

U.S. DEPARTMENT OF COMMERCE
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NATIONAL OCEANIC AND ATMOSPHERIC

ADMINISTRATION (NOAA)

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HYDROGRAPHIC SERVICES REVIEW PANEL (HSRP)

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MEETING

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THURSDAY

MAY 5, 2011

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The Hydrographic Services Review
Panel met in the Kona Moku Ballroom at the
Waikiki Beach Marriott Resort and Spa, 2552
Kalakaua Avenue, Honolulu, Hawaii, at 8:30

a.m., Edmund Welch, Chair, presiding.

HSRP MEMBERS PRESENT:

EDMUND B. WELCH, Chair
MATTHEW WELLSLAGER, Vice Chair
LAWSON W. BRIGHAM, Ph.D.

JEFFERY J. CAROTHERS
MICHELE DIONNE, Ph.D.
CAPT. SHERRI HICKMAN
CAPT. THOMAS A. JACOBSEN
DAVID A. JAY, Ph.D.
GARY JEFFRESS, Ph.D.
JOYCE E. MILLER

SCOTT R. PERKINS
SUSAN SHINGLEDECKER

VERTICAL AND HORIZONTAL DATUMS STAKEHOLDER
PANEL:

STEPHEN S. ANTHONY, Director, USGS Pacific
Island Water Science Center
CRAIG CLOUET, Solutions Engineer, ESRI
CHRIS GUERIN, Hawaii Department of
Transportation, Highways Division,
Design Branch, Cadastral Engineering
Section
JOHN MARRA, Ph.D., NOAA National Climatic Data
Center, Regional Climate Services
Director, Pacific Region
BILL WARD, NOAA/NWS, Chief, Pacific Region
Headquarters, Environmental Scientific
Services Division

ALSO PRESENT:

MATTHEW BARBEE, UHSOEST
JULIANA BLACKWELL, NOAA/National Geodetic
Survey Director
PAUL BRADLEY, NOAA/NOS
ARTHUR BUTO, DLNR
EDWARD CARLSON, NOAA/NGS
VIRGINIA DENTLER, NOAA/HSRP Staff
RICHARD EDWING, NOAA/CO-OPS Director

MARC ERICKSEN, Sea Engineering
CAPT. GERD GLANG, NOAA/NOS
LCDR MARCELLA GRANQUIST, Waterways Management
Division, Sector Honolulu,
U.S. Coast Guard
LAURA HAMILTON, NOAA
TIFFANY HOUSE, NOAA/HSRP Staff

DAVID M. KENNEDY, Asst. Administrator, NOS
JEFF LaDOUCE, NOAA/NWS, Director,
Pacific Region
CAPT. JOHN E. LOWELL, JR., NOAA/OCS Director
RAY MORGAN, Critigen
DANIEL G. MORRIS, U.S. Navy COMPACFLT
KAREN MUNROE, Critigen

JESSICA PODOSKI, U.S. Army Corps of Engineers
DAN POLHEMUS, U.S. Fish and Wildlife Service
LT. KYLE RYAN, NOAA/OCS

ALSO PRESENT (Cont'd):

RONNIE TORRES, HI-ARNG

NANCY WALLACE, NOAA/NOS

KATHY WATSON, NOAA/HSRP Staff

HENRY WOLTER, USGS

C-O-N-T-E-N-T-S

Vertical and Horizontal Datums
Stakeholder Panel

Need for Accurate Elevations in Pacific
Islands: Dr. John Marra, NOAA National
Climate Data Center, Regional Climate
Services Director, Pacific Region 7

Hawaii Leveling and RTN: Chris Guerin, Hawaii
Department of Transportation, Highways
Division, Design Branch, Cadastral
Engineering Station 29

Pacific GPS Met Program: Bill Ward, Chief,
NWS Pacific Region Headquarters,
Environmental Scientific Services
Division. 40

Need for Accurate Horizontal and Vertical
Datum for Groundwater Resource Assessments in
Hawaii and the Pacific: Stephen S. Anthony,
Director, USGS Pacific Island Water Science
Center. 58

GIS Needs Accurate Datums and Transformation
in the Pacific Region: Craig Clouet,
Solutions Engineer, ESRI. 65

HSRP Member Presentations

Arctic Issues and the Role of NOAA Navigation
Services: Dr. Lawson W. Brigham,
Distinguished Professor, Geography and
Arctic Policy, University of Alaska,
Fairbanks 127

Recreational Boating Community and the
Pacific Region: Susan Shingledecker,
Boat U.S. 174

NOAA Navigation Services' Role in Supporting
Coastal Science: Joyce Miller, Joint
Institute for Marine and Atmospheric
Research, Research Corporation for the
University of Hawaii. 209

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Adjournment

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P-R-O-C-E-E-D-I-N-G-S

1:04 p.m.

CHAIR WELCH: Good afternoon,
let's resume our meeting on the second day of
the Hydrographic Services Review Panel. I
want to thank Matson Navigation and all the
various folks that worked on our outing this
morning over to the Matson container port and
container vessel. I think we got an
instructive several hours over there.

And so we will get back to our
regular agenda. Captain Lowell, have you got
anything you want to say as we begin our
official day two?

Okay, we would encourage all of
our guests who are here today for the first
day to sign in on our sign-in sheet behind us
on the table. If you signed in yesterday you
don't need to sign in again, right?

No, if you signed in yesterday you
have to sign in again today, according to
Kathy. So if you would, if you'd be good

1 enough to take a moment or two at some point
2 in the afternoon and sign in we would
3 appreciate it.

4 We are going to start with our
5 second stakeholder panel, talking about
6 vertical and horizontal datums. Do you think
7 John Grisham could work that into a novel?

8 And so we have got a good
9 representation and what we will do gentlemen
10 is we will recognize each of you in turn,
11 have you make your presentations and the
12 panel will hold any kind of comments or
13 questions until you all finish, unless
14 something is really a burning question in
15 which case we might make an exception.

16 So I guess we'll just start, John
17 Marra, with you, and have you talk about
18 accurate elevations in the Pacific Islands.
19 So welcome. Go ahead John.

20 DR. MARRA: Great, thank you.
21 Aloha, and on behalf of the other islands in
22 the Pacific, talofa and hafa adai. Thank you

1 very much for the invite. I really appreciate
2 the opportunity to speak with you.

3 I am the regional climate services
4 director for the Pacific region. I work under
5 the National Climatic Data Center out of
6 NESDIS, one of the other NOAA line offices.

7 If there are any problems at all
8 with this panel, it's Ed Carlson's fault. So
9 what I am going to talk a little bit about
10 are climate services and then the
11 hydrographic services' role in that context,
12 and then I'll focus on one particular area
13 within the -- sub-area within the climate
14 services.

15 There is a definition, again, I
16 won't read that for you, but really what we
17 are talking about is in the end there
18 ultimately is actionable information that can
19 be used to support decision making.

20 I think the Weather Service
21 provides a very good analogy in that folks,
22 without really thinking about it, depend on

1 the information, the products and services
2 they provide, on a day-to-day basis to make
3 decisions, and I would like to think that
4 maybe 10, 20 years down the line, that
5 climate services will serve that same role in
6 people's mind when they begin to make
7 decisions, you know if they are planning
8 things for the season or even longer-term
9 projections for buildings and things like
10 that, is they will begin to think of climate
11 services in that way.

12 So that's really what we are
13 talking about. In the Pacific, PaCIS, the
14 Pacific Climate Information System, is really
15 the umbrella under which climate services are
16 being developed.

17 It's a program integration and
18 planning framework if you like. It's focused
19 on the U.S. flag and affiliated islands but
20 not limited to them. It really includes the
21 agencies, institution, organizations across
22 the Pacific.

1 So we have participants like the
2 Australian Bureau of Meteorology, the New
3 Zealand Met Service, in addition to folks in
4 Guam and Marianas Islands and Samoa, so it's
5 really region-wide.

6 So PaCIS itself evolved from a lot
7 of the work that folks like Eileen Shea and
8 Jim Weyman and others did related to the
9 Pacific ENSO applications climate which is
10 known as the Pacific ENSO applications
11 climate center where folks across the region
12 began to coordinate around ENSO events, and
13 that has actually developed this mechanism
14 through which we have these partnerships
15 towards kind of combined products and
16 services today.

17 So I just want to emphasize this
18 partnership, particularly in the context of
19 climate services, is a real, very important
20 part of the whole process.

21 So this is kind of the conceptual
22 framework I guess is what you might call it

1 for how we are pulling together climate
2 services.

3 Much like Rich's comment
4 yesterday, we have identified several focus
5 areas, but the idea is that the products and
6 services are user demand-driven.

7 So these three priority areas were
8 identified through a series of meetings and
9 workshops: it's freshwater resources and
10 drought; community resilience to sea level
11 rise which is one I am going to focus on a
12 little bit more in the next coming few
13 slides; and then marine and terrestrial
14 ecosystems.

15 And of course there's sub-sectoral
16 applications like transportation and tourism,
17 creation, that even -- that kind of cut
18 across and through those.

19 The idea is then that in addition
20 to the focus areas, there is a set of core
21 capabilities that essentially any one of
22 those focus areas that you draw upon to

1 deliver the products and services within each
2 of those areas.

3 And among those are, and it's
4 anywhere from education, outreach,
5 observational products, research and
6 development; together this kind of defines
7 the end-to-end climate services system.

8 And I think there's a couple of
9 pieces in here key that you guys can pick up
10 on. One of those is the observing systems
11 section, and that's clearly where a lot of
12 the stuff we have talked about to date in the
13 context of hydrologic services fall.

14 It's the framework data, it's the
15 datums, it's also some of the sea level
16 station information, that's a key piece of
17 that, so it's a major part of the puzzle.

18 And then there's also some of the
19 specific derived products, some of the things
20 like the CO-OPS sea level trends that are
21 also relevant in the context of the piece
22 that's -- so there's climate variability and

1 change but kind of the full term for that is
2 understanding and predicting climate
3 variability and change.

4 So there are several pieces within
5 the context of these core capabilities that
6 this group supports.

7 So using that same -- the focus
8 area is kind of the organizing framework, I
9 have just highlighted a couple of different
10 specific sorts of applications where the
11 hydrographic services would be relevant.

12 I think there's a number of other
13 speakers on the panel that are going to begin
14 to address these specifically, so I am not
15 going to touch too much on the individual
16 areas other than like I said, the sea level
17 rise piece.

18 But what we are talking about
19 really are geodetic and tidal datums,
20 topographic and bathymetric data that you
21 have got to have to run models and things
22 like that, the data itself, the data

1 services, which is very important, the actual
2 provision and access to the information, and
3 then again some of these derived products.

4 And so as I segue into the sea
5 level stuff, the way we begin to do this is
6 what we are calling focus area coordination
7 teams.

8 So we have actually brought
9 together -- in this instance it's around 20
10 or 30 people that are all doing work related
11 to sea level rise, inundation, extreme
12 weather, sort of the -- not necessarily the
13 program manager, but really at project level,
14 and begin to talk a little bit about who is
15 doing what and begin to kind of align each
16 other's interests and activities.

17 And that's -- again it's this idea
18 of the partnerships is very important to how
19 we are trying to kind of leverage resources
20 and move, act a little a bit more efficiently
21 and effectively.

22 So I am going to go ahead and move

1 into some of the sea level stuff, which I
2 think is an area that we are actually
3 probably pushing forward further than maybe
4 the other two areas, or at least earlier and
5 we will probably learn form some of that as
6 we move into some of the other focus areas.

7 My main point here that I am
8 really trying to emphasize is when we start
9 talking about sea level, or I am going to
10 call it coastal -- or sea level rise -- I am
11 going to call it coastal inundation because
12 it is really broader than simply sea level
13 rise.

14 And so we are not just talking
15 about tides, and we are not just talking
16 about the sort of long-term, the steric if
17 you like, the fact that it gets warm and
18 expands and ice melts and there's more water.

19 We are not just talking about that
20 when we are looking at these sea level
21 station records.

22 There's really a range, a variance

1 and a range of different frequencies all
2 being forced by different parameters that are
3 all, each changing with the changing climate.

4 So this is kind of on the -- the
5 pictures just represent some of the pieces of
6 that puzzle that are within what is known as
7 essentially the non-tidal residual component,
8 if you like, of the sea level record.

9 The one on the -- oops sorry about
10 that, I'm looking for the pointer. This is
11 just a map of the waves indicating one
12 component is storm surge. I think folks are
13 very familiar with that.

14 In the Pacific there's the ENSO
15 signal, which is very important. We are
16 looking at variations on the order of a foot
17 or two every six or seven years, so that
18 places like -- Hawaii isn't necessarily so
19 bad but the south -- excuse me, western
20 Pacific experiences these sorts of sea level
21 variations. When your tide range is only a
22 foot or two those sorts of things can be a

1 big deal.

2 On the Oregon coast, where it is
3 about 10 feet, it's not such a big deal.
4 Oregon Coast gets that foot or you could even
5 say they get 20 or 30 years of sea level rise
6 every five or six years.

7 So there's some -- you know you
8 have to kind of keep in mind these -- how
9 these are expressed vary from location to
10 location.

11 The bottom here, what I'm just
12 showing with this blob of water is basically
13 a sea surface height anomaly. They are known
14 as mesoscale or anticyclonic eddies. These
15 features that are about 300 kilometers wide
16 and about 10 to 20 centimeters high and they
17 basically move across the Pacific to the east
18 about every one or two years.

19 So again, when you have got the
20 tide ranges we have here, you combine that
21 with a high tide, when one of these come in
22 it can actually be pretty severe in terms of

1 elevated water levels.

2 And then finally, just the sea
3 level piece itself. We often see the idea, oh
4 it's three millimeters a year, on average,
5 and it's important to point out that that
6 really is a global average, and that you
7 know, it actually varies considerably across
8 the Pacific.

9 And this isn't just the ENSO
10 signal where you know, the normal signal is
11 everything is piled up against the west, and
12 the ENSO signal, during La Ninas, that gets
13 even worse, but there's actually even some
14 suggestion of some longer-term increase in
15 that. So the idea is again these different
16 locations feel these differently.

17 So Mark Merrifield, I was going to
18 mention, has done a lot of the work in this
19 area and I am going to talk about some of his
20 stuff in a minute or two.

21 So this is just another way of
22 describing what I was just talking to you

1 about. The idea, then, is so each location
2 has its own unique signature if you like,
3 within which these different variance
4 components are expressed.

5 So this is what it might look
6 like, something might look like for over the
7 South Shore here in front of us. Yes, they
8 are pretty good-sized waves, but when it
9 actually ended up as run-up, it's not -- the
10 run-up component is pretty small.

11 There's the tidal component. For
12 the most part storm surge is really not a big
13 deal because the waves buffer most of it,
14 it's a different bathymetric configuration,
15 so it's actually a relatively small
16 component. There's a little bit of a seasonal
17 cycle.

18 These anticyclonic eddies that I
19 mentioned, in a relative sense are actually a
20 pretty large component of the signal, as is
21 the ENSO piece.

22 And there may be some larger-scale

1 variations that even at further out time
2 periods, and of course the sea level rise
3 component itself.

4 And so we can begin to sort of
5 combine those if you like, to look at what
6 are the extremes, how do those all combine in
7 any given situation to look at sort of the
8 idea of return intervals.

9 I guess that was left over from
10 before. There's this other thing called a
11 tsunami that actually does affect water
12 levels in Hawaii on occasion.

13 So that's kind of the complete,
14 the signature if you like. And so what we are
15 able to do, as we begin to pull that
16 information together, this is an example of
17 exceedance probabilities, generalized extreme
18 value analysis, it's a return interval,
19 that's another way to think about it, I
20 guess.

21 So this is the water level above
22 mean sea level and over time, and you are

1 seeing, in this instance what is kind of
2 unique about this plot, is it's actually non-
3 stationary, in other words we have actually
4 got the sea level trend incorporated into the
5 extreme value analysis, and then there's the
6 five largest for any given year.

7 In the context of our
8 conversation, notice that it's relative to
9 mean sea level, so everything has to hang on
10 something, on water level stuff.

11 If we didn't have datums, it's
12 useless, it's just floating in space, so I'll
13 just bring that up.

14 Here's another diagram that's --
15 that really isn't the -- so if those were the
16 sort of longer-term trend that we would use
17 for projections if you like to support things
18 like, oh, Army Corps of Engineers, or DoD
19 needs to build some facilities in Guam for
20 example, they want to know what the water
21 levels are going to be like 30 or 40 years
22 from now.

1 This is another piece of it. There
2 really isn't a trend, it's the patterns. And
3 so instead of looking over the duration of
4 the record, we are really looking at, how
5 does the water behave on any -- over any
6 given year how does it behave.

7 And so we are looking at three
8 different locations here: the Guam; Pago Pago
9 and American Samoa; and Honolulu. And again
10 you have got kind of a height here, it's
11 above -- it's relative to me, high high
12 water, and you are looking at -- so for any
13 given day over that record it's basically
14 what has the water level been on average.

15 And so at the bottom is the mean
16 water level. The short-term is essentially
17 the storm surge, the short-term component.
18 The blue is the tide. And then that black is
19 the total water level.

20 And what you are seeing here is
21 very weak tidal signal in Guam. There's
22 nothing strong. All these events, in other

1 words everything that generates high water
2 levels, those are all typhoons, hurricanes,
3 cyclones, whatever you want to call them.

4 So that signal is dominated by --
5 they are dominated by the storm signal. So
6 typhoon season, if I am an emergency manager
7 in Guam, that is when I want to be worried.

8 Pago Pago, on the other hand, is
9 almost completely dominated by tides. It's
10 the solstitial and the winter/summer solstice
11 essentially, that is controlling when those
12 high water levels are.

13 And you can see that reflected in
14 the total water level and that is when the
15 bulk of the top events are. So again, if I --
16 I want to be keeping an eye out -- this time
17 of year, if I am somebody like an emergency
18 manager or even FEMA for example, thinking
19 about when I might need to worry about
20 flooding events.

21 Hawaii is kind of interesting in
22 that it has clearly a strong seasonal signal,

1 but there is this one outlier here. Does
2 anybody in the audience know what that one
3 is? September. If I look at it, it was right
4 around 1992.

5 It was the Iniki. And so what you
6 are seeing here is the fact that in Hawaii
7 you have actually got a mixed signal. So you
8 get these extreme events or a combination of
9 you know, everybody knows that it floods on
10 the North Shore during the winter, during
11 those high tides, just around, what,
12 December, January?

13 But you can also get similar sorts
14 of high water level events if you get a
15 hurricane going through. And again, this is
16 all, you know, you really have to have these
17 datums to be able to hang this information on
18 or it's irrelevant.

19 Okay. So this is just another
20 example of some of the sorts of products we
21 can develop through the analysis of these sea
22 level station records.

1 This one is going to look familiar
2 to Rich because that is the -- that's right
3 off-of the CO-OPS website. This is actually
4 an experimental product. I don't know if they
5 have got it out, but the service did, it's
6 real nice from a user standpoint, you know it
7 lists return intervals and then it plots them
8 relative to tidal datums and the geodetic
9 datum, so it's kind a useful kind of a stick.

10 I am not going to dwell on any of
11 the others right now. It's just kind of
12 summarize some of the key points then.

13 So clearly we need to do -- we
14 need these geodetic and tidal datums. Right
15 now the -- this is -- Ed is helping me out on
16 some of this, so if I don't get it quite
17 right, Ed, feel free to jump in.

18 You know, the Federated States of
19 Micronesia and the Republic of the Marshall
20 Islands, these are U.S. affiliates and so we
21 do have obligations to support their needs as
22 well.

1 And so Ed has started to do some
2 of this work and he has done a lot in Guam
3 and Samoa and I guess the idea is that we
4 need to really repeat that process through
5 Pohnpei Chuuk, Kosrae, Yap and Majuro.

6 And then within the northwestern
7 Hawaiian islands, I think Joyce had pointed
8 out that there aren't a lot of tide stations
9 out there and that also means there aren't a
10 lot of local tidal datums.

11 So we need to begin to tackle that
12 problem. And then within the, I guess I think
13 I have merged this one here that was actually
14 supposed to be the bottom one, excuse me,
15 this is within the main aid itself and the
16 idea is here we do need to reference our
17 local. We have local tidal datums for each of
18 the Hawaiian islands if we need to reference
19 that to a common datum, and just the idea of
20 -- in an ideal world we would have these all
21 tied to the, you know, the CORS and tide
22 stations are seamless.

1 The sea level stations themselves,
2 yes we need more stations. But probably even
3 more important than that, we need to make
4 absolutely sure we maintain the existing
5 stations and that we also maintain these
6 records, the data stewardship component.

7 In some instances that may involve
8 data recovery, so those are critical
9 considerations. It's not very sexy stuff, but
10 it's very important. I'll come back to one
11 last example as I close.

12 And then finally, the same thing
13 with respect to data services. We need to
14 ensure that we are providing this information
15 to all the users.

16 And the interoperability piece is
17 very relevant here. There's a lot of
18 challenges here in the Pacific between -- in
19 some of these places where you get
20 information from Australia or us and we use
21 different datums and let alone the challenges
22 between University of Hawaii sea level center

1 and the GLOSS, which are the Global Sea
2 Level Observing stations and the NOAA
3 stations. So this interoperability issue is
4 key.

5 I'll just -- I think a real good
6 sum-up is I was in the Solomon Islands a
7 couple of weeks ago and they spent about a
8 week brainstorming climate -- needs related
9 to climate change and variability, and sea
10 level rise came up.

11 And after a couple of days, their
12 conclusion was, well, we need LIDAR, we need
13 all this really good LIDAR data and we need
14 all these detailed hydrodynamic models.

15 And so I said -- I raised a
16 question and said, how is your geodetic
17 control? And they said what do you mean? I
18 said well do you have benchmarks, do you have
19 vertical and horizontal datums?

20 And they said oh, no we don't. I
21 said well, then maybe that isn't what you
22 need to be doing. Maybe you would be better

1 off, you know, going out and measuring it by
2 hand or something, but it just shows that
3 this stuff is not -- maybe it's not
4 publicized, but it's absolutely critical to
5 the generation of all these products that
6 folks need. And that's it. Thank you.

7 CHAIR WELCH: Okay. Thanks John.
8 Next, representing the Hawaii Department of
9 Transportation, Chris Guerin, and his topic
10 is Hawaii Leveling and RTN, which is Real
11 Time Network, if you don't know, which I
12 didn't know until Juliana told me.

13 Chris, welcome.

14 MR. GUERIN: Thank you. This
15 picture is actually taken from Diamond Head
16 so most of you guys who have never been up
17 there, at least you get to see it now instead
18 of having to walk up there with all this
19 equipment.

20 The purpose of the height
21 modernization that we started here in Hawaii
22 is a lot of that was due to a lot of our

1 control network or benchmarks have been
2 damaged, destroyed, due to highway widening,
3 subdivisions coming in, just about anything,
4 even vandalism, we have noticed in Hawaii
5 that people are stealing the benchmarks just
6 for their brass or copper.

7 So when we looked at this height
8 modernization, we looked at when was the last
9 time any leveling has been done and with the
10 help of DBEDT we actually had to go back
11 looking through all the records and it has
12 been since the 1970s since either the DOT or
13 any state agency or even NGS has done any
14 type of leveling through any of the islands.

15 After looking at that component,
16 we decided to look at it horizontally also.
17 We are still back on NED 29 so we are really
18 behind the U.S.

19 After looking at the horizontal
20 component, and we decided to take things one
21 step further in Hawaii. We actually looked at
22 creating a new GOI model for Hawaii. We are,

1 I guess, we don't have enough data for NGS
2 to make a really good GOI model.

3 So we were looking at what else
4 steps that we can do to help out NGS in the
5 long run.

6 The plans for the DOT height
7 modernization, we actually broke it up into
8 six phases. The first phase that we are going
9 to do is actually the digital leveling for
10 each of the islands.

11 We are looking to do on a first
12 order, class 2, following all NGS guidelines,
13 so the data that will be given to the DOT
14 will be actually seamlessly going to NGS's
15 database.

16 Everything will be tied to all the
17 NOAA tide gauges so we will be starting at
18 the benchmarks at the tide gauge and then
19 running outwards and doing loops as we can.

20 Everything will be done by digital
21 leveling with invar rods, thermisters and all
22 the specifications will be followed through

1 the NGS guidelines

2 The DOT actually took a step and
3 actually went out and actually looked for the
4 benchmarks in -- on Oahu only.

5 We also had the military surveyors
6 help us out on the military bases where there
7 may be some issues with taking photos, so
8 they went out and actually had photos taken
9 of certain benchmarks and had it submitted to
10 I guess clean up a little bit.

11 Of the benchmarks we searched for,
12 we only found 197, so when we talk about how
13 much things have been damaged or destroyed,
14 now you -- at least this is only for Oahu. I
15 cannot speak for the outer islands yet. We
16 are still you know, in the process of doing
17 those.

18 Currently the DOT does not have
19 the time or the money to go to the outer
20 islands to actually look for the benchmarks.
21 So we are actually relying actually on the
22 community to go through the NGS, their data

1 recovery program.

2 So we rely on the other
3 engineering, surveying, and also the GIS
4 community to help NGS fill out the sheets
5 when they find a benchmark.

6 So it will save time when we put
7 out contracts to the consultants to do work,
8 they will you know, they are not spending
9 time searching for benchmarks that no longer
10 exist.

