. And if we haven't been invited to the table to talk about risk, to make sure that risk is defined meaningfully in terms that matter to us, then we may not be ready to accept the analysis is done as valid. So these are difficult problems and it's heartening to hear and to know about the extent to which native communities have been brought in to the dialogue. I think one of the great credits to the AMSA study led by Lawson Brigham was to highlight the native communities and to bring them effectively into discussion and indeed the work of the Arctic Council in that regard.

With all that we've heard about uncertainty - the science is uncertain, but so is the development path forward. One of the things that strikes me is that we're kind of the regulators and the people who want to think about what the standard and the rule is, and yet market forces are going to determine what happens in the future. So those are really important things to think about.

There was a *New York Times* insert on energy that I had in my hands as I flew out here yesterday and I got to read a lot of it. It's really not clear what the energy mix of the future is going to be and it's one thing to look at \$100 plus prices for a barrel of oil, it's another thing to realize that all the natural gas is being delivered through fracking. So what are energy companies really going to want to do, and what's the cruise ship industry going to want to do, we haven't talked about them



very much. Probably right now that's the fastest growing activity in the Arctic, cruising. And we heard about the Polar Code.

Let me talk a little bit about Analytics since I committed to do that. I think there are four kinds of things that I see that are important to this discussion. First of all, risk analysis and risk assessment is a tried and true technique long with us and it is being used, has been used, and is really important because it does help us sort through that question of what are the cost-effective things that really will reduce the risk that we want to do. Of course, that often works against many popular ideas about what we should do or what people want us to do, a difficult choice.

But another thing is scenario analysis. Risk is about quantifiable uncertainties; sometimes that's the definition. Scenario analysis is what you do when you don't think you have much control, and you don't think you are very certain about what's going to happen in the future. So you talk about the plausible, and one of the things the AMSA report did very nicely was to lay out some broad scenarios about the future development of the Arctic. Because we don't know how the Arctic is going to develop, how are we going to really manage the risks into the future?

I was taken by *The President's Commission Report on the Deepwater Horizon*. I thought one of its major conclusions made a really striking finding. That two things happened, there was the kind of creep of the offshore industry into deeper water into a more hazardous environment. It was slow, gradual, happening over decades; things were getting riskier in a slow incremental way. We were getting to a place where we were relying on robotics for things that's we used to be able to do with real humans and divers and ships. So there we were. But the other thing was even more fascinating, it was that the oil industry itself had become much more complex, and a system of subcontractors are essentially what drives major oil field development and exploration.

I've also worked on nuclear waste in my career, even though it's not marine. The Department of Energy in trying to deal with the clean up of the defense waste sites, invests huge infusions of money and [it's] a politically important arena to get into. We were not able to - in doing that - reliance on subcontractors ended up being the reason why huge expensive mistakes were made, and radiation was released. Rules and operating procedures don't necessarily get handed down to the third subcontractor in line. And that's seems to have been some of the problem, the deep underlying problem with *Deepwater Horizon*.



I'll say one more thing about scenario analysis, and that is that you have to do scenario analysis at the local level as well as at 30,000 ft. level. The Coastal Response Research Center at the University of New Hampshire did a nice workshop where they looked at scenarios of what can go wrong with a vessel in transit. They developed what are called bow-tie models. You know the fault tree that can lead to an accident, the events that's would happen afterwards - will you be able to rescue those passengers who are now going to be put out into lifeboats in a field of ice. Looking at that level of detail, at the things that can go wrong, it's daunting.

Decision support – I want to say one sentence about support. Decision support systems are really important to managing the whole environment and the thing called Arctic ERMA - Environmental Response Management Application. I think with a better name Arctic ERMA could sell. So, this is a big GIS-driven management system that really showed its mettle in the *Deepwater Horizon* spill developed by NOAA, and Arctic ERMA is really interesting because it's an attempt to develop something like that for the Arctic to give, I guess, a battlefield awareness basically, but in the world of shipping and other activities in the Arctic as well.

Lastly and quickly, what the National Academy, the National Research Council is about is worth mentioning. [Holding up document] this is the study that gave rise to the Aleutian Islands Risk Assessment. There's a technical review panel associated with it. I'm a member of it. This is really setting a very high standard for risk assessment, a very comprehensive look at the whole traffic mix going through Unimak Pass, and throughout the chain. Admiral Ostebo mentioned some of the findings or some of the changes that already being made based on this study underway.

This is a \$3 million undertaking. The money was only there because of the *Selendang Ayu* settlement. I'm not sure how many more of those we're going to do, but this is setting a standard that is very high in this realm. The National Research Council has three boards that deal with things Arctic. The Marine Board, that I'm a member of. There is also the Polar Research Board and the Ocean Studies Board. And for all those boards the Arctic has really consumed a surprising amount of our attention. The Marine Board met in Anchorage last fall and we are planning a workshop in Seattle in October called Navigation Safety in the U.S. Arctic. We hope a wide variety of stakeholders will attend this workshop still being planned for mid-October. Because we want to try to lay out on the table, as well as we can with an eye toward defining



future studies, what are the navigational issues that the widest possible group of stakeholders will see and what can be done about those.

The Ocean Studies Board and the Marine Board are trying to partner on studies, for example, about the capacity for environmental response in the Arctic. That's another important activity that we hope we can do, in fact all three of the boards will probably join in that activity, and I think I will stop here. Thank you very much.

Professor Allen:

Thank you, Professor Leschine. We have time for a couple of questions. I will give the first word to Professor Brigham who wanted to say something...

Professor Brigham:

Yeah, I thought someone should say something about this Arctic strategy, so I'll try being a little controversial. The United States has a nuclear submarine force operates for 50 years under the ice, tremendous investment. United States has the largest investment in research at both ends of the planet times something for all the rest of the countries. The United States is a proactive player in the Arctic Council, negotiates treaties, you know shapes agreement, and leads many of the assessments and invests heavily in the Arctic Council. I could go on and on, there's a long list of proactive things. So it's not all bleak.



So I would ask the question of, and we have a national policy signed by the President of the United States, we have a national academy involved, and a whole host of over things. Intellectually at the Arctic Council, I'd put money on that we're pretty close to the top there leading things. And so I want to know, what kind of Arctic strategy we want, what kind of integrated Arctic strategy? To me it sounds a little bit like the USSR. Integrated, comprehensive, something government



led, you know. Ours is multidimensional, commercial, science, security, and we do a lot of that. Maybe we need an integrated Arctic strategy for development of The United States Maritime Arctic, but even that's a little tricky, all driven by the United States Government. So my question is what kind of Arctic strategy do you all want? We're doing lots of stuff, I think we have an Arctic strategy, I think it's multidimensional, but it's not cast as some grand plan.

Professor Leschine:

Since I was the speaker I'll take this one.



I don't really have the answer to your question, it's a great question. One answer to your question we want ecosystem based management, that's what we say we want. And you know I was taken by another point that David made in his remarks last night. He talked about the school children lifting up the desk drawers to see how many pencils they had. And that we are pursuing sectoral based management right now. We have a cruise ship industry, we have an oil industry, we have shipping, and we have globalization of the Arctic, Lawson's words. I think we want ecosystem based management, which isn't really necessarily directive, but it is sort of using principles of integration and breaking down sectoral barriers and kind of looking for the common interest. You know the trans-boundary pollution should be the basis, if we believe our international theories that drive law, it's a place where there's a common interest in avoiding this problem and there ought to be common ground there for getting beyond the sectoral debate.

Professor Allen:

Well thank you for that Tom, because my students in fact are going to have a poster presentation for you this evening down in Leamy Hall. They've prepared comments on the Presidents National Ocean Policy Implementation Plan, looking specifically at ecosystem based



management, coastal marine special planning, and our response to the Arctic. So encourage all of you who are interested to meet the cadets and listen to their presentations, we're also going to have some from the MES students down there as well. Questions?

Question:

I'm going to read the book. It was an interesting panel, but it's all about process and what I would like to know having read the (inaudible); and also, looking back on everything over many, many year, well before the *Exxon Valdez*, nearly all of these [captains], first of all is a result of a corporate arsenal. A safety program, safety management, while the ISM Code generally tend to fall victim to the finance department, the leadership office of the major oil companies, and this was somewhat touched upon in the presentation before.



But I didn't hear anything about that today. I heard about the process, and if I may go over what I hope is a constructive criticism, it's not meant or intended to be. I will make a bet with all the money I have, don't have, that BP's safety record from here on out is going to be excellent. Not just for their tankers, but also for their onshore operations. How much do you want to bet? You know why, because the industry, including BP is going to throw a heck of a lot of money at all of these processes, which they didn't before.

I apologize, this is not a question, but I think it's important when we gather in these kinds of things to ask the question of ourselves. And isn't this whole issue of quality management, safety management and analyzing the whole element of risk in the Arctic, shouldn't we ask the oil bigs right now "How much money are you guys putting into all of this, in terms of safety and that?" We know what the risks are and we know where the systemic problems are. We also know what's going



on, we've seen the plan. Now how much money are they prepared to spend in their budget on safety matters?

That ends in a question. So I think that's not a question directed at you, but you guys are the regulatory, a very large part while you're working as consultants and I must say please ask these questions. This is a question that needs to be asked by the government, the new government in Alaska: could you please ask the question "What's your budget?" Exxon Mobile, then Exxon, never had another major accident after *Exxon Valdez*. Of course they didn't.

Professor Allen:

Well let me give that to Director Watson because I think he did talk about the best available technology, which is not a question of budgets and also performance monitoring, so Director Watson.

Director Watson:

Yeah I'd like to address that because I think corporate responsibility is very, very important. That's certainly one of the main things that we do at the Bureau of Safety and Environmental Enforcement. I don't think it's the only thing. I like to tell the story to my people that we've got to change the culture of the guy on the drill floor. And the story I tell I think that most of us remember, when that soldier over in Iraq raised his hand when the President was there, and said "Why do I have to take my Humvee to the junk yard to put the stuff on so it doesn't get blown up by the IEDs?"

For some reason there wasn't communication between the guy who's out there fighting the war, and the Army which is supposed to be supplying him, and doing everything possible, and they're spending billions of dollars so money was not the problem. I think we still have that problem. Not only in the offshore drilling industry but I think in the shipping industry. You've had the ISM Code in the shipping industry for some time. We're just starting to introduce a thing called Safety and Environmental Management System, which is modeled after the ISM Code, but you can't necessarily get there from here.



You've got to also do something to create that safety culture on the drill floor in the different layers of management, so that those guys communicate when there's a problem. I want them to talk to me. I'm looking at the aviation industry; we have a pretty safe aviation industry these days. So I ask the FAA, "Well how is that." And they're attributing it to, non-regulatory things, where just about everybody in that industry is now communicating near-misses. And then they got the ability, it's taking some years to do this, to turn that information into knowledge, and to make it useful, not just to the government, but to the operators, to the designers, to everyone in the system.

So I think that that's where you have to wring out safety. It's not just throwing money at a problem, or sending the CEO to jail. I think you have to come up with a change in culture. I think you have to have different processes to do your regulatory thing. You know we had a little discussion over here about performance designed versus you know prescriptive design. I'm all for that. I think that we can't keep up with the technology that's being used in the offshore industry with our slow regulatory process, or the IMO process, or whatever it is, they're always lagging. So we've got to get out in front of that, and how do you do that? So we're working on all of those things but you can't just put all your eggs in one basket. That's my answer.

Professor Allen:

With that, please join me in thanking the members of the panel.





Arctic Maritime Stewardship (VI)

Panel 4

Leadership in Arctic Maritime Stewardship: *Bridging the Gap*

Moderator: CDR Russ Bowman – Chief, Law Faculty, Department of Humanities U.S. Coast Guard Academy

Panelists:

- Dr. Merv Fingas – Author, *Oil Spill Science and Technology*, formerly Chief, Emergencies Science Division, Environment Canada
- Dr. John Whitney – Scientific Support Coordinator, NOAA-Alaska Region Office of Response and Restoration
- Dr. Kathryn Mengerink – Senior Attorney and Director, Ocean Program, Environmental Law Institute



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CDR Russ Bowman:

Good afternoon, ladies and gentlemen. We have come to the final panel discussion of our first day. Following Professor Allen's reference to the *Coast Guard Strategy for Maritime Safety, Security and Stewardship*, we will now turn to maritime stewardship. It is certainly a daunting task to tackle stewardship in a 60 minute time block. We will not attempt to cover everything within the concept of stewardship. Maritime stewardship within the high Arctic was provided until recently by the environment itself with pack ice and extreme weather limiting fisheries, offshore oil exploration and production, and maritime transportation in the region; issues that we have heard referred to as dormant. They are no longer so.



In providing effective maritime stewardship for the Arctic government agencies, industry and indigenous and local communities will need scientific information on environmental changes - we heard about that this morning - plus new environmental response technologies and clear and comprehensive regulations and policies for marine environmental protection, conservation and management.



Our panel this afternoon will address some of the history and context in current capacity and capability to meet these stewardship challenges and do so in two venues. First, we will address marine environmental response. We're pleased to have with us today Dr. Merv Fingas and Dr. John Whitney. I'm going to introduce both of them and after their remarks on oil spill response in the Arctic we'll open the aperture and talk about stewardship more broadly, addressing issues with Coastal Marine Spatial Planning. You've heard some reference to also. Ecosystem-Based Management, which I think we'll also hear more of this evening.

Dr. Merv Fingas is a scientist working on oil and chemical spills. He was Chief of the Emergency Services Division of Environment Canada for over 30 years. He's been currently working in research in Western Canada. Dr. Fingas earned his Ph.D. in environmental physics from McGill University, three masters' degrees—in chemistry, business, and mathematics all from University of Ottawa and also a Bachelor of Science degree from Alberta and a Bachelor of Arts from Indiana. He has more than 800 papers and publications in the field, six books and two in the works. When we were putting the panel together anyone I called said "Dr. Merv Fingas wrote the book on that." So we are pleased to have him here.

His specialties include Arctic oil spills, oil chemistry, spill dynamics and behaviors. You'll hear some of his research and works in that field. Dove-tailing his presentation about what is known and what has been studied we have Dr. John Whitney who has served as the Alaska Scientific Support Coordinator for the National Oceanic and Atmospheric Administration for over 25 years. His responsibilities include the primary scientific support to the Coast Guard as well as to industry government agencies and stakeholders in the waters offshore of Alaska.

Dr. Whitney's background is in physics and geophysics having earned a Bachelor of Science degree in Physics from Occidental College in Pasadena and later his Ph.D. from the University of Washington. So without further adieu I'll turn it over to those gentlemen and let's talk about stewardship.

Dr. Merv Fingas:

Thank you very much. I'm going to just talk briefly about oil spills and my talk will be brief. I really didn't know what to talk about when Commander Bowman called me and so after some discussion with John we decided to split it up so that I would be talking a little bit about a historical perspective on oil spills with an emphasis on what did we gain in knowledge in the past. I'm talking about very general knowledge and how to manage these studies and that I think will benefit us all.



My first slide shows you a magnificent scene of the Northern Lights at Yellowknife this past winter, because of the sun's activity the Northern Lights were absolutely spectacular. Here is an overview of my topic. I'm going to look at glimpses of former major studies to give you an idea about what has happened and what did we learn about managing oil spills studies in the past and how it might lead to better management in the future.

The first study I'm going to talk about is the Beaufort Seas studies and most people here probably never have heard of these. These were conducted between 1974 and 1978. They were, believe it or not, supposed to be a series of one-year studies and it took all the efforts to actually compress it into four years, much less one year. They were major studies - that's tens of millions of dollars in "present value" dollars.

The Beaufort Seas studies were very multidisciplinary. They had 75 different areas covering everything from seals to whales to oil spills. They were so comprehensive; in fact that they probably counted everything that was out there. That's probably the last time it was done as well. George [Hunt] is nodding his head there. We had a discussion about this earlier. We should redo these studies once, just to see what shifts in population and locations have been since that time. They resulted in 75 technical reports and several summary studies. I'll just show you the pictures of the summary studies. The titles of them are quite interesting and quite apropos to today's work—birds and mammals, oil, ice and climate change. This is in '78 believe it or not. Oil spill counter measures. Crude oil and cold water, very interesting studies.

This slide will illustrate something that was a culmination of one generation of several scientists' works and that was to look at the



properties of ice. This was a very comprehensive study by these scientists who had discovered many years before this test took place that first-year ice was porous and probably porous to oil. Then they tested it in the lab and found out indeed it was. This is the full scale test of it. In 1977 oil was put out in [Ballina] Bay underneath the Beaufort Seas and sure enough in springtime it came popping up. Of course, as a planned venture in the second part of it was to move it by in situ burn and we were able to remove most of the oil by the in situ burn.

There are some lessons from the Beaufort Seas studies. Number one is that collaborative studies are best. We need several years to do a proper study. You can't cram in one year and expect to get some stuff. Expertise is most important. We rely very heavily on those in the academic sector who have studied that very thing sometimes for a generation. Information on transmittal is necessary. I bet if I took a poll around here nobody has ever seen a Beaufort Sea study. Is there anybody who has read one? See, I know all of you too well.

Information transmittal ended up being a good lesson here. A new set of studies came up and this is only one of several. I'm just highlighting it because I worked on it of course and that's AMOSS, the Arctic and Marine Oil Spill Study. It was largely funded from 1977 to 1987 then minor to the modern era. That minor funding really switched over to other issues such as southern oil spills, et cetera, et cetera. It was funded big as well. It was linked to several industry and other government studies. It focused on oil spills and associated environmental issues. There were many international cooperative studies and links. Some of the people sitting around here that raised their hands that actually had read reports were some of my best cooperators from the United States Coast Guard. They cooperated in studies with us for over 35 years. There are thousands of studies, literally, in this set.

There's a whole bunch of sub-studies in these lists. Basically all the sort of sub-studies you get when you study oil spills, it's not just some single study. And to focus on one item here that you should recall, we came out with a multidimensional informational technical plan and that was to transmit information at various different levels. Everything from technical reports to the white literature to an annual seminar which by the way was started by accident not started to do this. This year we're going to have the 35th one. So for 35 years we've been having an annual seminar on this topic but also on other topics.

I'm going to give you some example studies. This one I'm going to talk about it BIOSS Baffin Island Oil Spill Study. We built on purpose a camp. This was a purpose camp built here on Cape Hat which is right across from where that new iron ore mine is scheduled. If we look the other way you'd see where that new iron ore mine is going to be. This was completely in the wilderness at times, 100 miles west of Pond Inlet and you can see it was also very heavy international participation in



there and as usual led by the United States Coast Guard. You can see some of the flags of the participants here when they were hauled out one morning to get a picture of. The participants vary. The camp was occupied for three years but we've been going back every year for about ten years and then about every five years or so until now.



This year will mark the 30th year that the oil was put out and there is a team going in this year to actually measure the oil distribution at that site. This was also multidimensional information transfer. After a whole bunch of technical reports that nobody ever used or looked at, they were too extensive. We also published a special issue of the *Arctic Journal*. Kurdistan was a real major oil spill on ice. It was 10,000 tons and it spilled into packed ice off of Nova Scotia and we spent quite a bit of effort studying the spill there. There was a far north under ice, it was conducted at a location that was half way between the North Pole and what would be the Alaska north shore.

One unexpected result of this was we found that the abolition of ice was extreme. This on the return next summer was the location of where our tent was. You can see how much the tent was also blown away. Oil under ice detection studies were conducted in the southern Beaufort Sea off of one of the drill islands. Here you see some of the divers used down there putting oil surrogate underneath the ice for our prototype device. Some of the studies got a little carried away. One of the oil under ice studies they took the entire lot of the ice out with giant cranes and very heavy trucks and hauled it to some lab on the shore. Perhaps there could have been an easier way to do this.

In situ burning: there were hundreds of studies. This was a very important element we found that was very useful in the Arctic for



removing oil quite quickly. That shows three series of burns in completely different locations at completely different times. Oil on ice behavior studies; this is oil on packed ice study. We did put some oil deliberately in and look at its distribution over quite a period of time. This is an oil and ice behavior study again on packed ice. This will be defined as loose-packed ice here. We also studied a series of spills that were real. I mentioned the Kurdistan earlier; this was a Russian spill that occurred on the Boreal Forrest in Siberia and the oil actually went into the Arctic Ocean from this site.

And just as a comment, everyone was talking about maritime oil spills here in the Arctic being the only thing. Canada has an awful lot of land north of 60. In fact, we've got an awful lot of land north of 60 probably more than Russia has. We also have an interest in land spills as well. They are an issue right to this day. There was also a diesel spill in Alaska that we did a few studies on. That, by the way, is a rope mop [skimmer] recovering the diesel fuel from underneath ice. The fellow that you see there carrying the bucket is actually taking the diesel from the skimmer over to the tank and dumping it into the tank on the road, interesting scene.

Just a few lessons demonstrating that expertise is very important. Long studies are important, information dissemination is important as well and basic studies are essential. You have to get back down to the root science of some of these things. Collaboration is absolutely essential. There are different perspectives on ice and snow. Here are two positive perspectives. Here is somebody who actually built a house on an iceberg. I think that's a very positive reaction to ice. These fellows here are in Newfoundland, they've dug their car out of a very massive snowfall. My question is what would they do with a car after that? Where could you go?

Let's move on to some future studies. Use the knowledge of the past, read the literature, use the best expertise and design good long term studies based on good science as a basis. Use good Arctic background experience. There are a lot of folks who spend a lot of time studying this, use them. Collaborate and get results into the peer review literature. This is one of our downfalls in the past where sometimes we didn't do that. Thank you.

CDR Bowman:

We'll call on Dr. Whitney and then we will open it up for questions.

Dr. John Whitney

Good afternoon, everyone. Thank you very much to the Coast Guard Academy for inviting me to this event. I've been looking forward to it for several months and I'm very impressed with the caliber of the people here and hopefully you can get a lot out of it.



When I think of Arctic stewardship the form that I think about is actually doing a risk analysis and determining what risks are in the environment that you really want to control and you want to protect, and then doing something about that. That's actually the second half of a risk assessment is what are you going to do about that? So what I'm going to do is talk about a risk that hasn't been nearly as popularized as the normal risk that people think about in drilling in the Chukchi and Beaufort Sea and in the Arctic in general. Basically one that I think is an up and coming one that is really, really important and I'll have to admit that Admiral Ostebo sort of stole my thunder on that but I'll give you a lot more details on it.

Let's start with this slide right here. This is probably the major reason we're here right now. This is the Chukchi and Beaufort Sea off northern Alaska and on the left are the sale blocks that MMS [Minerals Management Service] at that time leased to the oil industry for a total of 2.6 billion dollars. You can see there in the red dots on the Chukchi block part of that green field in the lower right are the ten most expensive blocks. Now to spend \$2.6 billion was actually the highest amount of money that was put down by the industry ever in the outer continental shelf in the history of the sales that MMS conducted in the outer continental shelf. When I say that it kind of makes you wonder if the oil companies didn't know something in advance.

Well it turns out that 25 years ago there was another sale in the Chukchi Sea in which there were bids for. There was actually about five or six drill holes that were put down in pretty much that same area where the high value tracks were purchased. And in fact I think they did know something because they put down those holes. They knew what they were going after. That is the primary prospect that Shell will be drilling in this summer. The other prospect that Shell will be drilling in this summer—let's go backwards again, I'm having a hard time with this—this is a slide that looks pretty busy but it really has a lot of significant information in here. What I wanted to do is show you this



slide so we can get to know the Arctic neighborhood we exist in and some of the activities that are going around the entire Arctic.

What I put on this slide for a little bit of scale is this round oval, this red oval right here is basically that Chukchi resale area that I had in the previous slide. This area right here is the area in the Beaufort Sea where Shell will also be drilling. What I did is I tried to locate the areas around the Arctic that had existing ice to deal with when they were producing oil. You can actually go all the way back to 1965 in this lower diagram right here in which a platform was built in the Cook Inlet oil fields and there was actually a fair amount of seasonal ice that existed in that area. This is representative of the amount of ice. That's the best picture I could find of one of the platforms. But they had actually built platforms with legs of reinforced steel in order to prevent damage from the ice that moved so much. There are very strong tides in Cook Inlet, and as a result the ice, large sheets of ice are often times bigger than what you see over here on the left hand side occur out here. In fact I've actually walked on the major ice around these platforms and there's about a foot of ice and it felt very safe. I don't know how realistic that was.

The next area where a lot of oil and ice occurred was in Sakhalin Island. About 25 years ago oil was discovered off the east coast of Siberia and major efforts were done to develop that. What they had to do to develop it for the first six years or the first six or ten years they found out that since ice comes all the way down from the Okhotsk Sea and surrounds that platform they brought a tanker up for six months of the year and then the other six months of the year the ice came in and they had to remove the tanker and they just left the field idle until they could get in with the tanker the next season, the next summer ice free season. They've since built a platform to Sakhalin and on to the mainland and down the coast there to a deep water port.

Moving around the shoreline here, it's interesting that some of the comments that have been made in the other sessions about some of the sciences have indicated that the real major oil and petroleum activity is in two areas, namely the Chukchi Sea both the Canadian and the Beaufort Chukchi Seas—excuse me, both the Canadian and the American Chukchi Seas as well as off the coast and onshore here at northwest Russia. What we're talking about here is the Barents Sea and the Kara Sea. You can see here, here's an oil tanker that was moving in the Kara Sea and here in the Barents Sea is that same terminal that Lawson Brigham showed. It's basically the old terminal that the tankers come in to and load up with the oil in order to take it out.

The point is that activities for oil and ice in terms of petroleum are relatively common around the perimeter of the Arctic Ocean. This is a slide of shipping routes in 2004. In addition to that it shows the minimum ice for September in the diagonal lines and then the maximum ice for March of 2004 is the remaining light blue and it



shows the shipping routes. What you'll notice here is that the shipping routes were beginning to develop along this Northern Sea Route. The Russians had to supply a lot of the communities, the resource development activities that were common along that Northern Sea Route with fuel. They popped in along there and you can see that there was still ice in a portion of that sea route during the height of the summer and yet the Russians have a tradition of accompanying all of their oil tankers and their missile traffic along that sea route with icebreakers. They have done that successfully for quite some time.



Now you notice at the same time they're headed for the Bering Straits and where do they go from the Bering Straits? The two places that Admiral Ostebo was talking about. Down to Asia and China, that's India, Indonesia and basically the Asian countries and then likewise to the Unimak Straits being over here. There was a fair amount of activity that was generally moving around that Northern Sea Route for quite some time prior to the present day. If you move up a little bit sooner in time the sea ice in the summer of 2011 we can see that it's shrunk a fair amount. Here it is in the white over here and it shrunk a fair amount. Not only has it shrunk but for the first time we're seeing that that Northern Sea Route is open. It's this dash green line. The northwest sea route is down here and whether it's open or not. I'm not really sure. There may be some ice in there or not. What I really want to concentrate here on is the Northern Sea Route.

The Northern Sea Route is now an opportunity to bring goods and services and commodities and petroleum products down to this Northern Sea Route for a much cheaper price. It's basically an economic driven thing. Instead of going all the way around down through the Mediterranean and the Suez Canal and back up the Asian markets. This is an experiment that some of you may have seen written



up. I think it was written up in the *Alaska Dispatch* but it's basically an article that describes a September 2011 experiment that the Russians attempted. Basically they took one of their super-tankers that had been ice strengthened. It had a full load of fuel on it and that basically accompanied it with two major icebreakers along the entire Northern Sea Route just to see whether or not they could make it and they were very successful in doing it. The whole journey was done in seven and a half days. They completed 2,200 nautical miles.

What this is is really a major economic advantage to be able to do this and because that ice is opening up I think we'll be seeing a lot more traffic in that particular direction. In fact, this is the largest shipment that ever completed the Northern Sea Route to the Arctic. It was touted as the floating sea bridge linking the high potential offshore of oil fields in northwest Russia, the Kara and the Barents Sea to major international energy markets mostly in Asia. This is another piece of information that I picked up. Furthermore, the Chinese are currently building the world's largest non-nuclear breaker along with a fleet of ice-strengthened oil tankers. What do you think this means now to Alaska and to northwest Alaska? That means there is lots of petroleum traffic, petroleum tanker traffic that's going to be passing through the Bering Straits and believe me that's going to be at high risk undoubtedly. We saw the information that Dr. Walsh showed about the low pressure systems that seem to be developing more particularly now that there is greater ocean exposed in the Bering Straits area. That indicates greater storms in that particular area, potentially stormier weather that's more difficult for tankers to get through there.

I go back to my days when I spent time with the Minerals Management Service doing some of the risk analysis. What I learned from that and the way we developed that is the Minerals Management Service had done for several years an oil spill risk analysis on the outer continental shelf for the entire petroleum evolution. Basically exploration to development to production and finally to transportation to the market. What they found was that the lowest probability of oil spills occurs in the oil exploration phase. That's really the safest phase of oil exploration. However the highest probability of oil spills occurs in the oil tanker transportation phase. I think you can see what I'm leading up to right here.

The Coast Guard has gotten this message fortunately and they've conducted a port study analysis of Arctic vessels from 2008 to 2011 and you can see here the results. They've done it for the various kinds of vessels; from tank vessels to cargo vessels to tugs to government vessels and so forth. Basically what sticks out are these two red arrow lines right here that the tanker traffic and the cargo traffic have basically more than doubled in the number of ships that have been in the Arctic arena from 2010 to 2011. Furthermore the Northern Sea Route vessels have increased from 20 in 2010 to 28 in 2011. That's just a remarkable increase in traffic. But that's economically driven, let's



face it, it's a lot faster to get to the market place than if they were taking the route all the way down through the Mediterranean Sea.

I ran across a statement from the former mayor of the North Slope Borough, Mayor Itta, and it turns out that the North Slope Borough was originally somewhat against the development of the oil in Chukchi and Beaufort Sea because they saw that as potential oil spills that could then ruin some of the environment and the subsistence values that they had there. Now, they've come around a little bit more to putting on certain parameters and saying listen this is something that may be good for our next generation. We can get some value out of it. The financial aspects are worthwhile and we want to encourage it. We want to encourage it with some very environmental safeguards as well as strong stewardship.

The quote that Mayor Itta gave was the single most important mitigation issue and that's regarding Arctic Alaskan offshore development is the need for buried pipelines to transport any produced oil to shore and not have a steady procession of oil tankers through our icy waters. He really gets it. MMS would love him because that's exactly the message that MMS had developed statistically. It turns out that when the tracts were leased in 2008 in the Chukchi Sea some actually stipulated that U.S. oil produced from the Arctic ocean will travel via subsea pipeline to the northern Alaska coast and then over land to the Trans-Alaska Pipeline infrastructure with no planned tanker transport of the crude oil. That's a major step from prevention and prevention is really the answer in the Arctic.

Coast Guard and the stakeholders need to follow this issue very, very closely to make sure that no tankers ever carry crude oil in the new Chukchi oil fields through the Bering Straits. What have we learned regarding oil spill risks in the Arctic Alaska? Number one; there is a dramatic increase in the amounts and types of vessel traffic passing through the Bering Straits that will significantly increase in the near future. Number two, these vessels will be fuel as well as some cargo with complete suite of oil products, gasoline, diesel, jet fuel—that's the tugs and the barges. IFO, that's the tankers and the cargo vessels and crude oil, those carrying the major unprocessed oil.

Number three, marine vessel transportation poses as a significant risk for an accident resulting in oil release into the environment. We've learned that. Probably no oil tankers from the Chukchi Sea will be coming down to the Bering Straits but lots from the Russian Northern Sea Route. Exploration drilling in the Arctic poses a valid risk of major oil release but the risk of Bering Strait oil tanker and cargo vessel traffic traversing from the Northern Sea Route cannot be ignored and it may be somewhat higher. Coast Guard and local communities and other interested groups are developing a Bering Strait vessel traffic system plan to reduce this risk right now. I think I mentioned a little bit



about that vessel traffic plan that the Coast Guard is currently in the process of developing.

I want to move on now a little bit to the topic of response to oil and ice. If you have an oil spill often it will—for this coming summer the BOEM has basically changed the drilling season in order such there will not be ice. The chances of there being ice are very small for if there is a blowout or any kind of a spill during the season because it will be during the open water season. If there is oil and ice that's different. NOAA asked me to write a white paper on the preparedness for our group on dealing with spills in the Arctic. I covered all of these nine topics here and I'm going to talk, give you some very, very brief bullets on these five topics.

If we talk about logistics here is a map of Alaska. This has been brought up before but it's over 900 statute miles from the nearest logistics station that the Coast Guard has down here at Kodiak Island up to Prudhoe Bay anyway. If you're going to take things there by vessels you're going to be coming out of Dutch Harbor and Dutch Harbor is 1,500 nautical miles away. Not a very rapid response. In addition to that we have two months of total darkness at Barrow; the maximum Barrow temperature is only 14 degree Fahrenheit. That's pretty hard to take. The maximum high Barrow temperature is approximately 63 degrees. Wow, that seems like it's warm and I'm sure it is if you live in Barrow.

The mean minimum annual Barrow temperature is around 4 degrees Fahrenheit. That is something that would be hard to take if you had to do that day after day. The minimum low Barrow temperature is approximately minus 40 degrees Fahrenheit and I think this past winter they experienced even lower temperatures than that. The maximum Barrow wind speed is 58 miles per hour with gusts up to 78, so the storms often hit there and they can be pretty difficult working conditions. The North Slope road network? Zero. There is one road that goes all the way up the North Slope, hall road, that goes from basically from Fairbanks or Valdez all the way up to the North Slope but the North Slope community is not connected with the road system at all. You have to go in with an airplane from basically community to community in order to get around up there.

There's 8 to 9 months of total ice cover in the Arctic Ocean. That's a winter of ice that will form. In the U.S. Arctic, dedicated Coast Guard ice breakers? Zero. There are zero of them up there and we could use some. There is no question about that. North Slope large and medium vessel ports? There are zero of those. Although ones are being planned right now. They're in the draft form and on people's minds. North Slope accommodations? They're actually very, very limited so if you want to get a large group of people up there it's going to be difficult to handle them as was mentioned by Jim Watson that Shell has a pretty sustained group of people up there with a fleet of 17 to 18 or 19 vessels



in which the people are actually staying on the vessels in order to accommodate themselves in order to actually conduct the drilling and possibly conduct a response if necessary.

We have lots of hungry polar bears. I say that almost as an afterthought but that's a problem if you're out having to clean up shorelines or you're out working on the ice in the Arctic Ocean. You've got to look out for the polar bears.

Let's move on to the topic of weathering of oil and ice. We will talk about weathering of oil and ice and the detection of oil and ice. And then the three response techniques that have been customary with in situ burning and then mechanical response. Then I want to finish with partnerships and collaborations.

A lot of this work that I'm going to be talking about are the studies that were done on an industry joint information program called the SINTEF JIP or Joint Information Program from 2006 to 2009 in which they actually did laboratory experiments and then business scale experiments and then ramped up until they were able to do experiments in actual oil and ice at Svalbard Island which is way north of Norway, right in this area right here.

In conclusion, they found about weathering oil and ice, spreading evaporation; emulsification is considerably retarded resulting in a significant expansion in the window of opportunity for all three of the major response options. That's a pretty important point to keep in mind. Detection of oil and ice has been an ongoing problem although successful demonstrations have occurred for the ground-penetrating radar unit. If you put it right on the ice and pull it along the sled but that doesn't accomplish doing a large area and trying to do a survey over that area. What they're trying to do now is develop that technique for a heel based GPR ground-penetrating radar system.

In addition to that people in the SINTEF study showed that dogs with sensitive noses can be very, very good at finding oil in ice. In fact it was just announced that Shell is going to be training some dogs and training some handlers to help potentially do this as part of their preparation for drilling this summer. During this whole SINTEF study significant advances were made in some of the techniques were dealing with oil and ice. Number one in terms of mechanical response, drum skimmers were shown to be the most promising type of skimmers with the oleophilic systems on them in order to pick up oil and ice. These skimmers and basically I'm talking this skimmer right here which is an example drum skimmers with oleophilic brushes on them, it's self-propelled. It's able to move around. The biggest problem with dealing with mechanical equipment in oil and ice is ice managing. You try to get the ice out of the way so you can pick up the oil. If you can move it around on its own or you've got brush drums on three of the various sides around the skimmer you have a much better chance of doing it.



As Merv mentioned, in situ burning is probably one of the more promising techniques that we're going to deal with oil and ice. This is a situation here where they use fireproof booms. They corralled a bunch of ice and poured oil into it and basically tried to simulate oil spills in broken ice. They found out that they can ignite that and it would burn at approximately 90% efficiency. Finally dispersants, they found that dispersants in fact were effective, that you could introduce enough wave energy to successfully develop any of the really small droplets that are necessary to breakdown, to biodegrade and breakdown.

A lot of these systems need to be refined. In fact I'll talk about another JIP that is ongoing and just getting started right now. One of the real advantages that we've had in this Arctic domain and Arctic involvement are partnerships. We were actually a partner on this SINTEF JIP study and you can see all the other partners. There were universities and other agencies and so forth in this red column on the left. When it was determined that disbursements were moderately effective the industry decided to have a JIP in which they actually tested in a laboratory, a Barrow laboratory with indigenous species from the Arctic Ocean and waters from the Arctic Ocean to see whether or not the oil was toxic to these species and whether or not the biodegradation would occur to this oil.

In fact these were the partners. You can see that NOAA, North Slope Borough was one of the partners. Several other groups there. I'm not sure whether you understand the abbreviations but these are all groups that once a month we would have a technical advisory committee meeting. This was a very, very positive aspect of this whole study. They're continuing to go on with this. I missed my call yesterday morning but I'll be in tune next month.

Moving on, after that first SINTEF JIP study there were a lot of new advances made but the industry decided to move ahead with an augmenting one, so they moved ahead to try to even refine those techniques and they built up other techniques for cleaning up oil and ice. They've just signed a JIP agreement at the IOSC in Portland last May. They're in the process of letting out ROPs right now and they hope to be able to keep this very transparent information flow, hope to have technical advising committees that are composed of government agencies as well as academia that proves very valuable.