11 This picture is of all the
12 benchmarks that were existing on Oahu. Most
13 of it has gone through most of the populated
14 areas, so --

15 This is what we are actually
16 proposing so we are actually looking to run
17 through a lot of the existing, but also
18 increasing the amount of data points that's
19 going to be out there.

20 The area that is in blue, the Kahe
21 site, we are currently not going to be doing
22 because the road hasn't -- I guess they

1 collapsed the road so they don't want people
2 really out there, so we are going to leave it
3 at that for now. Maybe in the future, we may
4 run it.

5 This is on Maui so you can see
6 there's not you know, there's only a few
7 areas that they ran it and then going to --
8 this is what we are proposing. So you can see
9 we are really going to be adding a lot more
10 data to the benchmarks this year.

11 On Kauai you can see a very little
12 bit. And then the proposed -- Big Island,
13 what it is is actually just going up to the
14 observatory, that's just about only ones that
15 you have.

16 This one is the one that is going
17 to be the most time-consuming, but the most
18 beneficial to the people on the Big Island.

19 As you know, on Lanai and Molokai,
20 there is actually no leveling that we could
21 find, so we will be adding some data for them
22 also, and Molokai was pretty much the whole

1 island.

2 On Oahu, we are estimating about
3 211 miles, Maui 251 miles, 120 on Kauai and
4 410 miles. All these are just estimated, that
5 we just took off our state plans and did the
6 best estimation that we could.

7 A lot of the actual numbers will
8 be adjusted once the consultants have run
9 through all the actual miles.

10 All this data will be given to the
11 DOT and then submitted to NGS to include into
12 their spatial reference system.

13 The second part that DOT is
14 planning to do is the CORS and VRS system. As
15 you can see we are looking to cover the whole
16 state of Hawaii.

17 The one red one in Molokai is
18 actually one that we are trying to see if we
19 can do because there is not much Internet
20 connectivity out there.

21 We are looking to use the current
22 GPS systems, GNSS and the equipment all will

1 have server backup, batteries and everything
2 else.

3 The construction, mainly we want
4 to stay in any state, federal or county
5 property just so that there's no issues about
6 access. If we have property owners then we
7 sometimes might not be able to get access to
8 the stations for a couple of days to maintain
9 or repair if it goes down.

10 The other thing we are looking at
11 is having a server on each county, so that
12 would be one in Kauai county, one in Maui,
13 one on Oahu, and one on the Big Island, plus
14 a central server on Oahu.

15 So if one goes down there's
16 additional server backups all located
17 throughout the state.

18 So this is just a review of where
19 they are located so you can get a better idea
20 of where they are going to be at. We are
21 actually going to be -- I didn't plot the
22 existing CORS stations on here but most of

1 you guys will know where they are at.

2 So this is the Maui county ones.

3 We are not going to put anything on
4 Kaho'olawe at the moment. That's the bottom
5 picture, the bottom item.

6 And this is Kauai and Maui -- Big
7 Island. So on Oahu we are proposing seven
8 stations, Maui eight, with a possible ninth
9 and then Kauai six and the Big Island, nine.

10 We will level, digitally level to
11 each of the CORS sites, so they will be tied
12 from the tide gauges to the CORS sites.

13 I guess we are asking NOAA, and
14 not only that, NGS, we would like 20 percent
15 of our stations to go into the national area.

16 The main reason we looked at this
17 VRS system is a money saver. Some of you look
18 at it now, when you see people doing GPS on
19 the side of the road, you will see a
20 babysitter with some of the equipment, and
21 that's just time and money wasted for
22 somebody to sit there and watch it.

1 This VRS system will allow any
2 user to complete projects in a big area in a
3 shorter time.

4 The DOT has done a couple of
5 hiring HARN projects. First project that we
6 did was back in 2004. That covered all the
7 way from Kahe power station all the way out
8 to Kaimuki, and it was an interesting project
9 because the DOT has never done anything like
10 that. With the help of Ed, we actually got it
11 done and the data looked very good and it was
12 published into the NGS database.

13 In 2006, we actually went back out
14 and actually started identifying the two main
15 areas -- Ewa Beach and Waipahu -- with a lot
16 of stations.

17 And then 2008, we actually added a
18 lot more stations going from downtown to
19 Diamond Head. So that picture of Diamond Head
20 actually came from -- the first slide came
21 from a 2008 picture.

22 So this is the area that we

1 covered with the HARN projects. A lot of this
2 is through the DOT corridor that, you know, a
3 lot of it, the rail has gone through.

4 So the rapid transit can use a lot
5 of the NGS controls that the DOT used and
6 helped put into the database.

7 In the future, what we are looking
8 to do in phase 3, 4 and 5 is actually doing
9 LIDAR with airborne gravity, and then
10 research and development you know, for new
11 GOI model for the state of Hawaii, and then
12 also the reference center where all this data
13 will be residing at.

14 The other thing -- well, we looked
15 at also who is going to benefit the most: the
16 private sector, and then you have your
17 engineers, the surveyors, the planners,
18 contractors, construction contractors; the
19 government, well, federal, state, county, the
20 military, even the GIS community; but the big
21 important guys who benefit is the actual
22 taxpayers at the end, with a reduced cost in

1 their, you know, for projects.

2 This is just my contact
3 information. Thank you very much.

4 CHAIR WELCH: Okay. Thank you
5 Chris. We will come back to that at question
6 time. So next Bill Ward will be making a
7 presentation on Pacific GPS Met Program.
8 Bill?

9 MR. WARD: Okay. Hi, I'm Bill
10 Ward. I work for the Pacific Region
11 Headquarters for the National Weather Service
12 and I am going to be discussing a lot of kind
13 of first of all, what we do and what we are
14 up here and then get into the GPS units
15 themselves and how much it's really helping
16 us and what we have to look forward to as we
17 move forward with the things.

18 I'll start out with our area of
19 responsibility in this kind of work through
20 what we do up here and then as I mentioned,
21 get into our GPS systems.

22 Our area of responsibility and

1 what we do out here is we have two WFOs,
2 several WSOs, our Hurricane Center, we got a
3 tsunami center, an International Tsunami
4 Information Center and then we do aviation
5 stuff throughout the whole Pacific, as we do
6 climate and marine, and then we even have our
7 own ITs, well mainly ETs, that take care of a
8 lot of stuff that is way out in the distance
9 and I will get into that a little bit more as
10 we move through.

11 This is our area of
12 responsibility. It's roughly four times the
13 size of the CONUS so we have a lot to take
14 care of out here.

15 Our PR observing program, we have
16 a lot of things that we try to do with very
17 little land and very little resources, but we
18 certainly do surface network errors,
19 observation satellite, we have our own ground
20 satellite stations, just recently GPS sensors
21 have really started getting a foot in
22 throughout the Pacific.

1 We are trying to get more in the
2 way of buoys. We use what we can with what
3 ships are out here and planes that fly
4 through the area.

5 And all of this data is very
6 invaluable support for our Watch, Warning and
7 Advisory Programs. It's providing forensic
8 verification for what we do out here and even
9 if something big happens, to where we can do
10 -- use it for assessments and every bit of
11 this of course is used in all of our
12 forecasts, watch, warnings and advisories as
13 I mentioned.

14 The challenges? Boy, do we have a
15 lot of them. Comms throughout Micronesia and
16 all that can be very troublesome, I mean
17 there's times where some of the folks out in
18 Micronesia is only running at maybe 4,000
19 bytes per second and it's really hard to get
20 systems operating out there when you have
21 data breaks that horribly low.

22 Trying to get airlines out to some

1 of our far, remote islands outside of the
2 main ones such as Majuro right there at the
3 main site, you know, we have got stuff that's
4 in like Ailinglaplap and other places, and
5 things like that, and even as we go across to
6 FSM there's still locations out there that we
7 have tried to do our best in getting
8 automated sites out there but just trying to
9 get ships and airlines just to get us out
10 there is really hard.

11 And then resources for operations
12 and maintenance for each of these programs
13 can be kind of costly and rough for us to
14 operate.

15 And then of course since a lot of
16 these islands, especially out in Micronesia,
17 are no more than eight feet above sea level,
18 you get an awful lot of corrosive salt
19 invasion into the equipment and stuff, so if
20 it's not visited quite often, it falls apart
21 quite quickly.

22 I mean I used to live out in the

1 Marshall Islands at the DoD missile range out
2 there. A bike would just about fall apart on
3 you in less than a year if you didn't take
4 care of it.

5 So, and then in addition to that
6 it's high cost for equipment, contracts and
7 travel and shipping for everything that we do
8 out here in the Pacific region, for the
9 National Weather Service.

10 Now getting into the GPS itself, I
11 found out about a lot of this oh, I'm going
12 to say roughly about three years ago with a
13 trip up to Boulder talking to Sandy McDonald,
14 and then eventually Marty Ralph, Allen White
15 and Seth Gutman and Kirk Holub.

16 I don't know if any of you folks
17 realize or know who all of these folks are
18 but when I found out what we could do with
19 these and what value they added to our upper
20 air program, our satellite that we are
21 already using up here, I was just like wow,
22 sign me up, how do I get this moving and what

1 can I do to get these things out in here.

2 And luckily through the coastal
3 storms program, I managed to get some monies
4 and we started moving forward on that.

5 But I probably don't need to go
6 into a whole lot of what all this does, other
7 than mentioning that you know, we have
8 certainly used a lot of satellite stuff
9 through CIRA and through calibrations and
10 validations we have been able to show that
11 these things are very accurate with the total
12 integrated precipitable water that we can get
13 because that is the one thing that is kind of
14 bad with a GPS, it's one signal that hurts it
15 is moisture, and for us that's a huge
16 benefit, so I was really happy to see that
17 and to be able to use that and then to find
18 that the systems -- I think when I first
19 started looking into that, these systems were
20 running roughly around \$11,000 each. We now
21 found a couple of companies out there that
22 are doing this for around \$4,900 each so I

1 couldn't be happier that the price has come
2 down, it's just I wish the airlines and other
3 ways of getting out to some of these islands
4 would come down too.

5 Right now, these are the ones on
6 the left-hand side that I certainly have
7 already worked with our ET folks and
8 everybody else and the folks up in Boulder
9 and Giovanni and the CORS sites in Boulder as
10 well to ensure that we get these all in place
11 and online.

12 And right now everything on the
13 left-hand side is taken care of. On the
14 right-hand side, Kwajalein, that one should
15 be hopefully done by the end of the summer.

16 We have got a data collection
17 office in Lihue, I hope to get that one
18 completed this summer. There are some in some
19 of these locations on the right-hand side,
20 but we are having a little bit of trouble
21 with getting continuous data or they are not
22 into the CORS site itself, so I want to make

1 sure that we do what we can to get those in
2 there.

3 I believe Ed Carlson is working
4 with one to get into Midway. I would like to
5 see what we can do about getting one into
6 Rose Atoll and even Wake Island down the
7 road.

8 Right now, again, this kind of
9 goes back to the big overall picture I showed
10 earlier of our area of responsibility, but
11 yet, you look at what is in the CONUS versus
12 what we have out here in the Pacific, and
13 it's pretty data-sparse.

14 So if you guys could do me one
15 real big favor, if you could help me find
16 some land, it would be really helpful to get
17 some more sites out here.

18 But we are going to do everything
19 we can with what available land we have and
20 some of the monuments, and like I mentioned,
21 Wake Island, Johnston Island and some of
22 these other locations, if we can find ways to

1 get them into there, that would be valuable.

2 I show one of the things that we
3 did out here, as I mentioned earlier, talking
4 through Ed Carlson, Giovanni, the CORS sites
5 and even the folks up in Boulder, I show this
6 antenna that we mounted here because I want
7 to make sure that people realize that we are
8 doing absolutely everything we can to make
9 sure that these are, even in the most remote
10 locations, we are doing everything we can to
11 fasten them so that everything is great in
12 the x, y and z, so that they don't move
13 whatsoever.

14 What's going to happen in a
15 typhoon or something, I don't know, we will
16 see. But I think the way they are mounted
17 right now, it should be pretty good.

18 The programmatic areas that we
19 kind of take care of, and how these even help
20 us in them, for local forecast and warnings,
21 this does indeed support model validation for
22 the moisture in the column.

1 Tropical cyclone forecasting or
2 tropical forecasting in general, I think
3 these systems itself, with time, with being
4 able to see the changes in moisture
5 increasing, decreasing, may actually be able
6 to help us understand that sudden increase or
7 decrease in a tropical cyclone or what have
8 you.

9 The atmospheric rivers, I can
10 pretty much say that we know these are coming
11 out of the Pacific but it's kind of the
12 chicken or the egg, you know exactly what
13 starts these and how do they get moving,
14 because it may even be something that is
15 triggered from the mid latitude, but the
16 moisture has to be coming from the deep
17 tropics.

18 Tsunami information, I just
19 recently discovered you know, because of the
20 fact that we are doing these things roughly,
21 I believe it's every five seconds they are
22 transmitting, ground displacement is

1 something that can be greatly valuable for
2 the seismic folks in being able to tell how
3 strong an earthquake was and the possibility
4 of a tsunami.

5 So there is some possible tsunami
6 warning center support for both the Pacific
7 Tsunami Warning Center and the Alaskan
8 Tsunami Warning Center in Anchorage.

9 Elevation datum, that's critical
10 to a lot of the things that we do out here
11 with our data and observing systems, and the
12 climate information.

13 The thing that we have got to make
14 sure is that if we don't have tide stations
15 in some locations, we have got to see what we
16 can do about getting them in some areas so
17 that we can get a little bit of ground proof
18 and understand exactly how the ocean is
19 rising or lowering or whether it's actually
20 the items themselves that are decreasing in
21 height.

22 This is a little bit of some of

1 the things that I have already mentioned, the
2 cal-val, radiosonde and aviation, and one of
3 the things I guess I should mention here too,
4 since I was mentioning how this can help with
5 intensity on tropical cyclones or
6 deintensifying, our radiosondes are launched
7 twice a day every 12 hours, but these
8 systems, these GPS-Met systems gives us data
9 on a continuous basis.

10 So using the radiosonde data that
11 we have every 12 hours, we can certainly see
12 where the moisture levels are, and if this is
13 something that is very relative to some type
14 of system that is out here in our forecasting
15 responsibility, we can get a -- we should be
16 able to get a clue as to what is happening in
17 that column as to -- when we see decreasing -
18 - or decreasing moisture or increasing
19 moisture.

20 Numerical weather prediction. This
21 is probably going to be one of the first
22 times we are going to be able to see this

1 getting assimilated into our atmospheric
2 models, and I am hoping to certainly see some
3 value in that.

4 Climate reference. We are --
5 Geographical Reference Upper-Air Network, I
6 apologize for a lot of the acronyms. If you
7 have questions on any of that, please speak
8 up, but I think we are going to be able to
9 see a lot more time, or a lot more
10 information with that.

11 Let's see. I think that I pretty
12 much mentioned all of the other ones here and
13 then the other areas. Oh yes, the
14 laboratories and universities are also very
15 jumping into this and wanting to help out
16 with some research and be able to get things
17 back into our operations with all of these
18 systems that we are getting out here.

19 Oh, yes. I mentioned earlier the
20 new sites that we have just now gotten into,
21 the deep tropics largely across Micronesia,
22 and so I am really pleased about that so I am

1 hoping that maybe in another year or so, as
2 we have gotten a lot more data and can start
3 compiling things over the full spectrum of
4 our -- what we like to call our two seasons,
5 our dry season and our wet season out there.

6 I have listed a couple of sites
7 that we use. Folks up in Boulder have created
8 a GPS-Met site so that you can actually see
9 what is being done with these systems.

10 And then I also work a lot with
11 the satellite folks and that's the total
12 precipitable water that we get out of some of
13 the polar orbiting systems and I want to
14 mention too, this also helps with that too,
15 even though we are getting total precipitable
16 water out of the satellites, we don't see
17 those but maybe every four hours they will
18 pass over a site, so this helps in between
19 all of that information too.

20 So we are getting -- these systems
21 are really helping us build more of a blended
22 product so that we get continuous data all

1 across the board.

2 Here's a depiction of the
3 integrated water vapor that is just done by
4 the polar orbiting satellites and this is
5 kind of a case where moisture coming out of
6 the deep tropics ended up causing a lot of
7 problems all the way up into Colorado and
8 Tucson, Arizona, where there was a great deal
9 of problems with rain and even blizzard
10 conditions up in those areas.

11 Here's another depiction of some
12 ways that you can actually see it in water
13 vapor imagery that we get off of our
14 geostationary satellites, where there's a
15 very, very strong and vigorous upper level
16 low over the Hawaiian Islands, kind of
17 similar to the thunderstorms that we got here
18 just a few nights back.

19 And then you can see up to the
20 higher right, where you are going up above
21 Baja going into CONUS, where the moisture
22 gets bumped all the way up in there from the

1 deep tropics.

2 And then, as can be understood and
3 has been publicized many times, all of the
4 landslides and things that you see in
5 California and all that.

6 So I can see where having these
7 systems out here in the deep tropics is going
8 to not only help us, but it is going to help
9 folks far beyond that with modeling and
10 understanding how the moisture is pumped up
11 and moved across the globe.

12 Here's another example where we
13 had a Typhoon Rex many years ago but the more
14 important thing I want to point out here is
15 you see the cloud trail that's coming all the
16 way back there, and if you could see that in
17 motion, you would see that there's a great
18 deal of moisture and cloudiness in
19 thunderstorms, something else, that goes
20 right up into the tropical cyclone, and as
21 this was happening, it was wholly evident
22 that this tropical cyclone was intensifying

1 and it would be great if we could have had
2 signal systems back then that would have
3 given us more information as to how much
4 moisture was coming up, where it was coming
5 from, and the time interval in which this was
6 running in.

7 Then, my data quandaries, you
8 know, where can we better put additional
9 sensors, I like to -- and listening to
10 Chris's discussion here, cause they're
11 looking to put more sensors in, but we have
12 got to make sure that they are also
13 co-located with Met sensors and that would --
14 so I plan to talk to some of you guys
15 probably flying afterwards to get more
16 information on how we can all work together
17 and build a system that works well for the
18 entire communities.

19 Automated data sites, if I can get
20 those in some of these, way out there in the
21 middle of nowhere locations, GPS sensors
22 could be located with them.

1 I would like to see about getting
2 wind profilers out here but one of the
3 problems there is that is a very costly
4 system.

5 And then I am hoping that maybe as
6 we move down the road here too, with the
7 satellite integrated precipitable water, we
8 can build additional algorithms and things
9 that may help us understand a little bit more
10 and even build additional satellite products
11 that will help us with our forecasts.

12 And last thing is this is, again,
13 you know, I think it will help us with our
14 vertical transport of moisture, the
15 meridional transport and then whether it
16 really is the tropics that is running the
17 program, or I mean running the moisture, or
18 maybe it's mid latitude systems that are
19 running across that helps pull it out.

20 But I am hoping that we can really
21 move forward with helping the entire globe
22 with moisture with these systems and what we

1 are doing out here with satellites.

2 So just kind of a summary, as I
3 noted and showed, we do indeed cover a very
4 vast area of responsibility. We have a huge
5 problem with comms and then diversity in our
6 offices and services that we need to make
7 sure that we provide the people, and then
8 resources. I guess that's always kind of a
9 thing that's needed to make sure that you can
10 always move one step forward.

11 And that's all I've got. I will
12 pass it on to my next individual here.

13 CHAIR WELCH: Okay. Thanks very
14 much Bill. Our next speaker is Steve Anthony
15 and he is going to be speaking about using
16 these datums for groundwater resource
17 assessments, so Steve, welcome.

18 MR. ANTHONY: Thank you very much,
19 and again I appreciate the opportunity to be
20 here with you and share what we see are some
21 of the needs with respect to accurate
22 horizontal and vertical datums to support our

1 groundwater resource assessments.

2 For those of you that are not
3 familiar with the USGS water mission, our
4 goals are to provide information to help
5 manage, protect and enhance water resources
6 in Hawaii and the western Pacific.

7 We do not -- we address water-
8 related hazards, flooding is one of the main
9 areas of concentration for our work, and we
10 are a bit unique among the federal agencies
11 in that we have no regulatory role. We are
12 strictly a scientific group to provide
13 information that is reliable, impartial and
14 timely.

15 Although we don't have a
16 regulatory role, a lot of our information
17 gets caught up in rather contentious water
18 disputes here in Hawaii, and those are
19 handled by our state water commission. But we
20 find our information often is in the middle
21 of that.

22 We have many partnerships,

1 cooperators that we work with. We primarily
2 work on a reimbursable basis. Our office has
3 about one and a half million dollars of
4 matching funds we make available to other
5 state and county agencies.

6 We also do work with other federal
7 agencies, such as the National Park Service,
8 the Army and the Navy and the Marine Corps,
9 for state agencies, the state water
10 commission, state civil defense, very
11 interested in the flooding reporting that we
12 do for them, the Department of Health, DoT,
13 Department of Hawaiian Homelands, Office of
14 Hawaiian Affairs and at the county level with
15 the various water departments and public
16 works departments and then some work with the
17 University of Hawaii as well as the
18 University of Guam.

19 Groundwater in Hawaii and much of
20 the western Pacific is critical and it's one
21 of the most valued natural resources. In
22 Hawaii in particular and in Guam, more than

1 90 percent of the public drinking water
2 supply comes from groundwater.

3 And one of the challenges we face
4 and why these datums are so important is that
5 the water table is extremely flat and when
6 trying to get an understanding of what those
7 water levels are, there's a potential for
8 large error in some of the coastal areas.

9 And we use these need for accurate
10 water level measurements that are referenced
11 to a common datum, we use these for
12 determining groundwater flow directions and
13 change in the freshwater storage in the
14 aquifers. These also help for understanding
15 how contaminants in the aquifers move.

16 And then we also use these water
17 level measurements that we make to calibrate
18 our numerical groundwater flow models used to
19 assess water availability.

20 This is a cartoon of the
21 freshwater lens for the Pearl Harbor aquifer
22 here on the island of Oahu. This is the most

1 productive aquifer on the island, and most of
2 the water is coming out of this basal
3 freshwater lens area here.

4 And as you can see, the surface of
5 the water table here is very flat. It has a
6 gradient of about one foot per mile as you
7 move inland.

8 And this is a map showing water
9 levels that we measured in 2003 in a series
10 of wells in the aquifer, and as you can see
11 in plan view here, the differences in water
12 level are not great spatially and so it is
13 very critical that we understand these
14 elevations very accurately.

15 Let me go back. We have been
16 working very closely with Ed Carlson at NGS
17 to help us update and create new benchmarks
18 in some of these areas so that we can update
19 the measuring point elevations on these
20 wells.

21 And a number of years ago, we were
22 working in Maui, and Maui, for those of you

1 that aren't familiar, development there is
2 constrained by the availability of water.

3 And what we found when we were
4 working with Ed here is we went out and we
5 resurveyed established benchmarks for common
6 datum and then resurveyed all the wells.

7 And we found that for several of
8 the wells, the measuring point elevation had
9 changed up to a foot and in some cases a foot
10 and a half.

11 And this is really significant in
12 that that changed the perception of the
13 availability of water on the island, in that
14 for every foot of freshwater you have above
15 sea level, that represents approximately
16 about 40 feet of freshwater below sea level.

17 So it's very important that we
18 have accurate datums to work with and that
19 these are updated periodically as these
20 resources are extremely important to our
21 communities.

22 Some of the areas that we have

1 worked with NGS recently, as I mentioned,
2 central Maui in 2003, an effort in Lahaina in
3 2007, west Hawaii, the Kona area, on eastern
4 Molokai and also out in northern Guam.

5 Current needs, looking this
6 summer, we are looking to do an update of the
7 benchmark elevations in the Pearl Harbor
8 aquifer area.

9 And again, in closing, I just want
10 to thank Ed and the efforts of NGS because
11 without them, we really wouldn't be able to
12 accomplish our mission, because these datums
13 are sort of the foundation for which all of
14 our work hangs, and without it, we don't know
15 where we are in space and we just really
16 could not accomplish our mission, so we
17 really thank all that NGS provides to us.
18 With that I will pass it over to our next
19 speaker.

20 CHAIR WELCH: Okay. Thank you.
21 Thank you Steve. And finishing the panel will
22 be Craig Clouet, is that pronounced

1 correctly?

2 MR. CLOUET: Yes.

3 CHAIR WELCH: All right. And we
4 are talking about GIS Needs Accurate Datums
5 and Transformation in the Pacific.

6 MR. CLOUET: Thank you all for
7 having me. So we have a small office and I'm
8 not sure, but most of you have probably heard
9 of ESRI, the company.

10 I am not going to actually talk
11 sales pitch today or anything to you guys. In
12 fact today what I am going to do is talk
13 about all the GIS people of the -- in Hawaii
14 and the Pacific.

15 And part of my job is to take
16 calls from people so every day people call
17 up, anything they want to ask, they ask. And
18 funny, you would think that it's all about
19 software, but in fact one of the most common
20 calls I get is about vertical datums or
21 horizontal datums and like how it relates to
22 their everyday needs.

1 So I will just go through what
2 some of those needs are that people keep
3 calling me about, since you guys are the ones
4 who hopefully will know what to do to help us
5 out.