The other partnership that NOAA has developed is a partnership with the University of Alaska at Fairbanks. It turns out that University of Alaska Fairbanks is submitting a proposal to the National Science Foundation to be designated as an Arctic Science and Technology Center with an emphasis on oil spill science. They've asked us to help them out and to advise them. We're sort of working with them and trying to create a more harmonious relationship. At the same time NOAA has signed an MOA, a memorandum of understanding with



Shell, Conoco-Phillips, and StatOil, the major companies that are going to be developing in the Chukchi Sea area. Basically all the environmental data that they are developing is available to NOAA, ultimately that data will become publically available but in the case of a spill that data will be immediately made available in order for us to do better official ice forecasts, trajectory forecasts and weather forecasts.

We developed a partnership with Alaska Clean Seas which is a major OSRO, that's the Oil Spill Recovery Organization in the Arctic. As much as we can we take advantage of creating opportunities to interact with the North Slope Borough natives and the elders, and the captains have been trying to develop some statistical knowledge and understand what they have to offer, which is a lot.

In summary, I would say this Arctic leadership for the Coast Guard will be guiding the design of a safe and effective vessel traffic system for the Bering Straits. That's really, really important and ultimately for Unimak Pass – I can see that. Arctic leadership and preparedness can be enhanced with partnerships and collaboration among industry, academia, government agencies, NGOs and local stakeholders. Thank you very much.



CDR Bowman:

Thank you, sir. I do want to make sure we have some time for Dr. Mengerink but we'd like to take one or two questions. Yes, sir?

Question:

Just a very quick comment: all of the whales that go, we know about in the Arctic, in the North American part are going in and out through Bering Strait in spring and fall. So there is an immense number of whales that go through there in fairly short time periods but very critical in terms of spills and damage to the environment.

CDR Bowman:

Dr. Whitney, I think that plays in prevention.

Dr. Whitney:

I think you're right about that. It's largely an aftermath of the *Exxon Valdez*, and probably the biggest factor is increased liabilities that these companies have to pay in order to get insurance to sail. I would agree



but I talked to the MMS, former MMS, the BOEM people about that and they said it's still a significantly higher risk for oil tanker transportation than exploratory wells.

CDR Bowman:

I now want to introduce Dr. Kathryn Mengerink, who is the director of the ocean program at the Environmental Law Institute. She researches law and policy to support effective ocean management. Since 2008 Dr. Mengerink and her colleagues have worked to support the role of Alaskan native communities in managing ocean resources. She holds a Ph.D. in marine biology from the Scripps Institution of Oceanography and a JD with a certificate of specialization in environmental law from Boalt Hall, the University of California's Berkley School of Law. Ladies and gentlemen to open our aperture, talk about stewardship in broader context, Dr. Mengerink.

Dr. Kathryn Mengerink:

Thank you. I derailed a bit from my original topic, which was going to focus mainly on marine spatial planning, and I thought in the context of stewardship when I think about stewardship I think about people and the people responsible for taking care of a resource. In the context of the Arctic what I've learned in a very brief period of time in comparison of many of you who have spent decades working in the Arctic, is that the people of the Arctic play an immense role in managing ocean resources. So I wanted to spend my presentation today talking a little bit about the role of Alaskan native communities and those of you who are from Arctic communities I hope you keep me honest in this discussion and can provide some additional insight certainly.



I also wanted to then reflect and think about how some of the existing approaches in the Arctic can be used as platforms for implementation of the National Ocean Policy and in particular potentially coastal marine spatial planning.



The title of my talk is “The Subsistence Framework as a Platform for Stewardship.” We’ve heard a lot of comments today about the importance of subsistence and I just wanted to talk about a bit about the legal framework for subsistence in the Arctic, which really reflects the importance from a federal perspective in maintaining subsistence and the roles and the rights of the Alaskan native communities.

I thought I would start with a summary of what I want you to get out of this presentation. So if you hear nothing else this is the one thing that I do want you to hear. However a talk this morning—and this is the problem with going late in the day you just have all sorts of idea. But Dr. Noble said this morning, he talked about Healy and how Captain Healy took reindeer to Teller and I had the opportunity to visit Teller in 2010 and took this picture of salmon drying on a rack.

What I realized—we had to stop by the local grocery store and if you’ve been to the grocery store in Teller, Teller is a village of 300 people on the Bering Sea; you’ll realize there is not very much in the way of groceries. You can’t walk to the local store and get everything you need. What I would imagine if I were to have weighed the amount of food you can find in that store versus the amount of food that was gathered from subsistence and was hanging out on the racks, the amount of salmon that was hanging on the racks would have outweighed what you found in the grocery store. That just reflects the importance of subsistence to the people in the Arctic.

My three key points, this is all you have to take home and then you can think about the next thing that you’ll be doing. Subsistence is a central component of Arctic stewardship. Subsistence communities are actively engaged in marine resource management and development decisions and new management regimes can and should build from these existing structures and be integrated with existing community based approaches. Let’s briefly talk about the existing subsistence regime.

First of all there is a fiduciary duty, Alaskan natives are considered tribes under federal Indian law and there is a responsibility then by the federal government to protect the tribal resources for the tribes. The Endangered Species Act has a specific exemption that allows the take of endangered species by subsistence communities, by Alaskan native communities. And the Marine Mammal Protection Act provides an exemption, a “take exemption” for subsistence. In addition that and an important element of the Marine Mammal Protection Act is that not only is there a subsistence take exemption there is a requirement that other people who have incidental take, that being for example an oil and gas company doing seismic activity that may harass or harm a target of subsistence, so let’s say a bowhead whale. They may only have an incidental take permit if there is no unmitigable adverse impact on the availability of marine mammals for subsistence uses.



This provides some additional legal protection for the subsistence harvest. Another piece of the puzzle and I want to talk about it too much today is the implementation—the Marine Mammal Protection Act allows the federal government to enter into co-management agreements with Alaska native organization and communities. Some of the existing co-management structures that are already in place in the Arctic include the Alaska Eskimo Whaling Commission which has one of the strongest co-management programs in place and has been a leader in terms of Arctic management on the North Slope from the perspective of the bowhead whale; the Alaska Nanuk Commission which is involved in the polar bear and the Eskimo Walrus Commission.

Just to highlight some of the things that co-management includes, the Alaska Eskimo Whaling Commission was actually established as a result of International Whaling Commissions' restriction on the harvest of bowhead whales. So it exists whether or not there is a co-management agreement but there has been a co-management agreement in place since 1981. The purpose of the co-management agreement is to enable a management framework that allows both the Alaska native hunters and NOAA to manage the harvest together. In addition to that there is a consultation provision within the co-management agreement that allows consultation on other matters related to bowhead whales which either party believes are suitable for consultation.

This is a map of whale migration and subsistence and it shows a few things, one is it shows the migration of the whale and in the winter they spend time in the Bering Sea. They move through and they hug the coastline, again some communities, communities harvest as they migrate back into the Arctic Ocean during the summertime. Then when they make the reverse migration back out in the winter time they pass by some of the same communities but some other communities as well. There are different periods of time when the hunters are out hunting for the bowhead whale based on the migration.

That's one activity that's been taking place in the Arctic for a very long time as we learned this morning. Another activity that's taking place in the Arctic is that of seismic surveys. There are many people in this room who can speak to this much more than I can but this is just a USGS map that shows publically available seismic survey so this is not all the seismic surveys that have been done but the publically available ones that you can get data for. It's seismic survey overtime so certainly there is not that much seismic activity taking place at any given time. But what it shows is that there is a conflict or there is a potential conflict between seismic survey activity and subsistence whaling.

How do we address the conflict between seismic survey and whaling activities? There's three potential ways, if we're in the world of thinking about the possibilities there are three potential ways and probably more that we can come up with. One is that we have the



Marine Mammal Protection Act, no adverse immitigable impact and so we could leave it strictly to federal agencies to address what type of mitigation measures are possible. There's the potential for coastal marine spatial planning which I'll talk about briefly. And then there is something called the "conflict avoidance agreement" and I think many of you are probably familiar with the conflict avoidance agreement but for those of you who aren't I'll explain it to you because I think it's an interesting approach and there are lessons to be learned from the conflicts avoidance agreement when we're thinking about marine spatial planning in the Arctic.

The full name of it is the "open waters season; conflict avoidance agreement." And it's an agreement between the Alaska Eskimo Whaling Commission and oil and gas companies. It's been an annual negotiation. It's been occurring since 1986 so it's a long-term negotiation that occurs, as I said, on an annual basis. The idea is that the oil companies who are engaged in seismic activities are working with the Alaska native communities to make sure that their activities do not interrupt or interfere with the subsistence harvest. In this case largely what it results in is time area closures for oil and gas activity. So if you think about, we've talked quite a bit today about sea ice and when there is open water and when there is not open water. During that period of open water as we've been learning about, there is already the potential for intense activity and there certainly will be increasingly intense activity during that period of time.

One of the things that provides additional impetus for having this type of agreement and this type of collaborative relationships is the fact that the Marine Mammal Protection Act says "No unmitigable adverse impact" and NOAA can look to the conflict avoidance agreement as a mechanism to prevent adverse impact to the subsistence harvest. How does this relate to marine spatial planning? Before I tell you that I'm going to tell you what marine spatial planning is. For those of you who don't spend all of your time, which is what I spend most of my time thinking about it marine spatial planning. But for those of you who don't I will explain what it is in a nutshell.

Marine spatial planning is the public process of analyzing and allocating the spatial and temporal distribution of human activities. That's according to the UNESCO definition. The goal is to achieve objective, ecological, economic and social objective. What does this actually mean in practice? There are some key characteristics of marine spatial planning that can give us a sense of what it is and those are it is ecosystem-based management approach. It is supposed to be *adaptive*. It's *integrated* in the sense that it integrates across management sectors, jurisdictions, agencies. It should be *strategic and anticipatory* so it's not simply a backwards looking approach that says who is doing what where. But it looks forward into the future to decide what scenario do we want? What do you we want our ocean to look like in 2050 or beyond? It's place- or area-based and it's *participatory*.



On this slide you can see, it's a picture of Massachusetts, that's not the Arctic. It seems like the Arctic to me because I live in San Diego. The important thing that I want to point out here is that it's typically a map-based approach. It's a way of looking at what you have; often the process that we see is that there is an evaluation of the resources. What are the habitats? What is the distribution of species in a spatial explicit way? It also maps the human use, so what are people already doing in this space? And then it envisions, what do we want our future to look like?

That's the general concept of marine spatial planning. It turns out that July of 2010 President Obama issued an executive order creating the National Ocean Policy and calling for the development of coastal marine spatial planning on a regional level. The region that's been designated for Alaska is all of Alaska which is fairly large and certainly if you were to undertake this it could be broken down into smaller parts. But the idea behind it is that key federal state agencies along with tribes would work together to develop a marine spatial plan that is right for that region. The key output is a coastal marine spatial plan that would be used to inform management decisions

Let's get back to what's happening in the Arctic and the Alaska native communities and the management structures that exist already. How does this marine spatial planning piece fit with Alaska native communities and management? As one idea to present to you can we use the conflict avoidance agreement or does the conflict avoidance agreement represent a marine spatial planning tool? In some respects yes and in some respects, no. This is my big ugly slide of marine spatial planning at the end of the day. Just listen and close your eyes, the idea behind the conflict avoidance agreement, the information that goes into is ecosystem based but it's narrowly tailored, addressed to areas of human conflict that can occur between hunting and the oil and gas industry.

It's partially integrated in a sense that it's integrating these two different sectors but it's not wholly inclusive. It's not including the shipping industry. Other co-management bodies or other types of subsistence harvest or other activities. It is place based and the thing that I think is one of the extremely appealing things when you think about marine spatial planning in the Arctic is it is both spatial explicit and temporally explicit. You can imagine—it's hard to imagine some type of static map, a Massachusetts map for the Arctic is impossible to imagine if you're thinking about the physical nature and the biology and ecology of the system. Thinking about something that's more flexible is potentially a better way to think about the Arctic and how we need to manage the resources in it.

It is highly adaptive. The CAA is negotiated annually, so if there are changes those can be addressed. That's potentially too adaptive if



you're talking about multiple stakeholders, some type of larger process not just two main stakeholders. It is strategic and anticipatory in the sense that it recognizes oil and gas development is and will occur during that period of time and that it's also important to maintain the culture and traditions and the livelihood of the people in the Arctic through subsistence harvest. And once again it is only partially participatory. It's another limitation at this point in time; it is an agreement between the Whaling Commission and the oil and gas companies. So if you are truly to envision a marine spatial planning process you would have to create or include a much broader swath.

I'll leave that there and say thank you.

CDR Bowman:

We'll make time for one or two additional questions for Dr. Mengerink.

[inaudible audience question]



Dr. Mengerink:

I have all sorts of ideas about how to potentially entice industries into thinking about the utility of this tool. I think that the concern from industries is that marine spatial planning is some type of euphemism for marine protected area and excluding development. And so that is one of the fundamental concerns about it. I think another concern is that it's going to create massive bureaucracy and not be integrated into the existing legal system so how is that going to be effective and useful from an industry perspective? And then I would imagine there are some industries that already have a fairly solid system of management in place. The oil and gas industry has the Outer Continental Shelf Lands Act which provides a pretty strong legal framework for activity in the Arctic. If you were to take for instance wind energy which we don't have in the Arctic as this point in time that has a lot of regulatory uncertainties so this may be more appealing.



What I would argue is for those industries who question the potential utility of marine spatial planning is that it can provide, it can potentially provide regulatory certainty. So if it's designed in a way to actually think about the multiple uses of an environment and make smart decisions about an environment might be used in the future the concept is that you would create regulatory certainty. And it's certainly true that marine spatial planning has been much more developed in Europe and there is positive support from industries in that environment. I can tell you about my favorite theory for how we can achieve all of this using NEPA but I'll save that for drinks.

CDR Bowman:

And one more, yes sir?

[inaudible audience question]

Dr. Mengerink:

Yes, I think I've talked to other people about the work that has been done in terms of Massachusetts for designating shipping lanes as well as some of the, I guess passive acoustics to identify where the whales are and make sure that there is not interference or some type of real time communication to avoid interference.

CDR Bowman:

Thank you. Please join me in a round of applause for our last panel today.





Hedrick Fellow Address (VII)

2012 Hedrick Fellow Address

by

The Honorable Jane Lubchenco, Ph.D.

Under Secretary of Commerce for Oceans and Atmosphere,
Administrator, National Oceanic and Atmospheric Administration

U.S. Coast Guard Academy
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“Science, Services, and Stewardship: Leadership Opportunities in the Arctic”

Hedrick Fellow Recognition

Hon. Jane Lubchenco, Ph.D.

Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator



Admiral Stosz, distinguished colleagues, cadets and friends, I am deeply honored to be recognized as a Hedrick Fellow and to be part of such a distinguished group of fellows. And what a treat it has been to spend time with cadets today, both the women's leadership council and cadets presenting posters.

The Hedricks established this fellowship because they believed that everyone in the academy should have an equal opportunity to learn from leaders.

As you might have gleaned from looking at my pin depicting the yacht *Reliance* and my scarf showcasing life in oceans, I'd like to talk about ships and oceans tonight. Although I grew up in Denver, far from the ocean, I had the good fortune to be a Mariner Girl Scout. We honed our skills sailing on lakes in Colorado and later in the San Juan Islands of Washington State.

Like many of you, I relish being on or in the water. Doing so renews my soul, challenges my skills, provides opportunities for reflection, and reminds me of how vast the largest ecosystems on our planet really are. I was hoping to catch a glimpse of the USCGC *Eagle* while I was here, but I understand she is in New Orleans right now. However, the Women's Leadership Council presented me with Admiral Papp's book about her history, so I'm delighted.

I know how fond the Commandant is of the *Eagle*, and I share his love of Patrick O'Brien's novels. But I hasten to add that I am nowhere as fanatical about Aubrey and Maturin as Admiral Papp is! But



as much as I love those kinds of ships, the ones I want to focus on tonight are ships of a different sort – leader-ship, partner-ship and steward-ship. Go ahead and groan if you like! With apologies for the slight mis-direction and a little word-play and fun, let me begin with leadership.

I'm deeply privileged to lead a spectacular oceanic and atmospheric agency, NOAA, and I've had the immense good fortune to work closely with many of your visionary leaders, at multiple levels, in the Coast Guard. Building on the close partnerships forged across the years and during crises big and small, and reflecting our complementary missions and mutual dependence, NOAA and the Coast Guard continue to grow closer, strengthen one another, and serve the nation.



I've witnessed how very important leadership is within and across agencies like ours and I've seen the power of leaders working together to effect meaningful change. It is particularly appropriate that the theme of the conference today and tomorrow is 'Leadership for the Arctic'.

Tonight my focus will be on leadership in general and in the Arctic, in particular--leadership through partnership and leadership for stewardship.

My message is simple. You cadets--the leaders of tomorrow—and you, Arctic experts in the room, all have a golden opportunity to be gifted leaders, to do what gifted leaders do: listen, anticipate, inspire, and create order out of chaos. Your power lies in your ability to craft a vision and create the momentum, partnerships and will to tackle daunting challenges and succeed.

We live in a world where partnerships are essential for success. We also live in a world where human dependence upon the natural world is too often ignored. NOAA's and the Coast Guard's already strong partnerships position us well to work with each other and like-minded agencies and nations to tackle big Arctic challenges. The Coast Guard and NOAA are strong partners. We have dozens of formal agreements and memoranda of understanding, but our real collective strength lies in the synergy between our missions, our mutual appreciation for science-based action, the good chemistry between leaders and our willingness to embrace challenges.



The Coast Guard's mission of maritime safety, maritime security, and maritime stewardship is a great complement to NOAA's mission of science, service, and stewardship of the nation's weather, oceans and coasts. NOAA relies on the Coast Guard for enforcement of regulations in fisheries and in our National Marine Sanctuaries, maritime safety, rescue operations, emergency services, removal of marine debris, partnerships in science, and safety on our fisheries observer vessels. In turn, the Coast Guard relies on NOAA for marine weather forecasts, water forecasts, sea ice forecasts, disaster warnings, charting, navigation warnings, digital GPS. Our satellites pick up signals from distressed vessels or individuals, then, we relay them to you for your search and rescue operations.

We work closely together in responding to oil spills, hurricanes and tsunamis, dealing with marine debris, protecting Right whales and other endangered species and stock assessments. We recognize that partnering in our many areas of mutual interest is a win for our respective missions, a win in efficiencies of government, and a win for the nation. Together we are committed to protecting life and property, enabling commerce and being good stewards.

Our partnership was on full display during the *Deepwater Horizon* crisis where leaders at multiple levels within each agency worked closely together to respond effectively, using science, common sense, experience, and the trust that springs from deep respect for each other as our guides. Those leaders listened, anticipated, inspired and created order out of chaos.

Now, I would be the first to tell you that in the heat of those moments, hours, days and months, in the midst of the ever-changing flurry of activity and uncertainty, the reality was far from easy. But analyses and assessments of the events are vindicating the science and praising our efforts during the chaos.

One secret that you should appreciate is that many of the leadership partnerships that enabled trust and close working relationships during *Deepwater Horizon* were forged in the two years prior to the spill through collaboration on the President's Interagency Ocean Policy Task Force. The USCG and NOAA worked together to bring valuable insight, ideas and skills to the work of the Task Force. Teaming up with other like-minded agencies and departments, we proposed a vision for ocean stewardship that is now codified in the National Ocean Policy. Through that NOP, the President has declared that 'healthy oceans matter' and that agencies are to work together and with local, state, regional and tribal governments to achieve the goals he articulated in the NOP.

The Nation has a Clean Air Act and a Clean Water Act, but until the National Ocean Policy, it did not have clear direction about our collective goals for oceans. Some 26 different federal agencies and offices oversee activities that affect oceans. Over 140 federal laws regulate these activities. The President directed his Ocean Policy Task Force to propose ways to harmonize agency actions and regulations, to work with local communities and regions to create order out of chaos.

The Task Force realized that maintaining or recovering the wealth of benefits people receive from healthy oceans and coasts requires science-based, holistic, ecosystem-based approaches. And that is precisely the approach articulated in the National Ocean Policy.

Nowhere is the need for partnerships, stewardship and leadership seen more keenly than in the Arctic. Today, we face the considerable challenge of doing right in the Arctic – right by native peoples, right by citizens of the world, and right by the Arctic ecosystems that provide bountiful seafood,



breathtaking beauty and wildlife, regulation of weather and climate, economic opportunities, and unique cultures of its peoples.

Here in the United States, Alaska is known as the seafood basket of the nation. Fifty per-cent of the nation's seafood comes from Alaska, and Alaska's fisheries bring in sustainable catches. Last summer alone, 1.56 million people visited Alaska. 23 native languages are spoken across Alaska's indigenous peoples. It's a land of riches and opportunity.

But the Arctic is changing in dramatic ways. When I was in Barrow in 2009, I stood on the shores of the Arctic Ocean with the local children and village elders who, mouths agape, watched big surf come crashing onto shore. The elders told me that until recently, big surf in Barrow didn't exist because offshore sea ice offshore would prevent the buildup of large waves travelling across the open water. We visited nearby grave sites that were being relocated because ancient burial grounds are quickly disappearing under the pounding of waves and surf.

On the west coast of Alaska, entire villages such as Shishmaref are facing evacuation and relocation as the combination of melting sea ice, thawing permafrost, and higher storm surges undermine the towns' infrastructure. Across the Arctic, Inuit in Greenland described to me increasing numbers of tragic disasters, often involving loss of family and friends who went out hunting and never returned. They explained that sea ice and weather conditions are changing so rapidly that the familiar signs of danger no longer apply.

The native peoples of the Arctic have amassed a wealth of knowledge that has served them in good stead over the generations, allowing their cultures and communities to flourish. They have attuned themselves to the environment, and have adapted to many changes over the centuries. Now, however, their environment is transforming so rapidly that it is difficult to keep up with the changes.



Their experiences are borne out by data. Sea ice and ocean observations over the past decade (2001-2011) suggest that the Arctic Ocean climate has reached a new state with characteristics different than those observed previously. The new ocean climate is characterized by less sea ice (both extent and thickness) and a warmer and fresher upper ocean than in 1979-2000.



The persistence of these changes is having a measureable impact on Arctic marine and terrestrial ecosystems and people.

In the Bering Sea, ocean acidification throughout the water column is causing seasonal CaCO_3 mineral suppression in some areas. The effects of ocean acidification in the Chukchi Sea, induced by the uptake of anthropogenic CO_2 over the last century, are amplified by high rates of summertime phytoplankton primary production, which leads to more corrosive sub-surface waters.

We can't turn back the clock. And we can't simply flip a switch to stop anything more from happening. But we *can* Listen. Anticipate. Inspire. And create order out of chaos.

How?

- Reduce greenhouse gas emissions.
- Engage Native peoples in the Arctic dialogue and respect their values and knowledge. The Coast Guard's work in many Alaskan communities is exemplary in working with and understanding the native peoples.
- Establish a framework for responsible decision making.
- Conduct the scientific research and monitoring necessary to support these decisions.
- Plan for enhanced activities in the Arctic, but do so holistically, using an ecosystem-based management framework.
- And employ a precautionary approach with the goal of maintaining resilience in this coupled human--natural system. A stellar example of this precautionary approach comes from the North Pacific Fishery Management Council who decided in 2009 to prohibit expansion of commercial fishing in U.S. federal waters in the Beaufort and Chukchi Seas until the scientific basis for fisheries management decisions could be established.

As sea ice retreats, the Arctic becomes more accessible. With greater access comes the call for information, readiness, response and assistance. The Coast Guard and Navy feel increased pressure to maintain a "response-ready" presence for Arctic safety and security. Requests from native communities come in asking for help with relocating entire villages or burial grounds slipping into the sea. Where will my food come from if whales, seals and fish populations wane? How can we get more accurate weather and water forecasts?

An open Arctic trade route brings concerns about accurate navigation charts, weather and disaster forecasts, aviation forecasts, and the capacity to respond to emergencies. NOAA provides these tools and the USCG conducts emergency response, but we are not able to deliver all that is needed today, much less down the road.

As the fossil fuel industry seek permitting approvals for oil and gas exploration in the Chukchi and Beaufort Seas for 2012, we need more information about potential impacts, behavior of oil in frigid waters, and appropriate response capacity.

The Coast Guard's *Arctic Shield* prepares for the changing Arctic. NOAA too sees the change. We are inundated with increasing requests for timely weather forecasts and disaster warnings, more comprehensive and current navigation charts, tide tables, and elevation data, improved oceanographic information, and more baseline data on protected species and ecosystems.



What happens in the Arctic does not stay in the Arctic. The impacts witnessed by locals across the Arctic have global implications. The Arctic, for example, acts as a thermostat that helps stabilize the Earth's climate and regulate global temperature. The Arctic also acts as a barometer of change. Climate-related changes already apparent in the Arctic portend our global future. News stories recently called out the Arctic Oscillation as the likely cause of weird winter weather this year – snowstorms in Seattle, epic snow in Alaska and mild winters in much of the lower 48.

More open seas for longer periods of time have economic benefits for commerce, oil and gas exploration, and tourism. Yet we don't know how these human activities will change Arctic ecosystems. Nor do we know how the economics of the fisheries will play out as a result of changes in the ocean, whether those changes are natural or human in cause.

Understanding and effectively managing the changing ecosystems, expectations, and opportunities in the Arctic requires a solid foundation of ecological and socioeconomic information. Yet despite the wealth of traditional ecological knowledge, exploration, and research to date, even the most basic data are lacking.

We need to mobilize our efforts in the Arctic and commit fully to strengthening the science that underpins the decision-making processes and support services required for sound Arctic stewardship and enhanced national security—the pillars that support regional prosperity and national economy.

NOAA envisions an Arctic where decisions and actions related to conservation, management, and resource use are based on sound science and support healthy, productive, and resilient communities and ecosystems. NOAA envisions an Arctic where the global implications of Arctic change are better understood and predicted.

NOAA has taken stock of its responsibilities for science, services and stewardship in the Arctic. We released our *Arctic Vision and Strategy* last year as a dynamic, living document that translates our vision into priorities for action. It builds upon other governmental initiatives, including the U.S. Arctic Region Policy, the National Ocean Policy and decisions of the Arctic Council.

NOAA seeks to realize its vision by focusing on six priority goals, including:

- 1) Forecasting sea Ice;
- 2) Strengthening foundational science to understand and detect Arctic climate and ecosystem changes;
- 3) Improving weather and water forecasts and warnings;
- 4) Enhancing international and national partnerships;
- 5) Improving stewardship and management of ocean and coastal resources in the Arctic; and
- 6) Advancing resilient and healthy Arctic communities and economies.

These six priority goals were chosen because they meet two key criteria: First, they provide the information, knowledge, and policies necessary to meet NOAA mandates and stewardship responsibilities. Second, they provide the information, knowledge, and services that will enable you and others to live and operate safely in the Arctic.



Embracing these six priority goals provides NOAA with a holistic approach to addressing climate change in the Arctic. We need such an approach to ensure the continued health of this remote and fragile region—but embracing all six goals fully will take time. Achieving these priorities will enhance the ability of the Coast Guard to achieve its Arctic goals, and contribute to our collective ability to be good stewards. They depend on good partnerships. They enable good stewardship.

Better Arctic sea ice and marine weather forecasts and warnings support real-time navigation and seasonal planning. NOAA and the USCG, and the Navy are partners in the National Ice Center. U.S. Coast Guard (USCG) members serve on the government staff of the National Data Buoy Center to provide unique skills and interface with USCG for transportation support.

Accurate forecasts depend on deploying a variety of sensing devices—from buoys to airborne and satellite sensors. We need to do this more effectively, more strategically and at a faster pace. This is difficult when resources are limited.

Technology development is essential – such as for new platforms like Unmanned Aerial Systems and autonomous gliders that can withstand the rigors of the Arctic environment while collecting data more efficiently and cheaply. In the works is the MIZOPEX project, a NASA-supported project with NOAA contributions, which will fly UAS over the Beaufort Sea (2013) for Coast Guard Maritime Domain Awareness. The project will examine Marginal Ice Zone Observations and Processes (Experiment).

Improving sea ice and weather forecasts also depend on enhanced scientific research and modeling. We need to strengthen existing partnerships such as the National Ice Center, and our ties with the Navy, NASA, and Canada for weather data sharing.

The Coast Guard needs ice ridging data as does NOAA. There are few data on how ice ridging is changing in the Arctic. Ice ridging also affects critical habitat for four seal species (ribbon, bearded,



spotted, ringed). Each species depends on varying levels of ridging. And all of us care about oil spills that go under ice, where the oil gets trapped.

By committing to collaborate more effectively, we can begin to deliver on the accurate, quantitative, daily-to-decadal sea ice projections and improved weather forecasts that you need for safe Arctic operations and ecosystem stewardship.

Understanding sea ice means understanding how climate change impacts physical conditions. Broad-scale biological observation means being able to see how a changing climate and environment will impact the food web and other aspects of the ocean ecosystem. Climate models and ecosystem models will enhance our ability to do forecasts and understand how changing sea ice, ocean temperatures, salinity and pH will impact key species such as pollock, cod, salmon, and crab, as well as ice seal species and Arctic cetaceans (e.g., bowhead, gray, humpback, and beluga whales).

We will need continued and enhanced partnerships to improve baseline observations and understanding of Arctic climate and ecosystems, including *in situ* and remote sensing observations, shipboard sampling, and long-term, community-based research on marine species.

The Joint Hydrographic Center, a collaboration between NOAA and the University of New Hampshire, with the Geological Survey of Canada just completed a 5-year joint project with the USCG Cutter *Healy* and the Canadian CG Cutter *Louis S. St-Laurent*. The bilateral project collected scientific data to delineate the continental shelf beyond 200 nautical miles from the coastline, also known as the extended continental shelf (ECS). The U.S. has an inherent interest in knowing, and declaring to others, the exact extent of its sovereign rights in the ocean as set forth in the Convention on the Law of the Sea.

NOAA's MOU with the Department of Interior's Bureau of Ocean Energy Management (BOEM) will facilitate development of baseline observations and environmental studies needed to assess Arctic drilling. Leveraging these relationships to build sustained observations will enable researchers to study the effects of oil and gas exploration, sea ice loss, ocean acidification, and sea surface temperature warming on Arctic ecosystems over time. This information will inform NOAA's ecosystem stewardship, and will contribute to Coast Guard and Navy security risk assessments and the effective timing of Arctic military staging.

Arctic geospatial infrastructure supports marine transportation, maritime domain awareness, oil spill response, and community resilience. Currently, Alaska has limited geospatial infrastructure; meters-level positioning errors; sparse tide, current, and water-level prediction coverage; obsolete shoreline and hydrographic data; poor nautical charts; little understanding of oil in ice; and inadequate oil-spill response capacity. Why? Mostly because of limited resources and other priorities. We have the capability, but not the capacity. Much information that we take for granted in the lower 48 is simply not readily available in the Arctic.

Modernizing the Arctic geospatial framework will provide the foundation for many activities in the region, including Arctic security operations, effective climate adaptation, community and economic resilience, and safe marine transportation. The low-hanging fruit include:

Collaboration on gravity data collection for accurate positioning and surveying and mapping are two relatively simple ways we can work together to build a robust geospatial framework. By agreeing



upon an integrated mapping standard and the smart use of our limited vessel capacity in Arctic waters, we can update data on maps and nautical charts – some of which dates back to the 1800s, before the region was even part of the United States.

NOAA is working to build its oil spill response capacity to support Coast Guard first responders. For example, with the Bureau of Safety and Environmental Enforcement (BSEE) will be releasing Arctic ERMA this summer. Arctic ERMA is the same interactive online mapping tool for the Arctic as was used during the Gulf spill response. ERMA is the acronym for *Environmental Response Management Application*. But ERMA is only as good as the information within it, so the continuous sharing of new datasets is essential for accurate mapping.

In closing, the Arctic is changing, and it's changing rapidly. Leadership is urgently needed -- leadership through partnerships and leadership for stewardship. This, then, is your opportunity. NOAA and the Coast Guard have strong partnerships already, but we can and should strengthen those and other partnerships. Our challenge is to help ensure that new science and technology can be sustained without eroding core environmental services. This is a tall order any place. But in an environment where small changes can have big ripple effects and change is accelerating, the challenge of resource limitations is formidable. Partnerships are critical for putting us on track.



The Coast Guard's motto is "Semper Paratus." Good leaders understand that preparing for tomorrow's Arctic is will require more than just the next page of a calendar. Good leaders know that today's actions will shape the future of the Arctic, rippling far and wide.

I am reminded of the words of Abraham Lincoln in his Second Annual Message to Congress on December 1, 1862:

"The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country."

Words of wisdom to inspire all of us, but especially you new leaders.



I urge you to:

- Listen to the science and the wisdom coming from the past and the present in the Arctic.
- Anticipate what is needed to be prepared for uncertainty and surprise, and to be stewards of a healthy, productive and resilient Arctic Ocean and oceans everywhere.
- Inspire others whom you need to craft the vision and deliver the actions.
- Create order out of chaos.

That is my charge to you. That is my challenge to you. Thank you.





Leadership in Arctic Legal Issues (VIII)

Panel 5

Leadership in Arctic Legal Issues: *Cooperation, Coordination, or Conflict?*

Moderator: Professor David D. Caron – C. William Maxeiner Distinguished Professor of Law, University of California at Berkeley, Co-Director, Miller Institute On Global Challenges and the Law, Co-Director, The Law of the Sea Institute.

Panelists:

- Michael Byers – Canada Research Chair in Global Politics and International Law, University of British Columbia, Vancouver, BC
- Bernard H. Oxman – Richard A. Hausler Professor of Law, University of Miami, Miami, FL
- Alexander S. Skaridov (USSR Navy, Retired) – St. Petersburg Institute for Ocean Law, St. Petersburg, Russian Federation
- The Honorable Tullio Treves – Professor of International Law, University of Milan, Italy; Judge-emeritus, International Tribunal for the Law of the Sea, Hamburg, Germany



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David D. Caron:

Good morning everyone. There's such a wonderful buzz in the room I hate to disturb it, but we do want to start on time and stay on our schedule. Yesterday we had a wonderful set of panels; we talked about the history of leadership in the Arctic; about Arctic science and research and about Arctic safety and then stewardship. The design of the program is to make a transition today from "What do we know about the Arctic?" to talk a little more about "Where are we going and how do we get there?"

This morning we start with some considerations of legal issues, or how law is relevant. Then we will transition into a discussion of governance. And then we'll have the pleasure of hearing from the Commandant at the end of today.

Our panel is about Leadership in the Arctic; coordination or cooperation or conflict, and a particular focus on legal issues. So we are talking about the relationship, in many ways, of law to policy. And I want to just emphasize that for a moment; that it's partly about the



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legal shape of the Arctic at present. It's in part about legal disputes that will affect how we approach the Arctic. And it's about how law will be an instrument for the policy we seek in the Arctic, and also how that law will shape the choices we have in the Arctic.

And so as we start let me just pose two thoughts for you to keep in mind in the background. In 2007 I participated in a conference in Seoul, Korea that was strangely dissonant in a way let me describe for you. On the one hand, I was involved just coincidentally at the time, with discussions with a development authority in Incheon Airport about how the University of California could be involved in this booming Korea.

They had a number of pitches about Incheon Airport as the hub for the region. They would have a number of lines such as "Within one hour's flight from Incheon you can reach 20 cities, over one million people." "Within a two hour flight you can reach X number of cities, over 10 million people." And there was an image of this area rushing towards the future. And all my images of boundaries were all of a sudden gone in that image.

The other purpose of the conference, that was going on simultaneously, but the main purpose of the conference, at the request of Korean officials, was to discuss a particular boundary dispute between Korea and Japan around the [Ducto] Island that continued to inflame relationships. The reason I bring up what was dissonant there was one, there was future that was pulling everyone, certainly every one of the younger generation, and there was a past that wasn't just going to go away. And there's always a tension between the legal shape of the future and these legal disputes in the past and how you somehow bridge the past.

So after we have our history panel, we just don't jump away from that history. I think you're going to find in our discussion today, part of our discussion will be about our way forward and part of it will be about outstanding issues that exist between various countries in the Arctic.

My second point is, when we talk about law, often we're going to be talking about the content of a particular rule. How do we define a boundary? What's the rule? What do we think about shipping? In the area of climate change, climate change is a fundamental for law in many ways. Because law does not usually self-adapt, law is usually tied to a particular territory. Our discussion yesterday was about how things change, how fish move across borders. How things we assume are constant actually may be changing. So we lock in certain expectations in the law that are not necessarily responsive to all these changes. We should probably keep that in the background as well.

So, to touch these legal questions and to just give a change of pace, we're going to have a discussion with this distinguished panel. We're going to try and encourage discussion among us. You have a picture of a fireplace behind us and we're all seated in these big green chairs and



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we're all going to talk about various questions. And I'm going to start off with the gentlemen to my left, Michael Byers. And I'll depart a little bit, you have their full bio, so let me just say something a little different about each of them.

Michael is a Canadian. He was a tenured professor at Duke. He really burst onto the American and global, international law scene with a wonderful book about custom and power [*Custom, Power and the Power of Rules: International Relations and Customary International Law*, Cambridge University Press, 1999]. He is now in Canada in British Columbia, but what I want to add is he is that rare breed of public intellectual. He's a very powerful voice within Canada in politics and in law. And one of his recent publications is the book *Who Owns the Arctic?*



And Michael, thinking of that, I think one reputation you have is you represent Canada's view in the Arctic. You know the strength of Canada, which is essentially the Arctic. So perhaps we'll just start with shipping, which is of course of central interest to Canada and perhaps you could take a few minutes and tell us what you think about shipping in the Arctic.

Professor Michael Byers:

Thank you David. Can I start by saying that Prime Minister Steven Harper would disavow that I represent him or his government in any way. But I can actually speak as a Canadian for the considerable, emotional attachment that my countrymen and women have for the Arctic. We do consider ourselves an Arctic Nation.

I want to start by tagging onto something that David said concerning South Korea. I was at a conference at the East/West Center at Honolulu last summer, a conference that was funded by the South Korean Shipping Industry, and I had the pleasure of meeting with a number of senior executives from Asian shipping companies. All of



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whom were very excited about the prospect of a seasonally ice free Arctic Ocean.

And they were talking about how many tens of billions of dollars they were going to spend on ice-strengthened cargo ships to take advantage of the new opportunities of the Northern Sea Route and the Northwest Passage. And I think I burst their balloon a little bit because I said “Well, even when the sea ice melts, the Arctic will still remain a dangerous place for navigators.” And they looked kind of quizzical and I said “Well have you heard about icing?”