6 So, the GIS community out here in
7 Hawaii and the Pacific is very broad. It's
8 from all the governments basically are using
9 GIS, military of course, private companies,
10 utilities, very important use of GIS, and
11 then of course the natural resources, coral
12 reefs and wildlife protection, all using GIS
13 very heavily in Hawaii and the Pacific.

14 So for example, let's start here
15 at the Federated States of Micronesia. So the
16 Federated States of Micronesia telecom came
17 up, took some classes in GPS and went back
18 and they were mapping out new locations for
19 cell phone towers.

20 So they would map out where they
21 were using GPS and USGS maps. They would map
22 out using, do some analysis using USGS 10-

1 meter DEM, which is the best available. They
2 would map out where the coverage would be
3 with these new cell phone towers. So here is
4 an actual use in the remote islands.

5 But again, they do need some
6 upgraded modern data and datums. So here's
7 another one of the islands. So they did for
8 all of the islands and they went around, it
9 was sort of a big project and it was really
10 good that they could do it themselves too,
11 that's also very nice.

12 So here again, the remoteness of
13 some of these islands that we are talking
14 about, very small, tropical islands far, far
15 away, hard to get to and expensive.

16 So now we can move over to Guam
17 for example. So Guam is right now, if I get a
18 call, about a third of the calls are going to
19 be about people who are working in Guam.

20 Guam is undergoing the most
21 massive military buildup with base
22 relocations from Japan and Korea.

1 Every architecture, engineering
2 and construction firm in Hawaii and a few
3 from California is working jobs in Guam right
4 now.

5 So they are calling up all the
6 time. They want data, modern, up-to-date
7 data, and also they are GPS-ing or they are
8 surveying and they need to get good
9 information about the datums, especially
10 datum transformations between the historical,
11 like Guam 63 or something with the modern,
12 WGS 84s and the data 83s.

13 Another thing about Guam, I put
14 this up here, PALP, Association of Land
15 Professionals, they had a conference in 2008,
16 2006, the professional land surveyors of the
17 Pacific, Ed Carlson does a lot of work for
18 these people.

19 This is a great organization in
20 Guam APS is very good as kind of a central
21 location for the Pacific so it is great to
22 have the conference out there with a lot of

1 the local surveyors and I hope that there's
2 one coming up soon.

3 Some of the other data products
4 that people love and want more of, the SHOALS
5 LIDAR, I don't know if you realize there's
6 the terrestrial LIDAR where you take the
7 land, then there's a special, they generally
8 call it SHOALS LIDAR, that penetrates through
9 seawater.

10 So this actually is Kaneohe Bay so
11 you can see Chinaman's Reef is that pimple,
12 but everything else you are looking at is
13 actually coral underneath the water. It's
14 very accurate, it's very much needed for
15 things like tsunami modeling, coral reef
16 preservation, regulations of who's doing what
17 on the reef, navigation of course.

18 You can see what looks like a
19 river there is actually a submerged river
20 from the time when the glaciers sucked up a
21 lot of seawater and that was actually a dry
22 reef and actually land at one point. Right

1 now it's about 50 to 100 feet under water.
2 But the SHOALS LIDAR can pick it up that
3 well.

4 So people want this, all the
5 islands want it, Guam did a little bit, plus
6 the Hawaiian Islands have done it although it
7 needs to be done in certain areas and updated
8 at times.

9 Other things we can do with the
10 LIDAR and our coastal resource, again you can
11 use a lot of visualization. Everybody
12 nowadays wants their 3D visualization, the
13 Google effect, right?

14 So here is Honolulu Harbor with
15 some LIDAR, Army Corps of Engineers and DOT
16 harbor division have been working on projects
17 using GIS, and again, very critical to have
18 accuracy when you are talking about giant
19 ships in a very small harbor like Honolulu
20 Harbor is.

21 And again the 3D, any time you can
22 get us more LIDAR and good imagery, 3D is

1 always something people are asking for.

2 Of course, you can't not talk
3 about disasters out here recently. So not
4 only is there disaster response, which is
5 obviously critical -- preparedness is of
6 course more important.

7 And we in the Hawaiian Islands and
8 all throughout the Pacific with our cyclones
9 and tsunamis, are always concerned about
10 this.

11 And of course vertical datums are
12 very critical, not only again does it include
13 how much and what effects the damage of the
14 tsunami and all that, but again, the
15 property, later when we go back and rebuild,
16 you have got to know exactly where your lot
17 is after a tsunami or something like that.
18 There might not be anything left over except
19 for bare earth.

20 So to have accuracy all across the
21 islands is very important to be able to
22 rebuild and private property issues and

1 things like that.

2 So here's the two, unfortunately
3 the 2009 Samoan one was much more devastating
4 than the one we had recently in Hawaii.

5 Dr. Chip Fletcher, just a couple
6 of slides here from our University of Hawaii,
7 we have a great team in coastal geology, they
8 do a lot of work with coastal resources and
9 erosion and things like that.

10 Climate change of course is very
11 much a slow problem here, we are just using
12 slowly, imperceptibly beaches in areas, but
13 it adds up over the years, the damage.

14 And also property damage, you are
15 talking about beach erosion on very expensive
16 beaches in the small islands.

17 And also again, the storm surges
18 and inundation isn't just a huge or quick
19 thing or always just a tsunami, this could
20 just be large surf generated by a storm. This
21 is on the east shore in fact. It's property
22 damage, protecting private property it is

1 very important to have these datums, both
2 horizontal and vertical.

3 Transportation, this is a list of
4 all the groundings, actually as you know, GIS
5 is generally not used for ship navigation,
6 but we use it more for cleanup and
7 remediation when things like this happen.

8 So this was when the United States
9 Port Royal grounded itself off Pearl Harbor a
10 little while ago. Unfortunately it damaged a
11 lot of reef and that reef is being rebuilt
12 and it was measured heavily with GIS and GPS.

13 Here's another grounding recently,
14 Cape Flattery, a cement ship carrying raw
15 cement, it started on fire, they had to
16 unload a lot of cement while it was grounded
17 on the reef off-of Oahu so they could float
18 it.

19 So as they were offloading all the
20 cement of course it made a mess everywhere in
21 the environment, and then of course it did
22 destroy a lot of the coral and it had to be

1 rebuilt and NOAA did a lot of work on
2 rebuilding the coral and stuff like that.

3 And then there are of course fines
4 and things like that that are incurred in
5 events like this. GIS and GPS are important
6 for the legal aspects of ship groundings.

7 Undersea, this is a new one for us
8 all here, a brave new world. So undersea
9 cables. We do have tons of undersea cables
10 for communication here in the Hawaiian
11 Islands and we definitely need them, and we
12 always are trying to make sure they are not
13 being dug up or -- luckily we don't do a lot
14 of fishing that is dredging off the bottom.

15 But occasionally anchors do dig up
16 our communication links and drop out some of
17 our fiber optics or telephones.

18 But now we are going to add
19 something to that. A private company,
20 Hawaiian Electric, is thinking about putting
21 wind power onto the smaller islands, Lanai
22 and Molokai, and putting underwater cables to

1 Oahu. They are figuring it's going to cost at
2 least a billion dollars.

3 And basically those are
4 telecommunication cables you are looking at
5 there, but it would be the same sort of route
6 from those two small islands on the, your
7 left to the right to Oahu.

8 It hasn't been figured out 100
9 percent yet. There's still talk from the
10 other islands who are putting up the
11 windmills but it looks like it might go
12 forward so again, you can imagine how
13 accurate this is going to have to be to lay a
14 huge cable for underwater electricity and so
15 it's definitely going to need some very high
16 degree of accuracy.

17 Of course NOAA does a lot of work
18 and so do a lot of the state and the other
19 federal agencies in protecting our
20 environment, especially our unique and rare
21 wildlife. We have some of the rarest wildlife
22 here in Hawaii in the whole of the United

1 States.

2 Something like the monk seal,
3 there's only about a thousand left. So
4 obviously it's great work that NOAA does, and
5 also things like the marine boundaries like
6 whale boundaries for navigation and stuff
7 like that, again GPS and all that is used by
8 the navigators is very critical. There are
9 restricted areas where you cannot fish. There
10 are restricted areas where certain boating
11 activities are prohibited due to the whales
12 or monk seals or whatever, and again that
13 needs to be mapped out and it also needs the
14 ability to have people who are using boats
15 and things like that to know where they are
16 allowed and where they are not, especially
17 going to be a huge issue with the northwest
18 island monument, because again there are
19 certain areas where they do not want people
20 at all, period, and so you need very good
21 charts and you need very good GPS
22 communication devices to get -- to make sure

1 that the navigators know where they are going
2 and where they are at all times.

3 This is one of my funniest ones.
4 GPS, yes GPS nowadays is everywhere and
5 everybody has got one, right? Who does not
6 have a GPS?

7 And unfortunately the GPSs --
8 fortunately and unfortunately -- have gotten
9 so good even though they are still five to
10 \$10,000 but they are so good and so accurate,
11 everybody has got one, and so everybody is
12 out there thinking they are mapping
13 everything down to submeter nowadays although
14 most people are saying that because they are
15 reading the box and they are not necessarily
16 testing their equipment or they don't really
17 know anything about datums.

18 I know when they call me up and
19 say they heard about this datum thing, what
20 is it, I know we are in trouble. When they
21 have their one foot GPS that they just bought
22 for \$10,000, but it happens all the time.

1 And I know we are running into it
2 more and more, and keeping it smaller and
3 smaller and so everybody is going to have
4 this GPS. So we really have to put a lot of
5 effort, all of us, both on the commercial and
6 private side but as well as the government,
7 of getting this GPS mess sort of cleaned up,
8 as I call it.

9 The other thing that we like is,
10 and we think would be really good for Hawaii
11 and the Pacific in particular, is the USNG,
12 United States National Grid, it's a grid
13 mapping system for defense, I mean not for
14 defense, for -- basically for public safety
15 needs and also for government measurement of
16 assets.

17 Especially on these small islands
18 it works very well. It's also particularly
19 suited for our island style because we do
20 crazy things with our names, street names, we
21 -- everybody has like five different street
22 names and everybody locally knows them and we

1 do a lot of landmark references, even still
2 to this day, we'll say oh go Diamond Head,
3 turn -- stuff like that.

4 So it would be really nice to have
5 a mapping system that was much more accurate
6 for public safety, especially after a storm
7 or something like that.

8 And it would work really well on
9 the small islands, again, it's very simple
10 and on a small island, you only need a
11 couple, to know a couple of digits basically.

12 Data. Data is the other thing that
13 people call me up about all the time, oh,
14 where is data, how do I get it, even though I
15 sell them the software they want me to
16 provide them the data.

17 So I am always trying to show them
18 your guys's website and tell them to keep up
19 the good work.

20 But the other thing is of course,
21 once they get the data, then they always call
22 back and say how do I use it, right?

1 So I do have to know something
2 about it. So one of the things I noticed
3 about the data and you can see here, this is
4 bathymetric service from Hawaii, for the last
5 basically 20 years or so.

6 But you can see it's a patch of
7 different data in different years, and
8 there's tons of data and you can probably see
9 at the bottom there, but it says one of the
10 data sources for example is from 1930 to the
11 year 2008.

12 So if you can imagine how many
13 datums could possibly be in those date
14 ranges, it's incredible. So you can imagine
15 the amount of work when you get the data of
16 trying to get it all to match up.

17 Because although it looks really
18 nice and thick, you might have a survey from
19 1950 next to a survey of 2009 and issues like
20 that, so there's a lot of work and NOAA has
21 put a lot of time and effort into making
22 reports, and also going through and scrubbing

1 the data as much as possible, but it
2 definitely, it's a great effort, and more of
3 it is good.

4 All right, so on the vertical
5 datum issue again, this sums it all up, for
6 most users, and again I deal with the, kind
7 of the technicians, the guys in the field, so
8 when you start talking about the -- they
9 always think that sea level is just zero and
10 everything is above it. Most people -- or
11 zero and everything below it, but of course
12 there's always different tidal datums and
13 Hawaii, unfortunately, just a lot of
14 confusion about the datums. Some people say
15 there is and other people say there's not, or
16 it's local, and it's not.

17 So there's still a lot of
18 confusion and I could use some help with
19 trying to educate the local community of what
20 exactly there is and what it means. That
21 would be great, from you guys.

22 I know you do a lot of training,

1 in general NOAA has done a lot of great
2 training in the Hawaiian Islands for
3 different things and this is definitely one,
4 because nowadays what people want is this
5 seamless, from top of the mountain to the
6 bottom of the sea kind of approach, which is
7 really good for studies for example for like
8 tsunamis, you can't have two different data
9 sets of the coral reef and then the land
10 above. You need one, seamless data set, beach
11 erosion, sea level change, all the volcanic
12 activity.

13 So here's an example. So here's
14 the Hawaiian Islands. This is where I -- in
15 the lower one, Kaneohe Bay area, Mokapu
16 Peninsula. You can see it goes down 6,000
17 feet and so you can actually see these great
18 subterranean canyons and things like that,
19 and LIDAR in the middle and then USGS.

20 So that's what people are starting
21 to want, and the GIS software is starting to
22 allow that to happen.

1 And then also you can see the
2 Hawaiian Islands in the upper image and you
3 can see it goes all the way back to actually
4 Midway, but you can see we are definitely an
5 island chain, just built off the deep, deep
6 ocean out here.

7 And then we -- cell phone
8 companies also have issues, I mean,
9 transformations is one of the biggest ones we
10 got calls for because it is confusing, and
11 even we don't help it out by doing these
12 crazy -- trying to make it sound easier but
13 it looks pretty confusing.

14 So what we did locally for our
15 users is to put up a map that shows all the
16 different possibilities of the common uses,
17 so even I could see, if you work for the
18 county or get county data you would be in
19 state plane zone three, although there is
20 strangely not any uniformity for the counties
21 as far as the state planes -- some use state
22 planes, some use state plane feeder meters,

1 Kauai County uses UTM, so it's a bit
2 difficult.

3 That's another reason that the
4 United States National Grid would be well
5 suited for the Hawaiian Islands because the
6 counties all use different coordinate systems
7 and then the state uses UTM zone four while
8 federal users generally use zone four or
9 five, so it gets rather confusing for the
10 user.

11 And again, you can imagine, in the
12 case of a natural disaster it's really
13 difficult because you have to know all that
14 stuff in advance to get anything to work
15 together.

16 All right, so then, when we get to
17 the final nitty-gritty here we are going to
18 talk -- we are going to go deep. So Richard
19 Snay is one of your great guys. He is the
20 father of the PACP00.

21 So I am going to go a little deep
22 in the datums, so you know, there's the North

1 American Datum of 1983 but then because
2 Hawaii is on the -- and Guam are basically
3 Northern Mariana Islands are on different
4 plates, geologically we are a moving
5 different than the mainland.

6 So they decided to create a
7 special realization of the North American
8 Datum called the Pacific Plate 2000, or 00.
9 But then of course there's the too, and they
10 say that they are the same or different, but
11 there's a lot of confusion, and the only real
12 information is it's really difficult to read
13 articles for geodesists.

14 So I get calls all the time on
15 this, so when to use what, and what does it
16 mean, so if you guys can ever work it out,
17 some information for simpletons that would be
18 great, and also or even translations between
19 them because again, as a commercial software
20 company, we will put it in the official
21 translation. That is what we always prefer to
22 do because they are not always -- there isn't

1 always one available.

2 And so on top of that one, that's
3 just one, but the other one is of course the
4 WGS 84, World Geodetic Survey of 1983 and
5 North American Datum of 1983.

6 Of course they were at one time
7 the same and now of course they have parted
8 ways years ago, but this is a very difficult
9 situation here because of course GPS is in
10 WGS 84 which is aligned to the ITRF,
11 international reference framework, and then
12 NAD 83 has been fixed.

13 And so again most of these people
14 are going out and buying high accuracy GPS
15 and then they want to always map it down to
16 the land in general, which is generally North
17 American Datum 83.

18 And so it's problematic because of
19 course WGS 84 is actually changing over time
20 whereas North American Datum is fixed. And so
21 what happens is a lot, nobody, including us
22 software companies or you in the government,

1 are actually publishing like Epochs on the
2 1984.

3 So 10 years from now, there will
4 actually be quite a big difference between
5 your measurements and positioning and it's
6 going to be again a big mess.

7 And so we all have to work
8 together to put Epoch tags on our WGS 84
9 which no one is doing yet. And also, we
10 really need to use the NAD 83 Epoch tags as
11 well because again, computers are very
12 nitpicky and it's not exact, they do whatever
13 they want, basically.

14 So this is why I think we get a
15 call all the time is really again with this
16 high accuracy GPS, people are using all the
17 time but they keep calling up and saying it's
18 not super accurate, and this is most of the
19 reason why.

20 And here's an easy explanation of
21 what is going on there in the Forest Service.
22 In case you didn't understand what I tried to

1 describe, this is what -- so yes, simpler
2 documentation and more training on the
3 subject matter from NOAA would be great out
4 here in the Pacific.

5 And so again, it really does
6 matter, even on the simple cases between
7 state and things -- the 1983 original, we
8 call it, or 1986 here in Hawaii, has its
9 older brother now, the HARN, which is the
10 newer, nicer, more modern, and the difference
11 is 1.57 meters.

12 So again, it's quite a big -- if
13 you have a submeter accuracy GPS, it's 1.5
14 meters, so it's a phone call to Craig. How
15 come my equipment is not working so well? And
16 also it's important again for -- no one is
17 going to do too but engineering but they do
18 do some, like wells and especially some
19 commercial people, environmental firms and
20 stuff like that, will go out and do some work
21 and get data from state, the state GIS for
22 example is still using the NAD 83 original

1 for their data, and so again, they are --
2 there just needs to be some awareness of it
3 and maybe some direction from NOAA and USGS
4 as to what we should be using and what is the
5 best for the state and governments to be
6 using.

7 And the other part on this one is
8 NOAA itself is publishing a lot of data now
9 in WGS 84 for the Pacific islands and even
10 for land-based things, like you are going to
11 get your imagery and everything like that.

12 So again, at one time I believed
13 there was a standard that they were supposed
14 to be using for land-based North American
15 Datum and for surveys of the geodetic model,
16 but NOAA itself seems to be publishing a lot
17 of data WGS 84 which is fine, but it matters
18 greatly again for surveyors, because they
19 can't just, especially over time, it's going
20 to matter a lot, because in five years, if
21 they just have something called WGS 84 and
22 they don't know where it came from, if you

1 are doing super high-order surveys, that will
2 make a difference.

3 So it would be nice to get some
4 clarification from NOAA and the government as
5 to what is the official datum that government
6 agencies are typically using, just so we know
7 and we can adjust to that.

8 Yes, and the use of Epoch tags.

9 And I think just lastly, of
10 course, the silent giant we call it, the
11 metadata, thank you so much NOAA, you always
12 are definitely one of the best organizations
13 to publish not just data about data, so if I
14 give you data, it will tell you when it was
15 made, who made it, how it was made, all this
16 information that really is critical for
17 anybody using GIS for analysis for example,
18 they can't just do analysis without knowing
19 information about the data.

20 And so with metadata, while it's
21 the most boring part of the hi-tech industry,
22 it's one of the most critical because you

1 really can't do valid analysis without it,
2 and NOAA is great, they are actually going to
3 provide training out here in a couple of
4 weeks for the Hawaiian community and the
5 Pacific as well, so thank you NOAA for that.

6 There's some great stuff from the
7 UH, the bathymetric and sonar, so thank you
8 very much. That's it.

9 CHAIR WELCH: Okay. Well thanks to
10 all the panelists. I'm sitting here you know,
11 reflecting that from what I hear from this
12 panel and some similar panels that we heard
13 in other locations on this subject, convinced
14 me that if there had been a hydrographic
15 services review panel in the 1960s, and if
16 Bob Dylan had been a member of the panel, he
17 would have written: You don't need to be a
18 weatherman to know which way the wind is
19 blowing but it would sure help to know
20 vertical and horizontal datums.

21 So, what kind of, so what kind of
22 questions do folks have or comments to this

1 panel?

2 Okay, Matt.

3 VICE CHAIR WELLSLAGER: Excuse me,
4 Matt Wellslager, South Carolina Geodetic
5 Survey. John, I got a question for you. It
6 sounded, if I can get things straight, you
7 were using a lot of sea level stations for
8 trying to determine what the sea level was in
9 this very, very wide region, is that correct?

10 DR. MARRA: That's some of the
11 work that is being done, correct.

12 VICE CHAIR WELLSLAGER: Some of the
13 work, right, okay. And the tide gauges that
14 are being used are all installed by, say, the
15 National Geodetic Survey or are they going to
16 be Australian or is it a mix of a lot of
17 different moves that you are using together?

18 DR. MARRA: It's a mix of multiple
19 groups actually, yes.

20 VICE CHAIR WELLSLAGER: Is it?

21 DR. MARRA: Yes, and a lot of it
22 is coordinated through GLOSS, the Global Sea

1 Level Observing System, so there is an
2 official GLOSS network. But the in LAN, so
3 the CO-OPS stations constitute a portion of
4 that, but then the international component is
5 managed by the Hawaii Sea Level Center, but
6 then you get crazy when you start going,
7 well, the Australians actually have a set as
8 do individual countries, and some of those
9 are within GLOSS and some of those are in
10 different levels of precision and accuracy.

11 The idea is that GLOSS basically
12 has at least some sort of climate quality
13 standards within which you are supposed to
14 use for sea level analysis.

15 VICE CHAIR WELLSLAGER: Right. So,
16 let me get this straight. With all these
17 different groups doing it, is there a, for a
18 lack of a better term, an ASCII format that
19 the data can be submitted to a centralized
20 location, so the Australian tide gauges could
21 be used with the United States, with whomever
22 else, but they are all on a unique type of

1 format so that the data could be combined in
2 a uniform way and you can all analyze it?

3 DR. MARRA: Again, the primary
4 mechanism through which that occurs is like,
5 is the GLOSS sort of stuff. There's the
6 Global Seal Level Observing System.

7 So that Mark Merrifield, who is
8 the director of the Hawaii Sea Level Center,
9 they have several different sets of data that
10 are sort of the official sets, like the, what
11 is it, the JASL, Joint Archive for Sea Level.

12 So there is -- via that site you
13 can at least get maybe 300 to -- I think it's
14 about 350 sea level stations are at least in
15 a consistent QA/QC in addition to the, just,
16 you know, the U.S. stuff.

17 But there is, you hit a good point
18 that there is no single place where you can
19 get every single tide station on the planet
20 accessed, and in fact one of the challenges
21 right now for example if you went to go look
22 at -- you can go pull up a site much like the

1 CO-OPS site, where you can look at the tide
2 information that you saw, and I think the CO-
3 OPS at least allows you to reference to a
4 couple of different datums.

5 If you went and did that same
6 thing to the Australian sites, they would
7 reference you to a totally different datum.
8 So not only is it not interoperable in the
9 sense of there's not a common data format,
10 but even the way that we display it, you
11 know, a user could be looking at two
12 different charts and that are totally
13 referenced once -- I think they reference to
14 like low, low water or even something
15 different than that.

16 CAPT. LOWELL: I think it's -

17 DR. MARRA: So -- what's that?

18 CAPT. LOWELL: I think it's lower
19 astronomic tides.

20 DR. MARRA: Yes, so it's -- so you
21 are aware of these sorts of considerations,
22 but so there really isn't, at least in my

1 knowledge, sort of the ultimate
2 interoperability in the sea level station
3 datum data. It's one of the challenges that
4 they have had to do in analyzing some of the
5 global sea level stuff, is dealing with the
6 whole variations in not only you know, which
7 stations you use and the quality of those
8 stations, and so there's been actually a lot
9 of debate in the sea level community about
10 sea level estimates as a result of those
11 kinds of considerations.

12 VICE CHAIR WELLSLAGER: Rich, is
13 there any thought or consideration about
14 trying to create something like a RINEX
15 format for all these different types of
16 datums and issues? One thing that CO-OPS
17 could do by themselves but maybe spearhead
18 the idea of trying to get a unified format?

19 MR. EDWING: Well, that is one of
20 the missions of the IOOS program, is to
21 achieve interoperability between some of
22 these platforms, not just work level --

1 VICE CHAIR WELLSLAGER: Right.

2 MR. EDWING: It's not for the
3 purposes of sea level per se, in GLOSS, but
4 they are trying just to allow a little datum
5 to be integrated with other kinds of data for
6 whatever application folks are trying to use.

7 GLOSS is the umbrella organization
8 for those countries and networks that are
9 following those standards, and they have an
10 archive in England that pulls together all
11 those stations at the GLOSS station data.

12 Actually they take some of that
13 data and send them to us in the right format
14 that we display along with our data to sea
15 levels on the website.

16 So there are things moving in that
17 direction but of course it's a long process.

18 VICE CHAIR WELLSLAGER: Oh, I'm
19 sure it is. It's a lot of data there. It
20 would be good if we could all use it at the
21 same time.

22 DR. MARRA: I agree. That's why I

1 mentioned that I think the interoperability
2 is really important. And it's not even the
3 sea level stuff. It's the shorter-term stuff
4 that is actually very important, you know,
5 the storm stuff.

6 VICE CHAIR WELLSLAGER: Right.

7 CHAIR WELCH: Scott Perkins.

8 MEMBER PERKINS: Thank you. Chris,
9 I have a question for you and maybe it's a
10 follow-up question for Craig. You had
11 mentioned wanting to get a server on several
12 of the different, you know, geographic
13 locations.