I don’t know if you saw the wonderful poster that one of the cadets was displaying yesterday, but if you send a cargo ship with containers on top into the Arctic Ocean, and you get a gale—you don’t need a hurricane—but you got 40, 50, 60 knot winds, you get 20, 25, 30 foot swells – and there’s no sea ice. It’s open water, but the air temperature could be minus 10 or minus 20 degrees Fahrenheit. And the shipping executives, who were not stupid men, quickly realized that they did have challenges.

I made that point to them, and I make it to you, that the Arctic is not going to be open to unproblematic shipping in the future. There will be many challenges and those challenges will require the assistance of coastal states to provide ports of refuge, to provide good weather and ice forecasting, to provide search and rescue. To provide all the kinds of things that you expect in the Strait of Malacca, the Strait of Gibraltar or the Bosphorus and the Dardanelles.

So having coastal state engagement and cooperation should be a goal for any shipping company in the Arctic, because otherwise it will be dangerous and uneconomical as a place to operate. So it’s in that spirit of cooperation that I’d like to just touch on a couple of small things. The first of which is that between the United States and Canada we have had remarkable cooperation with regards to the Northwest Passage. You can go back to 1969 when Humble Oil, Exxon sent the SS *Manhattan* through the Northwest Passage. The *Johnny Mac* [John A. McDonald], a Canadian Icebreaker went with her and released the SS *Manhattan* from the multi-year sea ice where it had become trapped on 12 separate occasions. It was pretty amazing cooperation. And that kind of cooperation has continued.

In 1988 President Ronald Reagan came to Ottawa, and our Prime Minister at the time, Brian Mulroney showed him the Northwest Passage, and very cleverly did so on a globe rather than on a flat map. Because if you look at a globe, which is of course more representative of the earth than a flat map, it becomes pretty clear that the islands of Canada’s Arctic Archipelago are actually fairly integral to the coastline and the Northwest Passage cuts through the heart of Canadian territory.

Mr. Reagan subsequently ordered his diplomats to negotiate the Arctic Cooperation Agreement with Canada, which deals specifically with the issue of U.S. Coast Guard icebreakers. It’s a wonderful agreement to



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disagree. It shows how friends can paper over a legal dispute and just get on with the practicalities. You tell us if you're planning on sailing a Coast Guard icebreaker through the Northwest Passage, ask our permission, and of course we've already promised that we'll say "Yes" and everyone's happy.



The agreement actually says "without prejudice." That would have solved the Northwest Passage dispute between our two countries, but for the unexpected and dramatic melting of the sea ice. What we're seeing now was not foreseen in 1988. I've been through the Northwest Passage a number of times in the last five years and I've seen, on the last occasion no ice at all. I've seen significant cargo ships. There were 22 ships over 300 tons that went through the entire passage last summer. Last summer alone there were 34 private yachts.

And you look at that and that's a fundamentally changed circumstance. Of course it's not just through the heart of Canadian territory, it's through the heart of the North American security perimeter that this is occurring, which raises real issues not just of environmental protection, but also of security against non-state actors, whether it's smugglers or illegal immigrants or potentially terrorists.

In 2008 I had the great pleasure of partnering with Paul Cellucci, former Republican Governor of Massachusetts and former U.S. Ambassador to Canada. Mr. Cellucci had been calling on the State Department to reexamine the U.S. position on the Northwest Passage in light of 9/11 and in light of the melting sea ice. It actually expressed his personal view that supporting the Canadian legal position would be in the security interest of the United States.

So Paul and I did a model negotiation. Paul brought six or seven leading U.S. experts, ex-governmental and non-governmental. I brought the same number of Canadian experts and we sat down for two days and did a mock negotiation. We didn't solve the legal dispute, but you don't necessarily need to solve the legal dispute. We came up with



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nine concrete recommendations for the two governments, as to how they could cooperate with regards to Arctic shipping and build confidence so that at some point in the future the U.S. might be able to recognize Canada's claim.

So, a ship separation scheme for the Northwest Passage. Mandatory reporting for ships, not just in the Northwest Passage but also north of Alaska in Bering Strait. Cooperation on search and rescue – we now have a new multilateral search and rescue treaty thanks to the U.S. and Russia and the Arctic Council. But these are the sorts of recommendations that we put forward, and we put them forward because we were frustrated that Canada and the United States had not been discussing the issue of the Northwest Passage.

In fact, Canadian diplomats were prohibited from discussing the Northwest Passage with their U.S. counterparts and we thought this was just stupid, because we're friends and we're partners. Certainly in the Arctic we're much more equal than we are in many other places in that we are a serious Arctic country and we can sit at the table with the United States as equals and hammer out a deal on confidence-building and cooperation. Because you need us more, I think, in the Arctic than we probably need you.

So there are opportunities here and I was very interested yesterday in the discussion of Unimak Pass and the Bering Strait, because you are becoming a Strait state like Canada. You have environmental concerns in your straits like we have in the Northwest Passage. You're facing the prospect of many thousands of ships using transit passage or a claim of transit passage to try to access places you hold very dear to your hearts.

We are becoming closer in our interests as time passes, because of 9/11 on the security front; because of climate change and oil and gas development on the environmental front. If we can't do a deal, we're each other's largest trading partners. We share what is still, I think, the longest mostly undefended border in the world. Both my colleagues on either side of me here have serious Canadian connections. We don't think of each other as American and Canadian in most instances. We think of each other as partners.

And as we engage in this discussion on issues like Northern shipping, the question should be how do we move forward together, respecting our differences, but realizing that in this age, in the 21st Century we are so much stronger together than we are a part? Thank you.

David D. Caron:

Thank you for that Michael. For the lawyers in the room there were a number of code words in there. That we all skillfully observed. But what I would say, just as we transition here, is it's often said that there are many outstanding disputes in the Arctic, and actually most of them have been resolved in terms of border disputes. The two major disputes really are the Northwest Passage and the Beaufort Sea. And what



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Michael is pointing to is there should be room for solutions even with the remaining ones.

I'd like to bring into the discussion Alexander Skaridov at my not quite far left. There's been discussion in this conference occasionally about how we all wish Russia would provide more [oceanographic] data, we wish Russia were more a part of the discussions that are occurring, and I draw great comfort from Alexander Skaridov's presence. Because he has always come to conferences when we've called and he's very open in answering questions about Russia. It seems like he's even asking for the data himself.

Alex was a captain, a submariner, in the Soviet Navy. He has wonderful stories about submarines rising up in the night; because that was the only time they could do it, alongside a Soviet fishing vessel and trading various goods that they both needed in the middle of the evening. He has been charged at various points with very important tasks – the decommissioning of the older nuclear submarines. And he can tell you a lot about nuclear waste north of Russia, which is a topic we're not covering in this conference itself.

Alex, could you tell us about this same shipping question, but again we have sort of two regions. When we think about going on the top of the North American Continent or we think about going above Eurasia. So perhaps you could tell us about the Northern Sea Route.

Alexander Skaridov:

But I have a straight answer on your question, Russia will not provide data.

David D. Caron:

Will not provide data?



Alexander Skaridov:

Yeah. This is the end of this story. So no data at all because...

David D. Caron:

And it's just a matter of principle.



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Alexander Skaridov:

No. Through the history because each time we go out to sea it was a requirement for the submarines to collect data. But it's still classified for many reasons. So the first submission made by Russian Government to the Continental Shelf Limits [the Commission on Limits of the Continental Shelf], the reason was that the data was pretty poor. I mean we have to agree with this. The reason why is because we have, probably the only country in the Arctic which collects data to begin with 1935 on the bottom of the Arctic Ocean because it was requirement for me to read, my grandpa was the involved in this, I know exactly how they do this, usually in very small and difficult without any space, equipment and stuff like this. But they started in 1935 or something like this. But it's still classified. It's still under pressure of some government regulation, so I believe that not the whole data will be available.

What I found during several symposiums or conference like this, that the main difference, where Russia is different from others – we used to ask this question for ourselves a thousand times, “Why we are different?” Now I know the answer. We feel weather in a different way. Because all this time yesterday, and even today, we hear there's something changing in the Arctic, it's getting warmer, warmer and warmer. We can find even places free of ice, which is really strange because we're also trying to find something like this and we failed.

I am living six degrees to the south from the Arctic Circle, only six degrees. Our spring started on the 1st of May, no changes. 1st of May we are going to our dachas and roads are free from snow. This is an indication that spring has come. Each year, no changes and we will have snow at the forest until the end of May. Now, you can tell me about changes, weather issues and stuff like this. But I'm sorry, this winter was pretty windy, pretty snowy and the temperature goes about 20, 21 below zero sometimes and it was not a warm winter at all.

Five years ago it was a warm winter, but not this winter, not last winter. We have sayings that it doesn't matter what is the latitude of your first assignment, most important the longitude, which means you can be assigned in the place where it's at latitude of 30 which is our summer resort. But if you found yourself in Vladivostok, the same latitude but different longitude.

And it's especially not same in San Francisco, if you would point to the United States you would find San Francisco on the same level and it's just different weather right. In Vladivostok it's just as cold but there still, it was the same. In Yakutsk which is a little bit down, the temperature this winter was minus 51 Celsius. You cannot be outside.

My first experience with the Navy, I saw my ship as a young lieutenant. It was connected with the pier. There was this huge pipeline with hot steam, even the cruiser was new. It was not enough energy to warm up the internal places of the vessel, because it was so cold at night. So they built a pipeline from the shore supply just to get the steam inside



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the vessel to get to sleep because it was not even warm enough to feel comfortable during the nighttime, it was pretty cold.

Why I am telling you this? Certainly I understand that scientific is on the screen. It's understandable that the ice is getting smaller and smaller, maybe in the next 50 years or so. But in the places like Kara Strait for example, the ice this winter was so huge. So out of space of the current strait it was okay, it was empty spaces and you can actually use vessels without Icebreaker support. But you have to precede the Strait and you have to have huge very powerful icebreaker to do this.

So probably yes we will have some spaces and we can tell to each other that yes the ice is getting smaller and smaller. But in navigable waters it's not, the picture is different. Northern Sea Route is not the only legal problem for Russia. Just to show you what is on the table of the lawyers, maritime lawyers in Russia, it's again submission. I'm not a part of the team who supports this idea, but again the submission will be done in 2013.

The Northern Sea Route, yes it's an issue, but look at the bright side of the picture. We have public law issues, which is pretty much the same as we have during the Soviet period of time, but now we have private law issues, which push public law issues to resolve some problems which we had before.

Baselines by the way, is still on the table. Because we have a law produced by the Soviet Union back in 1985—heavily criticized by the United States by the way and some other countries. And baselines is something which we also need to fix in our legislation. To give you some flavor, to make Russian flavor in the limitation issues: this is how I picture it. It's a little bit different from what we saw yesterday and probably we will see today. This is how Russians understand the limitation [pointing to a slide of the Bering Sea and Strait].

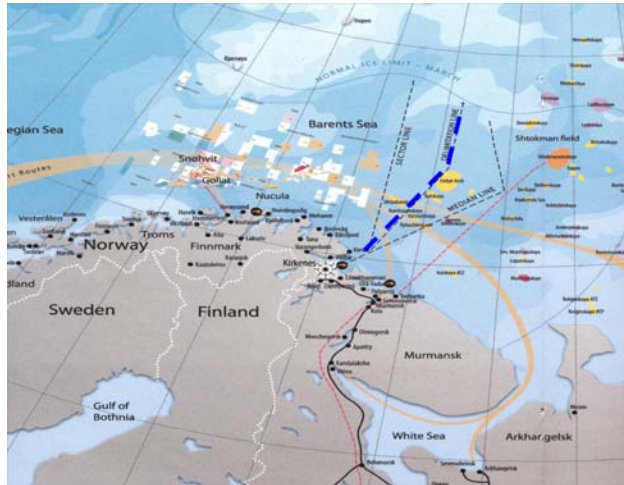
I would like to have your attention on these slides, on the U.S. side there is a line – it's a sector line – it goes through the North Pole. Picture the left side, is not correct. It's already done as an agreement with Norway. This is actually the entrance for Northern Sea Route from the Western side. What is the difference? The difference is that it was done on the pressure of oil industry, which has never happened in the history of the country. For centuries we struggle – well struggle, I mean we talk with our Norwegian colleagues about how to make this boundary.

Varakan Fjord is some kind of very strange place where the boundary of Norway and the boundary of Russia goes like this. So this is a point left side of the Norway boundary, this is where the Russian territory going to be stopped, so how to draw this line was very difficult. We built a gray zone. Everybody was happy catching fish in these places from both sides. Now the oil industry said “You know what, we would like to have Norwegians on board of our installations of Pechora oil field or Shtokman oil field. We would like Norwegian experience. We



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would like to have investments. Stop talking about boundaries, let's do it like this. That's it.



Now Russian experts start to talk that way, we lose a lot. Yes we lose. Blue is the line, is the real line by the agreement. On the left side is the median line, sorry, on the left side is the sector line. On the right side is the boundary which was supported by the regions as a median line. So it goes like, it looks like it goes through the middle, but in reality we have different estimations, but it's about 3000 square miles in favor of the Norwegian side.

So as I said, under the pressure of oil industry they immediately produced this agreement and they start several projects between the Norwegian Government and the Norwegian oil companies to push the oil industry in this place. This is a unique situation that never happened in the history of Russia when money immediately changed the picture. Because 55 years, 55 years we talk with Norwegians about the boundary, and it was done like in one day.

Northern Sea Route – there are few beliefs about the Northern Sea Route. First of all what is it? I would like to have your attention on the Russian law which says that – probably the next picture will be better. This is a very popular picture to show different lines, goes from the left side to the Bering Strait like seaward, closer to the coastline and like this. But it's not a Sea Route. Because by Russian law a Sea Route is a Route which – well it says in the Russian law about territorial waters and continuous zones, that this is national route, a historically national route goes through some specific straits like Ilguyskys, Algaiskua, Media Laptiva and Saldango.

So, this is a route which is pretty close, which goes through the islands and pretty close to the Russian coast. Okay, if this is a national route it means Russia manages this route, it belongs to Russia and Russian jurisdiction covers those places. What about the UNCLOS Convention? So, because it's a little bit outside the 20 nautical miles of



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the boundary, the Maritime boundary of Russian Federation. If this a national route it's supposed to be national.

It was okay. When we considered Arctic as typical Russian – but we consider Arctic that we are alone, there's nobody there. I have an old version of calculation of how many vessels made it to this stop, where are all vessels in one day or one night or one hour located in Arctic? And it's just three vessels; we know exactly which one to whom belongs. And one Canadian and Canadian side, that's it.

It feels like we are alone for centuries. And one day you said "Okay we would like to go to Arctic. We would like to sail. We would like to use our Navy actually. We would like to send our Icebreakers." And Russia is like it's fitting, it's cultural. "Well we are not alone in Arctic." Somebody, Chinese would like to bring icebreakers in St. Petersburg yard. "Chinese, why do we need in Chinese Sea an icebreaker?" "No, no we are not going to Chinese Sea we are going to Arctic. We would like to be inside. We would like to build also Arctic style vessels with Arctic ability like cargo vessels."

We just like – how to say it in English in a polite way? So one day we wake up and now several times already Mr. Putin said "You know what, Arctic is ours." I don't know what is the translation from Putin to English, but "Arctic is ours." It means that Russia is going to spend a lot of money.

Last time I got the numbers and it was like, in U.S. dollars something like 300 million dollars to invest in different kinds of activity in Arctic. Probably it's not amazing but at the same time for a Russian budget it's pretty good money. Northern Sea Route is not a route; it's not like a waterway. Because we have a lot of information right now on different kind of articles, scholars used to write about how many cargos used to be on the vessels, how many thousands or millions of tons should be moved from one point to another point in this place. Probably all this data is okay, it's calculated by somebody, but to free this route, to make it profitable, you need to pass in one year like 50 million tons of cargo. Now it's about three, from three to 50.

What Norwegian will give us this last 47 million tons, Norway? Because everybody is looking on the insurance companies and how they will deal with the Arctic navigation right now, it's another story, but it's pretty close to the Northern Sea Route because just to draw the lines on the map is not enough. You have to fit the navigation industry here. And on this map I'll show you some places.

So, the Northern Sea Route is not like a line from point A to point B. It probably mostly goes from the internal part of the Russia to the coastline, through the waterways, internal waterways using Janase Rivers and some other rivers, to fit ports on the coastline of the Arctic to be able to load all this cargo on the vessels moving from this part of Russia to China or whatever, Japan and other ports.



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That's like a few nice legal names for the legislation which we have. I just put it on the screen to show you that actually we have several, not just one, regulations and rules according to the use of Arctic. And the last one is a law for the Northern Sea Route, which is still not enforced; why? The first region, they passed this region and stayed two months in November. They should be adopted in March. I was thinking that I will tell you about this during my presentation that look we have a new rule. No way. No rule at all.

Why? Because guys from the gas industry, from oil and gas industry don't like some pieces of this legislation and they would like to change it. And it's like a fight right now between the fishery industry and in the oil industry from another site. And it looks like oil industry looks a little bit more heavy in this question. A little bit more, yes how to say it in polite way. But this law is still not enforced.

What kind of problems do we have in the use of the Northern Sea Route? Number one, Professor Caron told us on Wednesday night that probably the Russian coast is the most populated coast, so population of this coast is more than the population in other countries. You gave what, 3.5 right, 3.5 million. Now, that's correct. In official you will have 3.5. Now you can add military people. And you have to add people who are temporary here in those places because during the Soviet period of time people were sent to these places for work, they will get good money and immediately return back to Moscow and St. Petersburg, buy an apartment or some kind of goods which you're not able to do this being on the job in St. Petersburg in Moscow.

Now there is no reason to go. "Why am I going to the Arctic? It's not a nice place to stay. I will not have a backyard. I will not have a place to park my car. Even I will not be able to drive anywhere. What is the reason to live in this place?" Ask this question when we talk about the Arctic. It means somebody used to be here, not in New London I am sorry. But in Arctic space and doing some job in this strange port like [Tixie, Pahavek, even Arjanges], it's much better but [Tixie and Pahavek], you cannot imagine how bad it is. It's not Sitka. It's not Anchorage. And it's not even Fairbanks, I'm sorry. It's absolutely 100% severe place. It's impossible to live there.

Now you can find yourself on the bottom vessel, but if engine stops for a while for some reason, it could be a big trouble. So we realize this in the Northern Sea Route, and we understand that the human factor is the most important. How to send people to work in this place, for what reason. How to build place for living.

Our very wealthy person is [Mr. Abromovich], he was a governor for some Northern part of Russia for a while. He did what he did, just started to be a governor. He starts to paint buildings in different colors, like red, yellow, green, light blue. Because everything is grey and it's really hard to be inside. It's not a town actually. It's just a temporary place where I have to survive somehow. So he started to paint and it was a very good decision.



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Infrastructure is a severe question for Russia. Because infrastructure is something which needs to be invested a lot of money. Safety of navigation – instead of rebuilding up Soviet system, Russia decided to build here 11 special stations along the Northern Route, it will be built 11 special stations run by Minister of Emergency. Not Minister of Defense. Not any other Minister, but by Minister of Emergency. So they will be responsible for rescue, salvage and all these operations. Eleven stations along the coastline.

Icebreaker support is pretty important and Russia invests a lot of money right now, because we have what five nuclear powered icebreakers, minus one, which is Arctic which needs to be decommissioned probably next year, too old. And we need about 10, it's the calculation who used to work with building this issue. It needs about 10 and about seven conventional [and three nuclear powered]. So now in the shipyard we have a new one, which is pretty new, 65 kilowatt. I'm not sure I'm correct introduce you how powerful it is at 65, it's a big one. And conventional, like 18 kilowatt icebreakers already on the shipyard, three of them. We need seven. So it's a huge problem for icebreaker support.

The last one is cost-effectiveness, because we have to compete with the Suez Canal. Now the Suez Canal, they're pretty seriously looking at what we're doing on the North and said "You know what, once Russians will make one dollar, we will make half dollar." So it's like a competition but now we cannot do this because we have to pay a lot of money for the icebreaker support and a lot of things like this.

The last question but not the least, Bering Strait. We have no boundaries with the United States from a legal point of view. Yes we have some lines, but we have no boundaries. Russia rejects the US/USSR agreement on the 1990.





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This agreement is not ratified by Russian Duma. We have a lot of talking about this. We do not understand why the United States rejected that this line goes to the Pole, because it was on the 1880 agreement with the Russia and the United States. The line goes directly to the Pole as far as International Law allowed to do this. So, we know exactly that if we will have a huge shipping over here, navigation, we need to install [VTS] system, and this is on the table in my office, the requirements of [maritime] transportation – how to do this; whom we have it by; what kind of [VTS] system we have to install.

And the answer not a small question is the separation zones, which needs to be adopted by IMO. It's also on the table in my office, but what we understand right now, that we are not able to do it just on Russian site; just on one line. It needs to be done probably as a mutual research from several not governmental institutions – this is my view. Otherwise from Russian side we will get "Do it like this." "We cannot do it like this." "Just forget about it and do it like this."

And so to avoid this I think we need to make some non-governmental research trying to put some lines in this place, trying to present all this on the governmental level and say look, because of the ice we cannot just draw a line on the map like in the Mediterranean for example, because the picture could be different tomorrow. We have to invent something from one side to adopt through the IMO, but we have a frame, pretty good frame to feel flexible to navigate in these waters.

Thanks a lot.

David Caron:

Well Alex, thank you for that data. Thank you for filling in a big part of the map that we haven't really addressed enough in this conference. I'm going to bring in our last two participants just to comment on that exchange, and introduce them to you. First let me just say, these two gentlemen are really, we should view them as two key architects of the 1982 Law of the Sea Convention. They understand that document I think better than anyone.

Professor Bernard Oxman right to the left of Michael Byers was in the Navy, in the State Department, while a member of the negotiating team for the United States on the Law of the Sea Treaty. He wrote articles every year in the *American Journal of International Law* on what was happening, how it was evolving. It's probably one of the prime, I wouldn't say negotiating histories, but shaping documents on how we remember that convention, and is really a key record.

He was my teacher and I remember that experience with great pleasure. He is currently co-editor-in-chief of the *American Journal of International Law*, which really reflects his stature as an intellectual leader in International Law in the United States.

To his left, at the end of the panel is Tullio Treves. Tullio is a Professor at the University of Milan, but has been a very active diplomat and legal advisor with the Italian Government. He was in that



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role during the negotiations of the 1982 Law of the Sea Treaty. He continued on with the Straddling Stocks Agreement and with the agreement to change the seabed provisions of the 1982 Law of the Sea Treaty. He was a key figure in all of that. In fact, I would say if the compliment to a diplomat is that a diplomat is someone who takes your wallet and then you thank them, Tullio was chairman of the diplomats. He is a wonderful, wonderful negotiator and consensus builder, which is reflected in his recent work. He was a Judge with the International Tribunal on the Law of the Sea, and a Chairman of the Seabed Chamber and was the Chairman who wrote the recent advisory opinion concerning seabed activities.

So gentlemen, let me just ask you just briefly do you have comments on these last two presentations, Bernie?

Professor Bernard Oxman:

Let me just make some brief points, the last one first. It came as something of a surprise to me that there was any question regarding the boundary treaty between the United States and Russia, which remains in force provisionally. It was referred to by the Russian Federation in its submission to the Commission on the Limits of the Continental Shelf, and was indeed just referred to by the International Tribunal for the Law of the Sea in its opinion on the Bay of Bengal case.

It is of course in force provisionally. The United States Senate has given its advice and consent to ratification, but the Russian Duma has yet to act on it. But my understanding, and I am not an expert in Russian law, is that its status as a provisional agreement is established by the provision of the Russian Constitution that continues in force the agreement of the Soviet Union.

Turning to Professor Byers comments, and one could go on at great length, let me emphasize at the outset that I think the United States should accept Professor Byers invitation to cooperate with Canada. Let me add to that that I think the United States should reject Professor Byers' invitation to recognize Canada's claims.



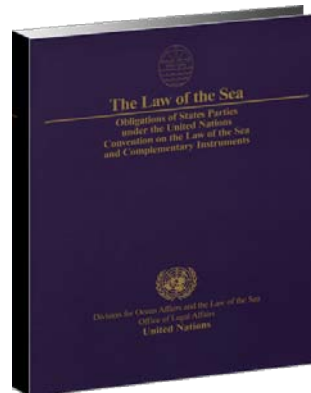


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I think the serious problem is that the Arctic is not the only ocean and Canada is not the only coastal state. Indeed, Canada is not exclusively a coastal state. Professor Byers tends to routinely forget such matters as the entry of Canada into litigation before the Supreme Court of the United States, in which Canada persuaded the Supreme Court to declare a number of navigation restrictions imposed by the State of Washington unconstitutional inter alia because they interfered with navigation to and from Canadian ports.

So we are to remember that Canada is a maritime state. Russia has exactly the same power. Problem, it is a global maritime country, but those concerned with administration of the Arctic in Russia seem not to necessarily have responsibility for Russia's status as a global maritime country. It's a classic difficulty.

Turning to the United States in this respect, the failure of the United States to become party to the UN Convention on the Law of the Sea raises serious questions regarding the extent to which the United States regards itself as a global maritime power. Were we to accept Professor Byers' invitation to recognize Canada's claims, we would confirm the view that the United States plans to retreat from the world.



That view can be expected to foster considerable instability around the world, including the kinds of miscalculations that can lead to armed conflict. So it is very important to look at the kinds of questions that have been raised here in a global perspective.

Among the many interesting points made by Professor Byers is that the Northwest Passage cuts through the heart of Canada. I have to say I'd always thought that that was somewhere between Montreal and Toronto, but in any event, we'll put that aside. The archipelagic sea lanes cut through the heart of Indonesia, indeed they cut through the heart of all of Indonesia. Indonesia seems to be doing quite well and comfortably with the regime of archipelagic sea lanes passage for ships and aircraft.

In terms of assistance of coastal states, I think we should recognize that ships navigating around the world typically required the availability of



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assistance in entrance into port for provisions and other purposes, safe harbors and other kinds of assistance. It was indeed the rare nuclear vessel that could contemplate making very long voyages without the need for such assistance. Nevertheless, Professor Byers is absolutely correct that the level of assistance and the attendant expense involved is going to be much greater in the Arctic, and it would be silly to pretend that that is not the case.

Canada's responsibilities to have due regard to navigation in the Arctic do not include the responsibility to fund those exercises gratuitously, and we will have to sooner or later face that issue. The same would hold true for Russia, and those issues should be addressed, I think along the lines that Professor Byers probably has in mind. Let me stop there.

David Caron:

Thank you very much. And now Professor Treves.

Tullio Treves:

Thank you David. Well my remarks will be certainly much shorter than those just made by Professor Oxman. And they address both speeches by Michael Byers and Commander Skaridov. Coming from a country that is far away from the Arctic, even though there are countries that are further away from the Arctic than Italy, what struck me in both presentations is the kind of inward looking approach. Both speakers spoke of domestic legislation, of fights within their governments, which is very interesting for all of us to know, or with cooperation with their immediate neighbors, or as a maximum, and they didn't even go too much into that, with the other coastal states of the Arctic Ocean.



Well, my feeling is that the Arctic Ocean of course is of concern for the five coastal states, but it also of concern, I would say, for all maritime states of the world, and certainly for those who are not in the first row in the Arctic theater, but perhaps in the second and third and fourth row. There is, I would say, a need for the five riparian states, I would say to educate other states about the Arctic. The remarks made by



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Commander Skaridov about the Chinese and their approaches to Russian ship-builders in St. Petersburg is illustrative of the need to take a full riparian state, to take into account that not only these five states are interested in the Arctic; many other states would be interested in navigating there and in participating in the way the private law permits in the exploitation of the dispute.

And they are not as accustomed to the environment of the Arctic as the five first row states are. So there is a need, in my view, to involve other states, including the European Union, which is in part a riparian through Greenland, even though Greenland is not formally a part of the European Union but is part of a state that is, Denmark. In any case, there is a need to involve other states and this should be done of course because these other states are so interested in doing things in the Arctic that it will be difficult to stop them, but also because they are not so accustomed to the environment and so they might even risk making disasters. Thank you very much.

David Caron:

Thank you Professor Treves. Well with that remark about looking beyond just inward, looking just beyond your immediate neighbors, I'd like to turn to Professor Oxman and ask him to comment briefly on the Arctic as a region, as a shared area and whether he has any reflections on that, that direction.

Professor Bernard Oxman:

Thank you. The Arctic is governed by International Law, although at times when you read about it you wonder about that.



I want to talk about three respects in which it is governed by International Law. First, the Arctic is governed by the many rules of International Law that apply to all areas of the planet, be they on land or at sea. Those rules establish the basic rights and obligations of states. In the time available I'll just give two examples.

The first example relates to the rules set forth in the Charter of the United Nations regarding the use and threat of force and the right of self-defense. These rules have acquired particular significance in the



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face of new kinds of threats posed by terrorism. And those threats have prompted new kinds of responses by the United Nations Security Council in the exercise of its functions under the Charter.

If terrorism is the issue and international governance is the objective, the Security Council is the first place; IMO if you're talking about ships may be the second place, where one would look and where people have looked to deal with the underlying problems, bearing in mind that at the end of the day, enforcement capabilities of course, reside in individual states, including for the United States in large measure the Coast Guard.

The second example relates to the rules of International Law concerning human rights. And those rules include the rights of indigenous peoples. The enthusiasm of some activists for a particular cause leads them to question whether duties under International Law that restrain all states also apply directly or indirectly to indigenous peoples.

I think these activists would do well to remember that the rights of indigenous peoples do not derive solely from the grace and the goodwill of the state in whose territory they live, but also derive from International Law. If International Law is the source of rights, it is likewise the source of duties. Weaken the latter at the peril of weakening the former.

The two remaining respects in which the Arctic is governed by International Law reflect the fact that, as has been pointed out by a number of speakers at the conference, the Arctic is an ocean surrounded by land. To understand the regime of the Arctic, we need to understand the law of the sea. This is at a minimum a lifetime endeavor.

The second respect in which the Arctic is governed by the rules of International Law relates to the rights of all states to use the sea throughout the world, including, but not limited to, the Arctic and to their duties when they do so. These rights and duties are spelled out in the UN Convention on the Law of the Sea. They notably include high seas freedom of navigation and over-flight, both within and beyond the exclusive economic zone. They also include transit passage through straits that connect to parts of the high seas or to parts of the EEZ, and they include innocent passage through the territorial sea and through internal waters formed by straight baselines.

The duties that are associated with the exercise of these navigation and over-flight rights and freedoms notably include those concerned with safety and those concerned with protection of the marine environment. Two global institutions are the principal organs for giving precise content to these duties in accordance with both the Law of the Sea Convention and more detailed treaties.



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For civil aviation it is the International Civil Aviation Organization based in Montreal that is the relevant organization. Its writ is mandatory over most of the sea and is also ordinarily respected over land. For shipping the relative organization is the International Maritime Organization, IMO, based in London. All affected states have the right to participate in these organizations and most of them do. And picking up on the theme just mentioned by Professor Treves, this notably includes the members of the European Union, as well as China, Japan, and South Korea.

These states and the European Union in its own right can be expected to have a significant interest in and role to play in the future of navigation in the Arctic and in its regulation in the common interest. Under the Law of the Sea Convention and the complementary treaties, many of the regulations adopted by these two organizations apply automatically to all parties to the Law of the Sea Convention or to the complementary treaties. This includes special procedures for establishing sea lanes, traffic separation schemes, and related measures in areas such as the Bering Straits, which if approved by IMO must be respected by all states and may be enforced by the Strait states; a bit more was just said about this by my colleague.

If safety or protection of the environment in the conduct of navigation or over-flight is the issue, and international governance is the objective, ICAO in Montreal, IMO in London are the first places one would look. With the seabed of the Arctic beyond the limits of continental shelf is concerned, the exploration/exploitation of nonliving resources would be regulated by the International Seabed Authority under the convention.

If deep seabed mining is the issue, and international governance is the object, we already have this system; the Seabed Authority would be the place to look. There is an issue in this respect with regard to non-parties of the convention, such as the United States. It's to be hoped that this will no longer be a problem well before there is a practical need to address the matter with respect to the Arctic.

It would seem that from what we've heard from experts at this conference that there is no pressing need to worry about fishing that is not only north of the Arctic Circle, but beyond the limits of the exclusive economic zone. Needless to say, if we broaden our concept of the Arctic to include adjacent seas south of the Arctic Circle, such as the Bering Sea, then of course, there are important fishing areas beyond the exclusive economic zone that are already the object of special arrangements among the states concerned.

The third respect in which the Arctic is governed by the rules of International Law relates to the rights and duties of coastal states, including the coastal states that border the Arctic. Those rights and duties are spelled out in the UN Convention on the Law of the Sea. They notably include sovereignty over internal waters and the territorial



sea and sovereign rights over the living and nonliving resources of the exclusive economic zone and the continental shelf.

Coastal states have important duties with the exercise of these rights. Those duties notably concern the obligation to have due regard to navigation and other rights of all states. Those duties also concern the conservation and management of living resources and those duties entail a requirement to protect the marine environment.

Under the convention the minimum that the coastal state must do to protect the marine environment, the minimum, is spelled out in the convention itself and in measures adopted through the competent international organization which is IMO. Thus, for example, IMO has helped develop procedures and minimum standards for the regulation of offshore installations and for dumping through the Dumping Convention and subsequent instruments.

However, more than minimum standards are needed. In this regard the Law of the Sea Convention expressly envisages cooperation between coastal states on a bilateral or a regional basis in order to ensure the effective implementation of coastal state duties. This is true especially on matters that may well engage the interest of more than one coastal state, such as marine scientific research about which we heard a great deal yesterday, conservation of living resources, and prevention of pollution from offshore drilling and installations from dumping and from land based sources, lest we forget.

Regional arrangements have emerged in many parts of the world for the purpose of enhancing cooperation for these and similar purposes. As one would expect, those regional arrangements are tailored to the particular needs of the particular marine region that's involved. And it is in this respect that one might envisage an active, important and even expanding role for the Arctic Council that is tailored to the particular needs of the Arctic. I think Michael Byers is absolutely correct in citing the special safety concerns that exist in the Arctic in this regard, and I think it's gratifying that the Arctic Council has already taken on this topic.

In this context I think it's appropriate to regard the Arctic Council, at least in many respects, perhaps not all, as potentially performing the functions of a cooperative regional arrangement contemplated by the Law of the Sea Convention with a complementary role to play in the effective implementation of coastal state duties under the Law of the Sea Convention. I think this is a particularly useful perspective in thinking about the issue, because it helps us determine whether, and if so in what respects, particular functions are appropriate to the Arctic Council.

For example, if the matter is one that engages the rights and freedoms of all states, and is entrusted to a global organization such as IMO or to a dispute settlement mechanism about which Professor Treves will speak shortly, then it's probably best to defer to the role of that



organization or mechanism. Similarly, if the matter is one already regulated by other regional or functional organizations, or that should include states that do not participate in the Arctic Council, then it also may be best to defer to other cooperative procedures.

Moreover, if the matter is one that engages only two states, such as a maritime boundary, then it is probably best to leave the issue to them. This connection I think is quite important to distinguish between cooperation and the performance of obligations on the one hand, and the rights of states under the convention on the other hand. I don't much care for confusing the language of private property with the principles of International Law because the latter ordinarily concern jurisdiction and governance. But the fact remains that the Arctic is not a no-mans-land. There is sovereignty over land territory. There are vast marine areas subject to the sovereignty or sovereign rights of the coastal states. There are established rules regarding the authority of the flag state over its ships and aircraft on and over the sea. And there is a global system for international security established by the UN Charter that takes precedence over all other treaties.

Restraint and cooperation in the common interests that respect the rights of individual states and the functions of other international mechanisms is what can be and should be envisaged for the regional agenda among the Arctic States. This is itself a very daunting task. It need not be further complicated, and ultimately prejudiced I fear, by unbounded ambition.

I might end by paraphrasing Edmund Spencer, 'Be bold, be bold, be not over bold'. Thank you.

David Caron:

Before we go to our last speaker, Professor Treves, I'd like to give a very brief comment so we leave Professor Treves time, to both Alex and Michael. We're hearing this movement from concerns of particular states within the Arctic to more the region or the interests of states outside. I wonder if you both could just comment on that for a moment. Alex, Russia is not alone.

Alexander Skaridov:

I would like to say a few words about the comment made by Professor Oxman regarding the agreement between the United States and Russia in the Bering Strait. Yeah it's provisional in law, but based on the Russian law, the duration of these provisional issues could be not more than six months. So after six months you have to decide if it will be enforced or not. If not, it means that there is no law at all. Yes, it's supports this line and reviews this line, Coast Guard from both sides know about this line, it's on our maps. But speaking from the pure legal position, there is no law like this in Russian legislation system.



Making comments on Professor Treves, yes it looks like it's internal problem not international. It should be international. What I tried to do, I tried to show you that Russians understand this not international. Russians understand this as an internal problem. Probably that is the reason that we still have a legislation which in my view should be changed. We're still producing some kind of rules without international, I would say, without international translation; just rules which we could apply only for somebody, which we found in the street, and we think that all of them should follow those rules.

We never asked the question why the vessels in the region which passes through the current sea should use the rules and regulations which we apply for the Northern Sea Route. We understand that this is internal and that is the problem, it should be international. We understand that as internal, and in this case, this is our approach to deal with all our problems. Because state officials would like to push some regulations and some people used to support even in state Duma to make Arctic as Russian Arctic, not international spaces.

That is why I tried to tell you this story, to make you feel that it's still international in the approach for our – not international – it's still internal approach to Arctic. In all cases it's still internal even in submission [to the Commission on Continental Shelf Limits], which in 2013 we will do again in as the next step. It's still internal regulations which we produce right now. And I'm not sure, I'm sorry to say this, that it should be international. Why? Tomorrow we will find exactly the same picture as we have right now in Bering Strait.

Poland's vessels used to catch fish over here without any rules and regulations. A lot of vessels from North Korea, from China probably will have the same picture of the north. And me personally, on this stage, I think it's not very good for Arctic. It's better to manage Arctic in some case as – how to say it in English – I think it should be done on the basis of the mutual agreement, but this mutual agreement will



produce a legal base for some specific countries to do their best to deal with the Arctic spaces.