14 Looking at your project and the
15 concern with costs and limited funding, I
16 guess the question is, have you looked at
17 going cloud-based with that, and have you
18 looked at what ESRI is putting out there now
19 in the way of geospatial communities, so
20 rather than the expense and the
21 infrastructure and maintenance of putting
22 that stuff server-side and maintaining it,

1 maybe you can go elastic with it, put it in
2 the cloud and use the free thing that the guy
3 at the end of the table is providing with the
4 geospatial communities.

5 MR. GUERIN: Actually, we did not
6 look at the cloud any time yet, because at
7 the time we were doing this project, cloud
8 was not available.

9 So that may be a possibility but
10 we would have to look at if the real time
11 network can handle through the cloud, or will
12 there be enough -- will there be delays in
13 the transmitting of the data. But that,
14 possibly we could look at that.

15 MEMBER PERKINS: Yes. I compliment
16 you on the presentation and on the program
17 you have undertaken.

18 MR. GUERIN: Thank you.

19 CHAIR WELCH: Yes. Please come up
20 to a mic.

21 MR. LADOUCE: I'm Jeff LaDouce.
22 I'm the regional director for the National

1 Weather Service out here in the Pacific.

2 Mine's a comment more or less.

3 I'd like to thank NGS and through
4 the efforts of Ed Carlson, who have
5 contributed to our efforts out here. I'd like
6 to tie a couple of things together that Bill
7 Ward and John Marra brought up, and that's
8 the importance of the geodetic data that we
9 have for the instrumentation, for the
10 climate.

11 And one of the areas that has not
12 been mentioned very much is the tsunami
13 inundation maps that we are responsible for.
14 We are producing them -- a number of
15 different organizations are producing them
16 for the U.S. flagged areas, but NOAA
17 basically is producing them for American
18 Samoa, Commonwealth of the Northern Marianas,
19 Guam.

20 They are instrumental in
21 collecting the data, both the hydrographic
22 and bathymetric data, and then developing the

1 charts or funding the development of the
2 charts at PMEL, or Pacific Marine
3 Environmental Laboratory.

4 Ed's work is particularly
5 important in being able to get the right
6 leveling information for those charts.

7 But I have -- we have one other
8 responsibility in NOAA and that is brought to
9 us by the Compact of Free Association. I
10 don't know how many people here are familiar
11 with the Compact, but there's two of them.

12 They are treaties with -- one
13 treaty with the Marshall Islands and the
14 Federated States of Micronesia, and another
15 one that is in the Congressional approval
16 process right now for Palau.

17 That makes those countries look a
18 lot like they looked when they were the trust
19 territories of the Pacific and we owned them,
20 basically.

21 So NOAA has the responsibility to
22 provide all the weather support, the climate

1 support and everything that's interrelated. I
2 would like to -- and it gets complex and
3 complicated and nobody appears to have a real
4 clear picture of what that Compact means.

5 I will give you -- try to make it
6 a quick example. About three years ago, FEMA
7 said we don't do foreign, and so we are
8 getting out of the Compact countries and we
9 are going to turn that over to USAID.

10 So we had a tabletop exercise here
11 with the Ambassadors from Marshall Islands
12 and Federated States of Micronesia and FEMA
13 Region 9 and USAID.

14 FEMA got up and kicked off the
15 conference and said we don't do foreign, this
16 is very unique and we have been doing this
17 for the last 20 years, we are now turning it
18 over to USAID who does foreign, and they know
19 what to do.

20 And USAID got up and said yes, we
21 do foreign, but we don't understand this
22 thing. These islands have a unique

1 relationship with the United States that we
2 don't deal with.

3 So there is -- there are some
4 uniquenesses and there are some things that
5 we -- me as the guy that's responsible for
6 providing about 99 percent of the NOAA
7 support to the islands, I am interested in
8 protection of life and property, and so we
9 deal with it.

10 I was interested in the water
11 because we have worked together in some of
12 the water issues out there. It's the number
13 one issue in the islands and some of these
14 islands are no more than five feet high. We
15 don't know whether they are rising or whether
16 they are sinking. We don't -- and so there is
17 a number of things that the NGS provides for
18 us to help us do that support.

19 I would like to thank you for that
20 and hope that you continue to support our
21 efforts out here. They are important. We are
22 saving lives. We have people who are losing

1 their farms, they are losing their fresh
2 water, and in many cases the Marshall Islands
3 are probably losing their islands.

4 So thank you very much.

5 CHAIR WELCH: Thank you. Let's see
6 if other panel members and then we will turn
7 to our guests. Any other questions or
8 comments?

9 MS. BLACKWELL: Juliana Blackwell,
10 Director of the National Geodetic Survey. I
11 want to thank you all for your wonderful
12 presentations, and I know the datums are
13 complicated for those who don't work with
14 them on a daily basis, and even if you do, it
15 still is mind-boggling when you start to
16 think about all the different relationships,
17 horizontally, vertically, that we have to
18 deal with.

19 Just a few general comments about
20 -- NGS understands and appreciates a lot of
21 the issues that you have brought up today. We
22 are working on datums for the future which

1 will help with a lot of the issues that you
2 have brought up, the fact that the
3 conterminous United States has a different
4 vertical datum and all the different islands
5 have their own sort of starting points for
6 measuring elevations.

7 The National Geodetic Survey has
8 begun work on two new datums, one that will
9 be a geometric-based, one that will be
10 geopotential-based for elevation information
11 that you will be getting for datums.

12 What the new datums will provide
13 is it will get rid of this fraction between
14 the islands and the territories and the
15 mainland and so we are looking this
16 holistically, we are doing this with a GRAV-D
17 based geoid model that will then develop into
18 a new vertical reference system.

19 So I know, again, this is very
20 complicated, but we have started this as our
21 GRAV-D project, we are now in our third year
22 of GRAV-D collection. We are doing a lot of

1 work in Alaska right now, Hawaii and the
2 areas around Hawaii are part of that plan.

3 I believe that right now the time
4 frame is four to six years from now before we
5 would actually plot that airborne gravity.

6 But we are always looking for
7 partnerships and/or from federal and state
8 entities to make this work happen faster
9 because obviously it's all tied into budget,
10 and budget constraints.

11 And if there are ways that we can
12 work together to make this airborne gravity
13 and new vertical system work faster, because
14 we can all pitch in and do this together, we
15 would be glad to talk to those entities who
16 can try to make things work as well as and as
17 quickly as it can in the Pacific area.

18 So one specific question I guess I
19 would have for you Chris, is do you have a
20 time frame for the leveling work that you
21 proposed?

22 MR. GUERIN: Currently, right now,

1 we have the data in our contracts office.
2 They are six plus months behind due to
3 furloughs and reduction in force and other
4 issues.

5 So they have six months of work to
6 get out first before they even get to ours.
7 Once the RP goes out, we are looking at
8 another eight months before actual contracts
9 are inked and approved and everything else
10 and then they can get started.

11 And then I think when we estimated
12 the project to complete start to end is two
13 plus years of field work and then office
14 time. So you are still looking at several
15 years down the line to get the leveling out
16 the door.

17 In the meantime we are also going
18 to be starting the VRS data paperwork on our
19 side too, start getting it out. We don't want
20 to, you know, finish one project and then
21 wait for the next one. We want to rush them
22 all together.

1 MS. BLACKWELL: I think it would
2 be helpful if we talked off line about ways
3 to look at that and look at our GRAV-D
4 initiative and see if there is some way that
5 we can work together.

6 MR. GUERIN: Yes, initial -- when
7 we did the initial estimate of the LIDAR, we
8 did ask Ed about your GRAV-D and we took the
9 figure out of your guys' book for what it
10 would cost and we actually put that into ours
11 just in case one type falls behind the other
12 and hopefully we can get it all done at the
13 same time.

14 CHAIR WELCH: Other panel members?

15 I have a question. One of the
16 challenges of the geodetic survey and the
17 profession, those of us that are interested
18 in trying to translate all these strange
19 terms and this esoteric process and the
20 things that people can relate to, the
21 tsunami, people can relate to it, at least
22 people on the coast can relate to it.

1 But even people inland, you know,
2 tsunamis are something they see on TV. People
3 understand cell phone towers. People gripe
4 about their lack of cell phone reception.
5 Craig, can you talk a little bit about how
6 the use of this data, these datums for
7 locating best cell phone tower locations on
8 the island, does it seem like you could do
9 that, that would be useful anywhere?

10 MR. CLOUET: . Yes actually they
11 are doing --

12 CHAIR WELCH: And people would
13 understand that and say hey, this kind of
14 stuff relates to what your cell phone
15 reception is, average person.

16 MR. CLOUET: . Yes, both American
17 Samoa and the FSM have been doing this
18 project, I guess it was ARRA money. But, and
19 they actually hooked up their GPS. Again, it
20 really does make a difference by foot, even,
21 where those towers are, so like, if you put
22 it on the wrong spot, all of a sudden you get

1 these black areas.

2 CHAIR WELCH: People understand
3 this, they intuitively know that if you
4 locate the tower in the wrong spot or the
5 wrong elevation, it makes things better or
6 worse.

7 MR. CLOUET: . Especially with the
8 ridges, and these islands all have very deep
9 ridges, so again, if you are like one foot
10 off to the side of the ridge, the whole other
11 valley is just not going to get anywhere.

12 So, yes, the ridges are always
13 very difficult here in the Pacific, different
14 in low-lying islands.

15 CHAIR WELCH: Yes, I think I am
16 saying the geodetic service ought to come out
17 with a one-pager about how what we do
18 improves people's cell phone reception.

19 (Laughter)

20 Seriously.

21 Secondly, though, Steve, on the
22 groundwater, do you have situations that you

1 could point to where the use of this data
2 showed that there actually was more
3 groundwater or less groundwater and therefore
4 people made different policy decisions as a
5 result of that?

6 MR. ANTHONY: Yes, the example we
7 have for Maui illustrates that quite well.

8 CHAIR WELCH: And but, what I
9 couldn't understand from your presentation
10 was did that lead to more restrictions or did
11 that free up things for more development?

12 MR. ANTHONY: Created confusion.
13 Yes, it created confusion and the end result
14 was actually it was less water available.

15 CHAIR WELCH: Okay. Again, people
16 can understand that too, you know.

17 MR. ANTHONY: Right.

18 CHAIR WELCH: Okay, thanks. Gary
19 Jeffress.

20 MEMBER JEFFRESS: Ed, what you're
21 talking about is knowing good elevations
22 everywhere, like the cell phone tower thing

1 is like, you need, pretty much need line of
2 sight from your cell phone to a tower to get
3 good reception.

4 But then you have got to know
5 where the topography is, because if there is
6 a mountain it is probably going to block it,
7 or -- and so their idea of good elevations is
8 that the topography and the hydrography, the
9 mapping of the sea floor, is on the same
10 elevation datum.

11 But traditionally they are not
12 because topography, you want to know from
13 like mean sea level or mean highwater, and
14 the bathymetry you want to know it relative
15 to the mean low water because you don't want
16 to go running either things in a boat.

17 And so that's where the difficult
18 comes in, modeling in a maritime area along
19 the coast, matching that so you can do models
20 for tsunami inundation and storm surge
21 inundation, that's where the problem comes
22 in.

1 But with the cell phone, this is
2 just by the way, with the cell phone problem,
3 the Air Force has actually a solution for
4 that.

5 They now have air ships that stay
6 on station at 60,000 feet. That's above the
7 weather, it's above the jetstream. They are
8 solar-powered so there's plenty of sunshine
9 up there and because they are not using any
10 of that energy to stay aloft, because they
11 are helium-filled, it's an ideal location for
12 cell communications and it covers an enormous
13 area on the ground.

14 They cost about 10 percent of the
15 value of a satellite. They already have the
16 solution to that little cell phone problem.

17 CHAIR WELCH: I wonder if that
18 will result in a decrease in cell phones.

19 (Laughter)

20 Other panel members? Okay, we had
21 some guests that had a couple of comments.

22 MR. POLHEMUS: I'm Dan Polhemus

1 with the U.S. Fish and Wildlife Service and I
2 am also the Chairman of the Monument
3 Management Board for Papahānaumokuākea Marine
4 National Monument, and I believe yesterday
5 after I departed, David Swatland from the
6 monument made a few comments in regard to
7 some of our issues up there.

8 I think that your panel member
9 Jeffress just brought up a very salient point
10 in regard to the monument, in that we have
11 got 10 islands up there. Three of them are
12 high and seven others are essentially low.
13 And just like the situation alluded to with
14 the Marshall Islands, those islands are
15 isostatically sinking and at the same time
16 the perception of the sea level around them
17 is rising.

18 Mark Merrifield from UH has
19 indicated that at least at Midway, there's
20 some tide gauge data that that level rises
21 about five millimeters per year.

22 So that's an inch every five

1 years, and that's not trivial when you are
2 dealing with a low-lying monument.

3 We also have a climate change
4 working group within the monument management
5 board that I currently chair, and one of the
6 things that we are doing is having a look at
7 a vulnerability assessment, coastal
8 vulnerability assessment, looking at both
9 inundation and potentially, erosion issues.

10 And we are trying to acquire data
11 in terms of LIDAR, talking with John
12 Brockett, USGS Reston, and they have a MOA
13 with NOAA to fly the ERL system that is
14 emerging off-of NOAA's King Air fixed-wing
15 platform. They would like to bring that out
16 to the Pacific I believe within the next
17 couple of years. I think they are going to
18 proof of concept in the Virgin Islands.

19 We are looking at acquiring
20 satellite data from via of all things USDA
21 NRCS.

22 But in all those cases, no matter

1 how good the data we get and no matter how
2 nice the toys we have are, in order to do
3 accurate scenario planning and actions, take
4 actions related to that, we really need to
5 know where zero is, you know, what is sea
6 level, what are we going to agree that we are
7 going to use for sea level, and how are we
8 going to measure what's going on from sea
9 level down versus what's happening from sea
10 level up in terms of tsunami impacts, which
11 were non-trivial in the northwesterns, I mean
12 the largest island at Pearl/Hermes was sliced
13 completely in half by the tsunami.

14 It washed over 70 percent of one
15 of the islands at Midway. Modeling those
16 potential -- a potential recurrence of those
17 impacts in the future is very important, but
18 we need to know where zero is.

19 So this is where the geodetic
20 survey can really help. We need to constrain
21 that. We need to have a reference point so
22 that we can analyze status of trends going

1 forward, see whether our projected scenarios
2 are playing out, for better or for worse.

3 And our panel member from National
4 Weather Service had pointed out the major
5 problem is there's not enough land in the
6 Pacific.

7 But we have 1,200 miles with 10
8 islands and we would be very happy to
9 cooperate with National Weather Service in
10 the location of instrumentation out there.

11 We are undertaking a strategic
12 instrumentation plan. That said, none of us
13 are geodetic experts. None of us are
14 meteorological experts. So we could use all
15 the very good advice we can get.

16 At the same time we are very happy
17 to help co-locate instruments that would give
18 us information and that would fill in holes
19 in broader, regional networks.

20 And so I would say that we would
21 be very interested in having dialogues with
22 anybody who is either on this review panel,

1 or on the expert panel, or if there are
2 people you might know who might talk to me
3 about any of these issues. Thank you.

4 CHAIR WELCH: Thank you. Other
5 comments or observations from anybody?

6 Yes.

7 MR. ERICKSEN: I'm Marc Ericksen
8 with Sea Engineering. We are a local ocean
9 engineering survey company that was founded
10 in the islands in the '80s.

11 We have been doing hydrographic
12 survey work in Hawaii and the Pacific for 30
13 years now, and I want to kind of reiterate
14 some of the comments that were brought up
15 here, because we have kind of been on the
16 front lines of dealing with these issues as
17 they have developed and progressed.

18 We are kind of, I guess, lucky or
19 not lucky to be in the position where we were
20 interfacing with marine hydrographic,
21 oceanographic type data sets with local land-
22 based surveying.

1 And so we have encountered the
2 problems of using GPS-based data and trying
3 to integrate that with local land survey
4 systems.

5 So, all of the datum problems,
6 horizontal control problems we have
7 encountered from the very beginning, and Ed
8 was a very important resource for us when he
9 did come to the islands in terms of starting
10 to clarify those things.

11 And there's been great improvement
12 over the years but we still encounter
13 horizontal control difficulties using
14 differential GPS around the island now.

15 For example for a lot of the
16 marine survey work, the coastguard
17 differential beacon is available. And then
18 there's also systems that use local, HARN-
19 based ITRF reference system.

20 For example, a SEANAV, C&C
21 Technologies, SEANAV system, versus a U.S.
22 Coast Guard beacon. Right off the bat you do

1 see that 1.5 meter difference.

2 So these are issues that really
3 you need to pay attention to, in particular
4 when you are trying to interface with coastal
5 engineering projects.

6 Same thing with vertical controls.
7 We constantly encounter differences between
8 local -- the most recent NOAA tidal epoch sea
9 level datums, and those that are used by
10 local land surveyors.

11 And again, these are key
12 differences when you are looking at
13 engineering projects in ports and harbors,
14 dredging projects for example.

15 We did a series of survey work in
16 Guam for the commercial port of Guam, just as
17 an example, a couple of months ago, and the
18 Port of Guam controls that we were provided
19 to do those surveys show an offset of about
20 half a foot with respect to the most recent
21 NOAA tidal epoch, at a NOAA tidal station in
22 Apra harbor less than a mile away.

1 So, you know, I think it's --
2 those problems still do exist. I think it's
3 really key the communication and the
4 dissemination of that type of information to
5 the local survey communities, and also to the
6 local agencies responsible for upgrading a
7 lot of the land-based controls. Thank you.

8 CHAIR WELCH: Thanks. Other
9 comments or questions for the panel?

10 If not, I want to thank all of our
11 panelists for participating with us and your
12 contributions to us today and we will
13 continue to stay in touch with you and invite
14 you to stay as long for the afternoon as you
15 can. So thanks again.

16 (Applause)

17 CHAIR WELCH: Let's -- we're
18 scheduled for a short break. Let's come back
19 at 3:10. We are scheduled to come back at
20 3:15 but let's come back at 3:10. We might be
21 able to finish a few minutes early if we can
22 do that. (Whereupon, the above-

1 entitled matter went off the record at 2:53
2 p.m. and resumed at 3:17 p.m.)

3 CHAIR WELCH: Okay, let's
4 reconvene and just let me remind our visitors
5 that a few of you have not yet signed into
6 our guest sheet over here at the table and we
7 hope that you will.

8 And before we go to our members
9 making their presentations, I had meant to,
10 before everybody got started, beginning to
11 give the floor to Ed Carlson for a little
12 context-setting and I am bound to do so, so
13 please come right on up and set the context
14 for us after the fact.

15 MR. CARLSON: Well, I wanted to
16 give you some history of the Pacific region,
17 NOAA's Pacific region, so I happened to have
18 these two handouts out.

19 One is what our mission is and
20 what we are supposed to take area of our
21 responsibility. But I think from the last
22 presentation, you heard a lot about it from

1 Bill and John, about how big our area is.

2 And the second one was just the
3 graphical view of how big our area is, like
4 we say it's almost two times the size of the
5 United States, and I say in here that -- but
6 the land there is only about the size of New
7 Jersey.

8 It's a big area but very small.
9 And the other issue is that we have the issue
10 of going across seven time zones, so we work,
11 today, right now, it is -- today is Thursday.
12 It's Friday, one o'clock in the afternoon in
13 Guam. So these are the issues that we have to
14 work with, to deal with.

15 And I just wanted you to have an
16 idea of how big the area is that is out here,
17 I mean a lot of people don't understand it
18 and realize it.

19 When I talk to people that come
20 from the mainland they say oh, you're just
21 off the coast of California. Well, we are way
22 off the coast of California.

1 CHAIR WELCH: How long does it
2 take you to fly to Guam from here?

3 MR. CARLSON: Eight and a half
4 hours.

5 CHAIR WELCH: And how long does it
6 take to get to American Samoa?

7 MR. CARLSON: Five and a half
8 hours.

9 CHAIR WELCH: Okay.

10 MR. CARLSON: And we are in the --
11 that's right, we go to the southern
12 hemisphere, we have northern and southern
13 hemisphere, too. So we have different
14 seasons. When it's winter here, it's summer
15 down there. When it's winter down there, it's
16 summer up here.

17 That's all.

18 CHAIR WELCH: Okay.

19 CAPT. LOWELL: Before you go Ed,
20 let me just ask you a quick, I guess,
21 clarification for me, but this graphic that
22 you provided here, it looks -- I only took a

1 quick glance, it's the one that Bill put up
2 on the screen -- but it looks a different
3 shape.

4 So can you give me a little
5 clarification?

6 MR. CARLSON: He just made it
7 rectangular. I just made it more trapezoidal.

8 CAPT. LOWELL: Okay.

9 MR. CARLSON: So they are
10 different shapes, but it goes to the same
11 area. This one goes all the way over to Guam.
12 They have responsibility, more responsibility
13 in the weather service than what's on this.
14 They have to do predictions for aeronautic
15 flights all the way to the Philippines, where
16 we don't.

17 CAPT. LOWELL: Okay, and those
18 areas, I guess I'll verify with Bill, is that
19 agreed on via the international convention
20 that the U.S. will take weather authorities
21 for areas?

22 MR. WARD: Well, because of the

1 cluster towards the Compacts even as Jeff
2 mentioned, they still fall under us. We have
3 money that is delegated directly to the
4 Compacts such that we take care of them in
5 both coastal and weather services, and until
6 such time that they can come up and take care
7 of their own services, we are on the hook and
8 we will continue to do weather and build up
9 the entities out there to help them move
10 along.

11 CAPT. LOWELL: Okay.

12 MR. WARD: Now, I want to mention
13 on the map that you mentioned, that is a
14 Mercator projection, and it is indeed four
15 times the size of the CONUS. CAPT. LOWELL: I
16 guess I just want to make sure that it wasn't
17 multiple Pacific regions that we were talking
18 about.

19 MR. CARLSON: No, it's the same
20 area.

21 CHAIR WELCH: Okay. Thank you Ed.
22 All right. Let's move from the south Pacific

1 to the north, and recognize our own fellow
2 panel member, Lawson Brigham, for a
3 presentation about the Arctic issues. So the
4 floor is yours.

5 MEMBER BRIGHAM: Quite, quite
6 amazing to be here in Hawaii. When I talked
7 to Roger about this, we joked -- we knew each
8 other from headquarters when he was working
9 in Washington and we both had a good laugh
10 about briefing on Arctic here in Hawaii.

11 I'm not sure I can answer the
12 questions today of how NOAA should respond to
13 the Arctic, but I thought maybe it's useful
14 to give, not necessarily a 101, but what's
15 going on in the Arctic and try to dispel some
16 notions of what you might read in the paper
17 and how things are interpreted by the world
18 and how we interpret them in the Arctic
19 Council.

20 Of course NOAA image here, a
21 passive microwave of the least extent of sea
22 ice in 2007 and in this slide we used for the

1 diplomats a number of times in the Arctic
2 Council to remind everyone there are lots of
3 ships in the Arctic Ocean today. There are
4 6,000 voyages -- 6,000 ships and 12-13,000
5 voyages. That was in 2004.

6 Lots of different types of ships,
7 the only one that is the outlier is in the
8 lower right. It's a cruise ship, not ice-
9 strengthened, the flag is the Bahamas and the
10 question is what is it doing there, and Ed
11 knows what it's doing there, it's making
12 money.

13 Does it fulfil all the safety
14 rules and regulations for a polar-clad ship
15 in the high latitudes and, of course, the
16 answer is no.

17 John and I have been meeting --
18 John, part of the U.S. delegation, myself as
19 a briefer, the Arctic Ocean Hydrographic
20 Commission, which is a new group under IHO,
21 and part of their work is this bathymetric
22 chart just to remind you all of the huge

1 continental shelves in the Arctic Ocean.

2 At the North Pole, it's 4,000
3 meters deep. The red dot -- blue dots and red
4 dots about 2,200 nautical miles across the
5 top of the world so if you are thinking about
6 crossing the ice more than 2,000 miles, it's
7 kind of a controller of speed, et cetera.

8 CHAIR WELCH: Lawson, can I ask a
9 question and I'm sorry if I am interrupting,
10 but if we look at that, that's the Arctic
11 Ocean more or less.

12 MEMBER BRIGHAM: It's the Arctic
13 marine environment.

14 CHAIR WELCH: But when you -- a
15 lot of people talk about the Arctic policy,
16 and there you don't see anything see south of
17 the Bering Strait but a lot of the people are
18 talking about Arctic policy and they are
19 talking about things considerably south of
20 the Bering Strait, so what are we talking
21 about?

22 MEMBER BRIGHAM: Yes, in the

1 United States, in legislation of which you
2 are aware, it's one of the U.S. Army Research
3 Commission, there was a definition for the
4 United States of the U.S. Arctic -- of how
5 the United States defines its own Arctic area
6 and it's from the Aleutian chain north, and
7 that's to include the seasonally ice-covered
8 sea, so it's not irrational, that we see ice
9 in the Bering Sea for more than half a year,
10 so it is a polar sea, it just happens to be
11 sub-Arctic, below the Arctic Circle.

12 So defining the Arctic mean
13 environment is the way we deal with it in the
14 Arctic Council, because you know that for the
15 Arctic Ocean and the UNCLOS activities, it's
16 only five states.

17 But when we talk about the Arctic
18 marine environment, the whole of the Arctic,
19 it's actually eight Arctic states. I'll --
20 maybe I can clear that up, but U.S. Arctic
21 policy is Aleutian chain north and includes
22 beyond our EEZ out the extended continental

1 shelf and around the whole of the basin for
2 marine issues.

3 CHAIR WELCH: How is it then just
4 sometimes we have using the same term and
5 envision larger or smaller geographic areas?

6 MEMBER BRIGHAM: I think we are
7 the -- only Canada and ourselves have in
8 legislation a definition of Arctic, but the
9 other countries, with which we dealt in the
10 Arctic Council and we asked for data from
11 your, that had a fluid and a dynamic
12 definition, like our Russian friends, of what
13 the Arctic might be and that causes some
14 friction.

15 You have all heard about and saw
16 or maybe read about Dr. Chilingarov taking
17 the flag down to the bottom of the North Pole
18 with Australian dollars, in an expedition --
19 private expedition -- but CAS has a
20 governmental expedition and of course it's
21 4,000 meters deep, and the question is, at
22 that depth, whether anybody has an extended

1 continental shelf.

2 Well, all of that activity has no
3 bearing, no basis of international law, but a
4 great adventure and it gave tremendous
5 tension to this issue of who owns the sea bed
6 in the Arctic Ocean.

7 Of course the framework of the
8 floor of the Arctic Ocean, this is UNCLOS,
9 and as we go from left to right, from the 200
10 mile EEZ to something different, an extended
11 continental shelf, and that's -- the Healy is
12 out there, and folks in New Hampshire
13 exploring with the Louis S. St-Laurent from
14 Canada the sea bed and trying to define what
15 our extended continental shelf will be beyond
16 200 nautical miles, even though we haven't
17 ratified UNCLOS.

18 So the framework for all activity,
19 it's another ocean planet and that needs to
20 be explained not only to the diplomats, but
21 the whole of the Arctic Council in this work,
22 is that it's a little different ocean because

1 it has an ice cover but it is a marine area,
2 no new Antarctic treaties, no new Arctic
3 treaty, the treaty and the framework in fact
4 is UNCLOS.

5 I'll talk a little bit about --

6 CHAIR WELCH: UNCLOS being the UN
7 Convention --

8 MEMBER BRIGHAM: Convention of the
9 Law of the Sea.

10 CHAIR WELCH: which the U.S. has
11 not ratified.

12 MEMBER BRIGHAM: But we may be
13 close to at least getting it up for a vote.

14 CHAIR WELCH: Yes, that's what
15 people have been saying for 25 years.

16 (Laughter)

17 MEMBER BRIGHAM: Yes -- but
18 Senator Kerry is going to offer it up there
19 pretty soon, I think. Here are some topics,
20 I'm just going to run through them real quick
21 -- marine access, use of this report, and
22 then how does this relate, and I suspect I

1 might brief again or work with the staff and
2 we can come up with some words together down
3 the road.

4 If you just look at the passive
5 microwave images, you can see, in our
6 lifetime, an extraordinary change in
7 openness. On the left you can see wide areas
8 are open. This is at the minimum extent of
9 course.

10 And I put the red lines on this
11 one across the Northwest Passage, open for
12 about 14 days in 2007, and across the Russian
13 Arctic, there's ice interacting with the
14 coast so at the minimum extent in this
15 particular -- this is the minimum extent on
16 record, satellite record -- but even at this
17 one there's ice interacting with the coast,
18 which means you need a polar-clad ship to
19 operate.

20 But we remind the diplomats, I
21 remind you here, the Arctic Ocean is ice-
22 covered most of the year through the century,

1 and beyond.

2 So as a mariner and as a regulator
3 of this, I take the reverse for my daily work
4 as sea ice oceanographer and looking at the
5 trends and stuff, I have to think about how
6 much is open, how much is it changing.

7 But actually it's not changing a
8 lot from a maritime perspective. The place is
9 ice-covered. It's thinner. There's less
10 extent. But there's a heck of a lot of ice in
11 the Arctic Ocean forever.

12 The amount of heat to -- as a
13 climate scientist looking at it -- to melt
14 the top of the world, the ice cover, there
15 would be astronomical temperatures in the
16 rest of the planet, and I don't think we'd be
17 worried about marine navigation or anything,
18 we'd be worried about frying the rest of the
19 planet.

20 So the place is ice-covered, so
21 that has regulatory implementations
22 throughout whatever we want to do there.

1 This big assessment was the Arctic
2 Council, led by the United States, Finland
3 and Canada. It had lots of workshops. But the
4 key challenge for the Arctic states is that
5 the rest of the world is coming --
6 shipbuilders, investors, Chinese ships,
7 Japanese ships, a lot of people who really
8 don't have much understanding of the Arctic,
9 and that's the challenge for the Arctic
10 states including our own.

11 There was Mercator projections
12 mentioned a minute ago. Throw those away
13 please when we are looking at this part of
14 the world.

15 Don't look at them ever again.
16 With the distortions of Greenland and the
17 whole of the Arctic basin, you don't want to
18 use Mercator.

19 I've covered the report, I've
20 passed it to the panel members, maybe many of
21 you have seen it, you can download it. Here
22 are the chapters of this.

1 We covered a range of topics, of
2 course indigenous use in the Arctic is hugely
3 important. The ship is the Russian flag
4 icebreaking tanker built in Korea with
5 Finnish technology. It's operating by
6 Sovcomflot, a Russian -- largest Russian
7 shipping company, so you see the
8 globalization of the Arctic.

9 We'll run through a couple of
10 slides of use today in the Arctic Ocean, just
11 to give you a sense. World's largest zinc
12 mine of course is in my state, and it's the
13 Red Dog Mine and some of the largest bulk
14 carriers on the planet come and anchor off
15 Kivalina in Alaska.

16 But those ships are all non-ice-
17 going ships and free water ships so they
18 don't operate in the wintertime.

19 On the other side of the Arctic we
20 have the largest nickel mine in the world,
21 fourth largest copper mine, largest palladium
22 mine, large taxpayer of the Russian

1 Federation at Norilsk and since 1979, there's
2 been year-round transport between the port of
3 Dudinka and Murmansk.

4 The largest high-grade ore
5 potential mine is here on Baffin Island and
6 there is a big plan to ship that ore to
7 European steel mills, and I think that will
8 begin in the next decade. So the place is
9 tied to a wealth of natural resources,
10 particularly mineral resources.

11 These are the kind of ships that
12 are operating in the Russian Arctic, Finnish
13 technology, independently-operated ships.
14 They don't need icebreaker support. These are
15 the very small, 660 TEU container ships.

16 When we talked about pods on
17 cruise ships and other ships, here's a pod on
18 this ship and I wonder if some of you might
19 guess what might be something -- a problem
20 with this picture.

21 There's no redundancy. We talked
22 about three radars maybe on the Madison ship.

1 There's only one pod here, so the future
2 regulatory push is for redundancy of
3 equipment in the Arctic because the ice of
4 course can do some interesting work on your
5 machinery.

6 Marine tourism at the North Pole,
7 of course, the Russian nuclear icebreakers
8 but the primary marine tourism, other than
9 the coast of Norway and Svalbad is this area
10 of the world, western Greenland, and a couple
11 of pictures of -- excuse me -- a couple of
12 pictures of that.

13 All of these ships in Greenlandic
14 waters. This is a picture taken standing on
15 Nuuk looking out from a ship with 4,000
16 passengers and oh, 1,300 in the crew, a small
17 city almost larger than all the towns and
18 communities in Greenland itself.

19 And those ships are operating with
20 minimal charts. Great safety systems on the
21 ships but you don't want to have a fire in
22 remote regions because there's not much

1 infrastructure.

2 But the challenge to the Arctic
3 states -- and this is the largest challenge,
4 the biggest challenge right at the moment, is
5 how do the Arctic states respond to something
6 like this if there is a crisis or a problem
7 with one of these ships.

8 Key fisheries of course, we know,
9 two of the largest fisheries on the planet
10 are in the Arctic, or sub-Arctic, Bering Sea,
11 of course the Barents Sea, modest fisheries,
12 and these places bringing fishing vessels
13 from around the world.

14 Oil and gas is one of the bigger
15 drivers of marine transport. We have leases
16 of course and happily, Shell has not been
17 able to drill yet out in the Chukchi. Of
18 course they're on the beach here and BP has
19 NorthStar, so some activity, not requiring
20 marine operations, very much marine
21 operations.

22 But most of the activity today is

1 in northwest Europe. LNG has carried from
2 Hammerfest, Norway to Chesapeake Bay and
3 Spain and around the world, as the Norwegians
4 move from the North Sea up into the Arctic
5 when this is ice-free.

6 And the Russians are moving oil
7 and some gas, but oil, both westbound and
8 eastbound in the summer, and the new
9 adventure of course is drilling for oil,
10 exploring in the Greenland coast just last
11 summer and more to come this year.

12 I joke, a little cynically, but
13 every Greenlander, all 56,000, pray that they
14 find oil because Greenland could become an
15 independent state after 300 years of Danish
16 rule, and would be analogous to a Kuwait of
17 the North.

18 Who would buy that oil? Maybe
19 China, maybe we would, who knows what
20 country? So it would be an interesting
21 dynamic as Greenland would replace Denmark as
22 the Arctic state. Highly plausible.

1 Off the coast of Russia, the
2 Varandei terminal, this is an investment of
3 Conoco-Phillips, the United States company of
4 course, and Lukoil, the Russian company.

5 Again, the ship is built in Korea
6 with Finnish technology, operated by a
7 Russian flag and so it's a mix of investments
8 today in the Arctic.

9 Summer sea lift in both Russia and
10 about 100 vessels sailing in the Canadian
11 Arctic in summer bringing ships to the Arctic
12 Ocean.

13 And then finally, it's the
14 exploration of the sea bed by highly capable
15 icebreaking ships in all of these areas.

16 So we show this map essentially
17 for the summertime to the diplomats to say
18 all of the Arctic Ocean is being utilized
19 today in the summer. Almost every square
20 kilometer has been traversed by surface ships
21 and of course by submarines also, in various
22 times and places, continuing today.

1 But in the Arctic Council we focus
2 on marine safety and environmental
3 protection, and issues related -- and the
4 non-security related issues.

5 We don't focus on fisheries
6 either. But all of the vessels, the 6,000
7 vessels are all involved in these activities
8 throughout the basin.

9 Of course we can't dismiss this
10 activity, this particular Greenlandic hunter,
11 and in the Arctic Council we deal with that
12 activity too, because we have the indigenous
13 people sitting at the Arctic Council.

14 In this transport study, we looked
15 at using scenarios, future of the Arctic,
16 what impacts might affect marine transport.
17 And of course there's a whole host, like
18 anything you pick: climate change, economics.

19 During the course of the study we
20 -- the price -- the fluctuation of oil was
21 \$55 to a hundred and something, so that
22 itself will change the dynamic of Arctic

1 shipping.

2 We pointed out it could be a major
3 shipping disaster in the Arctic, but it
4 actually happened in the Antarctic. You can
5 see the happy customers, the tourists in the
6 lifeboats, I say cynically, of course.

7 Everyone was picked up, which is
8 quite remarkable partly because of the
9 relationship of all the cruise ship operators
10 -- this is a Norwegian cruise ship operator.

11 But the explorers at the bottom of
12 the ocean, down in the southern ocean but had
13 been in the Arctic only six months previous.

14 And last summer we had Clipper
15 Adventurer aground in the Canadian Arctic. We
16 talked about a notice to mariners sent out by
17 the coastguard and sent out by the Canadians
18 to shippers.

19 And the mariners on the ship
20 didn't have on the chart the new notice to
21 mariners that had this reef -- charted reef,
22 minimally charted but on the chart, well,

1 should have been on the chart but the
2 mariners hadn't placed it on the chart so
3 aground they were, shifting sands and other
4 parts of the Northwest Passage. So the
5 Canadians are beginning to have a challenge
6 of operating in the Northwest Passage.

7 We put all these dynamics, these
8 drivers and uncertainties together, and we
9 found that -- and I say we, about 60 people
10 over a year, meetings in Finland and San
11 Francisco, we had some contractor help us --
12 but governance and the lack of rules or
13 stable rules base situation, vice resource
14 and trade, essentially natural resource
15 development, a connection of the Arctic to
16 the globe through natural resources, are the
17 drivers of marine use and transportation, not
18 necessarily the tourism, but everything else,
19 not sea ice, not sea ice retreat, it's
20 dollars and economics and global connections
21 of the Arctic to the planet.

22 Unusual complexity here in our

1 part of the world which requires a lot of
2 what NOAA information has to be provided, and
3 maybe new information particularly
4 oceanographic observations and datum for
5 shorelines, for coastal erosion and all of
6 that.

7 But for marine transportation,
8 routing and then this is what I would
9 consider the classic case of marine spatial
10 planning to come, is how do you mesh the
11 indigenous uses and the whale migrations with
12 all the other activities that could happen
13 not only in free water but of course in the
14 wintertime.

15 This is right out of the -- this
16 is AIS data, the marine exchange, a period of
17 tracking ships in the period of May to
18 September through the Bering Strait.

19 You can see Red Dog Mine and
20 Kivalina. You can see some traffic on the
21 Russian side, lots of traffic east of Little
22 Diomedes Island, along the coast, and this is

1 what I guess John you would use to see where
2 the important places are for new charting.

3 Of course, Nome is down here. So
4 we have some very interesting data, very
5 useful for not only the charting business and
6 hydrography, but of course, for the marine
7 spatial planning work to come.

8 USGS, important report, said that
9 about -- there's not a lot of oil in the
10 Arctic but a lot of gas, 30 percent of the
11 undiscovered gas probably on the planet is
12 located in the Arctic.

13 I put the red dots on one of their
14 chartlets, all indicate they are all coastal,
15 within the coastal, the EEZ of the coastal
16 states, so under the regulatory control of
17 the coastal state, which is very meaningful.

18 But a lot of the future finds are
19 all coastal, like off Greenland, off the
20 Russian Arctic and off Norway, it's all
21 coastal so it requires a response capability,
22 et cetera.

1 In the end of this study, of
2 course it had a number of recommendations and
3 we had to package it and market it, and we
4 did it with these three themes: enhancing
5 marine safety is essentially working at IMO;
6 developing a uniformity of governance and
7 particularly for marine shipping; special
8 rules for cruise ships and a SAR agreement.

9 And this week, maybe today, the
10 Arctic Council is meeting in Nuuk, Greenland.
11 The Secretary of State is supposed to be
12 signing for us a new Arctic SAR agreement
13 among the Arctic states, and that has some
14 implications for the coastguard, but for all
15 of you in NOAA also.

16 The other --

17 CHAIR WELCH: Search and rescue
18 for somebody's --

19 MEMBER BRIGHAM: Oh, sorry search
20 and rescue for the SAR, and having an Arctic
21 SAR agreement, that means some good
22 relationship among the eight Arctic states, a

1 movement towards a pretty secure and peaceful
2 place hopefully.

3 And protecting people and the
4 environment, lots of issues, invasive
5 species, many of which are in special marine
6 areas, delineating safe areas and oil spill
7 intervention, a whole host of issues.

8 And then finally we have a special
9 category for marine infrastructure which
10 includes everything, charts, everything that
11 NOAA is mostly responsible for, and the
12 coastguard, response capability, hydrographic
13 map and ocean data.

14 I show you this because the United
15 States and the Arctic states negotiated this.
16 So if you talk to the State Department they
17 will say use the AMSA as the guide because we
18 in fact signed up for all this whether you
19 knew it or not.

20 But you did know it, because in
21 the negotiation phase, the federal agencies
22 that were involved in this, all got a chance

1 to have a cut on the dynamic of what would be
2 approved by the United States.

3 Now these are very general and not
4 specific, but they actually are negotiated
5 and approved and so this is a marine policy
6 document of the Arctic Council.

7 It's a guide for a whole host of
8 players and actors. It's a baseline
9 assessment and but really it's a negotiated
10 text, so it is a very document of the Arctic
11 Council, first one that really is negotiated
12 and approved by the Arctic states.

13 You can look at marine transport
14 like this or like the media does. You can
15 look at it like this, from continental
16 connections between Churchill and Murmansk.

17 But for the next 30, 40 years or
18 forever, it's in and out of the Arctic Ocean
19 on a seasonal basis essentially. Some
20 crossings of the Arctic Ocean, we saw some in
21 the last year or two across the top of
22 Russia.

1 But most of this is not
2 trans-Arctic navigation. It's going up into
3 the Arctic, performing some activity,
4 whatever it is, picked up a -- it might be
5 year-round from Baffin Bay to Europe.

6 It is year-round already in the
7 Russian Arctic. Summer operations maybe
8 across, but most of it is destination as we
9 called it in this study, which has
10 implications to the U.S.

11 We ran a workshop at UAF with the
12 Arctic Council's support, and the highest
13 priority issues in the Arctic are a mandatory
14 polar code at IMO, a polar code that gives us
15 standards of ship construction, and most
16 important, standards for the pilot house and
17 the mariners. That's probably the most
18 important factor.

19 You can see tracking, monitoring
20 of ships using AIS, search and rescue
21 agreement, indigenous surveys.

22 If we have -- this one doesn't get

1 a lot of play, but very important, if you are
2 going to use multiple use management, or
3 marine spatial planning, we really need to
4 know where the indigenous use is, to apply
5 them into this mix of uses and that's tricky.

6 The next large task force and
7 project in the Arctic Council, supposedly in
8 the next couple of days we will hear about
9 it, is the Circumpolar Response Capacity
10 Agreement, in the next couple of years
11 harnessing the capacity of the Arctic states.

12 Observing network you have heard
13 about, of which NOAA will be part of it, AOS
14 is the U.S.-Alaska part.

15 And I would say, as you go down
16 the road, we need -- if we are going to look
17 at what should NOAA do and what should NOS do
18 in this area, we really need to follow it
19 closely, as you are -- staff are doing, this
20 first one.

21 How is number eight being
22 addressed, one of the objectives of the

1 Arctic Ocean policy is, addressing these
2 changing conditions.

3 The changing conditions are
4 described as, and related to sea ice retreat,
5 when in fact there are no words of economic
6 relationship which is really driving the
7 train for marine traffic.

8 But that's okay, I mean we can
9 ride under the guise of climate change and
10 sea ice, but it really is natural resource
11 development economics driving the need for
12 marine traffic, most of the marine traffic.

13 This assessment, again, is a guide
14 for U.S. policy and then of course, NOAA
15 itself, and you passed this out to us, has
16 its own vision and strategy, new, well one of
17 the issues is forecasting of sea ice.

18 I would say that one missing
19 element in the United States Arctic, we are
20 the only country that doesn't have a sea ice
21 atlas and have put our information together,
22 maybe an interactive atlas would be of the

1 past, today and the future using IPCC models.

2 So that's one thing that is
3 missing in it, and an atlas is useful for
4 strategic planning. It's highly valuable for
5 this marine spatial planning. If you don't
6 know where the sea ice is, how are you going
7 to plan out all these activities for safety
8 and marine environmental protection?

9 Last slide I think, and we will
10 have the discussion I guess after the next
11 two.

12 CHAIR WELCH: Well, I think --

13 MEMBER BRIGHAM: What do you want?

14 CHAIR WELCH: I think probably
15 what we ought to do is, if our other two
16 panelists don't mind, we ought to take a few
17 minutes on this and then each on -- so let me
18 just ask a couple of questions to start off
19 with.

20 Am I correct that in terms --
21 let's say that when we say the Arctic, the
22 U.S. Arctic, we are talking about the Arctic

1 Ocean, in other words north of the Bering
2 Sea. That's what I'm using right now when I
3 ask these questions.

4 Okay, north of the Bering Sea in
5 the U.S. territory, there are no commercial
6 port facilities.

7 MEMBER BRIGHAM: True.

8 CHAIR WELCH: Okay.

9 MEMBER BRIGHAM: Well, there are
10 coastal facilities along the north slope, but
11 they are minor. There's no real port north of
12 Nome.

13 CHAIR WELCH: Right, basically
14 when they supply the north slope up there
15 with the barge lift, they kind of beach the
16 barges.

17 MEMBER BRIGHAM: Come from
18 Seattle, come from wherever, no uptick.

19 CHAIR WELCH: Yes, they just sort
20 of run --

21 MEMBER BRIGHAM: Beach -- yes,
22 yes, there are a couple of piers up in the

1 north slope on the --

2 CHAIR WELCH: But nothing that you
3 would -- most people would consider to be a
4 commercial port facility, nor are there any
5 coastguard bases up there.

6 MEMBER BRIGHAM: None. No, Kodiak
7 is the closest air base.

8 CHAIR WELCH: Right. And the
9 coastguard's icebreaker fleet is what?

10 MEMBER BRIGHAM: Well, it's really
11 just the Healy, the two Polar classer. The
12 Polar Sea is going to be retired this year.

13 CHAIR WELCH: So we have one
14 working icebreaker under the U.S. flag that
15 can get up into the Arctic Ocean?

16 MEMBER BRIGHAM: True.

17 CHAIR WELCH: And the NOAA vessels
18 can't or don't go north of the Bering Sea?

19 MEMBER BRIGHAM: They do if it's
20 free water, right John?

21 CHAIR WELCH: Do they?

22 CAPT. LOWELL: They have in the

1 past. They have been up in the Chukchi.
2 They've been quite a bit. Most of the older
3 ships are ice-strengthened. They are
4 certainly not icebreakers. Do not confuse the
5 two.

6 And both the Rainier and the
7 Fairweather are ice-strengthened A1, E class
8 vessels, I don't know exactly how they match
9 to the polar code --

10 MEMBER BRIGHAM: What will bring
11 traffic of course to the United States Arctic
12 is not really this idea that there's traffic
13 from Russia or through the Northwest Passage.
14 I mean, there is going to be some, a few
15 cruise ships, some on the Russian side.

16 It's offshore development brings
17 an armada of ships. For each of the
18 production rigs, after exploration, and that
19 armada of ships could be huge, because each
20 rig, if they are working in the ice to keep
21 the ice away from the rig or reduce its --

22 CHAIR WELCH: The point I'm

1 getting at --

2 MEMBER BRIGHAM: Yes, I know.

3 CHAIR WELCH: The point I'm

4 getting at is --

5 MEMBER BRIGHAM: No capability.

6 CHAIR WELCH: The U.S.

7 government's physical maritime infrastructure

8 --

9 MEMBER BRIGHAM: Is zero.

10 CHAIR WELCH: in the Arctic Ocean

11 is pretty minimal.

12 MEMBER BRIGHAM: I mean, you know,

13 NOAA provides some charts, we have some heard

14 data, data shoreline work and important stuff

15 being done, which is very important.

16 But for real physical

17 infrastructure, other than providing

18 satellites and getting information, which we

19 have plenty of, about sea ice or whatever,

20 no, there's no real maritime infrastructure.

21 CHAIR WELCH: It just strikes me

22 as --

1 MEMBER BRIGHAM: None.

2 CHAIR WELCH: It just strikes me
3 as exceedingly strange that we have all these
4 people and all these governmental agencies in
5 Washington, they are all excited about the
6 Arctic, and they are not talking about, to
7 any significant extent, where we are going to
8 get the investments to put in government
9 maritime assets.

10 MEMBER BRIGHAM: Well, the
11 question is, what are those assets required
12 for, why would we need a port? We wouldn't
13 build a port like this here, because who is
14 coming there?

15 But we need maybe a base for
16 response. If you are going to have offshore
17 development, the response base can't be in
18 Kodiak or down in Dutch Harbor. It's got to
19 be near the activity.

20 There are no ports except for
21 Nome. Could be dredged. Could have handled
22 offshore supply boats. There's a meeting here

1 in the next two weeks up in Anchorage, the
2 beginning of the process the Army Corps is
3 hosting with the state on where should the
4 port be.

5 I am going to -- I think their
6 vision of a port is a grand container port
7 and all of that, and I am going to tell them
8 that it's a response port with a couple of
9 Coast Guard cutters and maybe commercial
10 response, with oil spill equipment.

11 I mean that's the port of the
12 future for the Alaska Arctic, because all of
13 the ships, wherever they come from, are not
14 stopping in Alaska, they are going to East
15 Asia or somewhere else, and it's a response
16 activity.

17 So it's not probably an economic
18 generator that people are envisioning, some
19 big meg-transshipment port. I mean, maybe it
20 could be plausible in the future.

21 But it's more of how do we protect
22 the place and the people and respond to

1 something that could happen, I mean, but
2 there isn't any true infrastructure today,
3 even communications is shaky. I don't know if
4 you have sailed up there, John, but it's
5 minimal.

6 CHAIR WELCH: Other comments or
7 questions? No? Michele?

8 MEMBER DIONNE: So what are the
9 next steps on this vision for the Arctic?

10 MEMBER BRIGHAM: Well, it's a
11 little tricky. CMTS is -- I don't even know
12 what the acronym stands for, CMTS? Is that --

13 CHAIR WELCH: Committee on the
14 Marine Transportation System.

15 MEMBER BRIGHAM: Yes, they deal
16 with it and I talked to the staff and some of
17 those folks in D.C. are envisioning some big
18 port that links somehow Alaska to the world,
19 and I unfortunately tell them, I mean, our
20 vision in the Arctic Council and the work
21 that we did for the State Department is, it's
22 not that kind of vision, although it could

1 happen I guess.