So, for example, we are not talking about delimitation line right now, but we are talking about if Russia is over there, how for example, Italian vessel will go through all these places without support, without navigational support, without rescue and salvage support and stuff like this. We're going to build some international organization along the coast which will help. Or even we are talking about the Polar Code. How we can apply Polar Code in these places?

We already have a law about the [colossal] vessels which could proceed through the Northern Sea Route. So we will take Polar Code as the main and the basic document in the current strait. Sorry, I have to follow orders. It's an Arctic story, something which I can speak on for a long time. I'm really sorry.

So to make it very small, we feel it is internal and that is the problem. When I say "we" it means Russian legislation, state Duma feels that this is internal. Remember Chilingarov? Mr. Chilingarov dropped the flags on the bottom of the ocean [under the North Pole]. Canadians immediately reacted to this "It's not sanctioned, we should not drop flags in places like this, it's not your territory. It means nothing." But he felt like this, that while he's here I need to drop the flag. This is here. It's not education. It's not something like this. It's attitude to the place as Russian place. Sorry. Thank you.

Michael Byers:

I have instructions to be brief, but I'm going to start with an anecdote. Shelagh Grant and I sailed through the Northwest Passage last summer on a ship owned by the Russian Academy of Sciences, the *Academik Loffe*, and I was very interested while on the ship to study the old Soviet charts of the Canadian Northwest Passage and discovered that the old Soviet charts had considerably more soundings through the Northwest Passage than the current Canadian charts.

I also know at least one person in this room who has sailed through the Northwest Passage under the ice on a U.S. submarine. But I would only like to conclude the anecdote or anecdotes by saying that covert actions can of course not make or change international law. So we'll just be friendly and ignore that history.

Russia was just admitted to the World Trade Organization. It is a major trading partner of Western Europe. It is cooperating extensively in the Arctic, the boundary treaty with Norway is just one example of that. There are obviously perspectives and concerns that need to be taken into account. But as we know from Wiki Leaks and cables from the US Embassy in Moscow, the Arctic is the perfect place to engage Russia cooperatively as part of the Obama administration's efforts to reset the relationship. This is not just about the Arctic. This is about the relationship between NATO and Russia on every single issue. And if we cooperate in the Bering Strait we're helping to achieve peace and



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stability in our world, and that's a remarkable thing two decades after the end of the Cold War.

On the issue of the Northwest Passage, just in quick response to Bernie, the center of Canada is politically half way between Montreal and Toronto. The exact geographic center of Canada however, is in fact Baker Lake, Nunavut, which is very close to the Northwest Passage. Geographically it is a waterway or series of waterways that does cut through the center of our country. I know that the US has concerns about a possible precedent. I would suggest that rather good lawyers in the State Department and the Department of Defense could hopefully distinguish a traditionally ice covered waterway that's thousands of miles long from the Strait of Hormuz or the Strait of Gibraltar.

There are abilities to legally distinguish situations available in our world. The other thing to remember is that it's always possible to contract out of customary international law by way of treaty, and the Bosphorus and the Dardanelles are in fact covered by treaty and not the customary international law respecting international straits. And we should at least explore that kind of option in our discussions. Because I think what you're seeing here today is the beginnings of that discussion that the Canadian and US Governments should be having about this issue.

There are ways to move forward with respect to the Northwest Passage. I am perfectly cognizant that the worst case scenario for the United States would be to recognize Canada's legal position, internal waters, and then have Canada do absolutely nothing to police those waters or provide infrastructure. I know that. So as part of the discussions it should be "how is Canada going to commit and demonstrate that commitment to building those ports of refuge, to providing those world class charts, to providing that world class search and rescue."

That has to be part of the agreement because otherwise we're not going to get you on our side, and I think the United States and Canada need to find a way forward. It may not be recognition of Canada's internal waters plan, but it has to be something much better than what we have today, and not just because of the Northwest Passage but also because of your Arctic Straits, which as we heard yesterday are becoming more salient as an issue of concern for the US. Thank you.

David Caron:

Well this is excellent. I feel like I'm in that conference in Korea. We're ready to move forward on the Arctic and the present, the past are giving us constraints. And it provides a perfect moment of transition to Professor Treves who is going to give a few remarks on how disputes might be solved, and we've touched on a variety of them. Tullio?

Tullio Treves:

I will not be long. Even though all we have heard up to now by the excellent colleagues that have preceded me shows that the potential for disputes exists in the Arctic, and may I, perhaps this is professional defamation having been on a tribunal for 15 years, on the score that mechanisms, functioning mechanisms for the settlement of disputes are



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an important element to make International Law work, and to prevent and solve situations of friction and dispute. And in particular, I would underscore that not all mechanisms for settling disputes, international disputes are equal. Those that I consider as the most important and efficient are those that include compulsory adjudication, be it by a permanent tribunal or by an arbitration panel. But the important word is “compulsory.”

Mechanisms that provide that one side can set in motion a procedure before a judge or an arbitrator without having to obtain the agreement for that dispute of the other side. This kind of arrangement, which of course cannot be put in motion unless there is an agreement behind them, has not only the advantage of settling disputes, but also I would say the advantage of preventing disputes.

States take more seriously their obligations under International Law if they know that they can be brought to court by other states. And so the presence of compulsory mechanisms for settling disputes is not only a dispute settlement mechanism, but also a dispute preventive mechanism.



What about the Arctic? Here we are all convinced that the Arctic is an ocean. It is a sea and so the law of the sea applies to it in most regards. And of course the first thing to look at is the United Nations Convention for the Law of the Sea, better known as the acronym of UNCLOS. But it is very well known that under Part XV of this convention, a mechanism for the settlement of dispute is organized. It's a complicated mechanism, but it provides for compulsory jurisdiction.

May I add that as far as the law of the sea is concerned, of course the UNCLOS is the most important document that contains compulsory



jurisdiction provisions, but it's not the only one. The United Nations Fish Stock Convention, or Saddling Stock Convention of 1995, also contains a mechanism for the compulsory settlement of dispute. And it happens to be same mechanism as provided for by the Law of the Sea Convention. Moreover, the IMO Convention on Pollution from Vessels [MARPOL] also contains a mechanism of compulsory arbitration.

So we have a certain amount of law that provides for compulsory arbitration. Let's now look for a moment at what kind of disputes we can imagine. And I would make a rough division in two kinds of division. One, the delimitation disputes. Two, other disputes. As far as delimitation disputes, unfortunately the existing provisions for compulsory dispute settlement are not of great help, are of no help at all I would say. Because first, as we all know, the United States is not a party to the Law of the Sea Convention, and consequently is not bound by its dispute settlement provisions on delimitation.

Second, the other four states that are the coastal states of the Arctic Ocean, Russia, Norway, Denmark and Canada all have taken advantage of the possibility of excluding delimitation disputes from compulsory jurisdiction, which is provided by Article 298, Paragraph 1 of the Law of the Sea Convention.

So, none of the five states, of the five coastal states, is bound to submit to the adjudication of a court or tribunal if another starts the proceeding. And none of them is entitled to start proceedings under the Law of the Sea Convention. Moreover, delimitation disputes can go to court only through a *compromis* or a special agreement that two states might decide to conclude. And it's my impression that at least the two biggest states are not very much inclined to follow this route as a general policy, there may be exceptions.

There is a further complication perhaps that all these states have or will have to submit to the Commission for Limits of the Continental Shelf data in order to be able to delineate the external limits of their shelves beyond the 200 miles limit. And if and when there is a pending question of delimitation with their neighbors, the Commission has a policy of not proceeding until this border is established. So, also this may have a part to play in the question of disputes concerning delimitation.

The Law of the Sea Tribunal in its very recent judgment of 14 March last between Bangladesh and Myanmar had to draw a borderline between the two countries beyond 200 miles. And, in so doing, it had to say something about the relationship between drawing borders and the function of the Commission as far as the external delineation of the limit beyond 200 miles is concerned. And of course the judgment will not solve all problems for the future; it was very limited to the two states. But still, the judgment shows that at least in certain circumstances a delimitation, a site delimitation can be drawn.



I will stop now on delimitation and say very briefly that there may be also other kinds of disputes. And these may indeed fall under the mechanisms for compulsory jurisdiction set out in the Law of the Sea Convention, set out in the Straddling Stock Convention, and this may involve also the United States, which is a party to the Straddling Stocks Convention and also MARPOL.

May I also add that through the MARPOL, the Straddling Stocks Convention, also fishing arrangements and agreements that perhaps one day will be applicable to the Arctic Ocean, come with a mechanism for the settlement of disputes. Thank you very much.

David Caron:

Thank you Tullio. Please join me in thanking our panel.





Leadership in Arctic Governance (IX)

Panel 6

Leadership in Arctic Governance

Moderator: Ambassador Reno Harnish Director, Center for Environment and National Security, Scripps Institution of Oceanography, University of California San Diego

Panelists:

- The Honorable Lloyd Axworthy – President and Vice-Chancellor of the University of Winnipeg and former Foreign Minister for the Canadian Government
- Ambassador David Balton – Deputy Assistant Secretary for Oceans and Fisheries, Bureau of Oceans, Environment and Science, U.S. Department of State
- Peter E. Slaiby – Vice President, Shell Alaska Exploration and Appraisal
- Lisa Speer – International Oceans Program Director for Natural Resources Defense Council



Panel 6: Leadership in Arctic Governance

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CDR Russ Bowman:

Ladies and gentleman we are glad to welcome you to our sixth and final panel, in what has been over the course of the conference an intentional progression. We began with a history panel to provide context and serve as a waypoint for our course forward. We had presented a science panel to give us our call to action. We had our safety and stewardship discussions putting forth the responsibilities, and we just heard from our law panel some of the frameworks. Now, our cross-cutting finale on governance – to address the “how?” question.

To help us facilitate that discussion, I am pleased to introduce Ambassador Reno Harnish, currently serving as the Director of the Center for Environment and National Security at the University of California’s Scripps Institution of Oceanography. In 2009, he retired as the Principal Deputy Assistant Secretary of State for the Bureau of Oceans and International, Environmental and Scientific Affairs, having previously served as Chief of Mission in Baku, Azerbaijan, and Krishta, Kosovo, and Deputy Chief of Mission in Cairo.

He has a Bachelor’s degree in Political Science from San Diego State University, a Masters in International Studies, and a second Masters in Economics from American University, and he’s a graduate of the Seminar 21 Program at the Massachusetts Institute of Technology. Ladies and gentleman, Ambassador Harnish

Ambassador Harnish:

Well good morning Commandant Papp, Administrator Lubchenco, ladies and gentleman. We are very pleased to have such a distinguished panel for you this morning. I will be introducing them



individually, as they are scheduled to speak. It is fitting that our panel should be last in the day. We've discussed already the prospects for oil and gas in the Arctic. We've talked about the fishing in the Arctic. We've talked about indigenous peoples and their concerns. We've talked about the delicate Arctic ecosystem, and what might be done in response to increased transportation through the Arctic.



We've looked at them through the prisms of history, science, maritime safety, stewardship and the law. Now, we will be taking a look at governance options. We will be positing an overarching framework that will help reduce concerns or solve some of these problems. Do we need more law, more treaties? Perhaps the existing governance structures like the UN Convention on the Law of the Sea, as we've just heard, the Arctic Council and the International Maritime Organization are sufficient to regulate matters.

But what about nations like China, Korea and Japan that are not recognized in the Arctic Council? In the end are we going to be pessimistic as we looked at the Arctic? One could quote Will Steger, an Arctic explorer who said "As an eye-witness to the changing topography of the Arctic, I was stunned to see the rapid transformation of global warming on the region, its wildlife habitat and its indigenous cultures." Or will we be able to take a more optimistic look at this and be of one mind with Canadian Prime Minister Brian Mulroney who said, "One must see the future of the Arctic as an opportunity, and not as a problem or concern, that we will gain profit in the future from the Arctic, without destroying the environment on which it is based."

I'd like to introduce as our first speaker, Mr. Lloyd Axworthy, the President and Vice Chancellor of the University of Winnipeg, where he graduated in 1961 with a BA, and then went on to earn an MA and



Ph.D. from Princeton in 1963 and 1972. Dr. Axworthy's political career has spanned 27 years, during six of which he served in the Manitoba Legislature and then 21 years in the Federal Parliament. He held several cabinet positions, most notably for this discussion I think his time as Canada's Minister of Foreign Affairs from 1996-2000.

In the foreign affairs portfolio Dr. Axworthy became internationally known for the advancement of the human security concept, in particular the Ottawa Treaty, a landmark global treaty banning anti-personnel land mines. Dr. Axworthy currently serves on many panels. He serves as a Commissioner of the Aspen Institute's Dialogue and Commission on Arctic Climate Change and he is a board member of the Macarthur Foundation, Human Rights Watch, the Educational Institute and the University of the Arctic.

We hope today to hear from Dr. Axworthy how we might plan for the building of a cooperative approach to the Arctic issues, ensuring full participation of the northern people, a protection against environmental risks, and combined effort to steward and share the development of northern resources. Dr. Axworthy.

Dr. Axworthy:

Thank you very much, Ambassador, and good morning to all the guests and the distinguished persons that are here and to everybody who has joined in this last round-up that we have on the important topics.

I'm going to ask your indulgence for a moment just to pick up on the theme that was running through the last panel and has actually been the undercurrent throughout the last day and half, that is about the need for cooperation between Canada and the United States as we begin to plot our future as the North American partners in the circum-polar world.

It's not a particularly easy task. Cooperation is good to talk about. It's a little more difficult to make it work. I was reminded of this just after I retired from foreign affairs. I was invited to speak in Taiwan at a university group. At the end of the questions a young man got up and said, "You were a Foreign Minister of Canada for close to six years, and you had to work with the world's largest, greatest power. Can you give us some advice as to how we might get along with the great power living next to us?" Well normally I would have had a very smart young assistant slip me a note saying something like "Shut up, stupid" or something else elegant like that. But I was sort of forced back into my own resources and so I said, "Well there's an old Canadian saying, when you make love to a porcupine do it carefully."



I don't think it translated into Chinese too well, because I went to one of these power breakfasts the next morning and when I came in the room it was not exactly what you call a warm and fuzzy reception. So I said to my host, "Have I created some kind of diplomatic mistake in the protocol?" He said, "Well it may have something to do with the article in this morning's paper about your speech last night." I said, "Well what did they say about it," because my Chinese isn't too good either. He said, "Well it was reported that when you were giving advice on how to deal with a great power, you said 'well it's really like making love to concubine.'" So that's where I start my deep analysis of the problem of cooperation.



I want to talk first about the Arctic Council because of Dean Acheson's old saying in the book he wrote *Present at the Creation* [*I was in at the Creation*]. As the foreign minister in Canada we had taken on a leadership role in trying to work with a variety of countries in the circum-polar area, to provide a basis of cooperation because there was one fundamental understanding. This was post-Cold War, all the old conventional wisdoms had broken down, and what we began to discover as we were looking around the world that there was no more islands unto themselves, that the issues transcended borders.

As Kofi Annan once said, "These are problems without passports," and the kind of things that were taking place in the Arctic were ones that could be managed in some cases directly, some cases bilaterally, but increasingly they were issues that really crossed the frontiers. And that the only way in which you're going to get effective responses to them was to work in a collaborative, collective way and to determine how that could happen.



That's not easy to do, developing a new multilateral institution for the Arctic in an area where there's very little public presence, or very little political pressure to do so. Because I think it's quite right, most populations in circum-polar countries live on the southern edge, and therefore what happens up north may be romantic, and it may be sort of wistful, but it doesn't have political clout to it. I hate to bring in that kind of word, politics; it's a six-letter word. And I know that it's not one that's necessarily often used in distinguished surroundings like this.

But if you want to talk about the ability to get change, to build upon the kind of initiatives that have been talked about for the last day and a half, you're going to have to get some kind political leadership, some championship. You have to be able to provide some wedge to those issues. And that was really the beginning of a dialogue of circum-polar countries. But, along with the recognition that the issues, whether it was change in climate, whether it was the transportation issues, whether it was the incredibly difficult problems being faced by the indigenous people in the Arctic, is that we would have to find a forum in which there could be basis of collaborative consensus making.

Let me give you just three lessons that I draw out of that exercise that went on for about two years. First, it was largely undertaken by a group of people in the Inuit circum-polar conference that the leadership in helping to bring the Arctic Council together did not come from government officials or from political people. As ministers, we were simply really responding to a very strong stimulant that came from Inuit leadership in Russia and the Scandinavian countries and in Alaska and Canada. They led the way. So, for us to be talking somehow as if the Arctic Council is an institution that will do things for the indigenous, it actually started the other way around.

As a result of that, the Arctic Council became the only, I still think the only, international, multilateral body, that has as equal participants around the table, not just the foreign ministers or environment ministers or northern ministers, but actually the leadership of the Inuit people, of which there are some 30 or 40 different indigenous groups in that circum-polar area. So that they, while, ultimately don't have the final say in the authority of decision making, because only those who represent the government and the state can do that, their participation at the outset was seen as an integral part of making decisions in that broad based regional way.



I think that, if I can be sort of, well I can be because I'm a university president now so I can kind of say what I want. You know what they say about university presidents. We're like caretakers in a cemetery: we have lots of people under us, but nobody listens. We can get away with; we can pretty much say what we want.

But I think we're regressing back from that basic principle. I don't think that the same commitment, and if I had to state a reason for it, you might have your own assessments, but my understanding is, as soon as it became clear that the Gold Rush was on in the Arctic for minerals and oil and gas, there's a lot of money at stake, the idea of enabling and allowing the representatives of indigenous organizations and communities to have that full stake at the table began to regress.

I was very disappointed to see two years ago when the five coastal states came together as a group of five to start making decisions. And not only did they not invite some of their colleagues, but they didn't invite the indigenous people either. It then forced the Inuit Circumpolar Council to issue their own statement of sovereignty, which has something to do with the application of the Law of the Sea extension of the code because they said, "Hey, you're going to need us to do it." And secondly, in terms of historical, traditional science understanding, stewardship is one of the areas of which has long been the hallmark, the signature of the group, so that they understand how to develop economically. We had a wonderful presentation about subsistence as a way of providing stewardship. Well, that's a lesson we have to learn. So I think part of what I want to suggest is that that is a fundamental of the Council, and it's one that should be built upon, not shrunk or reduced.

Secondly, the whole idea that you can actually collaborate around these issues is one that carries that concept of a broader participation even further. If the indigenous people have a real stake in what's going on, increasingly you're saying you've got quite a large multitude of new players. Clearly, the corporations, the oil and gas companies, the mineral companies, international associations, organizations. So that when people are sort of ungoverned, in fact it is becoming a very busy street. We're talking about people who are making decisions. In my cut there has just been announcements of a major iron-ore mine on Baffin with a \$2.5 billion dollar investment; gold mines - it is becoming a hot spot, to use a bad pun, in the world in terms of mineral development and exploration.



In part, that's what's happening with the Arctic Council. I think that its ability to govern those events is being overtaken. It just isn't able at the present kind of movement and pace, and I really welcome listening to the kind of very intensive work that's going on, by people working in the working groups themselves, on the maritime work and the oil spill development. I still don't think that at the decision-making level, at the policy level, we are there yet. And that to me is one of the real issues that many of you should be thinking about as you go back to the academies, go back to the companies, go back to the departments, and the admiralties, and the chancelleries, to say we've got to find a way of getting that Council mobilized. If the ice is accelerating in its melting, then the ability to govern has to accelerate at the same time, it has to keep pace.

One of the crucial issues in this is what I would say, and again I beg you apology, has been really a genuinely soft leadership taken by both our countries. That compared to what our Russian friends are now doing on their side of the Arctic, where \$10 billion worth of infrastructure investment is now being prescribed over the next decade. That would be a quotient of almost a 100 to 1 compared to what's being spent by Canada and the United States in its infrastructure. And let's remember, let's go back to Theresa Grant's history, there was a time when Canada and the United States, when they saw a security impulse and invested in the Alaska highways and the DEW Line. In other words, there was a major initiative to provide substantially effective infrastructure in our northern area, as long as we "saw there was a threat." I think that threat does not have the same saliency or relevance, and therefore I think there is pull back from that. There isn't quite the same kind of political will at all levels. I think also there is a part that we really haven't learned. Part of the lesson is that you have to decentralize much of this decision-making and begin to share it. That's also I think one of the things that we hope to have before the Council.

The third level - and I'll stop there - is that one of the missing links in the establishment of the Council was the issue of security. I was up in Tromsø in Norway, having breakfast with Strobe Talbott to try to come with a final conclusion about signing the agreement. At that point the United States, for obvious reasons, did not want security as part of the mandate. There was still a lot of movement under the ice. There probably still is. However, the point I'd like to make to the group is the notion of security itself has gone through quite substantial transitions and redefinitions since then. Ambassador Harnish referred to the work that we did in Canada on the notion of human security. That's simply



based on shifting away from a nation-centric idea of defense and security to the protection of people.

We authored the Responsibly to Protect idea, that sovereignty is not a divine right. Sovereignty is earned to the extent that you protect the people under you. If you don't protect your people the limits of sovereignty therefore become circumscribed. And therefore the international community has a much higher level of responsibility to get involved and get engaged.

Environmental security has the same kind of connotation. How do you protect against the incredible environmental risk. And there are so many people in this room who have seen it, but I just I think I mentioned yesterday I was in the Callouette just a week ago, where you see the open water, where you see the Orca whales. And I asked one question, "Well, what do you do about the worst maritime predator in the world coming up to chew up all those Belugas that come out to the Hudson Straits?" And somebody said, "Well you can't kill an Orca, it's against the law."

Well, then somebody's got to rethink the law, because I can tell you, for the indigenous people in that area, this represents a challenge not just to their food chain, but to their way of life. That we're in some ways beginning to talk about a form of cultural genocide in terms of the disruptions that are now taking place in large parts of the north. And, by the way, the Inuit Circumpolar Conference has just taken a legal action at the Inter-American Human Rights Commission on exactly that issue.





So, when we get back to some of the legal and political issues a lot of these things are really beginning to move into turmoil. They are really beginning to create a whole new area of action. In the two minutes left I'm just going to make a certain proposition. First, it struck me as we were in our discussions that we have an interesting convergence at the Arctic Council. That beginning next year Canada takes on the Chair for two years and the United States follows for the next two years. That's a four-year period in which if there is some effort to come up with a strategy, a set of initiatives, a combined and cooperative approach, we can have an enormous impact not only on the policies of the Council if we work together, but also bilaterally as well. We start maybe with a serious look at the infrastructure issues that are going to be needed in the Arctic. And if we can't supply all the navigation and the other requirements to have an effective Northwest Passage and to make sure that everyone is safe and sound and secure in their bunks, then we should be finding out the ways in which we come together to do it.

I think we have to be similarly committed to this notion of a maritime spatial planning ecosystem approach. I think Lisa will speak to that.

Is it impossible to do? Given four years and the kind of diplomacy and negotiation that go on, I really believe that combined together, being a Chair of a council where you set the agendas, have a secretariat, mobilize resources, you can really get to work. And I think that we could really in partnership, in a kind of two member tag team arrangement, spend those four years really building the council into an effective forum, for the kind of political decision making that's going to be required.





A third area I think is really crucial to make it happen is to focus in on the human security aspects, which is the rights and place, and responsibilities of indigenous people. My own university does a lot of work up north, in the Arctic Research Center outside of Churchill. The issue that is most clear and pressing as we work with a variety of aboriginal organizations, is the issue of sharing resource rent. And I look forward to the discussion with Michelle. But that has to happen. If it doesn't, there is going to be risk and uncertainty because they will react. I can tell you that the ability of the Inuit and other tribes to be able to frustrate a balanced sustainable form of development, if they are not brought in, not just to be consulted but to be participants and to share in that resource; well, it's going to be one that I think is, could be a major area of instability, risk, and uncertainty for the Arctic area. And I think that we are as two countries able to work collaboratively on that kind of issue.

One final comment. It's mentioned that my university belongs to the Arctic University. Some of you recall from the original days of the Arctic Council there was an effort made, since then the funding has really shrunk to almost a point of negligibility. But things like the Arctic University Initiative to deal with the education of Inuit youth. The question of looking at food and energy supplies for northern local communities; the issue of looking at healthcare and how it can be provided in remote communities.

You just went through the incident this year of the supply on Barrow. Perfect example, that was one of the original premises and points of activity for the Council, it's since been kind of pushed to the age. I think if you bring that back, if between Canada and the United States, those issues can once again be alerted and given new energy and some resources. I think that we can then begin to say that almost that the governance along with the law that's there, the platform of law that was so well described, can now be built up with a diplomatic, and political, and I would say even military, combination of activity.

Because the one thing that I, I don't know if I'm still under the ban I was when I was a minister, to talk about security, but there are still hard security issues that are going to have to be faced in the Arctic as well. That there is going to be, as the access opens up, there's going to be people that take advantage of it, whether its drug smuggling or new immigrants or refugees. I think one of the discussions that have to take place in a surrounding like this, is the issue of harder security itself.



So with a minute left let me just say this as sort of an old political hack who now sort of enjoys – I was going to say “the serenity of the university,” except I have to go home and work on my budget when I get there. The slings and arrows of students and faculty and everybody else are about to face me. Let me just say I think that the Arctic Council, while not perfect, is the place we have to build on. And it has to be built on not just in the kind of finally the well developed detailed work that we hear today in terms of the maritime developments and the oil spill developments that are now moving ahead. I have no argument with the sector by sector approach, but eventually those sectors have to be brought together. It has to have some cohesion to it.

And I would strongly make the case that in a forum like this and the kind of connections that draw out of it, the idea of beginning to develop a network in the Arctic, an information network of sharing the resources, sharing the data, getting all the players and participants, whether it’s a private corporation or government agency or an Inuit community, the ability now with the new information technology of digital media to reach remote places, can fundamentally change the way we allow participation, the way that we find collaboration, and the way we ultimately find a new form of governance for a region that will be one of the really crucial hotspots of the world. Thank you very much.

Ambassador Harnish:

We have time for a question or two for Dr. Axworthy.

Question:

Yes sir, how would you go about changes at the Arctic Council?

Dr. Axworthy:

I think in a couple of specific terms. I think each country first should assign a fairly high ambassador to the Arctic Council who would have a fairly wide mandate. I mean we set up special envoys and ambassadors, I had a circumpolar ambassador who worked for me and she was just terrific. She was Inuit, she knew the communities, but also was able to provide that level of diplomatic conversation that goes on, and I think the ambassador would know about it. You have to have that kind of, and with enough level to really kind of make it work

Secondly, I think we have to restore back into the council the issue of peace and security. I think there’s a vacuum there and I think we should work to see.. you know, Gorbachev when he first made the statements about the Arctic in 1987 said, “This must be an area where we all do our best to find a reconciliation, peace, and security.” Here’s a region that can become a model, and I think we have to bring that back on the agenda to make that happen.



Thirdly, is the old cliché that it's a resource issue. You can't be a cheapskate when it comes to this. I'm not talking about massive sums, but just take a look at what the Russians are doing, just by one comparison. Their investments are substantial. They're serious about it and we're not. I think we're still tinkering. And I think that would be a very important collaboration between the two countries because we do share this thing called the North American Rock, and we better sort of work on it, as well as the fact that we share many of the sort of cross-cutting issues because we are the northwest side and not on the northeast side.

Finally, I would bring together some of the best heads that you have in this country, and we have in ours, about developing a much more effective information network system for the Arctic, in which you can begin plugging in, not just the communities for education, participation of Inuit; connections into the companies that are involved, the international agencies that are growing up, the kind of academic research that's there; so it becomes a common pool of information.

That in itself and just I guess, trust me I think from experience, the degree in which that becomes then sort of a working two-way system of information, also begins to provide restraints on poor behavior or bad behavior, and incentives for collaboration between people who didn't think that they knew each other before. I think that there are a number of those kinds of things that would both strengthen the structure of it by giving more political presence and clout. And I'm sorry; one other thing that was mentioned earlier, one of the other ambitions of the Council when we first discussed and is in the Ottawa Declaration is that the Council should become the voice of the Arctic to the rest of the world. To make them understand exactly what's going on. And the corollary to that is I think we have to find out the right mechanisms for inviting other sort of states and participants of the world to be part of those discussions; observers to begin with, associates, others.

I think I go back to my NATO days where we have, where we established a NATO-Russia dialogue. There's no reason why you can't have an Arctic Council dialogue between the Asian countries and the European countries to get together in those things. I think we have to reach out. We can't continue looking in.

Ambassador Harnish:

Our second speaker today is David A Balton. He is the Deputy Assistant Secretary for Oceans and Fisheries in the Department of



States Bureau of Oceans, Environment and Science. In March 2005, with the confirmation of the U.S. Senate, Mr. Balton attained the rank of Ambassador. Ambassador Balton received his AB from Harvard College in 1981 and his JD from Georgetown University Law Center in 1985. In 2009-2010 he co-chaired an Arctic Council Task Force in negotiations on the agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic. He's currently serving as the co-chair on a new Arctic Council Task Force on Marine Oil Pollution Preparedness and Response.

Dave is a former colleague of mine and a good friend and I know he'll give us the clear view from Washington. I have a feeling that over time the U.S. view on the Arctic Council is undergoing some shift and maybe he'll speak about that today. David.

Ambassador David Balton:

Thank you very much, Reno. It's nice to work with you again. Commandant, Dr. Lubchenco, distinguished friends and colleagues. First, I'd like to thank the Coast Guard Academy and Law of the Sea Institute for inviting me and for collaborating on this conference. I know how hard it is to pull together an event like this, and I think I speak for all of us in saying this is just fantastic, so thank you very much.

My main message to you today is that at least at the international level there is real leadership going on in the Arctic. My presentation will pick up where Lloyd Axworthy left off. Talking about what the Arctic Council has evolved into today and where it may be going. Beyond that I'll try to touch on a few other issues of governance after that.





As the last panel made pretty clear, the Arctic is not a Wild West. There is a system of international governance already fairly well established, a key piece of which is the 1982 UN Convention on the Law of the Sea. All Arctic nations are a party to this, but one. And indeed the Arctic might turn out to be one of the best arguments we are currently using in trying to persuade the Senate to approve this convention. At least for the ocean part of the Arctic, the Law of the Sea Convention is *the* international legal framework for managing ocean issues. As a non-party, as the odd one, as the outsider looking in, we the United States do not have the same type of clout, the same type of influence over the issues as we should.

There is also the question of the continental shelf. As a party to the convention, we would have a clear path forward to have the extended continental shelf of the United States in the Arctic and elsewhere finalized and recognized with legal certainty. And so for Larry Mayers' benefit, and really for all of ours, we need to join, and we've been talking to Senate about that as well. If people want to talk about the prospects for U.S. accession this year I'd be happy to take a question about that later, but what I really want to talk about is the Arctic Council.

I was not "present at the creation," but I'm present at the present, and I will say we are in an exciting time. We are watching this institution evolve before our eyes. Why? Because of the very reasons this conference was pulled together here. There is a lot going on in the Arctic today, and the Council is uniquely positioned to deal with these issues. From its establishment in the mid 1990s it really has changed in some important way. It has its traditional focus that it's had since its inception of environmental and sustainable development. That I'd say is still the bread and butter of the council. But its mandate is in fact much broader than that. Indeed, the only thing not within, the only topic not within the Arctic Council's mandate is military security, as Mr. Axworthy pointed out.

But of course there other types of security, beyond strictly speaking military security, that are within the ambit of the council, including human security safety issues and I'll be talking about that in just a bit.

However, the council is not an international organization. It doesn't, as the international lawyers would say, have legal personality. It doesn't, more practically, have the power to adopt regulations or rules that bind the nations. Why? Well that I think can be attributed in large measure



to the United States, and to the view that we had, at least while the council was being created. There was not a desire in the United States, maybe even particularly in Alaska, to create an international regulatory body to tell us what to do in our piece of the Arctic. That is a point of view that I would say that is now evolving along with the council.

The council is a consensus based body and as we've heard it has a unique role for the indigenous people that live there represented by these six permanent participant organizations. And I would agree that this is unique in the world. I have never encountered another international regime, or body, or entity, in which indigenous people have the type of participatory rights, the type of influence and decision making, as in the Arctic Council.

However else the council may evolve in the future, this cannot be lost. This is I think the key to its success. The council has a system of rotating chairs. As we've heard, every two years a new country takes over. Canada will be taking over in 2013, followed of course by the United States, and I think there is scope for the two North American chairs to work together on a kind of four year agenda, as Dr. Axworthy was anticipating.

In recent years the council has been mostly doing assessments and projects, programs, on sustainable development and environmental protection. The Arctic Climate Impact Assessment was perhaps its most famous until the Arctic Marine Shipping Assessment, which came out recently, and has as we've heard prompted real action.

The last Ministerial Meeting took place 2011, in Nuuk, Greenland and it was a watershed for the United States. We - the United States - were the only nation traditionally that did not send our foreign minister, or in our case our Secretary of State, to these meetings, but that changed last year. Secretary Clinton, accompanied by [Department of Interior] Secretary Salazar, Senator Murkowski, Lt Governor Treadwell and lots of VIP's all tripped up to Nuuk. I have to tell you the town of Nuuk is not a big place. There are 30,000 permanent residents, and I would say a good third of those people were at the airport when Secretary Clinton's plane landed to welcome her there, and another third of the population were at the hotel when we arrived a little later. [Pointing to slide] Here you have a picture of Secretary Clinton and other ministers of the Arctic Council. In the bottom corner you have a picture of the Council and its meeting place.



At that meeting, the council was transformed in a number of ways. A permanent secretariat was finally agreed to, and being set up in Tromsø, Norway as we speak. I think there is a very real prospect of more regular and increased funding for council activities. And from where I sit most importantly, the work of the council is expanding and yes I would say accelerating. Let me give you three examples.



[Pointing to slide of capsized passenger ship in icy waters] We have seen this picture before, and it's from the Antarctic region, but this is the sort of picture that keeps a lot of people up at night. The prospect of a major cruise ship sinking or some other search and rescue problem in the Arctic. In 2009 the Arctic Council Ministers said we need an agreement to deal with search and rescue in the Arctic, and they created a task force to produce such an agreement, both maritime and aeronautical. It was yes co-led by the United States and Russia. We had five rounds of negotiations. We weren't drawing on a blank slate, there is through the International Maritime Organization a Global Search and Rescue Convention through the Chicago Convention that created the ICAO [International Civil Aviation Organization]; there is an annex on search and rescue.

And we took those existing bits of international law, some bilateral and regional SAR agreements as well, and we fashioned them into an agreement that is right and right for the Arctic Council. This is the first legally binding instrument the Arctic Council has ever produced. It is the first treaty of any kind on any topic signed by the eight Arctic



nations. And yes it was signed by Secretary Clinton and the other Arctic ministers just last year.

The agreement draws a map; it's kind of an odd one for essentially administrative purposes only. It creates eight polygons in the Arctic without prejudice to where the actual boundaries really are. But the point is that each of the Arctic states will have lead responsibilities for managing a search and rescue incident that would take place in their particular area. If they need help the agreement commits the other parties to provide help as possible. It also promotes cooperation in training, joint exercises, facilitates transfer of personnel and material across borders, all the sorts of things you need to make search and rescue work. Canada has already hosted the first set of table top exercises to implement this agreement.

And, yes, now we have a new mandate. In 2011 the Arctic Council Ministers created yet another task force; this one to produce an instrument on oil pollution preparedness and response. The work of this task force is to dovetail with ongoing work of the council in dealing with oil pollution prevention. This task force is co-led by the United States, Russia, and Norway. Admiral Cari Thomas of the U.S. Coast Guard is very ably leading a large and robust - sometimes boisterous - U.S. delegation that includes Coast Guard, Interior, NOAA, [Department of] State, the State of Alaska, industry, you have some environmental participants. The permanent participants, the indigenous people of the Arctic that participate in the process in their own name and right to, as well as several invited experts, Dr. [Lawson] Brigham for one.

We've had three rounds of negotiations so far, most recently in Anchorage, or actually at the Alyeska [Hotel] in Girdwood [Alaska]. And we have at least brought into focus some of the main aspects of this agreement to be. It will be another legally binding instrument, building on the search and rescue agreement. It will be within the framework of another IMO treaty the so called OPRC [Oil Pollution Preparedness, Response and Cooperation] Convention from 1990, and a number of bilateral and regional agreements too. It will cover marine oil pollution from any source – shipping, drilling, installations on land that might leak out into the sea. There will be commitments to cooperate, collaborate when dealing with oil pollution preparedness, and response. Joint training, joint exercises, some of the very same elements of the search and rescue [agreement] will, I'm certain, find there way into this agreement too. Not yet clear what the full geography of this agreement will look like. How far south it will



extend, whether it will create eight polygons the way the search and rescue agreement did. If so will it be the same polygons? That remains to be decided.

As a side note, I would say, for the Cadets here - among the many missions of the Coast Guard, here's another - diplomacy - because it has been the Coast Guard that's been leading the diplomatic efforts to try to get both the oil pollution and the SAR agreements negotiated.

There is another exercise underway in the Arctic Council; I'm not going to say much about it because I think the next speaker will probably talk some about it. But, yes, the Arctic Council is seized of the idea that there should be ecosystem-based management in the Arctic. This was something that the United States strongly advocated, based on our own national ocean policy. The idea is the types of things we're trying to do at home to become better stewards of ocean space under our jurisdiction in the Arctic, should also be done in the Arctic.

There are other governance issues beyond those that the Arctic Council can and should deal with. We've heard about boundaries. Yes, we have an agreement with Russia. Yes, it is being provisionally applied. And, yes, Russia has honored that agreement to apply provisionally for coming on 22 years now. The United States and Canada, however, do not have an agreement on a maritime boundary in the Beaufort Sea. But there is an odd dynamic underway, which I think is going to lead to negotiate settlements sometime in the next 3-5 years I would say.

I won't talk much about shipping because we had a whole panel of people talking about this in important ways, but this is another type of or piece of the governance framework outside of the Arctic Council.

So, about fisheries. Here is another issue of growing importance but probably not one that the council cannot deal with for variety of reasons. In the United States, as we've heard, we have closed the exclusive economic zone north of Alaska to commercial fishing. But there is this large high seas pocket on the map on right, where there is no international regulatory regime for managing fisheries. Now the likelihood that fisheries will start up anytime soon in that period is rather remote. But that may mean it's the perfect time to try to engage other countries in our approach. Namely let us promise not to allow fisheries to start there until we know enough about the ecosystem of that area, and until we have regulatory regime for managing fisheries properly. We have made in fact such a proposal to the Arctic countries. Next week in the United States the Minister of Fisheries and Oceans



from Canada will be coming to the United States, this will be one of the topics discussed. We're talking about it actively with Russia, Norway, Denmark, and others as well.

That's all I have time for, but I'd be happy to participate in question and answer, and thank you very much for your attention.

Ambassador Harnish:

Do we have a quick question for Mr. Balton? Here we are?

Question:

What about that ungoverned section of the Arctic...

Ambassador Balton:

The high seas you mean?

Question:

Yes - the high seas - what are the probabilities of getting Asian fishing countries to agree in advance to go slow up there?

Ambassador Balton:

The likelihood that there will be fleets from any country including from Asia up there any time very soon, is not great. Although if there were fishing anywhere in that area, probably the first place would be at mile 201 just outside the U.S. zone. And that would create an unfortunate circumstance, especially in a time when the U.S. does not allow fishing within its zone. My sense is that if we can build support from within the Arctic nations for the approach and outline we could then bring that proposition to China, Korea, Japan, the EU as a whole, and say let us all participate together and promise not to allow fishing to start there until we have a regulatory regime in place. It would otherwise be unregulated fishing something we are supposedly opposed to.

Ambassador Harnish:

I'd like to exercise the Chairmen's prerogative and ask you the question, you offered the answer. What is the chance for Law of the Sea Convention this year?

Ambassador Balton:

There is a chance for the Senate to approve the Law of the Sea Convention. This Administration, just like the Administration before it, is pushing for it. Senator Kerry, Chair of the Foreign Relation Committee, is saying he wants to hold a series of hearings on the convention beginning next month to try to push it through full senate even this summer. We are in an election year, it is true. But there is a very large coalition of groups not just people like me who are actively in support of the convention. Obviously, the National Security establishment in the United States has always supported it and continues to do so. But the ocean industries that have spoken to the issue, the oil and gas companies, the telecommunications companies, shipping, fishing have all come out again in support of it. So have the



unions that work in these fields. The U.S. environmental groups all support it, so you would think with a treaty with so much support, there would be in a rational world the ability to get it through. So I'm a rational person, and I believe it will happen. Thank you.

Ambassador Harnish:

We all dearly hope so. The next speaker is Mr. Peter Slaiby. He grew up in Connecticut and attended Vanderbilt University in Nashville Tennessee where he earned a BE in Mechanical Engineering. He started his career with Shell in New Orleans in 1980 working in the Gulf of Mexico as a Petro-physical Fluid Engineer. He then had service in Syria, in Brazil, in Cameroon, in Suffolk in England, in Brunei, and in all of these he managed the life cycle of the hydro carbon production business, and most importantly managed the facilities to the highest health, safety, and engineering, and environmental standards. Please join me in welcoming Mr. Peter Slaiby.

Peter Slaiby:

Well thank you everybody for being here. It's for me kind of a special to get back to Connecticut, and if there's an institution that can do it it's the Coast Guard, so I'm very very appreciative of the invitation and the hard work that's been put together to set this conference up.

First of all, thank you again for mentioning my last assignments and assignments at Shell. I've worked in tropical regions and of course worked in some less temperate North Sea areas as well, so my whole career has been spent actually in the migration further and further north. And Alaska is really is just like the final peak of this career, and I hope it's not the peak of my life, but the peak of my career anyway.

As I've spent my career moving north I think there has become more and more excitement about what remains in Alaska. And I think yesterday you heard a little bit about where other people are starting to run their game with respect to what's going on. It's been a story about both human capital and resources moving forward into Alaska.

When Shell looks at Alaska, and I don't think we're misaligned with organizations like the United States Geological Survey, we see about a quarter of the world's remaining hydrocarbon resources, oil and gas in the Arctic regions. And we when look specifically at Alaska, we see about a quarter of that quarter in Alaska, and specifically in the Beaufort and Chukchi Seas. So that is a fairly big prize, and I don't mind telling you as an experienced explorer, and Shell is one of the largest explorers in the world, we're counting on these resources in both the Beaufort and Chukchi Sea.



As you can see in the view-graph behind me, Alaska is not the only place we are looking, and I think it's this conference really more than others that has raised the flag that the quest is on. I don't want to call it a Rush because I think that really misstates how things are moving forward. I think it is largely progressing in a fairly ordered manner, but it is progressing and it is moving. And in the U.S. I think we've looked at this and under the guise of the governance section of the panel that I'm speaking on today, recognize that there have been gaps. We're about to move into a phase where the U.S. is going to be leading the Arctic Council the next few years and I think it's really incumbent on us to begin to exercise the governance that frankly we found a bit lacking in our move forward into Alaska.



So we have offshore operations in Russia. We have offshore operations in Norway, and now in Greenland. And Alaska is going to be significant and I've talked through that, but it underscores the fact that Shell is not new to Alaska. A lot of these operations have been going on for decades. As a matter of fact, for example, I live in Anchorage, Alaska. The facilities and the platforms, there are 17 platforms in the Cook Inlet that have been producing since the 1960s now. This is sub-Arctic conditions, but harsh conditions nonetheless. And actually have a pretty good track record of being able to be responsibly produced.

I get asked a lot of questions in these conversations about why the Arctic? And you know it's probably the second question I'm asked, and the first question is why we are not drilling in ANWR [Arctic National Wildlife Refuge], and I've got an answer for that, but I'm not going to give it, I won't. But the folks will ask why are you continuing to look, and why is industry interested in what's going on the Arctic



and what supports the map you see in front of you? Well if one looks at the scenario planning, and again this is another thing we do a lot of thinking about and planning at Shell, one looks at scenarios. In the next 40 years, energy needs, not necessarily just oil needs, but energy needs in the world will double. And as the ambassador was talking about, in my time and my work experience in the last 30 years, I've lived in a lot of countries that have aspirations to have many of the same things for example that I enjoyed growing up here in Connecticut.

So I'm convinced, having spent a large portion of my career, that that requirement or forecast for energy is something that we're going to see. In fact, we have to be up front about being able to move a lot of people in a lot of different countries into a world where they can get the support they need and have the lifestyles they wish with the energy that they would require.

So that really frames the challenge for the Arctic, oil and gas will play a part of these energy needs. It won't be the only part, it will be multidimensional. But it does make a case for us to be interested in the Arctic when one looks at significant volumes. I think if one looks here in the U.S. at our own individual picture, the only place that has more hydrocarbon energy resources than the Arctic would be the remaining deepwater Gulf of Mexico. Looking at the east coast and west coast, there is more energy potential in the offshore Alaska than we see in the east and west coast combined.

So I'm here today to talk about a company that believes that we can do the work and we've had a lot of discussions about what it will take with respect to working in the communities. Unless we can provide a substantial economic benefit for the communities that we work in, I think we're building a house on sand. Shell has clearly worked around the world where these foundations have not been deep enough, and I've worked in a lot of the areas as well. And what ultimately will come to roost is that economic justice has to be a part of the work in the communities that we play in.

We really do believe, when we go in and talk to these communities, that people should be looking for two things. They should be looking for that load of justice, but they should also be looking for programs that will be able to sustain traditional lifestyles. And clearly the four years I've experienced in Alaska have been a real touchstone on how important, we just had a discussion about the Beluga whales, but how important for example the Bowhead whale plays the [Native Alaskan] community. How important the whaling captains are and have been



really in the development of modern Alaska, as well as the cultural glue that keeps these places. Frankly, we would not be considering an entrance into Alaska and other Arctic regions, if we were not convinced at the highest levels in our company that we could do it safely.

I know that we're talking today about Arctic people and other experiences, but the time I spent prior to moving to Alaska on the island of Borneo in Brunei, convinced me of the deep love people have for their environment. We have oil installations that were actually installed over live coral reefs. A hugely sensitive area brings its own set of challenges. But I think the idea of Alaska being unique, and I don't want to detract from that, but it's really a standard that oil companies need to meet regardless of where they work. The Arctic is clearly special, but every place is special as we've seen. Stakeholder's needs and their ability to sustain their lifestyles are equally important throughout the world.

So we're talking about this in an Arctic context today, I would hope that it's brought it in through a lot of other contexts as well, and a lot of other places where energy companies are working. I don't want to diminish that uniqueness we've got in the Arctic, and of course we have to work for the trust and we have to basically earn trust to be allowed to explore in areas like Alaska and we well recognize that challenge.

For Shell, it's meant a lot of work in these communities and some of the statistics I talk about are pretty daunting because I've personally experienced it. I've had the opportunity to travel through every community in the North Slope the northwest Arctic Borough. I've spent time on St. Lawrence Island and in the Bering Straits. We've made over 450 visits into communities to largely gain trust, but it has to be more than a one-way dialogue. We have made some extremely important modifications to our programs because of what we've heard.

Traditional knowledge has huge value for example in our world when it comes to things like understanding how impacts of sound can move and potentially bring hazards to those who are harvesting Bowheads or seals or walrus. So, we've taken it all very seriously and we have made some very significant changes to our program because of the importance of working with stakeholders. Of course, we are always looking for the economic values in the communities we work in. And we're currently putting about 25%-30% of our dollars that we spend in Alaska.



However, there have been some big changes as well that accrue to the lower 48. Three weeks ago I attended a ceremony for the christening of our new Arctic class anchor handler at the Edison's yard in Galliano, Louisiana - actually down in Port Fourchon. It's an amazing vessel and I think a few people will appreciate it. It's 360 feet long. It has about 33,000 horsepower connected to it and can pull around 23,000 hp and is designed to work in about 6 feet of ice - not really as an icebreaker, but as a vessel we need to handle anchors. With success in our 2012 season, there's going to be a need for more ships, more people to build the ships in the U.S., and more people to crew the ships in the U.S.

This has had a significant impact in the Gulf Coast. The building itself meant jobs for about 800 people over a two year time frame. And it came at a pretty critical time as well. So it's a big piece of work. There have been a number of panels [where] I've discussed the importance of the Coast Guard developing an Arctic fleet, and ice breakers and ice management vessels I think more appropriately called. We are fully supportive and fully aligned with that request. I think it's hugely important that the Coast Guard presence augments between what Admiral Thomas Ostebo has planned this year, very, very pleased with what we're seeing with the level of cooperation and Admiral Ostebo's energy in really making sure that everything works with some precision this year.

The final topic I'd like to talk about, and we touched a little bit last night, is science. We're continually asked "Does the science you have in place support your exploration efforts?" Obviously, I'm going to argue my side on this topic, but frankly in the four years I've spent in Alaska a huge amount of time as well working on scientific programs.

Shell has spent more than any single government in bringing science to the Arctic. Industry is the largest contributor - as a matter of fact industry - and I will include the BOEM in that, because BOEM is bringing in science that really is aligned to oil and gas exploration. It accounts for about 80% of the dollars being spent in the Arctic. We had a program that we worked with the North Slope Borough and it took us a long time frankly to get over the suspicions that we had and were out there with respect to putting this in place. But it's a program where we've really worked with the borough, and Fish and Wildlife Department, as well as the communities about what kind of science they would like to see that would support subsistence lifestyles with potential developments.



I can tell you this week we've agreed to fund it to the tune of about \$5 million a year. The programs were put together by the borough a few weeks ago and we actually presented a check for \$4.8 million and I think that great work in making that happen to the borough, so that for us it can be the captains, the whaling captains in places as far removed as Kaktovik and Point Lay are indeed getting the science they need that will assure them that if there is development it can be handled in a responsible way and that their subsistence lifestyles can be protected and that they will have an opportunity as well to participate in the dollar economy. So, on that note I think I will stop.

Ambassador Harnish:

Do we have one quick question for Mr. Slaiby? Yes, Dr. Lubchenco?

Dr. Lubchenco:

Could you please say something about the MOU that we signed?

Peter Slaiby:

Yes, thank you for mentioning that, Dr. Lubchenco. I think that it's a great opportunity. We have now an MOU [with NOAA] and we've executed the first of the annexes with respect to sharing of mid-ocean data. So we put the agreement into place about August of last year, where Shell, Conoco-Phillips and Stat-Oil will be working jointly with NOAA in sharing of data and data protocols. What we saw when we had some good discussions in Washington DC, is that NOAA will keep a pretty macroscopic view of what goes on. Shell tends to be more microscopic and more situation-focused with respect to our data. So sharing, for example, our [data] sets on mid-ocean is going to hugely important to developing that bigger picture for everybody who is going to be participating, oil and gas and outside in the Arctic.

Ambassador Harnish:

Our next speaker is Lisa Speer. She directs the International Oceans Program at the Natural Resources Defense Council. She received her Masters degree for Yale University, and her Bachelors degree from Mount Holyoke. Ms. Speer's work currently focuses on conservation and management of marine biodiversity beyond national jurisdiction. She conducts advocacy to promote integrated ecosystem-based management of human activities on the high seas, with a particular focus on marine fisheries. Ms. Speer currently serves on the U.S. National Academy Committee on the Lessons and Legacies of the International Polar Year. Madam Speer.



Lisa Speer:

Thank you. I was reflecting back at my sole interaction with the U.S. Coast Guard and its staff and that has happened in the context of fisheries negotiations that have taken place around the world, where there is almost always a Coast Guard person to weigh in on enforcement issues and related matters. And to a person, I have been incredibly impressed with the professionalism, the intelligence, and the amazing ability to find the best bars within five miles of the conference facilities. And I was reassured last night by the Dean of Academics that bar finding is not an academic credit course here at the Academy, but you could have fooled me. I just want to join others in thanking the Law of the Sea Institute and the Coast Guard for organizing this conference. It's a terrific group of people and an excellent agenda and I think the results will be very productive and helpful.

As the last speaker on the last panel I wanted to reflect very briefly on what we've heard over the last day and a half, and think about how what we've heard has implications for how we govern the Arctic moving forward. We heard very compellingly that the Arctic is undergoing profound and unprecedented change, related to increase in greenhouse gas emissions and particularly CO₂. Those changes include, changes in ocean chemistry, resulting in acidification and changes in salinity; they relate to ocean temperature, and most visibly they relate to loss of sea ice. The latter in particular has effects that are very profound for both the environment but also for people who live in the region.

Many of the organisms - marine organisms - in the Arctic have evolved over millennia in exquisite timing with the ebb and flow of annual seas ice. As the summer sea ice disappears, those trophic relationships are being separated and torn apart. And we are only beginning to understand the level and depth of the changes that will result as we look ahead.



The disappearance of ice has also led to the second major focus of the conference, which is, the oncoming development oil and gas, fishing and shipping, but also may include over time, mining and other activities in the ocean. The question now before us is how we can deal with these two things. It seems the first and most important thing we can do is to reduce greenhouse gas emissions right away and as quickly as possible. But even if we stopped greenhouse gas emissions tomorrow, the warming already in the system will continue to melt the ice and we will continue to have this governance question before us. It is one that we have absolutely grapple with in a much higher and robust way.



So with that I would like to take a shot at outlining a potential strategy for the [Arctic Council] chairmanship of Canada and the United States over the next four years. To begin - to go in the direction of ecosystem-based management, which as Dr. Lubchenco and others have emphasized again and again, is a key way to maintain the resilience of Arctic ecosystems as they face the massive changes in front of them.

There are a couple of different aspects of this that I would like to talk about. The first is identifying the areas, the key habitats that are the most important for wildlife populations and for the people that depend on those populations for basic subsistence as well as their cultural survival. Identifying those areas has been a very slow process in the Arctic because it has, for obvious reasons, the Arctic is covered by ice most of the year, it's dark, most of our data comes from the summer



and it is extremely limited mostly to near shore areas, we know very little about areas further offshore.

In order to make a transition here, we need to far better understand what the ecological relationships are within these areas, but I think at this point we have enough information to at least start the process, of identifying and protecting these key habitats. Lawson [Brigham] made a reference yesterday to a workshop that NRDC and our colleague organization IUCN conducted last November to identify, as an initial matter, areas that should be considered for protection in the Arctic.



Since that time, the Arctic Council process to identify ecologically sensitive areas under the AMSA [2-C] process, has now come up with a draft. Although that draft does not deal with culturally significant areas, nevertheless, there is progress, and I think we have enough information to start identifying these areas that need to be protected and begin to make linkages across boundaries - international boundaries - so that eventually we can establish a network of protected areas. So that's the first thing.

Second, I think it's clear from the discussions over the last day and half that the current regulatory structure governing the individual sectors is in dramatic need of strengthening. As we know from Peter and others, we are looking at one-fifth to one-quarter of the world's remaining undiscovered oil and gas north of the Arctic Circle. Of the oil component of that, around 84% is estimated to lie offshore. So we are looking at major, major offshore oil and gas development in the future, and yet, there are no international standards governing offshore oil and gas development, let alone Arctic specific standards.



One area we might consider is launching a new discussion at the Arctic Council of whether in fact we want to develop Arctic-specific oil and gas activity standards. The negotiation that Ambassador Balton is co-chairing will deal with response and cleanup issues, and while important, that negotiation does not deal with the thing we've heard over and over and over again over the last day and a half, and that is that prevention is the key. That issue is being discussed within the Arctic Council, but it needs to be elevated to a much higher level and accelerated as oil and gas really begins to really develop in earnest.

The next area of focus needs to be, in our view, fisheries. As Ambassador Balton pointed out, now is the time to develop a fisheries management strategy for the high seas of the central Arctic Ocean. Once fisheries become established, it is exceedingly hard to retroactively go back and impose strict standards. So, our view is that by acting proactively, and at least agreeing among the Arctic Council states not to fish until have a management strategy that is based on sound science in place, makes a lot of sense. It shouldn't be too hard to do.

The third area is shipping. The somewhat demoralizing remarks yesterday of the speaker on shipping about the Polar Code are very disturbing. Shipping has a whole range of potential impacts, including spills but not limited to those. Noise issues, invasive species issues and others are very real and very imminent, and need to be addressed in a much more robust fashion. One possibility might be to take some of the areas that have been identified by various scientific efforts and have the Arctic countries go together to the IMO and recommend that those areas be treated as "particularly sensitive sea areas." That might be a way of cooperating together to advance conservation in the region, in addition to bolstering and elevating the development of the Polar Code.

One theory of focus is the Ecosystem Based Management Working Group that has been established, that was referred to in the Arctic Council. That Ecosystem Based Management Working Group is tasked with developing recommendations for the next ministerial, which will happen in May of next year, the second meeting of that working group begins on Monday. And the question is whether that working group will actually come up with meaningful recommendations or it will be another sort of low level, ongoing long-term, talk fest. In order to keep that from happening, our view is that the conversation needs to be elevated far above where it is taking place right now. And that comment really does apply to all of these issues. I



think Lloyd hit it on the head when he said the political focus of this is way too low and until we start bringing it up to a much higher level it's going to be hard to make progress.

The final area is - the final thing I wanted to talk about is the opportunity. We've heard a lot about the challenges of new development in the Arctic and to the regulatory structures that are out there. But there is also an incredible opportunity to get oceans management right. It's an opportunity to avoid the mistakes that have led us to screw up basically every other ocean on the planet. And if we can do that in the Arctic, it could provide us a road map for restoring the health and resilience of oceans around the world. So, in closing, I would call for leadership on this question. All of you in the room here today have a role to play in that. And we really look forward to working with you to make this a success, and keep this area as a unique and wonderful place it is. Thank you.

Ambassador Harnish:

It's been a stimulating panel, so I hope to hear some stimulating question in return, or observations. Yes --

Question:

Thank you to all the panelists for a very thoughtful and thought provoking presentation. Each of you brought a different element to the table, but what I'd like to know is how can we pull all of these elements together? How can we bring policy and protection of the environment together? How can we bring resource development and statesmanship together? How do we bring diplomacy and action together? How can we create change so that we can move in a responsible fashion in the Arctic, yet at the same time satisfy all of the many stakeholders that you have to satisfy? How do we get to accomplishment instead of dialogue?

Ambassador Harnish:

Does everybody want to take a shot at that?

Dr. Axworthy:

I'll give you sort of one piece of that picture, but I think in trying to generate changes now internationally, especially in the fairly constrained area of the circumpolar issues, I think there has to be a much broader coalition. It can't just be governments that do it. That doesn't work much anymore internationally. The Westphalian system [has] been around a long time but it's now being much more broadly shared. That's why I put such an emphasis I think in the mobilization of the indigenous people of the north. In fact, they have their networks around the world. You can't be sick of getting segmented anymore into fishing, or shipping, or oil spills, or just environment. I think that there



is such a package of interests which are all interrelated and I think that to me is sort of the great political challenge.

The council is a place to do it, but it's going to take the leadership to do it. And that's why I come back to my kind of two-plus-two four year strategy and say I would hope that the United States and Canada together over this four years would work out not just specific technical answers or specific recommendations on how to do things, but how to actually mobilize the kind of change that's going to be required so that there is a consensus amongst all the players, including the private sector the indigenous community, the scientific center and the governments themselves. It really now has to be a full partnership.

Ambassador Balton:

I was going to say largely what Dr. Axworthy said, that it does require this type of input from all different sectors. There is a largely academic idea about networked governance. Maybe the Arctic is a place to test that proposition. So that's one thing. Another thing for the United States is to continue this sort of evolution to move to the third image that Professor Caron had outlined for us. We no longer think of the Arctic solely as a barrier, and we are no longer looking inward exclusively, but looking outward to deal with the other partners in a more robust way as our ongoing challenge.

For every other one of the eight Arctic the Arctic features are more prominently in their national psyche. For the United States, we still have more people living in more tropical and sub-tropical areas than we do in the Arctic, but we are an Arctic nation and now for the first time in our history we do have high level attention on the Arctic issues we need to capitalize on that.

Peter Slaiby:

I will take a shot at it as well. I don't think that the sky is necessarily falling down. I do think that having worked in areas that were intensely regulated like Alaska and the North Sea, and some areas that were very, very unregulated - West Africa; I can tell you, the largest lever people can supply is the scrutiny that companies like mine get about moving forward. So don't underestimate the amount of impact that folks have on places like Shell's Board [of Directors] with respect to making sure that we're doing the right thing. And I think legitimate companies and companies that are really concerned how they will project in the world will perform.

Ambassador Harnish:

I'm afraid that is all the time we have. On behalf of the Law of the Sea Institute and the Coast Guard Academy, please join me in thanking our panelists.





Closing Remarks (X)

Closing Remarks

by

Admiral Robert J. Papp Jr.

Commandant, U.S. Coast Guard

U.S. Coast Guard Academy
New London, CT

April 13, 2012





Closing Remarks: Admiral Robert J. Papp, Jr. Commandant, U.S. Coast Guard

CDR Russ Bowman:

Good afternoon again, ladies and gentlemen. It is my honor to introduce Admiral Stosz for summary remarks and to convey her impressions of the past couple of days and then to introduce our final speaker, the Commandant. Please join me in welcoming again the 40th Superintendent of the Coast Guard Academy, Rear Admiral Sandra Stosz.

RADM Sandra Stosz:

Wow! As I stand here now thinking about what to say about this conference and what you have all brought to it, all I can say is “wow.” This has been incredible. Let me give a very warm Academy welcome to Admiral Papp. We’re delighted to have Admiral Papp here, and I’ll introduce him in a minute.

Yesterday, when they asked me to present some final remarks before introducing the Commandant, I thought I would just try to say something inspiring and then get on with the introduction. As it turns out, however, there is so much to tie together here. But I’m going to try, so please go on with your dinners.



This conference has been so energizing. It brought together the right people in the right place at the right time. I think we all can agree on that. We’ve been richly informed over the past day and a half by our national and international partners, who represent tremendous interdisciplinary diversity. I’ve been impressed beyond all expectations by the new connections made here and how the panel sessions have fitted together. Looking back on the past two days, all of the panels and keynote speeches have been superb. We began with experts on



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Arctic history. We were privileged to hear from some wonderful speakers who set the stage for our later discussions, laid the foundation, and entertained us with leadership stories about the likes of “Hell Roaring” Mike Healy.

Next, we heard from a fascinating panel of experts on Arctic science and research. I’m confident everyone enjoyed that panel. They provided an amazing portrayal of the Arctic’s natural state, the weather, the ice melt, the bottom contours -- all those features that are front and center when we think about changes in the Arctic. Then we moved to safety and stewardship and looked at some of the challenges generated by all those natural occurrences. We examined strategy options and risk management measures and the way ahead in that region. Then, today we looked at the legal domain, and I think that nicely brought it together at a higher level, while building on the other factors that we talked about yesterday. I took away from that the need for more partnerships and greater commitment, and also the urgent need to get the right governance mechanisms in place.

We’re all pleased to see increased partnering in the Arctic. We’re all delighted to hear that commitments are being made - at least verbally. But I think those commitments must be grounded in mechanisms, and some of those will be legal mechanisms. That was a great panel. And then - to finish up - we shifted from history all the way through to Arctic Governance, which tied it all together. What kind of institutions do we have now and what will we need to take those mechanisms and put them into action to implement our strategies? That’s where the leadership comes in.

We also heard an informal operational brief yesterday from Admiral Ostebo, the Coast Guard’s District Commander for Alaska. It was vital to have that operational perspective. That evening we heard an inspirational keynote address from Dr. Lubchenco, the NOAA Administrator. She was wonderful. She gave the Corps of Cadets her “ship” address - emphasizing the need for leadership, partnership and stewardship. Her message is so relevant to what we are all doing here today. I also want to say a word about the cadet poster displays in Leamy Hall last night before the dinner and Dr. Lubchenco’s address to the Corps. There are some cadets in here now, and I have to tell you, YOU are the leaders of the future. That poster display was a highlight for me. I didn’t even know a presentation of that magnitude was part of the plan. Let’s give the cadets a round of applause for those amazing posters.



Closing Remarks X – 3

As I thought about “leadership for the Arctic,” which is the theme of this conference, I asked myself what is that really? I have grown convinced over the past two days that leadership for the Arctic has two elements. It must include the element of *servant* leadership - putting the larger world interests above our economic and national desires. That gets to some of the issues involving native peoples. It also goes to the stewardship issues. That’s servant leadership. If we don’t have that we’ll never get to where we need to be. And I think *ethical* leadership - acting with the courage and the character to make the decisions that will have wide-ranging global impacts – is critical too. So servant leadership and ethical leadership need to be the components for the kind of leadership that we need in the Arctic today and in the future.

Let me also add that this stimulating, interdisciplinary engagement is just the kind of value we hoped to get out of the new Center for Maritime Policy and Strategy that we are standing up here at the Academy. Just last week, the Vice-Commandant of the Coast Guard signed the decision memo and agreement with the Academy to formalize that Center. So we are excited that this first conference event has been so successful and has set a promising course for a great future. We’re hiring two research fellows for the Center and I think they’re going to have plenty of material to dig into as a result of this conference I think my staff will be soliciting you for topics for our research fellows.

I want to spend just a moment here thanking a few key people aside from our cadets. First, I want to thank our co-sponsor, Professor David Caron, for the inter-college partnership that made this conference possible. We have also benefitted from funding provided by the Coast Guard Foundation. You can’t do something of this scale without money. Next, I want to thank you all for the time and commitment that you put into traveling here and for sharing your insights and ideas and concerns for the Arctic. Some of you have travelled incredible distances to be here with us today. I also want to thank the Academy faculty and staff for all the work they’ve done. This has been an enormous, all-hands undertaking. Last night we had senior tenured professors dragging boxes of cadet poster materials through Leamy Hall to make it all work. I have seen people chipping in from all corners and all seniority levels, from the Commandant on down to the cadets to make this work. It has demonstrated the kind of cooperation and partnering that we need as we move forward in the Arctic.

Finally, I want to ask you to show your appreciation with another round of applause, this one for the food you have been eating for the past day



Closing Remarks X – 4

and a half, which was prepared by our Officers Club. We have representatives around here and people serving us -- please give them a huge round of applause.

My personal favorite - I have to say this – For those of you who were in Leamy Hall last night, which is most of us here — We were up there on the ballroom floor, finishing our dinners and looking out at Thames River - not the “Temms”, the Thames - and this incredible double rainbow appeared - the biggest I’ve ever seen. We should be thanking the cosponsors here, Commander Bowman and Professor Caron, for that. I just couldn’t get over it. Maybe because I’m kind of sentimental, but I thought - what a bright note for the future as we think about leadership in the Arctic. It was a sign.

We have gathered some great momentum here, through great presentations and one-on-one dialogues. Our challenge now is how do we keep that momentum and dialogue going? We’ve all been to a lot of conferences where, looking back, it was good, but then everyone scattered. The momentum got lost. We don’t want to lose that momentum. We’ve come together and we’ve harnessed these various interdisciplinary talents, brought them together. How do we keep it focused on the leadership that we need to achieve goals in the Arctic? I think that’s what we need to do and I’ll work on that. I think our center here, the Center of Maritime Policy and Strategy, can help. We will do our best to keep the momentum going.

The conversation also needs to be elevated. Somebody mentioned that during the Governance panel. We have a great group here. We’re the right people at the right time, and in the right place. But there are people above our pay grade who need to be involved and I think this conversation needs to be elevated. To get back to what David Caron said the first night -- law and politics have been dormant. That was his thesis coming in. But I see some ways we can prod leadership into action with the energy we have in this room. We need to nurture the new relationships that we’ve formed here - develop new partnerships - to enhance our collective efforts to provide the leadership that we need in the Arctic.

With that challenge, it’s now my honor to introduce the 24th Commandant of the U.S. Coast Guard, Admiral Bob Papp, to present his observations and closing remarks. I’m going to take just a few lines from his introduction because not everyone here knows our Commandant.



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Admiral Papp leads the largest component of the Department of Homeland Security - a Coast Guard comprised of 42,000 active duty and 8,000 reservists, 8,000 civilians and about 31,000 Auxiliary volunteers, without whom we couldn't operate.

Admiral Papp has served on six Coast Guard cutters, commanding four of them, including the Training Barque *Eagle*, which - as we speak - is off on *OpSail 2012* missions. He is the 13th Gold Ancient Mariner in the Coast Guard, which means for the sailors in the room that he is the saltiest one here. He is a 1975 graduate of the Coast Guard Academy and also holds a Master of Arts in National Security and Strategic Studies from the U.S. Naval War College in Newport and a Master's of Science and Management from Salve Regina College.

Admiral Papp previously commanded the Ninth Coast Guard District in Cleveland, Ohio, where he worked closely with our Canadian partners in the Great Lakes region. He has taken a forward-leaning leadership position on the Arctic and we look forward to hearing from him today. Admiral Papp:

Closing Remarks: Admiral Robert J. Papp, Jr., Commandant, U.S. Coast Guard



Good afternoon, everybody. I'd like to thank the Superintendent for the very kind introduction, although she did steal my opening line: "Wow!" Actually that was perfect. I remember watching when we first landed on the moon. I was a big fan of Walter Cronkite, and you might recall on that particular day he was broadcasting live and we were listening to the first step being taken on the moon. I remember Walter Cronkite - as articulate as that man was - he took off his glasses and was holding them there and he just said "Wow." There are occasions where that is the most appropriate comment to make and I'm really gratified to see



Closing Remarks X – 6

that here today. What a tremendous turnout. As I look across the attendees that are here, I don't think we set our expectations low. In fact I thought we had very high expectations for this event, and we have exceeded them. I want to thank you all for being here.

I also want to thank the Law of the Sea Institute of the University of California's Berkeley Law School and Dave Caron in particular for co-sponsoring this with us. Now I know the mascots of both Berkeley and the Coast Guard Academy is the Bear. And our cheer at both schools is "Go Bears." So I can say that here without offending anyone. Now that's an example of bilateral engagement.

I also want to thank the Coast Guard Foundation for their support. I know the Superintendent has done that already, but thank you so much. I've seen [Foundation officers] Anne Rangel, Duncan Smith and Clay Maitland, who have been here throughout the conference. Thank you for your support - not just here but across the Coast Guard - in the many things that we do that can't be taken care of with appropriated funds.

Finally, "Good afternoon" to all of my Coast Guard shipmates. It's great to see the Coasties here, from the cadets all the way up to the Superintendent. Whenever I travel and have a rather large gathering of Coasties, I've just got to say thank you for all you're doing. Obviously most of the time it's an all-hands meeting out in the field and I'm thanking you for the operations you do out there. I want to start with the Academy, just thanking the faculty and staff for the tremendous job that you do in producing our future leaders. To the future leaders in attendance here today, thank you for being here and thank you for all your work behind the scenes. And thank you for studying hard - we need to get you out to the fleet as soon as possible. For those Coast Guard people that have come from across the Coast Guard and traveled great distances, thank you for being here and thanks for the job that you're doing out in the field.

I feel like I'm behind the power curve a little bit. As I became Commandant, the Arctic was one of those things that I wanted to think on. I'm not original in that thought. The last couple of Commandants have been talking about it. The last several 17th District Commanders have been talking about it. As you can imagine, there is a renewed urgency right now to get about the business of a strategy for the Arctic. Unfortunately, we get involved most of the time down at the tactical level. We're worried about what we're going to do the next day or the next week or the next summer. We don't have the time or the capacity



Closing Remarks X – 7

most of the time to talk about the strategy of the Arctic and I want to touch on that a little bit today.

I say I feel like I'm behind the power curve because it was one of the things that I wanted to take on as a priority. Obviously there's maintaining Coast Guard missions in an austere or what was going to be in my estimation an austere budget environment. At the same time, trying to rebuild the Coast Guard, getting those new ships that we need out there and icebreakers that we've been talking about probably for at least a decade.

But as I came into office - and I'm sorry Dr. Lubchenco had to leave - but many of us in Washington were consumed by the *Deepwater Horizon* oil spill. That sucked a lot of energy out of the organization - out of many organizations - and consequently a lot of the strategic things that we wanted to get launched had to be put on hold for a little bit. One of the people that I brought into headquarters is Admiral Peter Neffenger, who is going to be Vice Admiral Peter Neffenger here pretty soon and take over as our Deputy Commandant for Operations. I brought him in to run strategy, and what happened? He got taken by [Admiral] Thad Allen to be his assistant and Peter was gone for six months, so a lot of things were delayed.



We didn't kick off our Arctic program, our Arctic campaign as we're calling it, until about this time last year, well into my first year. But I had a great venue to launch it. The Navy League puts on something called "Sea, Air and Space" in Washington DC, and unfortunately Admiral Roughead had to cancel out as the keynote speaker for their big banquet last year. So, I said here is where we kick it off - and that was my first major speech on the Arctic, and we've been in full drive moving ahead ever since. This conference was one of the concepts that we had - to get together an intellectual cross section of all the equities that are involved in this and use the auspices of the Coast Guard



Closing Remarks X – 8

Academy to bring everybody together. So, once again, I say “Wow” because this is exactly what we we’re looking for.

I count as one of the most fortunate things that ever happened to me in preparation for this assignment and in preparation for what we’re doing now as my first assignment in the United States Coast Guard. I wish I could say there was a strategy to that but there was not. As many in this room will recall, back in the day - not like we do it today - but back in the day we used to select our first assignments upon graduation from the Academy based on our relative class standing. Headquarters sent a bunch of assignments up here. The number-one guy in the class selected his billet and we worked our way down. And in preparation for that we did something called “mock billet selections” over a course of nights, to sort of get the positioning and where people thought they were going. There was some gamesmanship there. But given my relative position in the class, when it got down to me ordinarily all that was left were 378s [378 foot high endurance cutters] in Boston or New York. So my fiancée, Linda, at the time, who lived out in East Lyme, was pretty well focused on either going to Boston or New York, which was great for her because her parents were in East Lyme. It was an equal distance just about to either location. But I’d had this dream of potentially going to Alaska someday. And I wanted to be on a buoy tender.

On the night of the selection, I’m ready to go in and make my selection and thinking “Should I go for Boston or New York?” and one of my classmates just ahead of me said “Papp, there is a buoy tender left.” And I said “You’re kidding me. Where is it?” He says “It’s some place called Adak in Alaska.” I said “Alaska? That sounds good.” So somewhat impetuously I went in and stuck my card in that slot and then I went to my room to find a road atlas to see where Adak is.

I don’t know if you’ve ever looked up the state of Alaska in a road atlas, but the main body of Alaska is on one page, then the Alaska peninsula is on an insert and then there is a second insert of the Aleutian chain and Adak is pretty well out at the far end of the second insert. I said “Uh-oh.” I then went out to East Lyme to inform my fiancé where we were going and I will say that I am just fortunate that 37 years later she’s still my wife. Actually she will admit today that going to Adak probably prepared her for almost anything she was going to face in the Coast Guard. Particularly when she’s married to a guy that planned on going to sea for a major portion of his career.



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For me, what it did was it initiated me into the challenges that we have in the Arctic and in Alaska - the time distance equations that you have to deal with, the severity of the weather.

We were out in Alameda last week and commissioned one of our newest cutters – the *Stratton* - the First Lady was there for it. They almost canceled the ceremony because it was blowing about 35 knots and raining - not horizontally, but close to it. When I went out there I said “ I know all of you are feeling pretty uncomfortable out here today, but where this ship is going to spend most of its career - up in the Bering Sea - this is going to be considered a relatively nice day. There will be days up there in the Bering Sea that we call “normal” weather which, down on the Gulf Coast, we would call hurricanes. It’s like that up there. It’s an area of vast distances; it’s challenging, and there aren’t marinas and other things to depend on, so you need to know your business if you’re going to be operating up in the Arctic. I know a lot of people in this room know that.

I mentioned that we seem to be driven by the tactics - the day-to-day operations we need to do. I think Dr. Axworthy was correct, when he said we need a national imperative, and I want to touch on that as I go through my prepared comments here. But my theme here today is – “there is not a moment to lose.” I’m a fan of the Patrick O’Brian series. I like to think as Captain Jack Aubrey - the hero of the stories - as sort of my alter ego. I like to think that. If you’ve seen the movie - Russell Crowe played him in the movie - whenever confronted with seemingly daunting situations, for instance in one circumstance they’re going to take on a frigate that’s larger, faster, has more guns and already has a head start on them, and the bos’n of the ship is saying “We just can’t get this done.” Aubrey just smiles and says “Well, then there’s not a moment to lose.”