2 I think we are working on the
3 wrong stuff, but --

4 MEMBER DIONNE: So, for the moments
5 things are just sort of working out okay?

6 MEMBER BRIGHAM: No, the Arctic
7 Council got a new SAR agreement, the Arctic
8 Council is going to have an environmental
9 response agreement of which the United States
10 will be a part.

11 Stuff is happening in Washington.
12 Gerd probably knows more about it than I do.
13 Not any money, I don't think they have asked,
14 NOAA or anyone, particularly not the Coast
15 Guard, from what I know --

16 MEMBER DIONNE: For supporting this
17 increase in shipping, it's not -- not
18 adequate supports?

19 MEMBER BRIGHAM: Well, there is --
20 well, from the work we did in the Arctic
21 Council, we would say it's not global
22 shipping trade routes, it's more shipping.

1 Most of it's actually happening in
2 the Russian Arctic and in northwest Europe.
3 There will be some in the Canadian Arctic.
4 And the shipping will be related to offshore
5 development in the United States if we
6 actually drill and do it, which --

7 CHAIR WELCH: There are people in
8 Washington that think that container ships
9 like what we saw today except bigger, are
10 going to start going through the Northwest
11 Passage, from Europe to Japan and China --

12 MEMBER BRIGHAM: Tomorrow.

13 CHAIR WELCH: Which is baloney.

14 MEMBER DIONNE: For 14 days of ice
15 -- you said 14 days it was open?

16 MEMBER BRIGHAM: Yes, I mean, it's
17 plausible I think from IPCC models and the
18 upcoming ones, that there could be a couple
19 of month period there in the summer, where
20 it's actually ice-free, whatever ice-free
21 means.

22 But I think all ships in the

1 Arctic Ocean in the future will be required
2 to be a polar-class ship of some sort, even
3 low class, because none of the Arctic states
4 including our own are going to allow free
5 water ships sailing around the Arctic waters.
6 It's going to be tough.

7 CHAIR WELCH: One thing that we
8 saw today, that I think impressed several
9 people because the commented on it, is how
10 that vessel is really part of a very
11 intricate system and schedule and rotation.

12 And all container ships are like
13 that, even things that are not just going
14 from inner islands to California. The ones
15 that are going across the Pacific Ocean, and
16 all these systems are like that.

17 And but that depends on you being
18 able to have a fairly stable operating
19 environment in which you can be pretty
20 confident you can make that schedule on a
21 consistent basis, and this, to me it just
22 seems intuitive that business people are not

1 going to put a system like that up in the
2 Arctic Ocean, anytime soon.

3 MEMBER BRIGHAM: Well, of course
4 the Russian Arctic, of course they --

5 CHAIR WELCH: Well, I'm talking
6 about --

7 MEMBER BRIGHAM: Oh, our side.

8 CHAIR WELCH: -- the U.S. Arctic.

9 MEMBER BRIGHAM: Well, we don't --
10 I mean we have Merchant Marine here but we
11 don't have a global Merchant Marine in the
12 context of the rest of the world, I mean we
13 have something, but I think you know what I
14 mean. It's not -- we are not going to have a
15 new fleet of ships, it could be someone else,
16 Russian ships carrying resources to China, in
17 the summertime again.

18 It's hard for -- we talked to
19 Maersk, not Steve, but during the course of
20 study we had Maersk strategic planners with
21 us and it is hard to integrate their fleet
22 with the seasonal nature of what the Arctic

1 might be, even if you have polar-class ships
2 it's hard to do.

3 Then people talk about
4 transshipment using the Arctic transshipment
5 between Adak and Iceland and a lot of plans
6 out there, a lot of vision. I personally
7 think it's a misinterpretation of actually
8 what the sea ice is.

9 It's a lot thinner, and there's a
10 lot less of it at certain times of the year,
11 but actually there's still a lot of it in the
12 Arctic so that just as itself, as a barrier
13 to high speeds.

14 I mean the ship we saw today is
15 doing 27 knots. There isn't an icebreaker in
16 the world that will do twenty -- even the
17 nuclear icebreaker does 23 knots in the ice
18 and we just can't go that fast because the
19 pieces of ice that you create can clean off
20 what you have astern. So it's a tricky thing.

21 So ship speed, of course, but then
22 people correlate maybe lower missions with

1 shorter distances across the Arctic. Well,
2 makes sense to us, shorter distance, lower
3 fuel usage, but you better pick when the
4 window of time, so correlating that with your
5 schedules of cargo across the world is a hard
6 thing to do.

7 I think we will see lots of large
8 ships in the Arctic Ocean, some tankers,
9 mostly bulk carriers, carrying stuff out of
10 the Arctic to the global markets, a little
11 bit year-round, in the Canadian Arctic, and
12 the western Russian Arctic.

13 But it would be hard to perceive
14 in the middle of the wintertime, year-round
15 transits through Bering Strait, from an
16 economic standpoint.

17 Physically, you can today probably
18 take a nuclear icebreaker across the Arctic
19 Ocean in the dead of winter, it would
20 probably take you some, probably about two
21 knots speed.

22 CHAIR WELCH: Now, the Red Dog

1 Mine, which is this mine in western Alaska,
2 below the Bering Strait --

3 MEMBER BRIGHAM: No no, it's
4 above.

5 CHAIR WELCH: It's right above,
6 okay. But it's -- how many months out of the
7 year is there marine traffic to it?

8 MEMBER BRIGHAM: It's about 60-
9 some days with a -- it's a window of
10 opportunity. It's managed tightly by the
11 Coast Guard. And the ships can only come in
12 free water and anchor offshore, because it's
13 a barge operation.

14 So part of it is related to
15 season. It's not as extended as it could be
16 because of the weather and storms in the fall
17 or early in the spring.

18 So it's limited. Could be extended
19 were the sea ice to retreat, maybe that
20 window of time could be extended, but what
21 they do is stockpile what they produce in
22 zinc. They stockpile it there and wait for

1 the summer to come.

2 CHAIR WELCH: And then run it out
3 as much as they can, quickly.

4 MEMBER BRIGHAM: Yes, because we
5 won't allow any non- -- well, we allow free
6 water ships to come in.

7 CHAIR WELCH: But that is an
8 example of what you are talking about, which
9 is extracting and --

10 MEMBER BRIGHAM: Yes, yes.

11 CHAIR WELCH: -- an Arctic
12 resource and then taking it south, as opposed
13 to transit across the Arctic Ocean?

14 MEMBER BRIGHAM: But the notion of
15 the different global industry, which is in
16 the Arctic and so when you deal with it, is
17 this cruise ship industry. It's a lucrative
18 market. People want to go see the last polar
19 bear and see stuff, last glacier, whatever
20 they want to see, I mean, it's a lucrative
21 market, both ends of the world we know, and
22 is the International Maritime Safety System

1 up to the task of providing an envelope of
2 safety for all that?

3 Ships themselves are pretty safe,
4 but there isn't the infrastructure in the
5 Arctic to respond to any -- no salvage in the
6 Arctic within a week of transit.

7 And people think about --

8 CHAIR WELCH: Yes, I was up there
9 a number of years ago at this beautiful,
10 pristine lake right up at the Arctic National
11 Wildlife Refuge, and about three years ago
12 some guy taking his float plane in there and
13 flipped it.

14 Well, here he is in this
15 wilderness area, upside down in the lake and
16 everybody is debating how in the hell can we
17 get this plane out of here, and for all I
18 know it's still there.

19 I mean, you know, there are just
20 no resources to respond to something like
21 that.

22 MEMBER JAY: A question about the

1 -- moving into the Canadian part of the
2 Northwest Passage there, is there any feeling
3 about what kind of -- I mean is there free
4 water everywhere, it's you know, or is there
5 --

6 MEMBER BRIGHAM: No, there are
7 about eight different routes across the
8 Northwest Passage. It's a set of routes. The
9 shore -- the ones closest to the continent,
10 the one that Amundsen used in 1903 and '06
11 are very shallow. It's only for yachts and
12 small vessels.

13 The deep water channels are
14 further north and they are a couple of
15 hundred meters deep, and it's been charted,
16 well we have heard briefings in Canada a
17 little bit, they have charted it, but it's
18 not completely to international standards,
19 the whole of each of the routes.

20 So they are a real challenge. In
21 Canada, of course, Nunivak and the devolution
22 of some authority to the indigenous people

1 and the regional people, that will have some
2 impact on the use of the area too.

3 So there's a lot of internal
4 politics in Canada. Of course you know we
5 disagree with their interpretation of
6 international straits. While we say it's
7 international straits, they say it's internal
8 waters, just like the Russians say it's
9 internal waters over there and not
10 international straits.

11 That's a difference that probably
12 will never be easily solved. Probably nobody
13 wants to take it to the world court, or the
14 International Court of Justice. Something we
15 will just have to live with.

16 It's -- but it is interesting, we
17 would deploy, I mean I say, the Coast Guard
18 would, if we have an international polar
19 code. In domestic law, we would accept that
20 polar code and then apply that to our region
21 of the Arctic, to mandate that ships sailing
22 through the United States Arctic waters would

1 adhere to this international polar code.

2 How you exercise enforcement and
3 security issues is a good challenge for the
4 Coast Guard in the future, if you have got to
5 have gear to go there and do it.

6 CHAIR WELCH: Gary.

7 MEMBER JEFFRESS: Lawson, last
8 year I came across an article by some Danish
9 scientist that pointed out the fact that the
10 ground track for the GPS satellites goes up
11 to around about 52 degrees or something.

12 Have you heard any concerns about
13 the degradation of the accuracy of GPS up in
14 the Arctic?

15 MEMBER BRIGHAM: Well, it doesn't
16 work too well at 70 or 80 north where I've
17 been on the Polar Sea. Of course this was in
18 the mid-'90s and so maybe the capability is
19 enhanced. I think not only GPS but all
20 communications are degraded quite a bit when
21 you are anywhere near the central Arctic
22 Ocean, 75, 80 north.

1 MEMBER JEFFRESS: Right.

2 MEMBER BRIGHAM: So it's -- I
3 think there are some questions.

4 CHAIR WELCH: Okay, I think at
5 this point Lawson, this is a good
6 introduction to us to this topic, which we
7 certainly will be exploring in different ways
8 at future meetings.

9 Also, many of you have met,
10 particularly the new members that came into
11 Silver Spring, Andy Armstrong, who is on the
12 panel, and Andy has a lot of first-hand
13 experience with recent expeditions up to the
14 Arctic and can tell us a lot of first-hand
15 observations up there. We will be able to
16 take advantage of that at future meetings.

17 So let us go to Susan and Susan is
18 going to bring us a perspective about
19 recreational boating, particularly in the
20 Pacific. So go ahead Susan.

21 MEMBER SHINGLEDECKER: I've been
22 trying to think a way to segue from the

1 Arctic to recreational boating, and I think
2 the only place that might have less
3 recreational boating in the U.S. than Hawaii
4 would be the Arctic.

5 So there's nothing graceful about
6 this transition. I apologize. Just a quick
7 show of hands. How many people in the room
8 consider themselves to be recreational
9 boaters? Great, great. Good to see.

10 I was going to skip over this real
11 quickly but since I have had a number of
12 questions since I've been here, I am going to
13 go a little bit more into who BoatU.S. is
14 just so that you can understand my
15 perspective, then I am going to go over an
16 overview of recreational boating and boaters
17 nationwide and how boaters interact with NOAA
18 as a whole, and then specifically
19 hydrographic needs of recreational boaters.

20 And then I will do my best to tell
21 you a little bit about recreational boating
22 in Hawaii. Joyce has been wonderful yesterday

1 giving me a little bit of a tour of some of
2 the harbors.

3 I also spoke with our Vessel
4 Assist captain here in Oahu and a couple of
5 marine surveyors, the guys that survey the
6 boats, not under the water hopefully, to get
7 their perspective as well.

8 I grew up boating on the Great
9 Lakes and the Chesapeake so sadly I don't
10 have much first-hand experience, but I will
11 work on that.

12 So who is BoatU.S.? BoatU.S. is
13 the Boat Owners Association of the United
14 States. We have about a half a million
15 members around the U.S. who are recreational
16 boaters.

17 Many people will say we are kind
18 of like the AAA for boats. We provide
19 membership. Through that membership, members
20 get discounts at marinas, on fuel, transient
21 slips and service.

22 They get premium discounts at West

1 Marine. We are a leading boat insurance
2 company. We are the largest towboat fleet in
3 the country.

4 On the east coast we are called
5 TowboatUS. On the west coast we are called
6 Vessel Assist, coming to the assistance of
7 recreational boaters throughout the country.
8 We also have inland coverage as well.

9 We also do on the road towing. If
10 you are trailering your boat and your boat
11 breaks down, if you call AAA they are
12 probably going to leave your boat at the side
13 of the road and take care of your car, and in
14 case we insure that boat, we want to make
15 sure that boat is not left at the side of the
16 road.

17 We have a consumer protection
18 bureau that looks at problems with boats and
19 kind of is an advocate for boaters when they
20 run into consumer problems.

21 We have a government affairs
22 department and where I actually reside is in

1 the BoatU.S. Foundation for Boating Safety
2 and Clean Water.

3 Obviously boating safety directly
4 interacts with a lot of the hydrographic
5 services provided by NOAA. I run all of our
6 environmental efforts, everything from oil
7 spills to sewage.

8 The foundation does a lot of -- we
9 are really the arm that really educates
10 recreational boaters how to be safer and how
11 to be more environmentally conscious with
12 their boating.

13 We offer a nationwide, online
14 boating safety course and we are really an
15 education resource for boaters. We are
16 actually in the process of developing new
17 advanced online courses for boaters, and this
18 -- the last two days have got me thinking a
19 little bit more about partnering with the
20 power squadrons and some of the groups that
21 offer navigation and charting courses for
22 recreational boaters and how we can take

1 those online and make them more accessible to
2 more boaters, is something that I had been
3 thinking about in that area.

4 So who are the nation's
5 recreational boaters? There are 17 million
6 recreational boaters in the U.S. and that is
7 one in 10 households owns a boat.

8 In 2009, 75 million adults or 32
9 percent of all adults went boating. I think
10 that's a pretty fantastic number, I'd love to
11 see it go even higher.

12 The most interesting bullet on
13 this slide I think is that 79 percent of boat
14 owners have an average household income of
15 less than \$100,000, and that's not the
16 picture that Hollywood portrays of boaters.

17 I think the average sized boat in
18 the country I believe is between 17 and 19
19 feet. So when you are talking the first day
20 about the kayak charts, yes, those are the
21 charts that some of those guys are needing if
22 they have a chart on board.

1 Just a little snapshot of
2 recreational boating and the economy. You
3 know obviously we are not the kind of thing
4 like the container ports are, but in 2009,
5 over \$30 billion was spent on sales and
6 service alone.

7 I won't read through all of it.
8 You guys can read pretty well I'm sure. But
9 recreational boating does have a significant
10 impact on the economy and on jobs.

11 Recreational boating especially
12 impacts a lot of small businesses. A lot of
13 the marinas and the service yards and the
14 manufacturers, a lot of those are actually
15 really small businesses and can be real
16 drivers of the economy, especially at the
17 local level.

18 This is an interesting snapshot
19 once again, talking about the size of boats.
20 And I put this up here to kind of give a
21 perspective because Hollywood and the glossy
22 magazines including the ones we put out like

1 to portray -- you know we like to show the
2 pictures of the really pretty boats.

3 But this -- non-motorized boats
4 represent -- this is registered boats in the
5 U.S., so obviously there are a lot more non-
6 motorized boats than are up there, but most
7 states do not register kayaks and non-
8 motorized boats.

9 So that number is actually larger
10 in total. Forty percent of the boats are
11 under 16 feet. And 47 percent of the boats
12 are between 16 and 26 feet.

13 So really only six percent of the
14 vessels are 26 feet and larger, and I don't
15 think that that is the common perception of
16 most boaters.

17 And I'll just run through, I'm
18 lacking in pictures, so I'll run through a
19 couple of pictures here. This is your boat
20 under 16 feet, you know, and I don't -- I'm
21 pretty sure these guys don't have a paper
22 chart aboard. I am hoping they have life

1 jackets aboard. You know, your personal
2 watercrafts.

3 Your boats 16 to 26 feet,
4 oftentimes these are trailered boats kept in
5 driveways, you know the family fishing boat,
6 some on lifts, your small racing sailboats,
7 that kind of thing.

8 And then this is getting up into
9 the category of boats that you are saying oh,
10 okay, yes, that's the boat I see in the
11 magazine.

12 Well once again, here we are down
13 to, I believe this was the five percent
14 category of boats in the country.

15 And then you know, your nice boats
16 over 40 foot. These are the guys that are
17 going to have your more modern chart
18 plotters, and they are going to really have
19 that kind of data on board for more distance
20 work.

21 Just, we were really fortunate. A
22 week and a half ago, two weeks ago, Dr.

1 Lubchenco and some NOAA staff came to
2 BoatU.S. headquarters for a marine debris
3 project I work on, and I was talking and
4 trying to think of all the ways that NOAA
5 interacts with recreational boaters and we
6 really had this epiphany that recreational
7 boaters actually interact with almost every
8 line office of NOAA in one way or another.

9 That first line, I have never had
10 a line of a slide that was all acronym, I
11 really apologize for that. This just kind of
12 looking at the different line offices of NOAA
13 and where recreational boating fits in with
14 the National Environmental Satellite, Data,
15 and Information Service, that's where the
16 search and rescue satellites are housed, and
17 EPIRBs are emergency positioning indicator
18 radio beacons.

19 These are basically your beacons
20 if you go offshore, you are outside of radio
21 range, this is how you let the Coast Guard
22 know you need help and it's NOAA that

1 maintains those satellites.

2 The BoatU.S. foundation actually
3 rents these devices at a low cost for
4 boaters, \$50 a week for those boaters that
5 can't afford to own one. We make that service
6 available to them for a lower cost.

7 We register all our EPIRBs with
8 NOAA and then when they go off, which does
9 happen about once a year, we get a call from
10 the Coast Guard and it goes through our 24-
11 hour towing dispatch so we are able to
12 provide really accurate information on the
13 type of vessel that is in distress, how many
14 people are aboard, that kind of thing.

15 Obviously, we work closely with
16 National Marine Fisheries Service on any
17 recreational fishing issues and issues
18 related to protected species.

19 The National Weather Service is a
20 huge component for us, as far as representing
21 recreational boaters but also as a boat
22 insurance company, we are really interested

1 in those marine forecasts and the hurricane
2 forecasts.

3 As an insurance company, if you
4 are insured with us, and your boat is in the
5 cone of a hurricane, there are certain steps
6 that you have committed to put in place.

7 Every one of our insureds has a
8 hurricane plan if they are in a hurricane
9 area and if they fail to put those procedures
10 in place that they have committed to, that
11 changes their deductible, should they have a
12 loss.

13 So from a business perspective,
14 that's very important to us. And then also on
15 the research side of things, looking at
16 invasive species, hurricane research,
17 observing systems, all of that.

18 Now to the office most of you care
19 about, NOS, I mean the list could just go on
20 and on and on. You know, charts, tides,
21 currents, water levels, ocean observing
22 systems, marine protected areas, marine

1 spatial planning, oil spills -- we did a fair
2 amount with working with recreational boaters
3 on the Deepwater Horizon and making sure they
4 were educated on where they could go, where
5 they couldn't go, and how to kind of stay out
6 of the way, frankly, and marine debris.

7 And it seems to me when looking at
8 the three offices served by the hydrographic
9 panel, depending on your size of the boats,
10 if you are a larger boat, yes, those charts
11 and having charts of areas that recreational
12 boaters go to, beyond just the deep water
13 harbors, is really important and especially
14 from an insurance company perspective, we
15 don't want those boaters to run aground
16 either.

17 And then for the smaller boats, I
18 see a lot of the CO-OPS products and the
19 water and weather observations, the tides,
20 the currents, as really vital to them.

21 While they may not rely on the
22 charting products, they are possibly more

1 vulnerable to on-the-water conditions being a
2 smaller craft. So those products are really
3 vital to that larger population of small
4 boats.

5 So that brings me to recreational
6 boating in Hawaii. There are roughly 15,000
7 registered recreational boats in Hawaii,
8 that's less than one tenth of a percent of
9 all registered U.S. boats, and also I have
10 heard anecdotally that per capita, Hawaii
11 also, per capita population, has the lowest
12 number of recreational boats per capita.

13 I don't think I have to tell you,
14 if you were on the bus this morning, that the
15 boating infrastructure in Hawaii is in
16 disrepair, and every single one of our
17 stakeholders that I have talked to to get
18 information about recreational boating in
19 Hawaii, has said the recreational harbors are
20 just in shambles.

21 And I mean I don't know about you,
22 but I am not going to go and spend a whole

1 bunch of money on a boat and put it somewhere
2 where it is not going to be safe.

3 And then if there isn't adequate
4 infrastructure, if there aren't adequate
5 slips, how can you go out and buy a new boat,
6 if there is no place for you to put it? And
7 so that's really concerning when you see how
8 can this market grow here.

9 Our tower tells me that the boats
10 here are older and larger than the national
11 average and that's not too surprising. I
12 mean, recreational boating in Hawaii is kind
13 of like jumping in the deep end of the
14 swimming pool.

15 It is probably good that they have
16 larger boats than the national average, and
17 the older part doesn't really surprise me
18 just because of the distance to get here and
19 once a boat gets here it probably doesn't
20 leave once it gets beyond a certain age.

21 And the type of boating people do
22 out here is just different because I mean,

1 there's deep water so from a charting
2 standpoint, for the recreational boats, I
3 haven't heard much concern that oh, there's
4 areas that need to be recharted from the
5 recreational perspective, no.

6 The water is pretty deep. But it's
7 the open ocean, the big swells, you know, you
8 better know what you are doing if you are
9 going out pretty far. Unless you are just
10 tinkering around the harbor for Friday night
11 races, you need to have some serious
12 knowledge or you are going to get in trouble
13 pretty quickly.

14 Our Vessel Assist Captain in Oahu,
15 I believe he has been here now two or three
16 years. He was going to try and join us but I
17 am thinking with how windy it is, he might be
18 out assisting someone right now.

19 He said he has seen his business
20 grow and he feels that there is an additional
21 sense of security by having a recreational
22 towing assistance provider in the area, that

1 people know there is a little bit more of a
2 safety net. So that's nice to hear.

3 As Joyce mentioned, there's few
4 safe harbors. If you go out and you get in
5 trouble, it's not like the Chesapeake Bay
6 where you can just tuck in wherever. You
7 know, you are really exposed.

8 She was telling a story about a
9 couple actually from Chesapeake Bay that had
10 chartered a boat and pulled into one little
11 harbor and just figured there would be a
12 restaurant right nearby, and kind of like the
13 Arctic, that isn't the case.

14 So that's some of the reasons why
15 recreational boating is just different and
16 even though it's an island state, it's not
17 full of recreational pleasure boats.

18 So as far as -- like I was saying,
19 relative to NOAA products, the water gets
20 deep quickly, the charting is pretty good
21 with the exception of maybe a few small
22 harbors, and I can get the names of those if

1 you are interested.

2 And the one thing, a lot of the
3 stakeholders I talked to, they just really
4 praised NOAA's work on the tsunami warnings
5 and I know our tower, he got his boats out of
6 the harbor, went pretty far out, and he said
7 he never even felt it go by.

8 So, but he has been pretty busy, I
9 think in the harbor that we saw immediately
10 after Madison, raising some of the sunken
11 vessels and trying to be part of the solution
12 there.

13 CHAIR WELCH: Okay, Susan thank
14 you. Comments or questions to Susan on
15 recreational boating?

16 John?

17 CAPT. LOWELL: Yes, thanks, Ed,
18 actually I liked your presentation there
19 Susan. Obviously recreational boaters is an
20 area that we typically don't put the
21 resources behind that we probably should. But
22 you know all the reasons for that. We are all

1 just resource-strapped.

2 To address that, I just want to
3 bring up a couple of quick things, is we do -
4 - we have recently put online our booklet
5 chart product which is really the ability of
6 anybody, anywhere to download any of our
7 charts in 8-1/2 by 11 format and they can
8 print it out and they have a fully, basically
9 it's a somewhat cut up, chopped up, but fully
10 updated nautical chart, and it's available
11 free on the web.

12 We have also -- are starting up a
13 relationship with chart vendors, so that they
14 can put some face on the front of that should
15 they want to, on orders perhaps, simply
16 provide that as a product that they could put
17 their stamp on it.

18 This is not for navigation but
19 it's certainly a good situational awareness
20 type product that was put in place
21 specifically for the recreational boaters.

22 So they didn't have to buy a \$20

1 big chart, they could simply get a little
2 booklet chart.

3 MEMBER SHINGLEDECKER: That's
4 great.

5 CAPT. LOWELL: So that's out there
6 and it's online right now. I do want to get
7 the names of those small harbors from you, so
8 thank you for that. And if you would,
9 obviously the towing industry for
10 recreational boats is something that has
11 developed over the last, I guess, maybe two
12 decades. Can you quickly for the panel,
13 review the relationship and the difference
14 between the commercial tow, such as your
15 service, and then the Coast Guard's role?