That’s exactly what we need to do. We’ve talked about the challenges. We’ve all heard about the challenges and my response is, “then there’s not a moment to lose.” We need to start moving forward.

In the 18th and 19th centuries, explorers traveled to the Arctic seeking its precious resources—seal skins and whales. That’s really where the Coast Guard got its start up there. After it became a U.S. territory we were in charge of going up there and protecting the fisheries, protecting the mammals and bringing the law to this new grand territory that was to become a part of the United States. Today is no different; it’s just that these resources are oil and natural gas — and shorter trade routes — which are really a big deal for China and Russia. It’s sort of a new



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Gold Rush of sorts that is underway in the Arctic right now and the prize promises to be much more substantial.

The Coast Guard is no stranger to Arctic waters. We've operated in the Arctic for most of our history. In 1867, the Revenue Cutter *Lincoln* brought the official delegation to Sitka for the transferring ceremony from Russia and, in what was the "territory" of Alaska, we soon became quite literally the law of the sea and land. Our cutters conducted "court cruises" with federal judges and Public Health Service doctors embarked, settling disputes, dispensing justice, and providing humanitarian care to its indigenous peoples, while we protected the fisheries and the mammals.

We conducted what we called for many years the Bering Sea Patrol, which oftentimes - and I've gone back and looked at the historical representations (Dr. Noble probably knows this) - it was not unusual to have four or five cutters up there during the summer months to carry out the duties that the then-Revenue Cutter Service and later the Coast Guard were charged with.

Today, the majority of our Arctic operations remain concentrated in the southern Arctic, or Bering Sea, where we protect fish stocks and fishermen. Protecting one of the world's richest biomasses, those who make their living harvesting it, and other shippers who transit through its often treacherous waters, creates a persistent demand for our Coast Guard services. We understand these waters - we've been working with the Native Alaskans to gain the benefit of traditional knowledge and we've had almost a century and a half of experience conducting these Arctic missions.



I heard yesterday that Dr. Lubchenco was going to talk about ships, and I thought "Wow, great. I want to listen to what she says about ships." I



didn't realize at the time it was *leadership*, *partnership* and *stewardship*. But her talk really plays into a lot of the same themes that I've been talking about as Commandant in describing what the Coast Guard needs to do, particularly in strengthening its partnerships.

I would like to talk about "protection." When we were defining exactly what the Coast Guard does, rather than talking in terms that we intuitively understand within the Coast Guard, we tried to explain what we do, and in particular what we're doing up in the Arctic. We protect people on the sea. We protect people against threats from the sea. And we protect the sea itself. That is a layman's explanation of our *Coast Guard Strategy for Maritime Safety, Security and Stewardship*.

Yet, today, we - along with many of you in this room - are facing a challenge. I don't think it's necessarily unique to the United States, but Canada gets it much better than we do. I've had many opportunities to work with Canadians when I was up on the Great Lakes. I also took a recent trip to Ottawa to meet with people and talk about the Arctic. While there, one of the U.S. representatives talking on behalf of one of the other [federal] departments happened to mention that there were no threats up there. He couldn't see any need for additional resources in the Arctic for at least another ten years.

Lieutenant General Simeonoff, on the Canadian side directly across from me, looked apoplectic. He just stared in disbelief. He stated, in response, "Defense is not the only thing that we need to worry about in the Arctic. There are other aspects of national security. There's economic security, there's energy security and there is environmental security as well."

So when I got up to talk about safety, security and stewardship, we immediately bonded. I think that he recognized that there are some agencies in the United States government that do understand. The challenge that we face, though, is with our own population. Perhaps one reason is that, except for the residents of Alaska, Americans do not intuitively consider the United States an "Arctic" nation. In fact, there are often times when I wonder if they consider us a "maritime" nation. That presents us with a challenge.

While there is a lot of hard work being done - led by many of you in this room - there needs to be a stronger and more comprehensive national focus on the efforts that are going on in the Arctic. This was not always the case. There was a time in the late 1950s when the Cold War was the driver for a surge in Arctic strategy and capacity.



I'm reminded of one of my favorite stories that goes back to the late '50s. In fact it was 1957, and the [U.S. Coast Guard Cutters] *Spar*, *Storis* and *Bramble* rendezvoused in the port of Seattle in preparation for a mission to transit the Northwest Passage. They reported to U.S. Navy Task Group Five, and TG-5 was commanded by Navy Rear Admiral Henry S. Persons. Admiral Persons was responsible for the resupply of the DEW Line stations on the Pacific side of Bellot Strait, and the Coast Guard cutters were reporting in to form Task Unit 5.1.5. The Coast Guard Task Unit was headed up by Captain Harold Woods, who happened to be the skipper of the *Storis*.

On the day they reported in, Captain Woods went up for the first meeting with Admiral Persons. As they walked into the room, Admiral Persons looked over and said "Oh, it's nice to see that the Hooligan Navy has finally arrived." Well, Captain Wood didn't miss a beat. He was a rather stoic individual, took his pipe out and he said "You know, Admiral, we really don't mind being called 'hooligans.' It's the 'Navy' part that we find objectionable."

The Coast Guard and the Navy, in spite of that, worked well together. They worked to jointly support the Distant Early Warning Line or DEW Line, which was a string of about 50 radar sites stretching across 3,000 miles of the North Slope, from Point Barrow, Alaska, across the northern Arctic Circle to northeastern Canada's Baffin Island.



This was a tremendous project, and if you go back and read about it you wonder how they could have accomplished it in those days. They



had to transport 2.5 million tons of equipment up to the North Slope, 12.5 million barrels of fuel. They had hundreds of ships, and they employed 12,000 U.S. and Canadian citizens in the construction project over the course of about three years. I've had a chance to see the product of that. We stayed overnight in Barrow last year - by the way, when we talk about infrastructure on the North Slope, we had a party of 12, I think, and we couldn't find enough hotel rooms to take care of the 12 of us. We went out to the DEW Line site. They still have a dormitory there, and we stayed in the dormitory. In the morning, I got up relatively early, which is easy when you've got 24 hours of sunlight. I went for a walk to the outskirts of town and to an area that the residents there referred to as the "Navy base." To me it's a metaphor for the challenge that we're facing right now, because there in front of me was a huge corrugated, steel runway. Of course there is no lighting anymore. Some of it is coming up, and there were two huge hangars. We could use some hangars up there.

There are these two huge hangars that are rusted shut, falling apart, no more power to them. But they were constructed by our country back in the late 1950s because there was a national imperative. Now that imperative was defense driven, and I suspect that once we do gain momentum here it's going to be economically driven. But it's got to be driven by something and we are behind the power curve in terms of building infrastructure to support the operations we're going to need to do up there.

The reason that *Spar*, *Storis* and *Bramble* were up there, as most of the Coasties in the room know, is because they were being tasked with finding a route through the Northwest Passage. There was a concern that when this fleet of hundreds of vessels that's up there - based upon our historic experience, including the whalers in 1897 who got frozen in off Point Barrow - we knew there was a possibility that the fleet could get frozen in and we would need to be able to escape into the Atlantic. *Spar*, *Storis* and *Bramble* transited the Northwest Passage and actually did a circumnavigation of the North American continent.

I've read recently that another fleet of ships is planning to head up to the Northwest Passage this summer. But they're not planning to circumnavigate - they're planning to lay down first submarine fiber optic cable along the seafloor, to expand and increase the internet connectivity between Asia and Europe. Indigenous people living along the remote Arctic communities will reportedly also have the opportunity to tap into this connection. Another cable laying operation is also going in along the North Sea Route above Russia. Now why are



the internet cable companies laying down cable along the Arctic sea rocks? I think it's for the same reason that the shipping companies are increasingly making use of these routes. They're shorter, they're faster and they're cheaper.

I don't know about you, but I've heard that the cable internet providers plan to take advantage of shorter and increasingly accessible Arctic sea routes, and for me it was just another indicator — a bellwether — that yet another important sector of the global economy sees opportunity in the Arctic.

Joseph P. Kennedy Sr., the father of President Kennedy, was reported to have famously said that he knew it was time to get out of the stock market before the crash in 1929 when he started getting stock tips from a shoeshine boy. Well, this is another shoeshine boy moment — it's just that the opposite is true here. When it's not just shipping companies and oil companies, but internet companies that are going up in the Arctic, it's a strong signal that it's time for a more deliberate and serious focus on the Arctic.

This is not to discount the important work that's going on, but rather to say that much remains to be done. We don't just need more wind pushing our sails - we need a bigger national sail.

And, speaking for the Coast Guard - I know you had the benefit of hearing from Admiral Ostebo yesterday, and he's been doing a great job up there. I'm really impressed with where he finds the energy to do as many things as he's doing in that huge district up there - there is a strong present demand signal for Coast Guard services in the Arctic, and I think for other agencies as well - so much so that tactical demands are currently overtaking the pace of Arctic national strategy development.

I recently met Ken Anderson, who is one of the Iditarod racers. He's sponsored by the Coast Guard. I met him when I was at a ceremony up there last week in Juneau. When talking to him about this, he gave me an analogy -- if the people developing strategy for the Arctic were mushers on the Iditarod we might say that current tactical demands are putting our sled before the dogs instead of vice versa.

Let me give you a few examples of what I mean. We watched this winter as the [U.S. Coast Guard] Cutter *Healy* broke the way into Nome, to ensure heating oil and fuel could be delivered. *Healy's* operation received a great deal of national media attention. We were



not only able to help out the people of Nome - we had the nation tuned in on a major Arctic operation!



But there was another story that received much less coverage, and I suspect something the nation did not see or fully appreciate. While a great deal of the present Arctic discussion is focused on the Arctic's increasing open and accessible waters during summer months, during the winter months we still need access up there. For me, *Healy's* operation demonstrates the importance of assured and year-round surface access to the ice-covered Arctic waters. We're working hard with the Congress and the Department [of Homeland Security] and the Administration to maintain this capability.

What you might not know is that the Coast Guard was asked to have *Healy* go down to the Antarctic this past winter. The reason for that was the Swedish flag icebreaker that had been leased to perform the break-out of our science station in McMurdo [Sound], was pulled back by the government of Sweden at the last minute. It was needed to perform Sweden's sovereign missions.

So, when the Coast Guard received this request to use *Healy* in the Antarctic we gave it a lot of thought. One of the cultural things about the Coast Guard is that when we're asked to do a job we tend to try to find ways to do it. But in the end we said no - and I think that was fortunate - because I didn't want to let the Arctic go unprotected by sending the only national icebreaker we have all the way down to McMurdo and not have it within reach.

It turned out that we were lucky when *Healy* was needed to do that breaking into Nome. So, while we are working on this strategic part of how many icebreakers and ice-capable vessels and other types of vessels need to be part of our fleet mix, to carry out our Arctic



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responsibilities, the point I want to make is we have a strong demand for those capabilities now.

In addition to *Healy*, which as you know is a medium icebreaker, we're also reactivating the *Polar Sea* as a heavy icebreaker and we expect to have it back in service by mid- 2013. Together, those two icebreakers will provide the nation's capability for, I estimate, at least another ten years, while we take a "whole-of-government" approach to examine our future national icebreaker requirements and resourcing.



I should say that we've focused a lot on talking about whole-of-government approach, but I would say that after listening to the presenters this morning what we really need is a "whole-of-nations" approach.

I think we've got a great partnership going with Canada and it's intrigued me with some thoughts and discussions I've had recently that there probably can be some more in-depth cooperation. Maybe even to the extent of sharing crews, sharing icebreakers - who knows? But I think we have to start thinking out of the box. Particularly, as all of our countries are faced with austere budgets and constrained resources.

The planned Arctic offshore exploratory drilling for this summer is another example of present demand for Coast Guard services. The increasing world thirst for petroleum is being driven by advanced emerging markets. Demand and the cost of petroleum continue to rise. As the U.S. and other Arctic nations seek new sources of energy there, we plan to be at the ready to protect our sovereign interests, to meet our



statutory responsibilities - including U.S. Arctic environmental response.

You notice that I said “sovereign interests,” and I say ‘sovereign’ because to me with all the important activities going on in the Arctic - from the intensive research our world-class scientists have been performing from vessels like *Healy* and Canada’s [icebreaker] *Louis S. St-Laurent*, to oil exploration and increased shipping and human activity - one of our most important missions is ensuring clarity of sovereign interest and a national, multilateral framework of rights and obligations. Doing so is the foremost responsibility of nation-states and the international community.

Which then brings me to the Law of the Sea Convention. I have to tell you that I am concerned that at every international meeting I go to, and particularly when we talk on the Arctic, I have to start by being lectured on why the United States is not a signatory to the law of the sea convention. It affects us in many, many ways that I don’t have time enough to talk about today. I think a lot of people understand that, but we need to be about the business of getting that treaty ratified.

Arctic governance will become increasingly important, especially if the reported reserves of oil, natural gas and other resources are discovered. We continue to work closely with the Administration, our partners in the Department of Defense and the interagency to advocate to the Senate the importance of acceding to the convention. Doing so will provide certainty to Arctic claims and will also provide additional credibility with our many other Arctic partners as we work to provide safety, security and stewardship for what is really an entirely new ocean.

I’ve been working with a couple of people to come up with an editorial on the law of the sea, and I’m going back to my hero Jack Aubrey. One of the other things he says is that in going into battle you need to hold the weather gage - which many of you know means being upwind of your target or your enemy so you’re in control. Signing on to the law of the sea convention is really gaining the weather gage on a lot of issues that are confronting us. And we need to get about the business of doing that.

On a personal note, I’ve made it a priority to travel to Alaska the past two summers with DHS leaders and interagency leaders like the Department of Interior Secretary Ken Salazar and his Deputy Secretary David Hayes, to meet with our local and state partners. That includes



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Governor Parnell, Lieutenant Governor Treadwell, the Alaska natives and Senator [Lisa] Murkowski and [Mark] Begich and industry as well, to see the challenges that we're confronting first-hand. As I said, if you want to understand, you've got to get up there. Oftentimes, in places like Barrow, people only swing in for a quick visit and get their picture taken. They really need to stay and get to know the people and appreciate the challenges they're facing up there.

It's my observation that in the Beaufort and the Chukchi Seas we're now seeing a gradual transition from very limited, episodic demand into a more sustained seasonal demand. At some point these demands may evolve into full-fledged seasonal operations. Therefore, our present operational concept is largely an extension of what we've done historically over the last year. We send a cutter up there, but we don't have the shore-side infrastructure. So next summer we're going to be sending the National Security Cutter *Bertholf* off the North Slope. *Bertholf* will organically bring a flight deck with hangars for two helicopters, worldwide command and control capability, four boats that they can launch with teams, and we'll also supplement them with a couple of our seagoing buoy tenders that are versatile and ice-capable.



As Tom Ostebo might have talked about, I think we are prepared for what we're going to face in the Arctic next summer. We've had a chance to work with Shell [Oil Company] and review their plans. I had a chance to meet with Pete Slaiby last summer when I was in Anchorage and see all of the effort they're putting in. I'm convinced that this is going to be a success, and the Coast Guard will be there to supervise and to support and to respond to any demands for Coast Guard resources that we have.



So, as you can see, what's going on in the Arctic is causing us to shift our forces North, and there is a strong demand now for our Coast Guard capabilities, competences and our broad authorities. It's okay to a point, if we're moving some of our Coast Guard resources to respond to change and demand signals - that's what an adaptable maritime service does.

But we knew in advance about the summer drilling plans and we were able to put that plan together. I'm very proud of our 17th District folks. From a broader perspective, however, the Arctic is a national and international challenge. As some of the speakers have stated over the last couple of days, it requires a whole-of-nation solution. What concerns me is that we don't want to fall behind on meeting this challenge - especially when we see other Arctic nations, including our partners, surging forward and expanding their Arctic capabilities.

Which brings us back to our collective challenge... how do we meet our current demands while continuing to move forward on the development of a national Arctic strategy? How do we get the demand for Coast Guard services - and services from our other fellow agencies and organizations that you represent - in the Arctic, when resources are limited?

That is why I'm so pleased that the Coast Guard Academy and its many partners have come together to host this conference. While I'm particularly pleased that so many of you - particularly from industry and academia with Arctic operational backgrounds, and who represent both the Arctic leaders and the Arctic thought leaders - were able to attend this week. As a service that is presently on point in Alaska, we need to hear from you, to listen to you and to learn from you.

The Coast Guard has the experience and authorities to lead, where appropriate, and we would also like to assist with the development of the national Arctic strategy. But we need your support. We need your leadership and your voice, not only to shape national Arctic policy, but more importantly to make the Arctic a national imperative once again.

I want to thank you once again for being here, and with the balance of my time we need to listen to you. We need to learn from you. I'd like to see if I can open it up to - as I do at my all hands meetings - questions, comments, gripes or opinions.

Question:

When you think about the Arctic and the coming summer, what kind of things keep you up at night?



ADM Papp:

The first thing that keeps me up at night is making sure that my people are prepared for the challenges that they face up there and that's probably one of the reasons for me going up there. As I said, I learned a lot about the Arctic during my first two years as a young officer. It prepared me well for a lot of the challenges that I was going to face. We went up there August, of my first year as Commandant - August 2010 - and it had been 34 years at that point since I'd been up to the Arctic. I wanted to see the changes, but I also wanted to see how well prepared we were. The thing that gives me great confidence is that we are well prepared up there. But it is a challenging environment - I've not withheld the fact that my first and primary concern as Commandant is making sure we can carry out the services that the American people expect of us. That requires well trained people and it requires sound, stout ships that can survive in that environment and aircraft that can survive in the Arctic environment as well.

Based upon a couple of accidents that we had and the fact that our ships that have to go up to the Bering Sea are now approaching 45 years of age - I need to be up there myself and see how it's going. My first and primary concern is "Are my people prepared to carry on those missions out there." I think we've done as well as we can to make sure that we are prepared to carry out our responsibilities.

The next thing is, I'm less concerned about Shell going up there or other companies that are going to be drilling because we had a chance to look at their plans, had a chance to have dialogues with them in terms of their preparation for going up there. What concerns me is - I guess it was three years ago, when we had a cruise ship show up there - what concerns me is that picture of the cruise ship in the Antarctic lying on its side. Those are the sorts of things that worry me, that bother me.

As we continue, and people - whether it's recreational sailors that don't understand that there are no marinas to pull into up there, whether it's cruise ships with hundreds or maybe thousands of passengers - is how well positioned are we going to be to respond up there? We can send a cutter up there some of the time, but we don't have the permanent infrastructure up there to rely on. When we have to send a helicopter from Kodiak and it takes eight to ten hours to get up there and you have to send a C-130 ahead with a relief crew for the helicopter for when they arrive, something is wrong with that time-and- distance equation. And right now, with the austere budgets that we have, I don't see us having the wherewithal, the capacity, the ability to build the infrastructure, whether it's communications, hangars, extended landing



strips and other things to be able to provide the proper support so that we can safely and effectively respond to the missions that we undoubtedly will be challenged with up there.

Those are my primary concerns - which are the same concerns I've got for the rest of the service right now. How do we - in austere conditions - continue the level of service that is expected of us? How do we rebuild and recapitalize? Right now, the most expensive part of the Coast Guard is ship-building. Those icebreakers are going to have to be replaced sooner rather than later, and I don't know how we'll fit that into the limited budget we've got.

How about some observations, if not questions -- some things that you think we are or ought to be bringing about.

Question:

Thanks for your remarks. Is the Coast Guard prepared in the IMO [International Maritime Organization] to be a leader, a true leader in pushing for the mandatory [inaudible—Polar Code?]?

ADM Papp:

My take away from being at IMO this last year is - you see the urgency when you're there and then when you get back and you get consumed with the day-to-day activities. I think the U.S. and Canada - and given the fact that in the Arctic Council we'll have leadership over the next couple of years - between the two of us we need to partner better and I think we will, at IMO, work on the Arctic Code and keep the momentum going. The challenge is - and I talked about a national imperative for us to get involved in the Arctic - when I look at the International Ship and Port Security Code, the ISPS Code and how rapidly that was pushed through after September 11th, 2001, and IMO members all signed onto it, it's unbelievable how fast that passed in comparison to most of the other things that try to work their way through IMO.

I think the IMO is one of the most productive bodies of the United Nations, but even with that sometimes things can move at glacial speed. I recognize that's one of the venues where we need to work harder and I think that teaming up with Canada - and we started some of that process last fall when we were there - is going to be the key to our success. We do need to push through faster.

Question:

Are you optimistic about the prospects for ratification of the Law of the Sea Convention?



ADM Papp:

We have been working very hard on it, but not by ourselves. The Department of Defense has been working very hard, the State Department. We have briefing teams that have been employed almost fulltime up in the Senate, going around member to member, staff to staff trying to work this through. We almost got a hearing last summer. Admiral Mullen and I we were all three going to appear on a panel before Senator Kerry's committee and unfortunately that got canceled at the last moment. But I think we're working back towards that again. The elections are complicating that a little bit, understandably. There's a lot going on in Washington. But I think David Balton was exactly right. There are reasons for optimism right now. Things are starting to come together.

RADM Stosz:

When he was CNO, Admiral Mullen spoke about - and I believe that was when we had a 300 ship Navy - he talked about collaborative efforts with other navies. Do you see that happening in the Arctic with other nations, maybe in areas where we don't have our own icebreakers, perhaps some collaborative efforts with Canada? I know we're already doing it with the mapping of the continental shelf, but I mean even more extensively than that.

ADM Papp:

Well, they were shooting for a 600 ship Navy at one time. I'm having lunch with the Chief of Naval Operations this week to talk about ship building. Ship building is another topic we could spend an entire afternoon talking about and perhaps we should. This is very important for our country - we're losing the industry and as we lose it it's making the ships that we are building even more expensive and we're criticized for building expensive ships and we just never get them built. Hopefully we can turn that around. But that's what I was alluding to. I think we all not only nationally within the U.S. but also probably with Canada as our best partner, need to think out of the box. What can we do?

I was thinking about this as we were flying up here. If you look at fiction and you look at some of the science fiction movies and things they speculate about, spaceships and other things in the future that are multinational, with multinational crews - it's not out of the realm of the possible. Anything in a human endeavor is possible if we put our minds together and come up with some great ideas and get behind them. I think a start would be us and Canada. The last couple of summers we've had *Healy* and *Louis S. St-Laurent* working together up there. I'm sure they do crew exchanges back and forth. Why not take that to the next level? While I was the District Commander on the Great Lakes we had our own Great Lakes icebreakers, but they have



Canadian icebreakers, and we never worried about the border up there. If a Canadian icebreaker wasn't available, we'd break someone in and vice versa.

We've got the relationships. We're two great partners. What it boils down to is the budget really. Neither one of us has the money. But maybe pooling our money - maybe there is some creative way we can come together and build icebreakers together. Or maybe even come up with a standard design that someone can share. I'm not sure but I'm willing to explore that.

Question:

Thank you, Admiral, I appreciate your comments. You and several others of the presenters mentioned the cruise industry in the Arctic. As a long time representative of the cruise industry - 17 years as you well know - quite frankly, we don't see large cruise ships up there. I think you'll see some adventure cruises. I understand the world may be going through the Northwest Passage, but as a commentary that you invited I would invite the Coast Guard and the North Atlantic and North Pacific Coast Guards to engage the cruise industry itself with regards to our future in the Arctic, because I'm not sure it's quite as robust as people are envisioning. Certainly, the challenges of rescuing several hundred people off a smaller ship are just as extensive as a larger cruise ship, but I think it's something that we need as an industry and as a regulator to engage with yourself, your staff to discuss that feature. It's very important.

ADM Papp:

I talk about interagency solutions. It may be interagency and industry solutions. For instance - and I'm not suggesting this is a policy that I've been thinking about - but a lot of our business in the Caribbean is helicopters flying out to cruise ships and removing ill passengers. Maybe, just maybe, if the industry wants to take on new areas, new areas of responsibility, I have finite resources. Moving *Bertholf* up there this summer creates a deficit in some other mission area because I just don't have the ships. I don't know where that deficit will be taken, but maybe there are possibilities for - I think I said this to Pete Slaiby last year - the potential for industry, some creative solution for funding, landing strips and other things.

I think the industry says "Thank you very much, we do pay taxes and we think we're contributing enough already." But these are new areas and I think, once again we are looking at the potential for thinking out of the box and coming up with creative solutions in terms of countries working together - but how about the companies that are coming up there as well? Maybe there are creative ways to share in the revenue, in



order to build the infrastructure - or perhaps the cruise industry might... There was a North Slope, search and rescue service, right now they are mostly focused on inland. They're not really prepared for maritime rescues, but maybe there is some way that industry comes up with that. I don't know what the solution is, but I know it's getting increasingly difficult for me to come up with new resources in new areas and it's a finite resource issue for me. Something else suffers when I move assets up to Alaska and until we get a strategy, a national strategy, and come up with some resourcing schemes across the interagency I don't think any individual agency is going to be able to do it on its own without sacrificing some other mission space.

Once again, thank you all for coming, and *Semper Paratus*.



CDR Bowman:

Admiral, it's my honor on behalf of my co-chair Professor David Caron with the Law of the Sea Institute and the Coast Guard Academy to thank you for coming and sharing your vision and your unique perspective on leadership for the Arctic. We actually have a token of our appreciation and a memento of this conference for you sir, a chart weight inscribed with "Leadership for the Arctic."



ADM Papp:

Thank you. I know I've thanked people broadly, but I'd like to thank Commander Bowman. It's a tremendous challenge to take on an event of this scope and magnitude and the numbers of people that we have here and I think he's done a great job from what I've seen. And I've certainly had a lot of great reports about his performance and preparation for this as well. So, thank you.

CDR Bowman:

And thank you, sir. Ladies and gentlemen, this concludes our Leadership for the Arctic Conference. We thank everyone for coming.



Arctic Leadership Research Needs

Compiled by

Professor Craig H. Allen¹

¹ Distinguished Visiting Professor of Maritime Studies, U.S. Coast Guard Academy; Judson Falknor Professor of Law, University of Washington



U.S. Coast Guard Academy Presents: *Leadership for the Arctic*

Throughout the conference and via the post-conference survey, a number research issues were identified for further study. They include:

1. How might the Arctic Council be improved? In response to calls to “elevate” the conversation within the Arctic Council, what is the appropriate level of representation on the Council?
2. Should the Arctic Council’s remit be extended to national security issues?
3. What role should NORTHCOM play with the Arctic Council?
4. What role, if any, should non-contiguous states have on the Arctic Council?
5. Several speakers remarked that the U.S. lacks a *National Arctic Strategy*? What would the essential elements of such a strategy be?
6. What role should the state of Alaska and Native Alaskans play in developing the U.S. National Arctic Strategy?
7. How is doing the best scenario-based planning for the Arctic?
8. Should any evaluative process, criteria or benchmarks for assessing the need for vessel traffic control measures in Arctic waters and approaches be more protective than those used for less vulnerable waters?
9. If the pace of IMO’s development of a mandatory polar code is deemed unsatisfactorily slow, what measures might the contiguous Arctic states take to ensure adequate vessel safety standards for the Arctic?
10. Do we need an “Arctic Coast Guard Forum,” similar to networks for the North Pacific and Atlantic?
11. What immediate changes would the U.S. see if it acceded to the 1982 Law of the Sea Convention tomorrow? What is the Administration’s plan if it fails to gain Senate approval again this year?
12. Does the U.S. status as a non-party to the 1982 Law of the Sea Convention really preclude it from asserting sovereign rights in the natural resources of the extended continental shelf in the Arctic?
13. What effect on Arctic planning will the fact that Alaska does not presently have a NOAA-approved coastal zone management plan have?
14. What studies, data and analysis should the North Pacific Fishery Management Council require before U.S. federal waters in the Arctic (Beaufort and Chukchi Seas) may be opened to fishing?



-
15. How might the Straddling Fish Stocks Agreement be applied in the Arctic?
 16. Because the Commission on Limits for the Continental Shelf will generally not take action on Extended Continental Shelf claims if the applicant-state has a boundary delimitation dispute with an opposite or adjacent state, will the U.S. be required to resolve its disputes before presenting its ECS claims?
 17. Does the actual or potential effect on vulnerable Arctic marine ecosystems posed by the northward migration of Orca pods call for a reevaluation of their protected status under U.S. law?
 18. How will the National Ocean Policy and its Ecosystem-based Management and Coastal-Marine Spatial Planning requirements affect required environmental impact analyses in the future? Must the “scope” of marine EIS’s necessarily be extended to the relevant large marine ecosystem?
 19. Admiral Papp mentioned that he turned down a request to send CGC *Healy* to the Antarctic, to support the McMurdo Station operations. What criteria should be applied to decide how scarce resources will be allocated between the two polar regions?
 20. Has the response community underestimated the air pollution consequences of large-scale in situ burning as a primary response method in the Arctic? Is there a serious risk of black carbon pollution?
 21. What steps should be taken to address communication needs in the Arctic? Should the elements of any Arctic communication system be local, national or regional?



Cadet Posters as Presented to Conference Participants

Compiled by

Professor Craig H. Allen¹
and
Lieutenant Victoria Futch²

¹ Distinguished Visiting Professor of Maritime Studies, U.S. Coast Guard Academy;
Judson Falknor Professor of Law, University of Washington

² Instructor of Marine Science, U.S. Coast Guard Academy



*Comments on the
U.S. National Ocean Policy
Draft Implementation Plan*
Presented by:

Cadet-Student members
Maritime Strategy Challenges and
Opportunities Seminar (2012)

U.S. Coast Guard Academy
Humanities Department
Government Section

Public Policy Development and Analysis

1. Define the problem.
2. Research.
3. Generate alternative Courses of Action (COAs).
4. Identify evaluative criteria for COA selection.
5. Apply the criteria to each COA.
6. Recommend COAs to cognizant policy maker.
7. Implement the COA.
8. Periodically assess how well the COA is meeting policy objectives.
9. Make necessary adjustments.

U.S. National Ocean Policy



Historical Background of the U.S. National Ocean Policy

The Stratton Commission.

- Chartered by Congress in 1966.
- Issued report *Our Nation and the Sea* in 1969.
- Led to establishment of NOAA.

U.S. Commission on Ocean Policy.

- Chartered by Congress in 2000.
- Issued its final report *An Ocean Blueprint for the 21st Century* in 2004.

Obama Interagency Ocean Policy Task Force (IOPTF).

- Chartered by President on July 17, 2009.
- E.O. 13547 issued on July 19, 2010, accepting the IOPTF's recommendations and its suggested National Priority Objectives.
- No new legislation enacted or proposed.



Comments on the
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Government Section

The National
Ocean Council
invited public
comments on the
National Ocean
Policy Draft
Implementation
Plan.

The Cadet-Student
members of the
*Maritime Strategy
Challenges and
Opportunities
Seminar* seized the
opportunity to learn
more about the
Policy and its
Implementation.

Draft National Ocean Policy Implementation Plan (NOPIP)

U.S. National Ocean Policy The Nine National Priority Objectives Implemented by the NOPIP

How We Do Business:

1. Ecosystem-Based Management.
2. Coastal – Marine Spatial Planning.
3. Inform Decisions / Improve Understanding.
4. Coordinate and Support.

Areas of Emphasis:

5. Resiliency and Adaptation to Climate Change and Ocean Acidification.
6. Ecosystem Protection and Restoration.
7. Water Quality and Sustainable Land Use.
8. Changing Arctic Conditions.
9. Observations, Mapping and Infrastructure.

We chose the three objectives highlighted in red for analysis and comment.



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U.S. Coast Guard Academy
Humanities Department
Government Section

1/c Nicholas Cosenza
1/c Melissa Gilday

National Priority Objective 1:

Adopt
ecosystem-based
management as a
foundational
principle for the
comprehensive
management of
the ocean, our
coasts, and the
Great Lakes.

Ecosystem-Based Management (EBM)



What is Ecosystem-Based Management (EBM)?

An integrated approach to resource management that considers the entire ecosystem, including humans. It requires managing ecosystems as a whole instead of separately managing their individual components or uses, considers all the elements that are integral to ecosystem functions, and accounts for economic and social benefits as well as environmental stewardship concerns.

Our Conclusions / Recommendations:

- Recognize the challenges of establishing “shared goals, collaboration, and consensus” in that agencies and stakeholders will not always agree on the best way to address ecosystem management issues.
- Build the capacity to implement EBM through outreach and education programs for the public and stakeholders.
- Identify and implement pilot projects that have an external audit element to assess effectiveness.



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U.S. Coast Guard Academy
Humanities Department
Government Section

1/c Hayley Feindel
1/c Ryan Sherman
2/c Holli Bastinck

National Priority Objective 2:

Implement
comprehensive,
integrated,
ecosystem-based
coastal and
marine spatial
planning and
management in
the United States.

Coastal-Marine Spatial Planning (CMSP)



What is Coastal Marine Spatial Planning (CMSP)?

An approach to ecosystem management which reflects the connectivity and diversity of marine resources. This is to satisfy the need to develop a holistic and integrated approach to managing human uses of and effects on ecosystems.

Our Conclusions / Recommendations:

- Bring regions together to facilitate efficiency.
- Establish leadership among agencies involved.
- Create subcommittees within regions to ensure efficiency during regional meetings.
- Ensure CMSP is an international process; develop partnerships with Canada and Mexico.



*Comments on the
U.S. National Ocean Policy
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Maritime Strategy Challenges and
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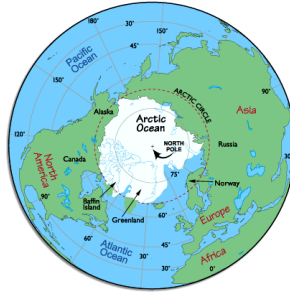
**U.S. Coast Guard Academy
Humanities Department
Government Section**

**1/c Christopher Martin
1/c Sean Newmeyer
1/c Hillary Smith**

National Priority Objective 8:

**Address
environmental
stewardship
needs in the Arctic
Ocean and
adjacent coastal
areas in the face
of climate-
induced and other
environmental
changes.**

Changing Conditions in the Arctic



What are the Changing Conditions in the Arctic?

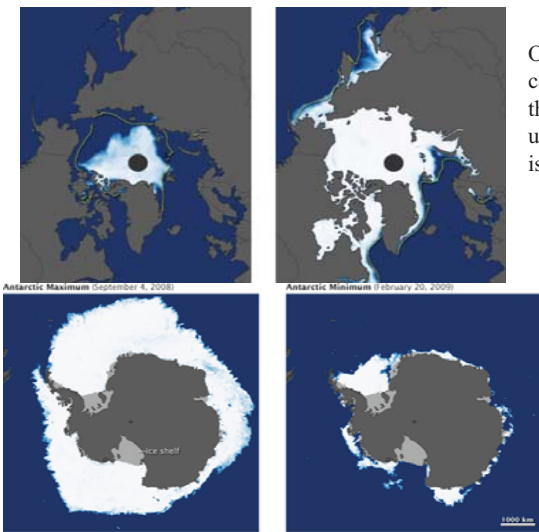
Little is known about the ever-changing Arctic. As it stands now, the Arctic Environmental Response Management techniques are inadequate: Arctic ice observation and forecasting capabilities are poor and there is a lack of distributed biological observations. Additionally, Arctic communication systems are inefficient and Arctic mapping and charting is woefully incomplete and inadequate.

Our Conclusions / Recommendations:

- The NOC should emphasize prevention over response in the Arctic.
- Additional funding is required to establish infrastructure sufficient to collect, analyze, and disseminate data for ice forecasting.
- Draw on the Coast Guard to provide extended on-scene maritime presence and data.
- Include a milestone of strengthening partnerships with Alaskan Native organizations and the Arctic Council.
- Expand responsibility for mapping and charting to include the Coast Guard, NOAA, and other agencies.

Antarctic Sea Ice Paradox

1/c Logan Donahey



Above: Seasonal variation in the Arctic and Antarctic over the 2008-2009 period.

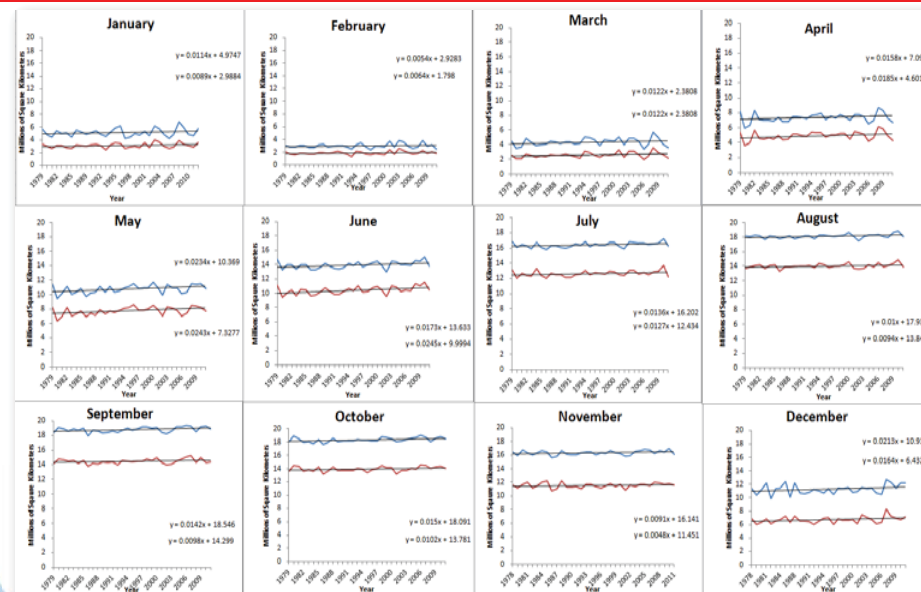
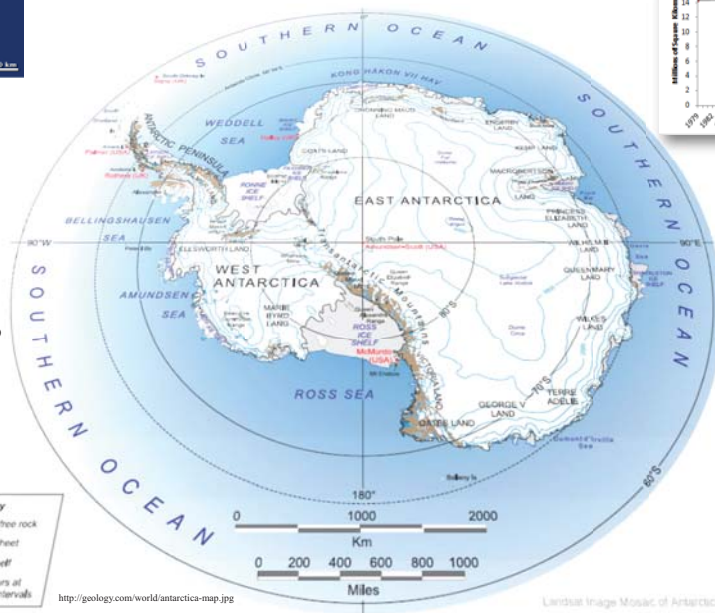
Every year, less and less Arctic sea ice survives the summer melt, opening up new waterways previously blocked off.

In the Antarctic, sea ice is forming around a large land mass. This makes it common for most if not all sea-ice to melt during the summer period.



Over the last 30 years, the warming climate has caused worldwide concern over the melting of polar sea-ice. Many people are aware that in the Arctic, sea-ice is decreasing at a fast rate. What is more unknown is what is happening in with Antarctic sea-ice and why it is occurring.

By plotting data collected by the National Snow and Ice Data Center, it is shown that over the past thirty years there has been an increase in the sea-ice extent and area in the Antarctic.



Month	Slope	Millions km ²
January	0.0114	11400
February	0.0054	5400
March	0.0122	12200
April	0.0158	15800
May	0.0234	23400
June	0.0173	17300
July	0.0136	13600
August	0.01	10000
September	0.0142	14200
October	0.015	15000
November	0.0091	9100
December	0.0213	21300
Year Average	0.0141	14100

Slopes of above graphs give us yearly sea-ice increase per month in millions of square kilometers.

Average Yearly Antarctic Sea Ice Increase is 14,100 km²

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Leadership for the Arctic, April 12-13, 2012
 U.S. Coast Guard Academy
 New London, CT



Supporting Oil Drilling in the ANWR

2/c Andrew Russo

Thesis

By learning from the mistakes and successes of the Prudhoe Bay oil field, accompanied by the use of new, safe drilling technologies, environmental free drilling is indeed plausible, and it is time Congress opens the ANWR for drilling.

Relative Size of Drilling Site

Drilling in ANWR

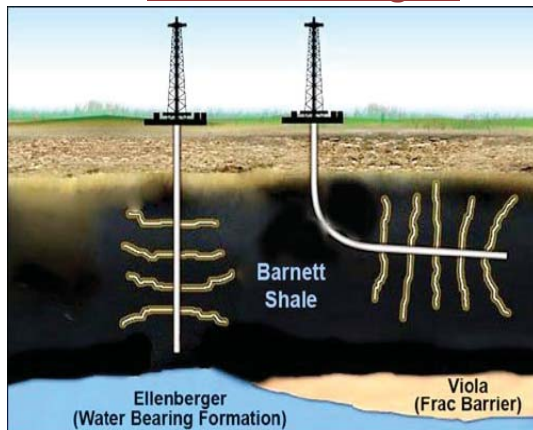
(2,000 Acres out of 19 million)



- Alaska is more than twice the size of Texas.
- The ANWR is 29,764 sq miles.
- Suggested Drilling area is only 3.5 sq miles.

<http://standingwithsarah.com/2010/06/extreme-enviros-drill-baby-drill-in-anwr-%E2%80%93-now-do-you-get-it/>

New Technologies



<http://www.horizontaldrilling.org/>

- Horizontal drilling allows for multiple oil wells to be reached by one platform.
- This technology alone has cut the projected drilling area from 12,000 acres to 2,000 (3.5 sq miles).



http://allnewworldbeauty2.blogspot.com/2011_04_01_archive.html

Alternatives

By not drilling in the Arctic, we will be forced to drill in other fragile ecosystems such as the Columbian rainforests.

Rising Gas Prices



<http://abcnews.go.com/US/gas-prices-continue-rise-dollar-gas-norm/story?id=13529072#.T3W448z5sjU>

Gas prices have risen so steeply, that airlines are charging \$40 surcharges to tickets, heating bills have doubled, and the livelihood of Long-haul truckers are being threatened.

Environment



<http://factsnotfantasy.blogspot.com/2009/03/visit-beautiful-anwr.html>

Since drilling began in the Prudhoe Bay oil field, the Central Arctic Caribou herd has grown from 3,000 members to nearly 29,000.

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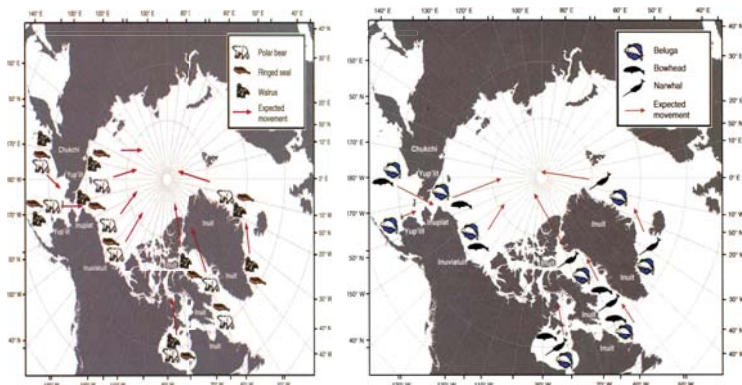
Effects of Climate Change on Arctic Marine Mammals

Cadet 1/c Emily Young

Abstract

Climate change is affecting Arctic marine mammals in a variety of ways. The effects have been seen all over the Arctic, from Newfoundland to the North Pole. There are changes in habitat, prey and productivity, and the increased human-marine mammal interaction that climate change has brought about. Habitats are being reduced and relocated farther north in more suitable waters, the food web is thrown off by the bottom up effect due to rising temperatures, and the reduction in sea ice makes it easier for humans to invade the mammal's environment with shipping routes and oil exploration.

Arctic Marine Mammal Relocation



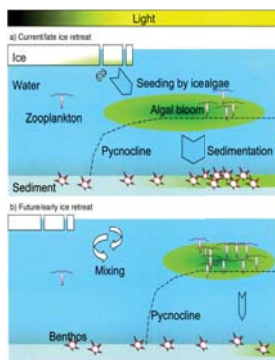
Figures 1 and 2: The predicted shift of polar bears, ringed seals, and walrus, as well as beluga whales, bowhead whales and narwhals with expected sea ice cover reduction (Bluhm and Gradinger, 2008).



Disruption of Primary Producers

As the endless cycle of rising sea temperature and decreased albedo continues, the warming temperatures of the Arctic waters is affecting the life cycles of the primary producers such as phytoplankton.

Figure 3: Representation of seasonal cycle of marine primary producers with a smaller ice season; the skewed timing of blooms causes problems all through the food web (Bluhm and Gradinger, 2008).



Increased Human Presence

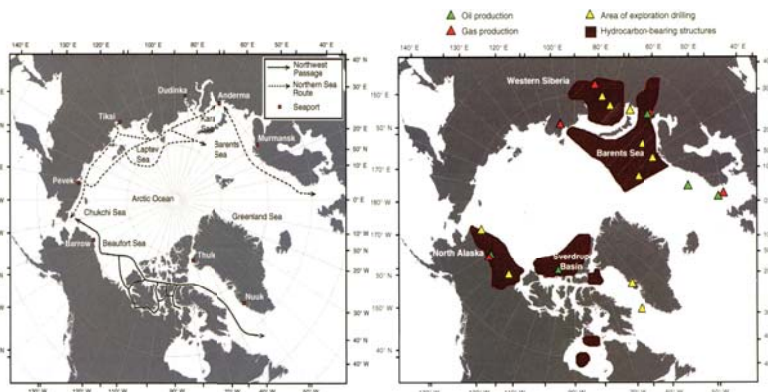


Figure 4: The Arctic shipping lanes, including the Northwest Passage and the Northern Sea Route (Hovelsrud et al, 2008).

Figure 5: Areas with potential for major oil exploration (Hovelsrud et al, 2008).

Conclusion

- Arctic climate change is predicted to continue for the foreseeable future.
- As the environment changes in the Arctic, it affects the mammals that live there through habitat change, the food web, and human interference.
- Conservation efforts should be enacted to preserve the habitats, if not from climate change, then from the increased human presence.



<http://www.fish-journal.com/2011/11/beluga-whale.html>

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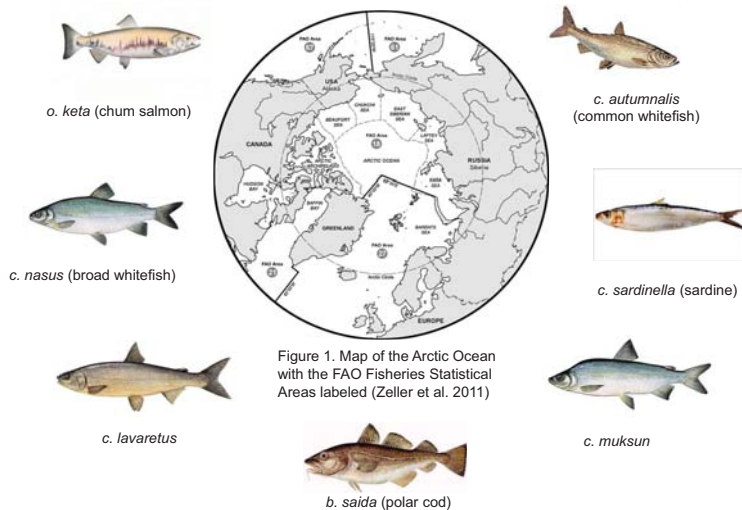
Arctic Fisheries Potential

1/c Rebecca Follmer

Abstract

Arctic fisheries are an important potential resource for the countries surrounding the Arctic Ocean. Determining the potential of the current Arctic fisheries requires researching the historical trend of fish catches. These trends might suggest how those fisheries will fare in the near future. Determining the success of the fisheries in the present day also requires looking into current environmental conditions that will effect fishery productivity. Finally, determining how the fisheries will succeed in the future requires researching current policies designed to protect and sustain the fisheries in the years to come.

I. Area (and some fish) of Interest



II. Historical Trends Predict Decreasing Fish Populations

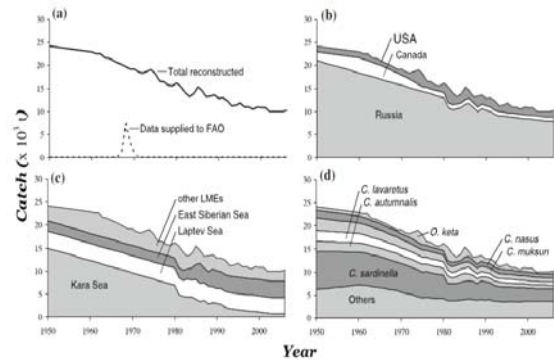
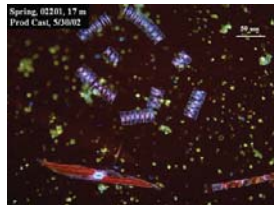


Figure 2: Fisheries catches in the Amerasian arctic, showing: a) reconstructed total catches versus catches reported to FAO; b) reconstructed total catches by the three countries by FAO Statistical Area 18 (Russia, USA, Canada); c) reconstructed total catches by the seven near-shore Large Marine Ecosystems comprising FAO 18; and d) reconstructed total catches by major taxa. (Zeller et al, 2011)

III. Environmental Changes Suggest Increasing Populations



New open water areas will likely experience a great increase in primary production from the increase in the availability of light. This primary producer explosion could lead to higher levels of zooplankton and a higher fish biomass throughout the area of the increased productivity (MacNeil et al., 2010, Molenaar, 2009).

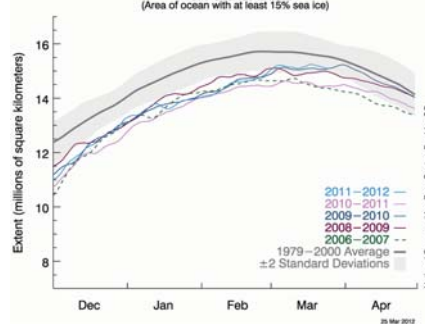


Figure 3: Arctic Sea Ice Extent. Recent years show amounts of sea ice extent that are lower than the last twenty years. (NSIDC)

IV. International Law/ Policy

The Arctic is in the process of being claimed by the coastal countries. However, there are several overlapping claims and non of the claims have been internationally recognized. Without a government to regulate and enforce regulations on a fishery, that fishery faces the "tragedy of commons" and will likely collapse. With a government to manage it sustainably, however, the fishery would have the potential to remain sustainable and profitable in the future.



Figure 4: Arctic boundaries based on claims of jurisdiction of different countries (Berkman et al., 2009).

V. Conclusion

In conclusion, the Arctic fisheries have good potential, but fishermen and politicians need to handle them carefully. Several of the fisheries have declined over time. These histories should be taken into account in implementing policies, even though fisheries may be expected to grow as a result of the receding ice and increased primary production. However, this increase won't matter if human impact in the Arctic, including fishing, natural resource drilling, and shipping, is not controlled through policy to prevent detrimental effects to the environment and the food chain.

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Images:

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The Affect of Global Climate Change on Beluga whales

2/c Josie Cartaya

Introduction

Global climate change has the greatest impact on the polar regions. In the Arctic, rising sea surface temperatures reduces sea ice, which plays an important role in the Arctic food web. After researching sea ice coverage, food web dynamics, and Beluga population data, I conclude that less sea ice reduces phytoplankton growth, which causes a ripple effect in the food web that affects the population of Beluga whales.

Area of Study

The area of study is the Arctic. Sea ice extent and sea ice area will be observed through out the Arctic. Changes in the Beluga Whale populations will be focused on Cook Inlet and the Gulf of St. Lawrence.



<http://www.maptown.com/geos/arcticocean>

Figure 1: Map of the Arctic Circle

Methods

- Compile average Arctic temperatures from 1970's to today
- Compile data from the Nation Snow and Ice Center, and plot to see sea ice extent and sea ice area trends from 1978-2012
- Research food web dynamics
- Compile Beluga whale population data across Arctic from 1970's to today.



<http://edebat.co.cc/2010/06/11/beluga-whale/>

Data / Figures

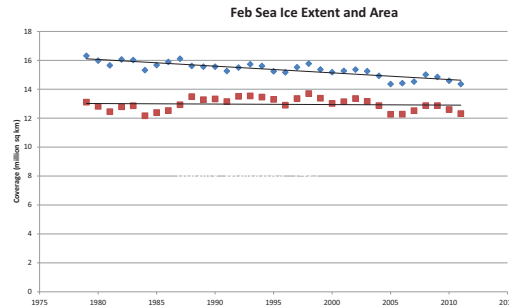
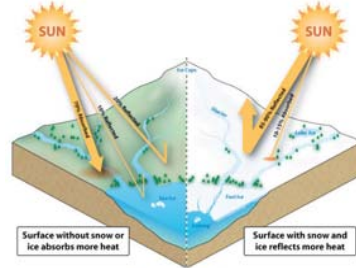


Figure 2: Plot of Arctic sea ice Area and Extent from 1978-2012



<http://www.sciencebuzz.org/buzz-tags/albedo>

Figure 4: Albedo cycle, which generates positive feedback for sea ice in the Arctic



<http://www.fish-journal.com/2011/11/beluga-whale.html>

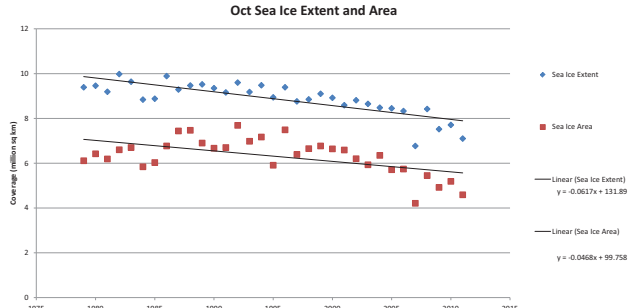


Figure 3: Plot of Arctic sea ice Area and Extent from 1978-2012

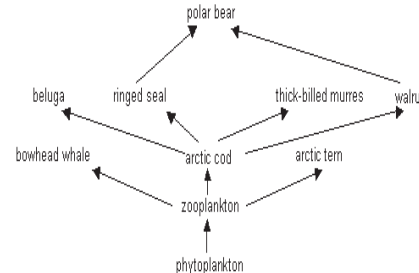


Figure 4: Arctic food web



<http://marinebio.org/species.asp?id=159>

Supplementary data

- Beluga populations in Cook Inlet drop from 1,300 in the 1970's to 280 today. In the Gulf of St. Lawrence, population had dropped to about 500 individuals
- Killer whale prefer ice free waters
- Killer whale population in Arctic has doubled every 20 years since 1920.
- Sea nettle population moving north and feed on larvaceans, copepods, and small fish, such as Arctic and Polar Cod.

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Conclusion

Decrease in sea ice extent and area since the 1970's has caused a reduction in phytoplankton on bottom of ice. These organisms are food for copepods, which are food for Arctic and Polar Cod. Reduced cod means less food for Beluga whales, and Beluga populations have dropped dramatically since the 1970's. Rising sea surface temperatures opens Arctic waters to more Killer whales and jellyfish blooms. While there are other factors that are not related to global climate change, it is adding to the reduction of Beluga Whales in the Arctic.



Leadership for the Arctic, April 12-13, 2012
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New London, CT

Threats to the Bowhead whale from Decreasing Sea Ice and Global Climate Change

2/c Nikki Corbett

Bowhead whales are declining throughout the arctic due to decreasing sea ice, predation by killer whales, and the effects of whaling. Research in global climate change is essential to saving the species for habitat protection and reduction of invasive species.

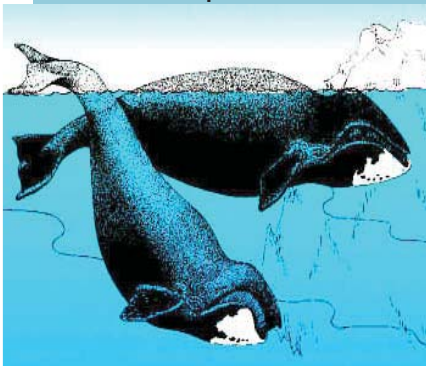


Figure 1. Bowhead whale

Background on Bowheads

- Arctic, baleen whale that can grow to 60 ft long and weigh up to 2,000 lbs
- 5 different stocks, 3 Atlantic, 2 Pacific
- 19th century whaling decreased the Atlantic stock from 50,000 to 3,000



Figure 2. Modern day Inuit whaling

Killer Whale Attacks

- Increased sightings in the Hudson Bay, Arctic Bay, Hall Beach, Repulse Bay, Cape Dorset
- 2007 Observation of 132 attacks on bowheads, 91% increase from the 20th century
- Stomach contents of killer whales show bowheads, belugas and narwhals as common prey

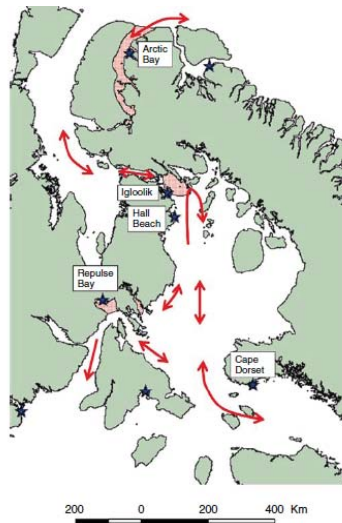


Figure 3. Eastern Canadian of killer whale invasion sites

Global Climate Change Effects

- Increase in temperature causes migration of invasive killer whale species into Arctic territory
- Rising Carbon dioxide in the ocean causes death of primary producers and food source of bowheads
- Loss of sea ice causes habitat destruction, loss of food that lives in brine channels of the ice
- Causes inbreeding due to loss of individuals in the population

Anthropogenic Problems

- Net entanglement causes drowning and death to juveniles
- Over exploitation decreases species mass
- Pollution assists in habitat destruction, causes medical concerns due to toxic chemicals in the water



Figure 4. Bowhead whale scarring from killer whale attacks



Glaciers in the Arctic: Short and Long Term Effects of Melting



1/c Sarah Colmenero



Abstract

A heightened amount of glacial melting triggers concern amongst Arctic researchers. Models, calculations and observation reasonably assess the effects of increased glacial melting. It ranges from species extinction and loss of a historical record to global sea level rise and changes in ocean circulation.

Introduction

Glaciers are major bodies of fresh water ice that move and change along a land mass (Arctic Change). The ice forms from compressed layers of accumulated snow over thousands of years.

The recession of glaciers in the Northern Hemisphere constitutes evidence of change in the Arctic. In looking forward for future Arctic research of glaciers, we must account for the short and long term effects of glacial melting, and how the world will change if melting continues at the current rate.

Study Area & Discussion

Most of the Arctic's glaciers exist in Greenland, covering approximately 1,784,000 square kilometers (NSIDC, 2012). Greenland's glaciers indicate overall glacial behavior in the Arctic due to their exorbitant size. Therefore, the melting of these glaciers correlates with the entire Arctic region.

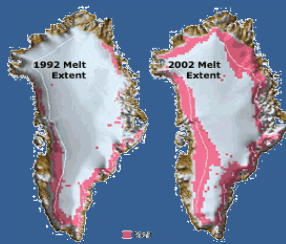


Figure 1. Greenland Ice Map Comparison. This model shows the ice cover in Greenland [white] as well as the melting [red] in 1992 and 2002. Melting is significantly higher in 2002. (Arctic Change)



Figure 2. Petermann Glacier in 2009 and 2011. The Petermann Glacier has experienced significant calving and melting of ice sheets, as apparent in comparison photos from 2009 and 2011 (NSIDC, 2012)

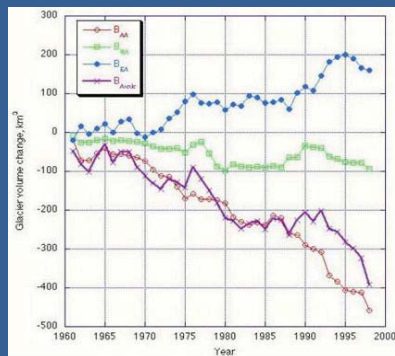


Figure 3. Arctic Ice Cap Volume Decrease. This graph shows and overall negative trend in Ice Cap Volume of the American Arctic (red), Russian Arctic (green), Eurasian Arctic (blue), and the entire Arctic (purple). (Arctic Change, 2012)



A world without glaciers can be modeled using ice cores, current research, and oceanographic knowledge.

If all the glaciers on earth were lost:

- The planet would experience a sea level rise of 60 to 70 meters (Murphy, 2012).
- The Global Conveyor Belt would weaken, bringing cooling to the Northern Hemisphere
- The Albedo Feedback Cycle would perpetuate out of control, to a terminal point of no reversal

Figure 4. Arctic Organisms depend on Ice Coverage. Glacier melts perpetuate the melting of sea ice as a part of the albedo loop, leaving polar bears without a habitat.

Conclusion

Short Term Effects of Glacial Melting:

- Loss of ice cores/preserved geological history
- Loss of fresh water reserve
- Extinction of Organisms that depend on Sea Ice

Long Term Effects of Glacial Melting:

- Sea Level Rise & Destruction of Coastal Cities
- Uncontrollable Albedo Feedback Loop
- Cooling of Global Conveyor Belt

Recommended Future Policy & Action:

- Nations with Arctic investment must take affirmative action to reduce melting
- More concrete study & research to reach an agreement on the primary cause of melting—action can be taken to reduce or mitigate the currently presumed causes
- Raised global awareness of the consequences of continued melting



Acknowledgements

This work is supported by the Polar Oceanography Course at the United States Coast Guard Academy. The views expressed are the opinions of the authors and not necessarily those of the U.S. Coast Guard.

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The Implications of Whaling on Coast Guard Operations

Cadet 1st Class Kimberly Hulbert, U.S. Coast Guard Academy

Abstract

In 1946, following World War II, the International Whaling Convention (IWC) was established for the purpose of overseeing the management of the international whaling industry. In 1986, the IWC instituted a ban on commercial whaling. However, since the IWC is unable to enforce the moratorium on whaling, many countries continue to exploit the whale populations in the Arctic and Southern Oceans, especially through the guise of scientific research. The United States, along with other maritime countries, have interests in protecting marine mammals, as well as upholding international law. In light of Greenpeace and other whaling protestors, the United States Coast Guard specifically has a keen interest on the issues of search and rescue and safety in the hazardous seas off the coast of Antarctica and the Arctic.

Whaling: Biology

The minke whale (*Balaenoptera acutorostrata*) is characterized by being one of the smallest whale species. They are found in the Southern Ocean, as well as in the Northern Pacific and Atlantic Oceans.



The Minke Whale



The Fin Whale

The fin whale (*Balaenoptera physalus*) is considered endangered according to the Endangered Species Act (ESA). Fin whales are also found in Arctic and Antarctica waters. They typically occupy the deeper waters away from land.

Sperm whales (*Physeter macrocephalus*) are the largest of the toothed whales. They are endangered according to the ESA. They frequent the Atlantic and Pacific Oceans between 60° N and 60° S latitudes.



The Sperm Whale

Study Area



Figure 1. The Arctic Ocean and North Pole

The Arctic Ocean is mainly characterized by low temperatures, high winds, and blowing snow. The average temperature ranges from zero degrees Centigrade in the summer to negative thirty degrees Centigrade in the winter. Lastly, the Arctic Ocean is prone to high winds which cause choppy, cold seas states

The Southern Ocean is known for its hazardous snow storms, extremely high winds, and its turbulent wave. It is important to note as well that the sea state within the Southern Ocean is known to be the worse than any other global ocean. This is due to the circumpolar current, as well as the pressure systems affecting the region.



Figure 2. Antarctica and the Southern Ocean

Whaling by the Numbers

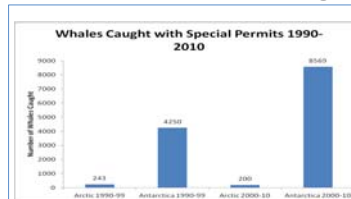


Figure 3. Whales Caught with Special Permits (1990-2010)

As seen from Figure 3, there are an increasing number of whales being caught in Antarctica with special permits. While far less, there are still some being caught in the Arctic. Due to the lack of resources in remote regions, aboriginal subsistence continued to increase from 1990 to 2010 in each Arctic country (Figure 4). The whales caught under objection have been increasing as well, specifically in the Arctic (Figure 5).

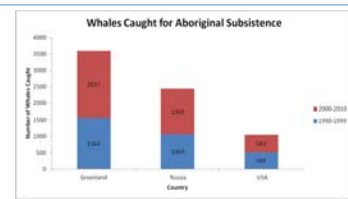


Figure 4. Whales Caught with for Aboriginal Subsistence (1990-2010)

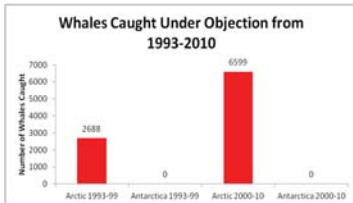


Figure 5. Whales Caught under Objection from the IWC (1993-2010)

Significance to Coast Guard Operations



Whaling relates directly to the Coast Guard's mission to protect and enforce maritime safety as well as the marine environment. First, there is the hazardous nature of the sea state throughout the polar regions. These harsh weather conditions endanger all mariners, including whalers as well as those who protest whaling. Dr. Allen of USCGA faculty stated, "potential threat to maritime safety and the marine environment posed by protestors who might be bringing their 'direct action' campaign to the Arctic (Allen, 2012)" This calls for the need of concentrated search and rescue focuses to be directed toward the polar regions. Next, there is a growing issue of lack of enforcement on the IWC moratorium on commercial whaling. This issue applies to Japanese whaling, as well as Arctic whaling, at the current time, due to the fact as explained that Japanese "scientific" whaling has been shown to have commercial implications and profits (Kasuya, 2007). In order to maintain the oceans' whale resources, the U.S. Coast Guard is needed to aid in enforcing fisheries management in the polar regions as well, mainly in the Arctic off the coast of Alaska.

Conclusion

The United States Coast Guard needs to have a clear presence within the Arctic and even the Antarctic region for these purposes in light of the potential and real threats that exist to maritime safety and to the marine environment. This is not an issue we can ignore for long. It must be made a priority within the international maritime law enforcement community now before the whales are unable to repopulate or a mariner dies in our waters.

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Freezing Spray and Ice Accretion on Vessels

NOAA Ocean Prediction Center, Washington, D.C., Summer 2011

Christa J. Funk, Class of 2012



Abstract:

Vessel icing threatens the stability of vessels that operate in high-latitude waters. The accumulation of ice on vessels depends on meteorological conditions and vessel design. To obtain a forecast, meteorological data is input into an algorithm that calculates the amount of icing that will occur. The ice coverage has changed significantly and that is not reflected in the current program. To understand the issue it is necessary to compare the Overland and Modified Stallabrass algorithms and to highlight improvements for forecasting icing.

1.0 Internship Background:

A component of the National Oceanic and Atmospheric Administration's mission is to "understand and predict changes in climate, weather, oceans, and coasts" (NOAA, 2011). In furthering this mission, the National Center for Environmental Prediction (NCEP), produces a daily icing forecast (NOAA, 2011). The Ocean Prediction Center (OPC) via NWS (National Weather Service) issues "marine warnings, forecasts, and guidance" in both graphical and text format. Members from the Meteorological Service of Canada (MSC) and NWS have been working together to evaluate the Overland and Modified Stallabrass algorithms. Their goal is to improve icing model forecasts to increase vessel safety and prevent mishaps.

2.0 Investigation:

2.1 Problem

The *Lady of Grace* (Fig. 1), a fishing vessel in Nantucket Sound, sank January 26, 2007 due to ice build-up on the decks (USCG, 2008). Arctic ice melt has opened waters for new shipping routes, resulting in a higher number of vessels moving through high latitude waters (Fig. 2). These examples emphasize the need for accurate forecasting models to predict icing.



Fig. 1. *Lady of Grace* (USCG, 2008).

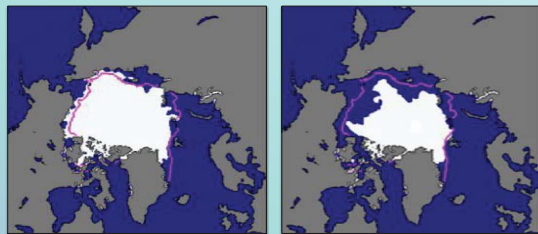


Fig. 2. Comparison of sea ice coverage from Sept. 1985 (left) to Sept. 2010 (right). The magenta line represents the median ice edge in Sept. from 1979-2000 (NSIDC, 2011).

2.2 Creating a Model

Creating a model for forecasting requires observational data. The available data varies depending on the type of vessel, speed, and heading. The models use data from different regions. The environmental factors that contribute to the icing rate include: sea state, sea surface temperature, air temperature, and wind speed. When models have the same inputs and yield different forecasts, it is due to their calibration of observational data and the physics of icing (Henry, 1995).

2.3 Algorithm Comparison

Overland (1990)	
Calibrated with observations from Alaskan waters and Labrador Sea	<ul style="list-style-type: none">-Predicts maximum icing rate-Models spray flux within the statistical parameter ϕ-Sensitive to changes in sea surface temperature-Applies wave height indirectly through wind speed
Modified Stallabrass (1994)	
Calibrated with observations from Eastern Canadian waters Spray flux equation is calibrated from liquid water content observations from Sea of Japan (<i>Narva</i>)	<ul style="list-style-type: none">-Predicts average icing rate-Includes time dependence of spray flux in equation-Weak response to sea surface temperature-Strong sensitivity to wave height

Fig. 3. Comparison of icing algorithm methodology. Sources: (Zakrzewski, 1986), (Henry, 1995), and (Hudson, 2011).

2.4 Model Formats

NCEP uses the Overland algorithm to produce daily icing forecasts (Fig. 4), where MSC favors the Modified Stallabrass. The NCEP model depicts accurate forecasts for the Alaskan waters because Overland is calibrated with observations from that area. When applied to Eastern Canadian waters NCEP model has the tendency to over-predict icing because sea surface temperatures are warmer in Alaska than in Canada (Hudson, 2010). The MSC applies Modified Stallabrass to their forecast output because it is calibrated for Eastern Canadian waters.

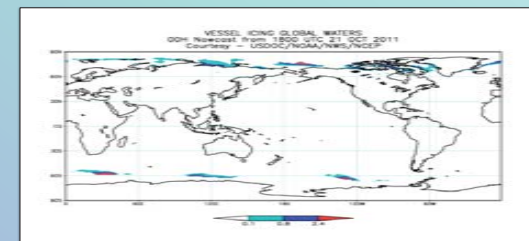


Fig. 4. NCEP daily icing forecast output example (NOAA, 2009).

3.0 Conclusion:

The goal of the NWS and MSC is to create a cohesive model that determines the icing rate throughout the North American region. The short term objectives are to code both algorithms so the model parameters can be input to build a 2-D ocean forecast and to create a web-base for the forecast models (Glazewski, 2011). The long term objective is to implement an observational system to obtain new data to improve the algorithms. Vessel icing threatens operations in high-latitude waters, causing stability and mechanical problems. Forecasting vessel icing is a difficult process due to uncertainty in observational inputs and environmental parameters associated with it. The value of improving forecasts is to increase vessel safety where the potential for freezing spray is present.

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Acknowledgements: LT Matt Glazewski, Mr. Joe Sienkiewicz, LT Victoria Futch, Ms. Marie Turcotte, Mr. Ross Brown, Mr. Edward Hudson, Mr. Peter Lewis, Ms. Jamie McLean, Mr. Eric Stevens, Mr. Mike McDonald, Ms. Lisa Torneby, Ms. Amiee Fish, Mr. Joel Curtis, Mr. Steve Miller, Ms. Bridget Thomas, Mr. Serge Desjardins.

Implications of Increasing Arctic Tourism

2/c Maddie Blackburn

Area of Study

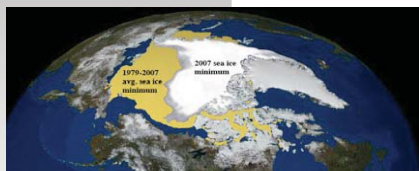


Figure 1. Sea ice cover decreases in the Arctic since the 1970's. The area indicated in yellow are previous year's sea ice cover, and the area in white is the ice cover in 2007 (photo courtesy of NASA)



Figure 2. The Arctic Ocean and general area of study, (courtesy of Wikipedia)

What are the issues?

Sea ice extent in the Arctic has decreased steadily since the late 1970's

The widening Northwest Passage will lead to increased cruise ship tourism

Higher numbers of tourists will place stress on the Arctic ecosystem

Greater access to the Arctic will require more complex infrastructure in order ensure tourist safety

The Presidential Policy regarding the United States' operations in the Arctic fails to set specific goals that dictate how tourism is to be managed. **Four goals are integral to the success of Arctic tourism...**

Increasing popularity of Arctic tourism requires a reevaluation of goals for the United States in the region. Policy change should focus on:

- Establishing protection of Arctic marine areas under MARPOL
- Developing infrastructure that will support sustainable tourism growth and improve safety of Arctic visitors
- Increasing scientific research to evaluate effects of tourism pressures on wilderness

Scientific Research

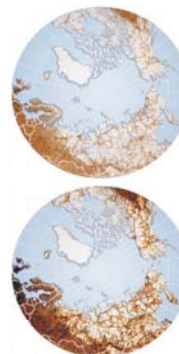


Figure 8. Human impact assessment conducted by the IUCN. There are concerns that infrastructure built in support of tourism, such as the clearly visible roads in this figure, will affect the Arctic habitat.

Government-funded research is instrumental in evaluating how increased tourism will affect the Arctic habitat. There is evidence that infrastructures built to aid in tourism expansion (including roads) force caribou and reindeer to alter their migration routes. Furthermore, research would aid in developing a contingency plan in the case of an oil spill; little is known about how oil would interact with sea ice and how a spill would circulate through the Arctic Ocean. Research will help to answer questions critical for the development of sustainable tourism.

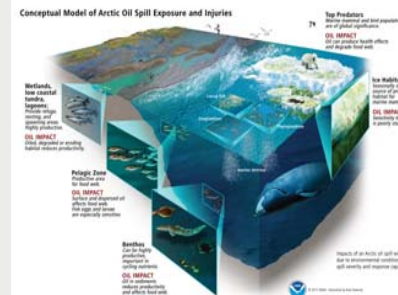


Figure 9. NOAA evaluation of how an oil spill in the Arctic would affect various marine life. It specifically describes the ice habitat as "poorly studied," which supports the need for funding and research. (Courtesy of NOAA).

Environmental Protection

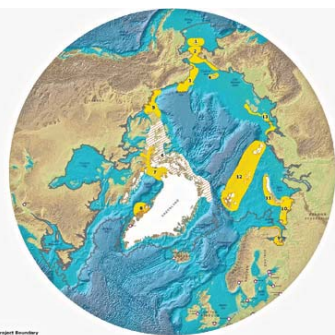


Figure 3. Thirteen Arctic areas designated as "highly threatened" by the IUCN. Of these regions, the Bering Strait, Wrangel Island, Chukchi/Beaufort Coast, the Polar Pack, Cape Bathurst, and Lancaster Sound are most susceptible to intrusion by American tourists (courtesy of the IUCN).



Figure 4. Aerial view of the MV Explorer, the first commercial cruise ship to sink in polar waters. The sinking of the vessel produced an oil spill ~1 square nautical mile in area. (Courtesy of BBC news)

MARPOL fails to established Particularly Sensitive Sea Areas (PSSAs) at any of the sites recommended by the IUCN (Figure 3). There are currently no PSSAs North of the Arctic Circle.

Furthermore, regulation of sewage discharge from ships under MARPOL Annex IV, does not take into account the low rate of waste decomposition in the Arctic. Sewage discharged in the Arctic Ocean takes far longer to break down compared to warmer climates. Cruise ships, which produce large amounts of waste, contribute greatly to the negative ecological consequences of blackwater disposal.