16 MEMBER SHINGLEDECKER: I'll do my
17 best. I don't know the ins and outs exactly.
18 I believe that the Coast Guard is only going
19 to come and get you if life is on the line,
20 and if your life is not on the line, they are
21 not coming to get you.

22 So we come if it's -- and

1 sometimes even the Coast Guard will come and
2 bring them in and they will cast them off to
3 one of our towers once they are closer in and
4 see that the immediate danger has passed. I
5 think it was just determined that that wasn't
6 the best use of taxpayer dollars.

7 And one of the things I wanted to
8 point out, that just from a -- I was really
9 pleased when I learned that as a company,
10 BoatU.S. and TowboatUS' interests are aligned
11 with that of the public and that of NOAA and
12 Coast Guard and such that when one of our
13 members gets towed, if someone gets towed, if
14 they are not a member, they are paying the
15 full cost to our tower.

16 If one of our members gets towed,
17 we are paying the full cost to the tower. The
18 tower gets paid regardless. But so as an
19 association, it's in our interests, we don't
20 want to pay for that, we don't want to have
21 to pay for tows.

22 So we want to do everything we can

1 to make sure our boaters are educated about,
2 that they have up to date charts, that they
3 know what they are doing when they are out
4 there, to avoid that situation.

5 I was recently talking with
6 someone from Sea Grant and they thought well,
7 you know, maybe you want people to get towed
8 so then you make money.

9 And it's not -- that's not the
10 case. We do not want to have tows. So it's --
11 I appreciate that our interests are all
12 aligned in that manner.

13 CAPT. LOWELL: Okay. Thank you
14 very much.

15 MEMBER HICKMAN: I can tell you
16 that a business partner of mine has a
17 recreational boat in Galveston. Tow was \$500.
18 Had he had his membership up to date, which
19 had just expired, it would have been fifty.

20 And the operator he was trying to
21 impress wasn't impressed. He wasn't impressed
22 at all.

1 (Laughter)

2 MEMBER SHINGLEDECKER: It seems to
3 me that you can't get towed for less than
4 \$500 almost anywhere, because you are paying
5 for the time and the moment they leave the
6 dock until when they get back to the dock.

7 Our basic membership covers a
8 small amount of towing, and then we have up
9 to unlimited towing for like \$130 a year I
10 think in coastal areas.

11 MEMBER CAROTHERS: This is Jeff
12 Carothers. Susan, we had a customer that we
13 helped rescue then he immediately got
14 stranded on the beach.

15 But I think what I am hearing that
16 I like a lot is the comparison between the
17 Coast Guard and that is kind of what we were
18 talking about yesterday. Where does the user
19 start paying a little bit of money rather
20 than the government paying the money.

21 I don't know where it leads us,
22 right now, but I mean, your company is a

1 perfect example of where the Coast Guard
2 doesn't have to do that work.

3 CHAIR WELCH: There were some
4 pretty heated Congressional debates back in
5 the early 1980s as to exactly where the line
6 should be between private towing companies
7 and the Coast Guard, and I think there still
8 is a fair amount of discretion to Coast Guard
9 officers, of you know, if somebody has run
10 out of fuel and the weather is good and it's
11 daylight, obviously the Coast Guard is going
12 to say either you or we will call the local
13 private towing company.

14 But there are a lot of Coast Guard
15 officers who are loath, even if the weather
16 conditions are okay, to leave people bobbing
17 out, you know, their boats bobbing out in the
18 water, if darkness is approaching.

19 So you know you might say there
20 really isn't a life-threatening situation,
21 but if it looks like that vessel is going to
22 be out there in the dark, I think in many

1 cases, the Coast Guard will go out and get it
2 then.

3 There's quite a bit of discretion
4 given to whoever the local Coast Guard
5 commanding officer is in a situation like
6 that.

7 MEMBER SHINGLEDECKER: From
8 everything I can tell, there is a great
9 amount of cooperation between the Coast Guard
10 and the towers in terms of who is responding
11 to radio calls, who is hearing what, the
12 relationship seems pretty good.

13 CHAIR WELCH: Susan, as you move
14 to the higher, the larger end of recreational
15 boats, is there any kind of legal requirement
16 on those larger recreational boats to carry
17 charts, like there is for commercial vessels?
18 And where is that delineation?

19 MEMBER SHINGLEDECKER: There is a
20 threshold. I don't know it.

21 MEMBER J. MILLER: I think it's
22 Class 2 boats. We were required to carry

1 charts on our boat. It was 48 foot. We have
2 recently sold it. I used to be a BoatU.S.
3 member.

4 MEMBER SHINGLEDECKER: I think I
5 remember hearing above 45 feet.

6 MEMBER J. MILLER: Yes, I think
7 that's what it is. We certainly are required
8 to carry it on our 25 foot survey launch that
9 -- so.

10 MEMBER SHINGLEDECKER: I think
11 it's interesting in looking in the context of
12 the panel of we have done some tests on
13 different phone apps and things like that,
14 and I would be interested in having you know,
15 a meeting that focused a little bit on that
16 chart of the future, because you know, even
17 those little -- even the bubbas in that
18 little fishing boat, you know, they might
19 have a smartphone that could access some
20 information. It's kind of what you said, it
21 may not be the most detailed, but it might be
22 able to give them the information that they

1 needed.

2 And so finding ways -- what people
3 can get on a smartphone nowadays just really
4 amazes me, and that for the recreational
5 boater, that's really accessible technology.

6 MEMBER DIONNE: Just a comment
7 about the guys out in the marsh area, you can
8 get lost easily in a marsh like that at low
9 tide. You can't see where you are and
10 probably the charts aren't detailed enough to
11 tell you how to get out of there, but if they
12 were, and you had your position, you could do
13 that.

14 MEMBER J. MILLER: Yes, one thing,
15 in '98, we went down the intracoastal
16 waterway, and it was before NOAA had the
17 flipcharts, but there were commercial ones
18 available, and they were just invaluable in
19 being able to control your chart.

20 I mean you were going down a long,
21 linear waterway, and they were really
22 excellent tools. You know, we had the big

1 chart and everything, but it just was really
2 hard to handle and those waterproof flip
3 things are really a good product for that
4 kind of boating.

5 MEMBER SHINGLEDECKER: The
6 foundation has actually tentatively scheduled
7 -- we test various products, usually about
8 two a year, and on our list, probably in the
9 next year or two, is various ways to access
10 charting products, in looking at different
11 commercial products as well as you know, free
12 products, government available products, to
13 see, you know, which applications work best
14 for different types of boating.

15 CHAIR WELCH: Gary.

16 MEMBER JEFFRESS: John, I got a
17 question for you. Has like Google shown any
18 interest in like getting all your electronic
19 charts and putting them out as a layer in
20 Google Earth or Google Maps? And would you do
21 that?

22 CAPT. LOWELL: Actually a number

1 of aggregation-type websites do that right
2 now. Google has approached us on bathymetry
3 but they have never approached us on you
4 know, like raster, a quilted together type
5 of a product.

6 But that exists in many, many
7 different websites right now. As long as they
8 don't put the NOAA logo on there, it's once
9 again, the data is all freely available and
10 they can do it.

11 MEMBER JEFFRESS: Wouldn't it be
12 better if you left the NOAA logo on it?

13 CAPT. LOWELL: Then they can't use
14 it for commercial purposes. That is actually
15 a registered trademark.

16 MEMBER JEFFRESS: But if they are
17 giving it way for free, it's not for
18 commercial purposes.

19 CAPT. LOWELL: If they are
20 charging somebody to access that quilted
21 data, then it's -- they are making money out
22 of it. There are a few that are doing that

1 though.

2 MEMBER JEFFRESS: I'm sure they
3 could figure out a way to take it off for the
4 lines of their charge and leave it on for the
5 rest of us.

6 CAPT. LOWELL: People are very
7 inventive, yes.

8 CHAIR WELCH: Lawson?

9 MEMBER BRIGHAM: Just a quick
10 question about it. I know you have an
11 effective relationship with the Coast Guard,
12 the Coast Guard is -- the active duty Coast
13 Guard and the reserves and the auxiliary, I
14 wonder if the Coast Guard auxiliary, how your
15 relationship is, and if you overlap in
16 training programs et cetera?

17 MEMBER SHINGLEDECKER: I think we
18 have a great relationship with the auxiliary.
19 A couple different services we provide for
20 them. We provide online education but we also
21 provide what we call our course line online.

22 It's a tool to help anyone find

1 in-person boating safety courses. You can go
2 onto our website and enter a zipcode and you
3 can find a boating safety course in your
4 area, and we put all the auxiliary courses
5 into that.

6 We do provide some free brochures
7 and things like that and the auxiliary seems
8 to love that, to take out to boat shows and
9 things like that.

10 We have -- I'm saying we, this is
11 all the foundation -- the foundation has a
12 small grants program that we provide grants
13 of up to \$4,000 to small, volunteer-based
14 groups around the country, to do boating
15 safety and environmental education to their
16 stakeholders.

17 We just -- this year we are doing
18 Pepsi Refresh style. We are going to have
19 online voting on Facebook and you, the public
20 can choose who we fund.

21 But there are a number of
22 flotillas that are in there with their

1 applications. I believe that this year we are
2 going to be a partner with the Vessel Safety
3 Check Program as well, BoatU.S. on a
4 corporate level sponsoring, getting auxiliary
5 and power squadron folks out working with the
6 public, inspecting their boats for mandatory
7 required equipment, things like that.

8 So we do a number of things with
9 them.

10 MEMBER BRIGHAM: The Coast Guard
11 auxiliary are an extraordinary volunteer
12 organization integral to the boating safety
13 of the country.

14 MEMBER SHINGLEDECKER: Absolutely.

15 MEMBER BRIGHAM: And kind of
16 amazing that it's all voluntary. There's
17 40,000 Coast Guard auxiliaries I think, I'm
18 not sure of the latest number, but a lot of
19 people.

20 CHAIR WELCH: Yes, did you have a
21 comment John?

22 CAPT. LOWELL: I actually, it was

1 a follow up on one of the comments that Susan
2 just made having to do with iPhones or that
3 type of a thing.

4 One thing we did two years ago, or
5 maybe it was three years ago at this point,
6 is we -- all of our charts have been
7 available free on the web for many users for
8 quite a while now.

9 But one of the things we did two
10 years ago is we created a product catalogue
11 that is computer-based, XML catalogue that
12 allows these ECS electronic charting system
13 builders, the people who write the software,
14 you know, the Rose Points, Captain type
15 programs, to easily integrate in an automatic
16 way, to reach out to our website, look to see
17 what has been updated, what has not been
18 updated, and download specifically only what
19 they want, and it's all in an automated
20 format at this point.

21 And we noticed maybe about a year
22 ago now, that we had a big spike in

1 downloads, and we were kind of scratching our
2 heads going well what the heck happened
3 there?

4 And almost the entire spike, which
5 was probably about 10 million downloads, was
6 attributed to iNav net. So somebody had
7 created an app for an iPhone and then
8 everybody downloaded that, you know, for some
9 reason, and then immediately started
10 downloading the charts.

11 And so we just got a big spike in
12 one month and it was all for navigating on --
13 well I don't know what they are navigating on
14 the iPhone, but they are certainly
15 downloading a lot of charts.

16 And so we kind of -- every once in
17 a while we check to see how many charts iNav
18 has been responsible for.

19 CHAIR WELCH: We had, about three
20 years ago, when I first came on the panel,
21 and I'm sorry Susan, I'm forgetting the
22 gentleman's name, but one of your leaders

1 from Florida who used to write the column in
2 the BoatU.S. magazine and passed away about a
3 year ago?

4 MEMBER SHINGLEDECKER: Chuck
5 Husick.

6 CHAIR WELCH: Yes, he made a
7 presentation to one of our meetings in
8 Florida about asking for the panel's help,
9 actually with regard to the Federal
10 Communications Commission and AIS systems.

11 Now, you saw automatic
12 identification systems on the bridge of the
13 container vessel we were on, but there are
14 much cheaper, less sophisticated versions of
15 it that provide lots of information for
16 recreational boaters, and the FCC was being
17 slow in giving some kind of regulatory
18 approval that would make those things more
19 accessible to the recreational boat
20 community.

21 So he came and made a presentation
22 and we debated whether it was appropriate for

1 our panel to contact the FCC but I think
2 eventually we decided, hey, you know, what's
3 anybody going to do if we did, so we did.

4 Because those simplified AIS
5 systems, AIS B systems, are much -- even
6 though they are relatively unsophisticated
7 for a commercial mariner, they can enhance
8 safe operations of recreational boats.

9 And there's -- I think there has
10 always been at least one active recreational
11 boating person, member, chosen for the HSRP
12 and many of us know Elaine Dickinson who just
13 finished her term, and so Susan, we are glad
14 to have you fill that role as part of the
15 panel.

16 MEMBER SHINGLEDECKER: Thank you.

17 CHAIR WELCH: All right I think
18 perhaps now it's time to go to Joyce Miller
19 and have Joyce make her presentation to us.

20 MEMBER J. MILLER: Okay so back to
21 the Pacific from the Arctic, well, we were in
22 the Pacific with the recreational boating --

1 I put in the title, I added to the
2 title -- the title that the HSRP sent me was
3 how can NOAA navigation services support
4 coastal science in the Pacific, and I put
5 management there because it's virtually
6 impossible to separate the science and the
7 management. Without sound science you can't
8 do management.

9 And so I put that in just to
10 remind, and I'll come back to it in the talk.

11 The primary drivers for mapping
12 out here in the Pacific region, Pacific
13 Islands region, Coral Reef Conservation Act,
14 they somewhat I would say optimistically in
15 the National Action Plan to Conserve Coral
16 Reefs, said produce comprehensive digital
17 maps of all coral reefs in the U.S. states
18 and Trust Territories within five to seven
19 years. Notice that was said in 2000.

20 And David Kennedy was head of the
21 coral program at that time. The Magnuson
22 Stevens Act, a variety of things in the

1 fisheries realm, the Essential Fish Habitat,
2 EFH, HAPC, ACLs, Endangered Species Act, if
3 any species is declared endangered or
4 threatened, you must define a critical
5 habitat.

6 So it's very hard to -- these are
7 management acts but you have to have the
8 science behind it.

9 Back to the Pacific Islands, one
10 of the things that occurred to me after I
11 finished the presentations pretty much after
12 the panel this morning, was to define -- I'm
13 going to be talking about benthic habitat
14 mapping and so the question would be what's
15 the difference between benthic habitat
16 mapping and charting?

17 And I would say, primarily two
18 things: time and tides. Out here in the
19 Pacific, vast and remote, 50 islands. In the
20 state of Hawaii, and then the Northwest
21 Hawaiian Islands, which are also a monument
22 and a World Heritage Site -- the main

1 Hawaiian Islands here have, I believe eight
2 permanent tide gauges.

3 There's been a tide gauge at
4 Midway and a sea level gauge at French
5 Frigate Shoals half way up the chain. There's
6 one tide gauge in Guam. There's one in
7 American Samoa.

8 With that level of tide control,
9 it's very, very difficult to do actual
10 charting without the underlying tide stations
11 that you need.

12 You rely on predicted tides. So in
13 this region, in the Pacific remote islands,
14 that's also a monument declared in 2009 I
15 believe, Samoa, there's the Rose Atoll, and
16 in the Commonwealth of Northern Marianas
17 there is the Mariana Trench Marine National
18 Monument.

19 Because of this, these acts and
20 the realities of mapping, the mapping that
21 has been done over the last decade, in the
22 Pacific region has been very coral-centric,

1 basically looking at zero to 150 meters.

2 It has been very remote and that
3 means dedicated ships and launches are just
4 absolutely critical for it.

5 And also, I set up on the coral-
6 centric side, whereas Michele over there in
7 Maine, has a lot of estuaries and that type
8 of environment, this is what we have been
9 surveying a lot of times. This is Uracus,
10 active volcano up in CNMI and these are
11 landslides.

12 And so these are very steep, it
13 goes deep very quickly in many areas, even
14 around some of the coral atolls.

15 So back to habitat maps. To make
16 habitat maps, you are looking at a variety of
17 things. First of all, you need the baseline
18 data, collected in a reasonable manner, and
19 here I'll come back to the tide.

20 Habitat maps -- or not to the
21 tide, but the time it takes -- habitat maps,
22 you don't necessarily need 100 percent

1 coverage. You can, to some extent get by
2 without it.

3 To map just as an example a small
4 harbor in Saipan, we mapped for a habitat map
5 in about six hours and we spent two weeks
6 doing a chart of it. That's the difference
7 between what it takes to do habitat mapping
8 and what it takes to do charting, complete
9 coverage, resurveys et cetera.

10 Then the other thing, habitat
11 maps, a lot of science is done out here by
12 the fisheries science center and by the coral
13 program looking at the species. And then you
14 look at the interactions.

15 All of this put together and you
16 hopefully come out with a reasonable habitat
17 map. I won't read all of these. The first
18 four have been very important for the benthic
19 habitat maps that we have been doing.

20 Identify where the coral resources
21 are and from a scientific standpoint, it's
22 important to design statistically valid

1 random stratified sampling, biological
2 monitoring protocols, for fish, for corals,
3 for whatever.

4 And these protocols are based upon
5 depth and bottom types so you can see if you
6 don't have either of those, it's going to be
7 very hard to create a statistically valid
8 sampling plan.

9 The maps also support site
10 locations for biological and climate change
11 monitoring, and the design and evaluation of
12 the MPAs.

13 And then the rest of them are more
14 specifically management-orient. A lot of this
15 has to do with Magnuson and the Endangered
16 Species Act.

17 And then down here, there are very
18 specific management needs that then come into
19 it and Dr. John Rooney will be here from the
20 Pacific Islands Benthic Habitat Mapping
21 Center tomorrow to talk more about management
22 needs.

1 What does it take? A lot of data.
2 One of the first things the coral program did
3 was they collected at that time, 2000 to
4 2002, ICONAS. Now there's GOI satellites
5 world view that Dr. Polhemus talked earlier.

6 And they created shallow benthic
7 habitat maps in this area. That does not
8 necessarily give depth. In some cases, very
9 limited, if the satellite data are good
10 enough, you can get what we call estimated
11 depths.

12 They do not replace solid
13 bathymetry data that you need to get with
14 either LIDAR bathymetry or launch-based in
15 the shallow waters.

16 Typically LIDAR goes down to about
17 30 meters in Pacific waters. A lot of LIDAR
18 people like to claim deeper, but I haven't
19 found it to be the case very much.

20 We have done a tremendous amount
21 of launch-based survey. One of the things in
22 these very steep areas as you can imagine, it

1 is very dangerous to get in these real
2 shallow areas, and it's very time-consuming.

3 So that's the reason the
4 combination of the LIDAR and the launch-based
5 multibeam is important.

6 And then the ship takes the deeper
7 data, and one thing that a lot of people miss
8 in all this, is this is all -- we are talking
9 imagery or bathymetry, the optical validation
10 without it, these are acoustic and optical
11 sensors up here. They don't really tell you
12 what the bottom is. It takes observations.

13 Divers, in less than 30 meters,
14 AUVs, ROVs and sonars in the deeper waters.
15 That's a tremendous amount of data needed.

16 We have been very lucky in the
17 Pacific. We have a variety of resources. On
18 the upper left is a UH boat, the Kilo Moana,
19 she has two sonars.

20 In the upper right the -- I'll
21 just say K-O-K, we saw her out at the harbor
22 today. She is a -- she supports submersibles.

1 And then a variety of NOAA and
2 university assets down here, the Hi'ialakai,
3 and the small boat, the 25 foot launch,
4 AHI, have been the two workhorses.

5 Hi'i carries two very capable
6 sonars and the AHI has a dedicated multibeam.
7 We have also used that multibeam on the Oscar
8 Elton Sette. She is more a fisheries boat but
9 she supports a lot of diving.

10 The Okeanos Explorer, which is
11 from the ocean exploration group, has done
12 some mapping out here, and then these are
13 just two examples, this is a sea bed AUV and
14 a towed camera system.

15 From these different sensors, we
16 get a variety of products. And these are not
17 -- this set of products is not what you call
18 a benthic habitat map. It comes from
19 primarily either the sonar -- primarily the
20 sonar, and it gives a bunch of what we call
21 derived products: hard-soft maps,
22 backscatter, this zoning is a feature map,

1 ridges, valleys, bathymetry, slope, rugosity,
2 and then a small amount in many cases, a very
3 minor amount of the optical data to
4 ground-truth some of this.

5 However, to really get to a full,
6 integrated mapping product from zero to 150
7 meters, you need almost everything: satellite
8 data; bathymetry, hopefully complete
9 bathymetry from zero to 150; and dense
10 optical ground-truth data. Only then can you
11 really come to the picture on the right,
12 which we call a seamless benthic habitat map.

13 This comes from a report that a
14 group that I was part of has worked on for
15 the last year, NOAA mapping accomplishments
16 and unmet needs. This includes both the
17 Pacific and the Atlantic Caribbean because
18 this report covered both. I am not going to
19 go into detail.

20 What this graph shows is that in
21 the Pacific, we are heavy on MPAs. In
22 American Samoa and CNMI/Guam it's less than

1 10 percent. Otherwise there's two areas that
2 are under 100 percent protection. In the
3 Atlantic/Caribbean it's 74 percent.

4 It also shows the difference
5 between approaches in the Pacific because we
6 have had these multibeam assets, we have
7 really concentrated on bathymetry and that
8 derivative product.

9 And as you see we have very high
10 percentages everywhere except the Northwest
11 Hawaiian Islands. We have got over 80 percent
12 mapped in most places, the PRIA is 70,
13 whereas in the Atlantic/Caribbean, that's 14
14 percent.

15 However, total Pacific, because
16 size-wise the northwest Hawaiians dwarfs
17 everything else, our only total is about 38,
18 so overall we have got about a third of the
19 coral reefs of the United States mapped in a
20 decade.

21 And I wont go through the details
22 on the products. It's just the

1 Atlantic/Caribbean has concentrated more on
2 fully integrated products in small areas,
3 whereas in the Pacific we have concentrated
4 more on bathymetry and large areas and are
5 now switching to the more integrated
6 products.

7 The integrated ocean and coastal
8 mapping we have been a part of for a long
9 time, basically since its inception, and I
10 have to say, I was just really very sad to
11 see Roger -- after 10 years they are finally
12 getting a budget in 2012 and it was really
13 sad to see him pass away.

14 But in the state of Hawaii and
15 first of all, I said it's coral-centric, and
16 this gives you an idea of what it takes.
17 These figures are for the United States
18 overall, so Atlantic/Caribbean, Coral Reef
19 Conservation Program invested \$26 million in
20 the last decade for mapping, and other NOAA
21 groups such as Coast Survey, OMAO and
22 external partners have contributed about 37

1 million.

2 So that includes ship time and
3 things like that. So a total of, what's that
4 \$53 million has been spent to map, let's see,
5 well, a third of the coral reefs. So that is
6 about a third of 40,000, however many square
7 kilometers that is.

8 And by the way those were all in
9 square kilometers. So partners here,
10 University of Hawaii, the Pacific Islands
11 Bethnic Habitat Mapping Center which is a
12 joint NOAA/UH concept, as well as the Joint
13 Institute for Marine and Atmospheric
14 Research.

15 And there is also a group,
16 Hawaiian Mapping Research Group. And I would
17 point you -- I forgot to put on these slides
18 the websites. All of the bathymetry that has
19 been collected in the Pacific, except for the
20 last six months, is available in gridded form
21 on two websites.

22 And so -- and the data that the

1 habitat mapping center has collected has
2 already been turned into NGDC and so there's
3 just a tremendous amount of data there.

4 So state of Hawaii, DLNR, and
5 DBEDT, there have been some surveys, they
6 showed the -- the guy from ESRI showed the
7 cable routes. That was a joint project.

8 Dan's here from Naval
9 Oceanographic. We have done a fair amount of
10 work with Naval Oceanographic in the Mariana,
11 sharing data there.

12 NAVFAC, Military Sealift Command,
13 USGS, Army Corps is here, I'll say a bit
14 about that in a future slide, Fish and
15 Wildlife Service, and then a lot of local and
16 state agencies in the Caribbean and Florida.

17 NOAA collaborators are legend
18 here. The Pacific Islands Benthic Habitat
19 Mapping Center has worked with the Office of
20 Coast Survey. We had the small boat asset in
21 Saipan, Tinian and Rota, and Coast Survey
22 came out and joined us, and we spent two

1 weeks mapping those harbors.

2 Two years ago, they sent
3 representatives out and mapped Honolulu
4 Harbor, as we were -- I used it in some
5 training for our group as we were readying
6 for the cable survey.

7 Coast Survey and OMAO have also
8 shared with us excessed equipment. Our sonar
9 is older though still very functional. But
10 having a backup in your pocket is a big deal
11 out here.

12 So they had some excessed
13 equipment and have sent it out to us. The
14 monuments, sanctuaries, you can read it for
15 yourself, there's just any number of NOAA
16 agencies that have been active in mapping out
17 here.

18 And one of our big challenges is
19 keeping all this data together. We have five
20 different synthesis efforts going. And these
21 grids are huge.

22 So what's missing? I wanted to

1 show this slide when the fellow from the
2 monument was talking. This is the central
3 section of the monument, this is UTM zone 2,
4 it's a third of the monument waters.

5 You see these big areas here. In
6 2002, we mapped a lot of the boundaries on
7 the university ship, these sort of doughnut
8 things around them.