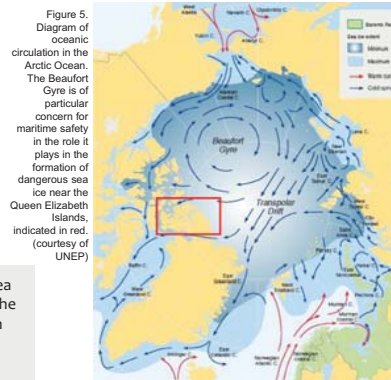
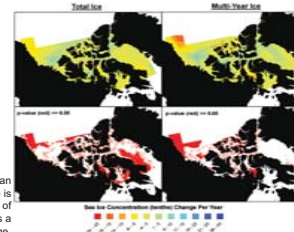


Figure 5. Diagram of oceanic circulation in the Arctic Ocean. The Beaufort Gyre is of particular concern for maritime safety in the role it plays in the formation of dangerous sea ice near the Queen Elizabeth Islands, indicated in red. (courtesy of UNEP)

Figure 6. (Left) Location of ice formation in the Canadian Archipelago. Red areas indicate locations where there is dense flow of multi-year ice. Predicting the flow pattern of large, 8 meter thick icebergs is an ongoing challenge, and is a safety concern for vessels traversing the Northwest Passage. (Courtesy of E.J. Stewart)

How will an emergency affect an Arctic Cruise ship? The U.S. Coast Guard has limited assets for Search-and-Rescue and emergency assistance in the remote Arctic. Vessel safety is limited in that there are no satisfactory emergency plans for dealing with a vessel grounding or sinking, or a vessel-caused environmental disaster.



Infrastructure Development

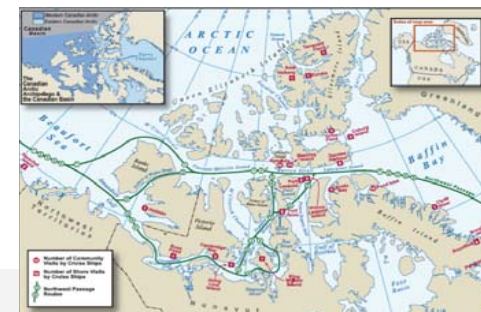


Figure 7. Map of the Northwest Passage and the most common navigation routes used by commercial cruise liners. Locations of towns used as port calls are indicated, along with the number of visits made to each town during the 2006 tourism season (graphic courtesy of E.J. Stewart).

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Threats to the Bowhead whale from Decreasing Sea Ice and Global Climate Change

2/c Nikki Corbett

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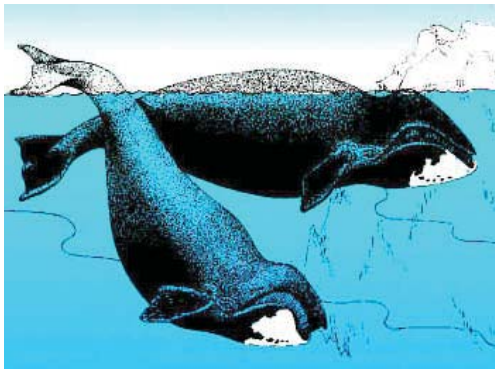


Figure 1. Bowhead whale

Background on Bowheads

- Arctic, baleen whale that can grow to 60 ft long and weigh up to 2,000 lbs
- 5 different stocks, 3 Atlantic, 2 Pacific
- 19th century whaling decreased the Atlantic stock from 50,000 to 3,000



Figure 2. Modern day Inuit whaling

Killer Whale Attacks

- Increased sightings in the Hudson Bay, Arctic Bay, Hall Beach, Repulse Bay, Cape Dorset
- 2007 Observation of 132 attacks on bowheads, 91% increase from the 20th century
- Stomach contents of killer whales show bowheads, belugas and narwhals as common prey
- Typical attacks are on juveniles-decreases population growth

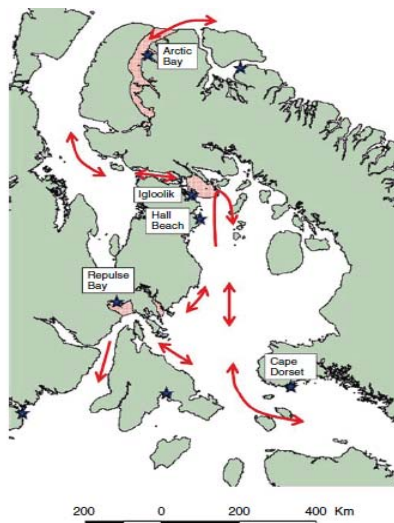


Figure 3. Eastern Canadian of killer whale invasion sites

Global Climate Change Effects

- Increase in temperature causes migration of invasive killer whale species into Arctic territory
- Rising Carbon dioxide in the ocean causes death of primary producers and food source of bowheads
- Loss of sea ice causes habitat destruction, loss of food that lives in brine channels of the ice
- Causes inbreeding to due to loss of individuals in the population

Anthropogenic Problems

- Net entanglement causes drowning and death to juveniles
- Over exploitation decreases species mass
- Pollution assists in habitat destruction, causes medical concerns due to toxic chemicals in the water



Figure 4. Bowhead whale scarring from killer whale attacks



The “White” Gold Rush in the Antarctic for the Patagonian Toothfish

1/c Brett Morris



Abstract

•The Patagonian Toothfish (also known as the Chilean sea bass and combined with a species named the Antarctic toothfish) has been commercially fished only since the 1990s. However, toothfish landings have continued to decline, in some places as much as 67% (Lack and Sant, 2011). This can be contributed to an imperfect system of management by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) and other nations. The management has led to illegal, unregulated, and unreported (IUU) fishing that has compromised future Patagonian toothfish stocks.



Figure 3: Scientific observer for Australia holds a Patagonian toothfish (Antarctica.gov)

Biology

- Long lived: 50 years
- Late maturing: 8-9 years old
- Slow growing: 2 cm and 2 lbs per year
- Recovery from current overfishing: 2-3 decades (with NO fishing effort) (Welsford 2011), (Cascoirbi, 2006)

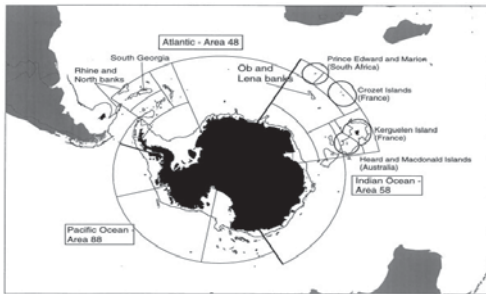


Figure 1: Map of the Southern Ocean showing subareas of Patagonian toothfish designed by CCAMLR (Agnew 2000).

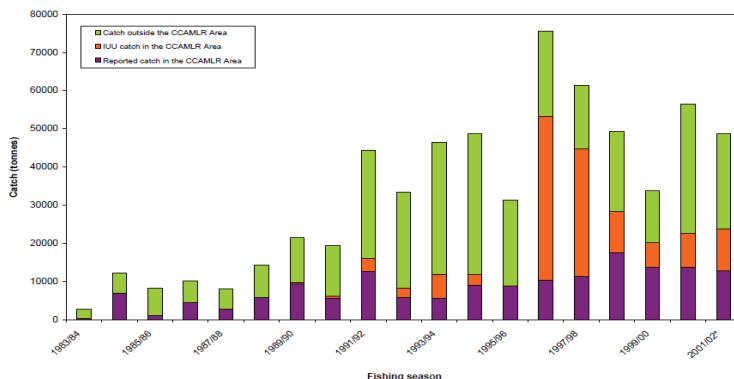


Figure 2: Estimated catches of toothfish from 1983/4-2001/2 (Fallon and Stratford 2003).

NOTE: estimated data that provides a general indication of *Dissostichus ssp* catches. Catch outside the CCAMLR area includes estimated EEZ catch plus estimated high seas catch (Adapted from CCAMLR 2002c, 2002d, Lack and Sant 2001, Agnew 2000).

Major Problems

- IUU fishing
- Management
 - CCAMLR
 - Nations with Exclusive Economic Zones (EEZs)
- Seabird bycatch (especially of endangered species)



Figure 4: Vessel illegally fishing for toothfish south of Australia being boarded by the Australian Navy (European Commission)

Solutions

- Catch Document Scheme (CDS)
- Vessel Monitoring System (VMS)
- Blacklisting IUU vessels

Conclusion

- Regulatory agencies need to work together to combat IUU fishing and set smart and efficient regulations.
- Steps should be taken to stop bycatch of endangered seabirds.
- Consumers have the responsibility to demand only sustainable and legally caught fish.

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Ozone Depletion in the Antarctic

1/c T. Kennedy

Abstract

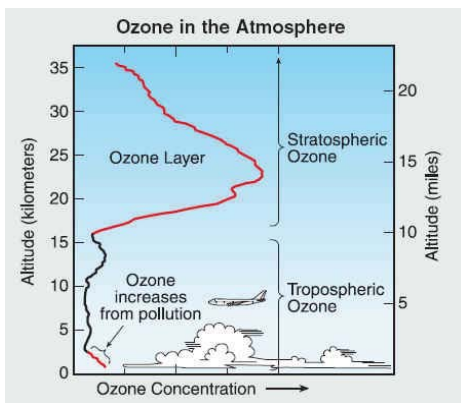
The purpose of this paper is to analyze current trends in the Antarctic ozone layer. The ozone layer, which protects life on Earth from UV radiation, has been decreasing rapidly in the last half century. In particular, a large hole has formed over the Antarctic. Although steps were previously taken to combat ozone loss, there is still considerable ozone depletion every year (European Space Agency). The yearly maximum areas for the ozone hole were obtained from NASA and graphed in Excel. The trends indicate that there was a drastic increase in the ozone hole area before the problem was discovered in 1985. Since then, the growth of hole has significantly lessened, but it continues to persist.

Introduction

The ozone in the stratosphere prevents UV radiation from reaching the Earth. A 1985 paper showed that a large ozone hole was developing in the Antarctic, and its growth is believed to be caused by human interaction. The growth of the ozone is closely monitored every year to observe changes.



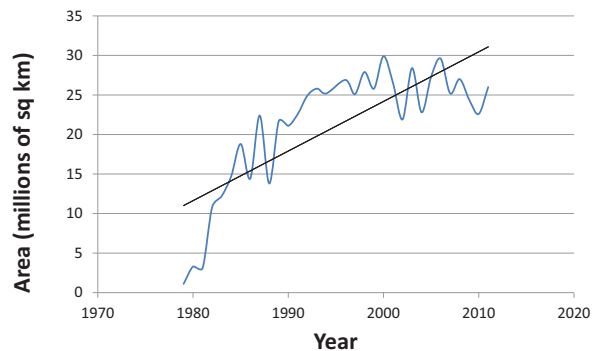
Map of Antarctica (CIA World Factbook)



Ozone Layer in the Atmosphere (www.theozonehole.com)

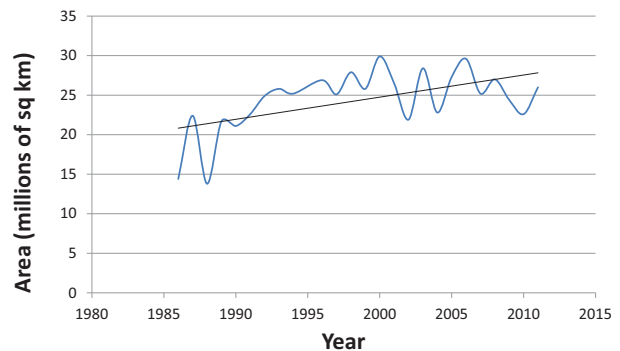
Results

Ozone Hole Maximum Area



Ozone Hole Maximum Area 1979-2011 (NASA)
 $y=0.63x-1230.4$

Ozone Hole Maximum Area (modified)



Ozone Hole Maximum Area 1986-2011 (NASA)
 $y=0.28x-535.77$

Conclusion

There is still a continuous increase in the ozone hole every year. However, the growth rate has decreased significantly since the discovery of the hole.

Acknowledgements

Data retrieved from NASA Goddard Space Center

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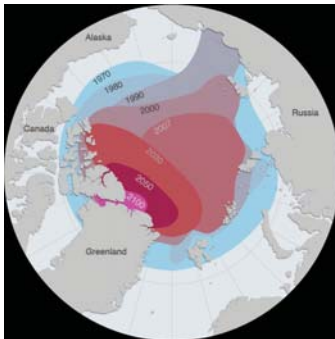
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Sea Ice Formation Models

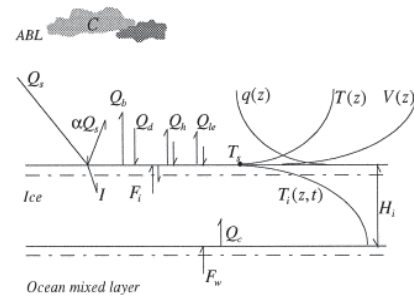
1/c Samuel Arnold

Abstract

Sea ice is an indicator of the predominating meteorological conditions, and participates in a feedback loop with the atmosphere. As such it is vulnerable to small variations in the surface energy balance. In order to both better understand what is happening to the ice, and to project what the effects of changing climates will be on ice packs models have been created. These models quantify ice as being a function of the thermodynamic energy, or as subject to dynamic processes such as atmospheric forcing. The impact of each of these types of influences on sea ice was evaluated by a review of literature and how well each model did in predicting ice formation. It was found that thermodynamical model account will for ice thickness, but dynamical models are more accurate at larger scales.



Sea Ice Extent observed from 1970-2007 and predicted from 2030 to 2100 using NOAA's GFDL Model.



Summary of energy fluxes considered in using a Thermodynamical Model.

Model	Model physics	Number of layers (N _{ice} ; N _s ; snow)	Time step (h) simulation scale	Main output parameters	Main characteristics
Stefan (1891)	conduction of heat released in freezing into air through ice	N=1		H(t)	analytical model; known boundary conditions; homogenous ice; linear temperature profile of no thermal inertia, no internal heat source, no heat flux from water below
Untersteiner (1964)	heat conduction through ice; effect of brine and penetration of solar radiation	multiple ice	1 annual	T(z,t)	effect of brine and density are included; boundary conditions (surface temperature, salinity) from field data; explicit method for heat conduction equation
Maykut and Untersteiner (1971)	heat conduction through snow and ice; effect of brine and penetration of solar radiation; surface energy balance with melting and freezing at surface and bottom	multiple ice and snow	12 seasonal or annual	H(t); T(z,t); T _i (t)	vertical heat conduction through multiple layer; surface temperature calculated by heat balance equation using the prescribed heat fluxes at the boundary; iterative method for surface temperature determination; alternating direction explicit method for solution of heat conduction equation; role of albedo and oceanic heat flux especially tested
Semtner (1976)	simplified model of Maykut and Untersteiner (1971)	N _{ice} =1; N _s =2	8 seasonal or annual	H(t); T(z,t); T _i (t)	surface temperature obtained from the balancing blackbody emission term as linearly approximated; model has been used with coupled climatic atmosphere-ocean model
Lumpkin (1983)	packing of snow, snowice formation, and growth of black ice	N _{ice} =1; N _s =1; N _h =1	24 seasonal	H(t); H _s (t); H _h (t); ρ _i (t)	role of snow and snow-ice formation in ice growth; prescribed boundary conditions
Cox and Weeks (1988)	ice growth with surface energy balance; salt entrapment, brine expulsion, and its gravity drainage	N=1	equal to time to grow 0.5 cm ice seasonal	S(z,t); T _i (t)	thermal role of brine inside ice with variations of surface heat balance and growth of ice
Omstedt (1990)	ice coupled with ocean turbulence model; horizontal variability of ice; ice formation and melting	N _{ice} =1; N _s =1 one-dimensional in horizontal	24 seasonal	H(t); A(t)	dynamic and thermodynamic processes considered to examine vertical and horizontal sea ice exchange; ocean coupled with ice; applied to semienclosed basins
Ebert and Curry (1993)	full thermodynamics	multiple ice and snow	8 seasonal or annual	H(t); T(z,t); T _i (t)	sea-ice thermodynamics interacts with atmosphere; iterative method for surface temperature determination; explicit Dufort-Frankel algorithm for heat conduction equation; influence of meltwater ponds (albedo) and leads examined

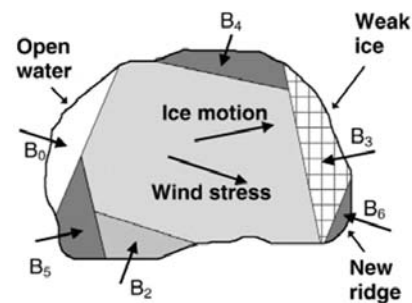


Diagram of the atmospheric stresses applied to an ice pack. These forces shape the large scale formation of ice.

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Polar Marine Benthic Seaweed Adaptations

2/c Victoria E. Lacefield-Rodriguez

Abstract:

Arctic:

- Fluctuating environmental conditions
- Relatively low seaweed biodiversity
- Nutrient levels decline in summer

Antarctic:

- Relatively stable environmental conditions
- Nutrient levels do not inhibit seaweed growth

Both:

- Seasonal light intensity
- These rays can negatively affect seaweed during succession
- Increasing polar temperatures have negative affects

Introduction:

The Arctic and Antarctic are classified as possessing harsh marine environments where large light fluctuations, freezing temperatures, and low nutrient levels make it difficult for marine species to habituate.

Results and Discussion:

- *Palmaria decipiens*: well-defined reduction in productivity (Table 1 & 2)
- High light under specific conditions harmful
- Inhibit photosynthesis and negatively affect pigment
- *Fucus distichus*: decrease in temperature proportional to yield values: increase in NPQ and decrease in yield values
- Low temperature, high light conditions: slow chemical reactions for both species

The Antarctic

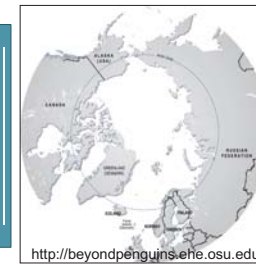


<http://www.slate.com>



<http://www.boldsystems.org>

The Arctic



<http://beyondpenguins.ehe.osu.edu>



<http://depts.washington.edu>

Methods:

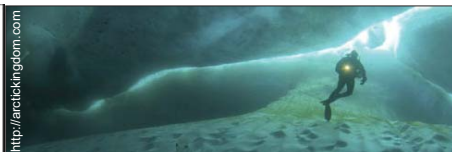
- *Palmaria decipiens* fronds were collected off King George Island
- Frond material distributed among beakers
- Beakers placed in temperature tanks, 0°C and 8°C
- 6 halogen lamps, 200 or 400 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ PAR
- After samples were treated for 3 days, 48 hrs in dim light to measure recovery levels

Methods:

- *Fucus distichus* fronds were collected in Spitsbergen, Norway
- Relied on freezing table, temperatures down to -20°C
- Used temperature sensor, and chlorophyll fluorometer to analyze samples' resilience
- Experiments included rapid freezing, dry freezing, and long-term freezing



Figure 2. King George Island, South Shetland Islands, Antarctica (Department of Glacial Geology, 2012)



<http://arctickingdom.com>

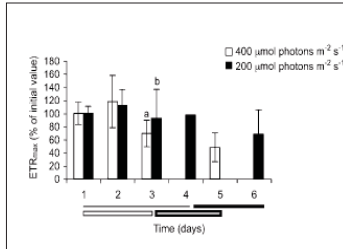


Table 1. *Palmaria decipiens* Maximum Electron Transport (ETR_{max}(%)) vs. Exposure Time (days) (Becker, et al., 2009)

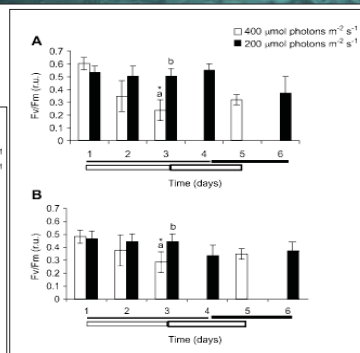


Table 2. Optimum Quantum Yield (Fv/Fm) vs. Exposure Time (days) of *Palmaria decipiens* (Becker, et al., 2009)

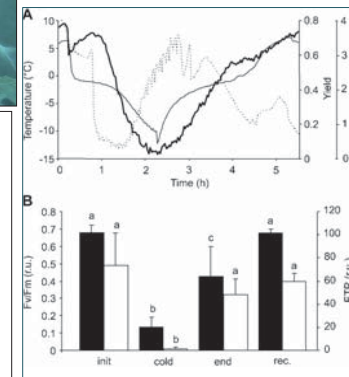


Table 3. *Fucus distichus* Fast and short freezing. (A) Changes in Temp. (°C, thin line), effective quantum yield (Fv/Fm; bold line) and non-photochemical quenching (NPQ; dashed line) in relative units. (B) Optimum quantum yield (Fv/Fm; black bars) & max electron transport rate (ETR_{max}; white bars) (Becker, et al., 2009)



Figure 1. Spitsbergen, Norway (TravelNotes.org, 2012)

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International Policy on Arctic Marine Fisheries

2/c Daniel Jones

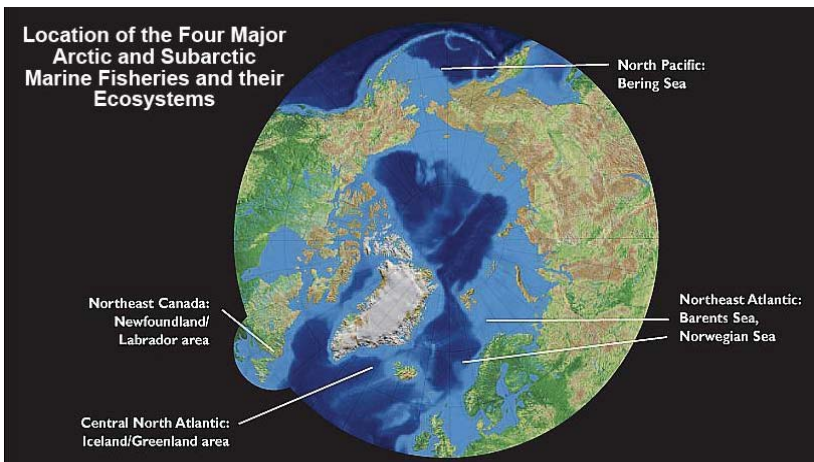
Abstract:

The four major Arctic marine fisheries provide millions of tons of fish captures every year and represent a multi-billion dollar industry. Existing regulatory organizations, both national and international, have allowed for fairly sustainable harvests in all Arctic marine fisheries. Regional fisheries management organizations operate under the general goals set forth by more broad based regulations published by the Law of the Sea Convention and United Nations General Resolutions. These general goals are to provide for sustainment of fish targeted for capture and for the protection of fragile ecosystems and non-targeted fish. Global climate change is leading towards a warmer Arctic climate and the opening of larger marine fisheries in the Arctic marine zone. Insufficient research has been conducted at this time to pass effective regulation of the new fishery areas, but preemptive regulations and regulatory agencies are still recommended prior to exploitation of the soon to be available fisheries.



A fishing vessel off the west coast of Greenland

Source: www.thesolutionsjournal.com



Locations of the four major arctic Arctic marine fisheries

Source: ACIA, Scientific Report, pg 693

Current Trends:

- Full ecosystem management approach replacing single-species management
- Quota-systems still used
- Mesh size requirements
- Bycatch regulations
- Local Arctic marine fisheries regulatory organizations
- Many areas not explicitly within any country's EEZ are subjected to unregulated fishing
- In recent years, international agreements have begun to be passed to regulate these areas, such as in the Bering Sea Doughnut Hole and the Barents Sea

Policy Gaps and Fixes:

- Focus of regulation on emerging fisheries within national boundaries and not on those outside of EEZ's
- Very little research has been conducted to understand the new areas
- Not enough information available to make fully effective regulations
- Regulatory fixes:
 - Legislation to postpone expansion of current fisheries
 - Legislation to defer any new fisheries in emerging areas until proper regulation can be devised
 - Establishment of new local regulatory agencies with power to enforce region specific laws as necessary
 - Formulation of a response plan for the fisheries following any major disaster
 - Designation of responsibility for enforcement of new regulations



An Arctic Cod

Source: www.fisheries.no

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Arctic Oil Exploration off the Northern Alaskan Coast

1/c Cadet Stephen Atwell

Abstract:

The growing demand for oil worldwide has led to increased Arctic exploration by major oil companies. Scientific research indicates that large, untapped oil reserves are located below the sea bed around the Arctic Circle. The potential concentrations of oil in the Arctic may help meet the growing fuel demands, however, countless environmental concerns still exist. The Alaskan frontier and waters of the Arctic Circle are treacherous and relatively unexplored. The risks of a catastrophic oil spill in this unfamiliar environment are great, while the benefits of oil are not as promising. Federal agencies, such as the United States Coast Guard are in the process of analyzing Arctic capabilities in the event of a major oil spill.

Worldwide Oil Demand:



- Average price for a gallon of gasoline in U.S: \$3.94
- The interest in untapped, Arctic oil fields has enticed many companies.
- Shell Oil intends to begin drilling off the Northern Alaskan coast this summer

Area of Interest



- Shell Oil has proposed a drilling site just off the Alaskan coast for the 2012 summer
- During summer months these waters are relatively ice-free

Environmental Concerns:



- Risk of an "Arctic" Deepwater Horizon spill
- Arctic environment is relatively unexplored/unfamiliar to most mariners
- Ice gouging and shifting ice packs can damage drilling machinery
- Response and clean-up efforts have not been tested in Arctic conditions
- Predominant Arctic weather conditions threaten clean-up success

Coast Guard's Future Role in the Arctic



- The Coast Guard is currently limited in the necessary assets to conduct Arctic missions
- CGC Healy is the only available ice breaking cutter
- There is no Coast Guard infrastructure in Northern Alaska
- The Coast Guard is relatively inexperienced in oil spill response in the Arctic
- The U.S has not yet signed the Law of the Sea to establish ourselves in the Arctic domain
- Increasing maritime activity in the Arctic offers an entirely new mission to the Coast Guard's service on the sea.
- Drilling may occur before the Coast Guard is fully prepared to respond to a disaster

References:

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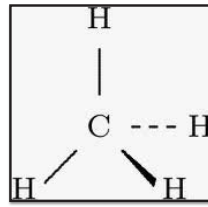
Methane Gas Hydrates in the Arctic

Cadet 1/c Jordan Mestemaker

Abstract-

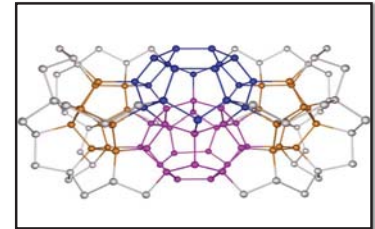
Methane is a prominent natural gas both within the Earth's marine sediments and in our atmosphere existing as a powerful greenhouse gas. As the Earth continues to experience climatological changes, especially increases in the planet's surface temperature, the possibility that the methane hydrates will melt and escape as methane gas into the atmosphere becomes virtually imminent. Research shows that methane gas levels have already increased due to its escape from Arctic permafrost and marine sediments, yet scientists declare that a large scale release of methane is very difficult to predict and is still considerably unknown.

Background on Methane Gas-



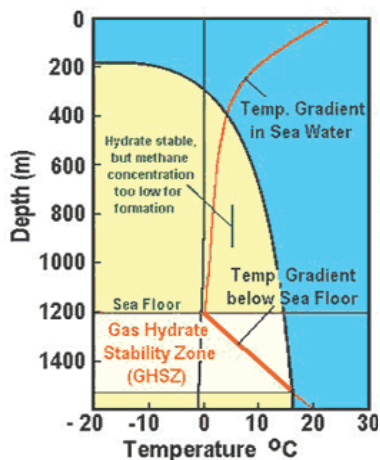
← Chemical structure

Methane crystalline structure →

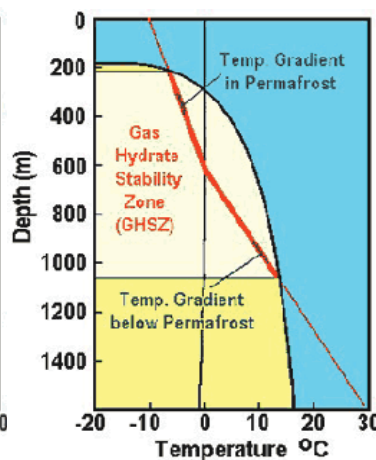


It is produced by bacterial ingestion and by the correct conditions of temperature, pressure, time, and contact with organic material.

Discussion-



^ Specific Hydrate Stability for Arctic Permafrost



^ Typical occurrence of the gas hydrate stability zone on deep-water continental margins. A water depth of 1200 meters is assumed.

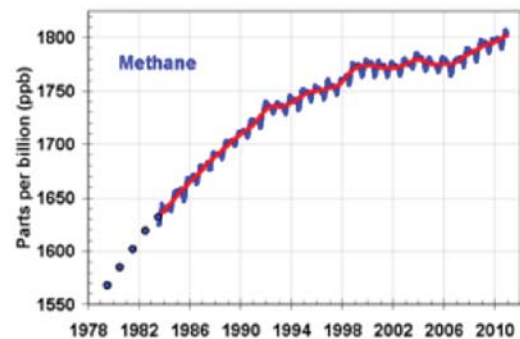
- ❖ A release of methane gas from the stored hydrates would contribute significantly to global climate change, especially warming of the earth's temperature.
- ❖ Methane hydrate escape is especially plausible in the Arctic where the shallower gas hydrates occur. (10.5 mil km² of Arctic permafrost)
- ❖ Plumes of methane gas bubbling up from the sea floor have been seen in many locations, specifically the West Spitzbergen continental shelf and the East Siberian continental shelf.

Conclusion-

- ❖ A large scale release of methane into the atmosphere would trigger a feedback loop, continually increasing this amount.
- ❖ Because of the difficulty of drilling for methane in the Arctic in combination with inclining sea and air temperatures, the potential for a release whether gradual or long-term becomes very possible, but when this will occur is ultimately still unknown.

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^ Methane gas concentration from 1978-2010. The red line represents the average over this time period.



The Effects of Suspended Sediment and Metals on Salmonids in the Arctic

2/c Steven Danseglio

Abstract

Global climate change has started to reveal natural resources in the Arctic that were once unreachable. One of these resources in particular is gold. Gold is most commonly extracted from the ground by placer mining. Placer mining requires a large amount of water in order to separate gold from the soil. After the water separates the gold from the soil, the water is pumped back into the stream it is drawn from, creating a large amount of suspended sediment and introducing harmful metals into the stream. The introduction of suspended sediment on metals into the stream has a negative effect on the salmonid fish species that inhabit the area. The suspended sediments and metals affect the food source of the salmonids along with the growth rate, immune system, development of eggs and larvae, and migrations habits of the salmonids. Various studies have shown a large decrease in salmonid prey downstream of placer mines when compared to prey levels upstream due to suspended sediments and metals. Studies have also shown that suspended sediments and metals greatly reduce the ability for salmonids to feed effectively. With little regulation on the placer mining industry it is clear that a strict policy must be created in order to protect the Arctic wildlife while still allowing for the extraction of the resources that many depend upon in order to make a living.

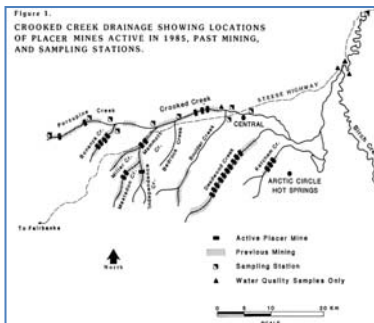


Figure 2. Test sites for sedimentation (Weber, 1986)

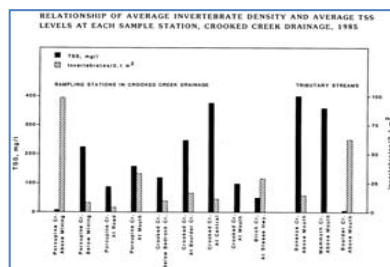


Figure 3. Results from test sites in Figure 2 (Weber, 1986).

Results (Sedimentation)

- The level invertebrates upstream of a placer mine on Porcupine Creek had a level of 100 invertebrates per .1m² (Figure 2 & 3)
- The level of invertebrates downstream dropped to 10 invertebrates per .1m² (Figure 3)
- Exposure to sedimentation reduces growth, slows feeding response, reduces tolerance to hypoxia (Figure 4)

Results (Metals)

- The accepted level of copper for aquatic life in Alaska is under 9 ppb (Woody, 2007).
- At these levels the fish's sense of smell is impaired and the immune system is weakened.
- Salmonids use their sense of smell (olfaction) to migrate, identify predators, and find mates which are all impaired by the introduction of metals.
- Copper lowered the immune system of trout to half that of non exposed trout (Woody, 2007).



Figure 5. Arctic Grayling - <http://www.alaska-in-pictures.com/close-up-of-arctic-grayling-2301-pictures.htm>



Figure 6. Coho salmon - <http://basiceating.blogspot.com/2010/01/coho-salmon-on-ortychus-kisutch.html>



Figure 1. Area of Research - <http://www.lonelyplanet.com/maps/north-america-usa/alaska/>

Test variable	Exposure period (h)	Sediment concentration (mg L ⁻¹)	Observation
Survival	1000	0	87 and 92% survival
		100	87 and 92% survival
		1000	88 and 92% survival
		10000	88 and 92% survival
Physiological condition	1000	0-1000	No effect on hematocrit, hemoglobin, or glucose glucose
			No effect on condition factor or body condition
			No overt signs of disease or gill damage
			Fish slightly paler than controls
			Fish slightly paler than controls, reduction per month
Growth (weight gain)	1000	0	227% increase, 8% reduction relative to controls
		100	217% increase, 10% reduction relative to controls
		1000	181% increase, 10% reduction relative to controls
Tolerance to hypoxia	1000	0-1000	No effect on critical dissolved oxygen content
			9 death
			Significant reduction in times to death
			Increased oxygen consumption rate relative to fish in 0 and 100 mg sediment L ⁻¹
Feeding response to surface drift	1000	0-1000	No effect on critical thermal maxima
			No effect on acute lethal sediment
			Decreased acute lethal sediment
			Decreased acute lethal sediment
			Rapid feeding, 100% consumption in 4-8 s
			Decreased acute response times (10-12 s)
			relative to controls
			Decreased times (24-42 s) relative to lowest sediment concentrations; acute lethal sediment
			Decreased times (25 to >100 s) relative to lowest sediment concentrations; acute lethal sediment
Feeding response to surface drift (24-hr exposure)	1	0	100% consumption in 10 s to 25 s
		100	Decreased response times (10 to >300 s)
		1000	Failed to feed in 24 tests, acute lethal sediment
		10000	Decreased response times (14 to >300 s)
			Failed to feed in 24 tests, acute lethal sediment
			Decreased response times (200 to >300 s)
			Failed to feed in 18 of 24 tests, acute lethal sediment
Feeding response to surface drift (24-hr exposure)	1000	0	Most times to consume all prey 1-4 min
		100	Most times to consume all prey 1-4 min
		1000	Most times to consume all prey 4-8 min
		10000	Failed to consume all prey 4-8 min
Feeding response to surface drift (24-hr exposure)	840	0	Most times to consume all prey 1-4 min
		100	Most times to consume all prey 1-4 min
		1000	Most times to consume all prey 4-8 min
		10000	Failed to consume all prey 4-8 min

Figure 4. Summary of laboratory findings for underyearling Arctic grayling exposed to suspended sediment. (McLeay et al., 1985)

Stream Types

- Type I – Salmonid spawning
- Type II – Home to developing salmonids
- Type III – Home developing salmonids; contributes to existing fishery
- Type IV – No major contribution to biodiversity

Topics for Further Research

- Finding the impact each type of fish has on local fisheries
- Finding what type of technology can reduce the impact of sedimentation and the addition of metals
- Case study on a placer mine using current technology
- Impact dredging for gold in the Bering Sea has on local populations



Figure 7. Blue Ribbon Placer Mine

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Antarctic Blue Ice

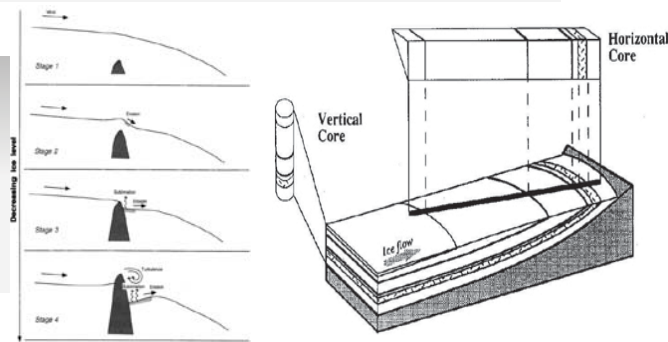
Cadet 1/c Colin Schembri

Abstract

Blue ice is an often overlooked naturally occurring phenomenon that has the potential to be very useful to the science community. Blue ice can be used in the field of paleoclimatology to provide climate data as far back as 100,000 years at a higher resolution than traditional ice cores (Bintanja 1999). However, because of its horizontal stratification it may actually be less efficient to take samples of blue ice for this purpose (Moore 2006). Blue ice also contains an abundance of preserved meteorites which can provide knowledge about the universe around us (ANSMET). Perhaps most importantly, blue ice can be used as a landing strip for conventional wheeled aircraft which will allow for expansion into new areas and more efficient movement of scientists and equipment (Meller 1993).



•Blue ice is formed downwind of exposed mountains and is expanded by wind erosion and sublimation (Bintanja 1999).



•Horizontal ice cores can provide paleoclimatological data at a higher resolution than vertical ice cores (Bintanja 1999). However, these horizontal ice cores are less efficient to gather (Moore 2006).



•Blue ice can be used for airfields and can land conventional wheeled aircraft. The abundance of suitable blue ice areas could be used to create a system of airfields to form an efficient system of transportation for scientists and equipment. Blue ice airfields require little setup and maintenance and cause virtually no environmental impact on the area (Meller 1993).



•The Antarctic Search for Meteorites has recovered over 20,000 meteorites in blue ice since 1976. Blue ice has preserved meteorites as old as 2.5 Ma. The meteorite pictured above, ALH 84001, was formed on Mars 4.5 Ba and was discovered at the Allan Hills site in 1984 (ANSMET).

Conclusion

Blue ice is underappreciated and should be an object of increased focus for the Antarctic scientific community. Blue ice holds information about the Earth's past and the universe's past as well. It has the capability to increase our productivity and efficiency in Antarctica through the creation of airfields. Blue ice has untapped potential that should be utilized for the advancement of science.

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