9 In the center, you see some
10 estimated depths from satellites and then the
11 rest, these are all shallow banks, shallower
12 than 50 meters, these are huge areas. This is
13 probably about 500 miles wide, and it's the
14 boundaries are -- Dan, 50 miles out?

15 Yes. And so -- and just to give
16 you an idea, we have spent about two months
17 with ship and small boat, this is French
18 Frigate Shoals, surveying this area and this
19 ring out here.

20 So that gives you some idea of --
21 we have an estimate, to finish the multibeam
22 mapping, without the LIDAR, so in greater

1 than about 15 meters, about a year's worth of
2 survey between boat and ship. So it's big and
3 it's just -- and as Dr. Polhemus was saying
4 earlier, there are plans to get upgraded
5 satellite imagery. The existing imagery is
6 often of very, very poor quality, and there
7 is under way a plan for bathymetric LIDAR as
8 well.

9 Probably not until 2013, okay. So
10 that's huge for this group. This is the main
11 Hawaiian islands. Looks pretty complete, I
12 mean, it gets kind of scrappy out to the
13 edges.

14 And I will say, this is a
15 synthesis effort that the university, the
16 Hawaii Mapping Research Group, this is also
17 online in a 50 meter grid, and it is used
18 widely.

19 But what's missing here often, you
20 don't see it in that big blow up, this is a
21 map I sent to Army Corps a couple of weeks
22 ago, they need to survey Mahukona here for

1 possible piers. They wanted to know what
2 data was there, but that big 50 meter grid
3 doesn't really show you the detail you need
4 for shallow mapping.

5 So this is Army Corps LIDAR. This
6 was a line we ran with a small boat as we
7 came down that -- and we were trying to
8 follow the 20 meter contour in very rough
9 water so it's kind of snake way, and then
10 this is the offshore.

11 In the main Hawaiian islands we
12 have LIDAR in most areas. The only other
13 place that we really have a lot of LIDAR,
14 there is some in Saipan, some in Guam, and a
15 little bit in Tinian.

16 So in most places, we will have
17 what we call the bathtub ring, and that's a
18 ring of data here in the shallow water that
19 is important for management, that has not
20 been filled, and really can't be filled by a
21 ship. LIDAR can only get so deep and so
22 launch-based multibeam is about the only way

1 to go after that.

2 This is Saipan. Again, we have got
3 the bathtub ring. We have done a lot of work.
4 This is the raw data, the deep blue is deep
5 bathymetry, the light blue is 30 to 150, and
6 the very light stuff is in less than 30
7 meters in the lagoon, and this is one of the
8 bigger lagoons in the Pacific.

9 And so the red and, you can't see
10 it very well, and yellow dots are the optical
11 data. So this has been combined into a bunch
12 of different products -- like I was talking
13 about, shallow habitat maps, deeper coral
14 cover maps. But the basic fact is in the
15 shallow water that is so important for coral
16 conservation, there's -- we are missing key
17 elements of the data.

18 And so finally, this is a
19 reiteration of many things that you guys have
20 heard me say, and I would say I am not just
21 saying NOAA navigation services, it's more
22 NOAA overall.

1 Because we need -- we have to have
2 ship time to do this work. There's just --
3 the small boat can do a little bit from shore
4 base, but it's deep and nasty out there and
5 you really have to have a ship for support.

6 So ship time, the fact is, it's
7 steadily shrinking. The budget process is
8 very uncertain. And it just, it makes the
9 future of getting the other two-thirds of the
10 corals mapped very uncertain.

11 Also, we have different assets,
12 the small boat, the other equipment, the AUV
13 and so forth, as everybody knows, funding for
14 everybody is going down, and we are really
15 hoping to -- we have used the boat for many
16 different purposes, we have used the
17 equipment for many different purposes, but we
18 really are looking to form partnerships to
19 better share the cost of maintenance, not
20 necessarily use, but just keeping those
21 things maintained so they remain assets out
22 here.

1 And that is very much, and I would
2 ask what I think Michele said something about
3 different partnership methods, one of the
4 things that has been the case out here for a
5 long time, we have done some collaborative
6 stuff, often through the university, but one
7 of the really, really difficult problems is
8 sharing, even if you have three groups that
9 need a survey in the same area, getting funds
10 in between those groups is sometimes
11 impossible.

12 You know, to do a small project,
13 you have to have six to eight months of
14 negotiation to get a contract in place to do
15 it, and that makes it very untenable.

16 So there's -- I actually did this
17 survey. These are the conditions we survey
18 in. This is the north coast of Molokai,
19 Pelekunu I think is the valley. Those are
20 2,000 foot sea cliffs, and there's some
21 pretty impressive surveying out here.

22 So questions or suggestions, you

1 know, of how to get things done like this.
2 You can -- you know if you have got an asset
3 in a place like this, I know the commercial
4 folks often really hate to hear oh well, you
5 know, NOAA can do it because it will -- it's
6 just that I mean, truly, the assets will go
7 away and the personnel will go away if
8 there's no funding.

9 There's just no way to run it
10 anymore, the small boat takes about somewhere
11 between \$60-80,000 a year in maintenance.
12 That's how it is.

13 CHAIR WELCH: Okay, thanks, Joyce.
14 Comments and questions?

15 MR. MORRIS: I have one. The data
16 that is --

17 CHAIR WELCH: You might want to
18 talk on the mic for the reporter.

19 MR. MORRIS: Oh, I'm sorry. The
20 data that is collected for your programs,
21 does it meet the quality requirements to go
22 in the nautical charts produced by Captain

1 Lowell?

2 MEMBER J. MILLER: Actually, Kyle,
3 how many charts have we contributed to now?
4 Do you have that stat? I don't know where we
5 stand. I mean we have certainly taken data
6 that was collected for benthic habitat
7 mapping. For instance Ofu and American Samoa,
8 there were two lines of soundings on the
9 chart that were about 300 meters deep around
10 this populated island.

11 And that was the first joint
12 effort we did, was putting those -- so, yes,
13 that boat is perfectly capable of collecting
14 data that is to that standard. But, Kyle, how
15 many are we working on right now?

16 LT. RYAN: I think currently
17 there's 11 charts -- right now, so they're
18 trying to do -- and the issue is that maybe
19 what they are already doing isn't exactly to
20 specification, 110 percent all the way, but
21 the fact of the matter is, is that what they
22 are collecting now is better than what's on

1 the charts when it was collected back in,
2 prior to 1939.

3 MEMBER J. MILLER: And, again,
4 it's not full coverage because we have got --
5 the ship goes there, we might have two days
6 at an island. We get done what we can get
7 done, basically, and the other thing is,
8 well, Molokai isn't bad because it's in the
9 main Hawaiian islands, but Uracus, the
10 nearest tide gauge was over 500 miles away. I
11 mean, you are not going to have accurate
12 tides.

13 The thing about it is though, if
14 the swathes match that you go around at
15 different times, that means that you have
16 corrected the data with predicted tides
17 enough so that they don't have a mismatch.
18 Now is it absolutely accurate? So.

19 CAPT. LOWELL: Actually, I think
20 Kyle hit the nail on the head. We struggle
21 with -- well to answer the short question, is
22 the data is not what we would consider

1 charting quality. It doesn't meet our specs
2 and deliverables. We would certainly not
3 contract for it, and we would certainly not
4 collect it ourselves.

5 Now if you have no other
6 information and you have some pretty darned
7 good quality data, although not charting
8 quality data, that is -- the approach we have
9 been taking now, it's a whole lot better than
10 anything else we have and let's utilize what
11 we have.

12 And we do caveat it in our
13 electronic products. We can put a data
14 quality association with it. I'm not sure how
15 much the users pay attention to it, and
16 that's kind of the problem that we have with
17 that is, you know, if they see a depth, is
18 they think all depths are accurate of course,
19 and we need to -- and we associate the same
20 quality to every data point on a product, and
21 that's obviously not the case.

22 And so we do struggle with a few

1 of these things conceptually and in the
2 execution phase. But we do use a lot of these
3 data sets where we have no other information.

4 MEMBER J. MILLER: And you're not
5 likely to get out there in the next 50 years,
6 I mean, these are just very low priority
7 areas.

8 CAPT. LOWELL: I would like to
9 also add is specifically like Saipan, where
10 we knew that the vessel had done some work in
11 there before for the Navy, the data set
12 actually created a little bit more confusion
13 because now we had a LIDAR data set, and it
14 had some uncontrolled, multibeam data set, so
15 there was just a little bit more confusion in
16 there.

17 And we solved that by going the
18 next year, is we actually put in a tide
19 gauge, and we used the same set but we put in
20 real charting standard data, and then we
21 pretty much solved that problem, and that was
22 to meet a Navy requirement, and that worked -

1 - obviously it worked out very well as we had
2 an asset in place, we planned for it, we did
3 it right, Navy got a much better product,
4 and, well, hopefully the chart's better, too.
5 Thanks.

6 CHAIR WELCH: Other comments or
7 questions for Joyce? Gary?

8 MEMBER JEFFRESS: Joyce, we have
9 the same problem everywhere, there's just not
10 enough resources to get the quality of the
11 data we want for good management, onshore and
12 offshore.

13 But I was wondering, what is the
14 status of the coral reefs that you are
15 talking about? Are they degrading, is like
16 the pH of the ocean destroying them?

17 MEMBER J. MILLER: Well, I'm not a
18 coral expert by any means, but I'm very close
19 to, you know, I work very closely with the
20 scientists. Actually the Pacific coral reefs,
21 because so many of them -- many of them are
22 very remote, they have at least got a better

1 chance than the Caribbean ones that are all
2 in very heavily populated areas.

3 And there's actually currently an
4 Endangered Species Act asking for protection
5 of 82 species of coral, and that is in
6 process and I'm not going there, you know,
7 are they.

8 But we have seen bleaching, and
9 one of the surprising places we saw bleaching
10 that nobody every expected and that's part of
11 the power of doing this monitoring and doing
12 this mapping, was in the farthest northern of
13 the Northwest Hawaiian Islands, they are up
14 about 30 degrees.

15 And what happened was, it was a
16 very hot summer, there were trades down here
17 up to about 25 degrees, and the trades
18 weren't blowing north of that, and so Midway,
19 Kure, and Pearl and Hermes bleached heavily
20 that year in 2002, and nobody expected it.
21 Everybody was saying the last place that
22 would ever bleach is those northern islands.

1 And so we are seeing some coral bleaching.

2 And this is part of a huge overall coral reef
3 conservation program to, you know, to
4 monitor, map, and understand what is
5 happening in the corals.

6 MEMBER DIONNE: So the bleaching
7 would have been something that was visually
8 observed by divers or because your sonar is
9 not going to tell you that?

10 MEMBER J. MILLER: No, the sonar
11 is not. I mean one of the questions is can
12 sonars tell the difference between, say,
13 algae beds and live coral and dead coral.

14 And that's -- those are research
15 areas. No, that was strictly diver
16 observations that there is a cruise up there
17 almost every year with divers, and they got
18 in the water and bleaching was extensive.

19 This past year they went down to
20 Howland and Baker which are two of the
21 islands right on the central Pacific, and
22 there was pretty severe bleaching at Howland

1 and Baker. They won't get back there until,
2 at the earliest, next spring, and so they
3 won't know what the after-effects are until
4 then. So --

5 MEMBER JEFFRESS: So that
6 bleaching was caused by temperature right?

7 MEMBER J. MILLER: Yes, and ocean
8 acidification, that's one of the things that
9 the coral program is looking at very closely
10 because ocean acidification is -- it's kind
11 of the rhinoceros in the room, and nobody
12 really knows what is going to happen with
13 that.

14 And so -- but one of the amazing
15 things is if you are interested in coral
16 reports, a Reefs at Risk Revisited report
17 just came out, and it's scary. It is really
18 scary. They were much more willing to talk
19 about a scary scenario, so it's on the web,
20 Reefs at Risk Revisited, and it's a very
21 excellent report. There's a webinar on it,
22 too.

1 MEMBER JEFFRESS: Is anyone
2 measuring pH?

3 MEMBER J. MILLER: Oh, yes.

4 MEMBER JEFFRESS: On a regular
5 basis?

6 MEMBER J. MILLER: Yes, they are -
7 - the biannual, so every two years they go to
8 these different reefs which may change
9 because of budget to a three-year cycle. They
10 have got -- they are taking water samples,
11 and they are doing -- they are putting out
12 what are called calcification plates to see
13 what the rate of calcification is.

14 Yes, it's -- you know, but it was
15 -- I was at a 2008 coral reef conference in
16 Florida, and in 2004 the conference had been
17 talking about coral bleaching, and in 2008
18 nobody could talk about anything except ocean
19 acidification. That is kind of how fast coral
20 science is changing with the climate reports
21 and things.

22 MEMBER JEFFRESS: Okay, but with

1 the temperature, we have got satellites that
2 can tell us what the ocean surface
3 temperature is. Do people monitor that?

4 MEMBER J. MILLER: Yes, but not --
5 they don't give you the detail that, you
6 know, there are really severe fluctuations
7 about that in patches, in back reefs and
8 things, and you don't have the resolution in
9 those to really get, you know, get the whole
10 story.

11 So, yes, it's a -- there's a group
12 called Coral Reef Watch that is watching,
13 that does the satellite, and they send out
14 coral reef warnings periodically, bleaching
15 alerts basically, based upon the satellite
16 temps.

17 MEMBER JEFFRESS: Not that you can
18 do anything about it, right?

19 MEMBER J. MILLER: They're trying.
20 They're trying to figure out ways to
21 mitigate, but, yes, it's tough. Does anybody
22 have any suggestions, I mean, any experience

1 with sort of local partnerships and how you
2 get money in between federal agencies and, I
3 mean, is there any -- or even state agencies?

4 I mean that's really been an issue
5 out here. NOAA seems to be particularly
6 difficult to -- how does IOCM do it? Gary? I
7 mean do you have any --

8 MEMBER JEFFRESS: Well, Joyce, in
9 Texas we have probably the densest tide gauge
10 network on the planet. We have like 30 odd
11 tide gauges including seven NOAA gauges.

12 And those tide gauges are all to
13 NOAA standards, and it's funded by the Texas
14 General Land Office, Texas Water Development
15 Board, and the U.S. Army Corps of Engineers
16 and NOAA with their gauges. So it -- and we
17 have a lot of local governments putting in
18 gauges as well for various projects.

19 MEMBER J. MILLER: So is each
20 group buying their own gauges? Is that how
21 it's going?

22 MEMBER JEFFRESS: No, each group

1 puts in money into the pot, and they get the
2 benefit of the whole thing.

3 MEMBER J. MILLER: Who runs the
4 pot?

5 MEMBER JEFFRESS: We do, well the
6 general land office hands it to -- but we do
7 all the work.

8 MEMBER J. MILLER: Okay.

9 MEMBER JEFFRESS: Yes, it's a good
10 model.

11 CHAIR WELCH: Other comments?
12 Michele, do you have something?

13 MEMBER DIONNE: Well, I know that
14 depending on how your organization is set up
15 some organizations can receive money and
16 distribute it through subcontracts fairly
17 easily and that -- our organization, we are a
18 state-federal partnership but we were set up
19 as a quasi-state agency. We don't have to go
20 through any of the state sorts of rigmarole
21 to use, to spend money, to receive and spend
22 money --

1 MEMBER J. MILLER: And you don't
2 have to go through NOAA rigmarole?

3 MEMBER DIONNE: Well, we get our
4 NOAA -- the NOAA funds that come to us, we
5 can make all the decisions internally about
6 how they get used. We don't have a state --
7 we don't have any other bureaucracy to go
8 through.

9 So often, we will receive funds
10 for other reserves who find it easier to send
11 us the money and have us give it back to them
12 than go their own state.

13 So non-profits often do this kind
14 of movement of federal dollars. If you can
15 find a non-profit who's willing to help you
16 by receiving money from multiple partners and
17 then redistributing it, that can work through
18 subcontracts or whatever.

19 But we have never really had a
20 problem cobbling together partnerships, but
21 it's because of the way our organization is
22 structured so you just have to find somebody

1 who can launder money for you.

2 (Laughter.)

3 CHAIR WELCH: Okay, I'd like to --

4 MR. MORRIS: Can I make one
5 follow-up comment

6 CHAIR WELCH: Sure.

7 MR. MORRIS: Dan Morris again. As
8 a follow up to the question I posed before,
9 we have a real problem with source data,
10 hydrographic source data in a lot of the
11 charting in the South Pacific.

12 And I applaud the fact that the
13 data from this program, which was not
14 collected to IHO standards, is still being
15 used to provide navigation service on NOAA
16 charts. Where possible, you can replace them.

17 Lead line soundings with multibeam
18 soundings, GPS, even they are not fully IHO
19 certified surveys, that's probably within,
20 although I would be concerned about the legal
21 liability issue and I'm sure your lawyers
22 are, my question to the Council here is that

1 what can NOAA do to improve the quality of
2 the data that's collected during these,
3 without driving the costs up exorbitantly by
4 making them full IHO-certified surveys?

5 For example with the inclusion of
6 better tide gauge systems in the Northwest
7 Pacific Islands, improve the quality of the
8 data, in an absolute reference to the
9 vertical datum, and make it better for
10 integration into the NOAA charts for the
11 area.

12 So I think that's something that
13 you ought to consider. If NOAA is going to
14 support this program already with resources,
15 perhaps you ought to go one step further and
16 provide the tide gauges or other support to
17 improve the quality of the data it's
18 collecting so that it is better for the
19 nautical charts.

20 CAPT. LOWELL: They are all good
21 points, Dan. And I don't think there is any
22 simple answer to that. You know, if Rich had

1 more money and he could densify his tide
2 network he certainly would. If Joyce could
3 fund third order tide gauges in all of her
4 areas both in time and money, I am sure she
5 would.

6 The problem is I think everybody
7 is caught in a bind where they have a
8 specific requirement that they are trying to
9 meet as cheaply as they can. And so Joyce, to
10 map coral, has a requirement that doesn't
11 require IHO quality data collection. Does she
12 want to pay for that? Well probably not.

13 I mean IOCM is kind of put
14 together to try to address these things in
15 some sort of a holistic way, and understand
16 that, you know, at any decision point there's
17 going to be tradeoffs. But at some point, I
18 think we end up chasing our tail by saying
19 the solution is a higher density tide network
20 because we might want to survey somewhere
21 once every two decades, which is kind of the
22 way we have been operating, certainly out in

1 the Pacific, and probably a lot more than two
2 decades.

3 MEMBER J. MILLER: Well, a lot of
4 those places didn't have a single sounding.

5 CAPT. LOWELL: Yes, and a lot of
6 it is really, really old. And let me caveat
7 the way we use data that isn't to standards
8 is we only use it in areas where the risk to
9 surface transportation is very low and it's
10 just going to be a lot better than anything
11 else out there. We would never do it in a
12 tight under keel clearance environment. It
13 just wouldn't happen, and we wouldn't use it.

14 CHAIR WELCH: Lawson you get the
15 last comment or question.

16 MEMBER BRIGHAM: Well, it's
17 off-message so you can finish this -- I
18 wanted to say something else about the
19 Arctic.

20 CHAIR WELCH: Go right ahead.

21 MEMBER BRIGHAM: Well, I should
22 have said but of course the Arctic Ocean is a

1 strategic waterway for a number of reasons,
2 and you all know that our number one
3 international maritime issue policy is
4 freedom of navigation, and so I might have
5 not have said that but that was woven in this
6 Arctic marine shipping assessment because we
7 had countries like Denmark and -- and there
8 was some notion in the NGO community to close
9 the place up as if this new phenomenon of
10 shipping and routes and offshore development
11 was a new use of the Arctic Ocean and had to
12 remind everyone in history that not only
13 millennium use but whaling, industrial
14 whaling, industrial sealing all happened in
15 the Arctic Ocean.

16 So this is not necessarily new.
17 It's different. And the notions of monuments,
18 MPAs, PSSAs, closing the place off for
19 business, ain't gonna happen in the Arctic
20 because of the tremendous resources.

21 Some of it will, so tension is
22 coming, and the marine spatial planning

1 issues are related to that, but some people
2 believe we can have a PSSA for the whole of
3 the central Arctic Ocean, and I'm not sure
4 the Arctic states, Russia, Canada and the
5 United States would go for that, not
6 forgetting marine safety and protection
7 issues done at IMO, but the notion of
8 restrictions on navigation in one of the
9 world's oceans in a very tight way ain't
10 gonna fly in this country, I would think,
11 Dan, nor for the marine world, or the marine
12 industry.

13 So there is going to be tension
14 coming, not necessarily going to provoke a
15 war, but there will be lots of politics and
16 the marine spatial planning, I think, is
17 right in the middle of that trying to
18 adjudicate some of the use of the place but
19 somehow protect the place and the people.

20 CAPT. LOWELL: Actually, we can
21 tie this right back to the monument that was
22 here. We were peripherally involved when we

1 put that on the chart obviously, and we went
2 to several meetings with the State
3 Department, Navy, and such, and the whole
4 idea about this freedom of navigation,
5 freedom of the seas, was a big deal when they
6 started to create this monument because if
7 you look at, I mean you saw the graphics, you
8 had this 1,000-mile chain which you were
9 about to put a big old wall across. I mean
10 the whole PSSA and all the call-ins, and so
11 there were very tightly controlled
12 discussions as to what they were going to be
13 allowed to do and protect and how the freedom
14 of navigation was going to be in there.

15 And so that doesn't go away in any
16 of these discussions, and I think that we
17 didn't talk about it here, and we didn't
18 really focus much of this discussion on the
19 monument issues and all the issues
20 surrounding that, but the freedom of the seas
21 is a big deal and we can't just willy-nilly
22 shut everything down because it does -- and I

1 personally believe the one reason the Navy
2 really bought off on the monument idea, and
3 then all the protections, is they put in some
4 clauses in there, well the Navy ships don't
5 really have to call in and check in, should
6 they be operating in the area and they really
7 don't -- there's not a whole lot of
8 commercial traffic cutting across the center
9 of the Pacific with the exception of perhaps
10 Matson. Everybody else is looping way high
11 above it, so.

12 MEMBER BRIGHAM: But in a place
13 like Bering Strait it's just going to be --

14 CAPT. LOWELL: But at Bering
15 Strait --

16 MEMBER BRIGHAM: A challenging
17 place to manage. It's the only waterway to
18 cross into the Arctic Ocean and out, but
19 there is some sense that we can manage that
20 by shutting it down somehow, which is pretty
21 bizarre, but because of the whale migration
22 and the impact on indigenous people.

1 And so there's different notions
2 of what the place is, and, I mean, it's never
3 going to be shut down.

4 CHAIR WELCH: That shows a lack of
5 understanding of the legal regime for things
6 other than territorial waters because there
7 is a process in the International Maritime
8 Organization that could possibly get to
9 something close to that result, but countries
10 just can't do it unilaterally.

11 MEMBER BRIGHAM: Now we go in the
12 place with the Russians, and it has to go
13 through IMO for routing, but the notion of
14 even a sense of you can't go through that
15 waterway with an icebreaker or something, is
16 going to be tough to sell in the world
17 community.

18 CHAIR WELCH: Sure, of course it
19 is.

20 MEMBER BRIGHAM: And in our
21 country.

22 MEMBER J. MILLER: Well, one of

1 the only reasons that they could do the
2 monuments in the Pacific is most of those
3 places, nobody ever goes and there's no
4 resources to extract per se, I mean not many,
5 and so it was a pretty easy thing to do and
6 get environmental credibility, I mean, it you
7 know -- there wasn't any oil and gas up
8 there.

9 MEMBER BRIGHAM: But there's a lot
10 in the Arctic, tremendous resources all
11 around, on the land side, which require
12 marine systems to get it out, not too many
13 pipelines going to go to the Canadian
14 archipelago or to Greenland.

15 So I think we are going to see
16 lots of marine activity and some conflict in
17 how to manage the multiple use of these areas
18 -- the marine spatial planning, whenever it
19 is, is timely, but how you orchestrate it in
20 the Arctic is going to be pretty interesting.

21 CHAIR WELCH: Well, and that
22 brings the whole question that to me is the

1 thing that is not discussed much about marine
2 spatial planning, but which is its real
3 vulnerability, is that if you get outside of
4 territorial waters, which is -- it's very
5 difficult for the federal government to make
6 any kind enforceable decisions about marine
7 spatial planning. They can say we want this
8 area to be reserved for this or that, and
9 there are very few federal authorities to
10 enforce it.

11 You can enforce fisheries
12 regulation out beyond the territorial waters
13 because of the Magnuson act, and you can
14 enforce a couple of other laws out into the
15 EEZ, but it's pretty darned hard to impose
16 navigation restrictions using federal
17 authority unless you are willing to go and
18 lobby the International Maritime
19 Organization. And I think there are lots of
20 folks in Washington at senior policy levels
21 that don't understand that.

22 Okay, I think let's thank all

1 three of our fellow panel members, Susan,
2 Joyce, and Lawson, for their presentations.
3 We will certainly be talking about this
4 subject at future meetings.

5 We do have time now for public
6 comment if we have any of our guests that
7 want to address us even though we have been
8 letting folks address us as part of -- the
9 whole time, but let me provide that
10 opportunity for any public comment.

11 (No response.)

12 And apparently everybody has
13 exhausted themselves with their prior public
14 comments. So let's wrap up for today.

15 (Whereupon the above-entitled
16 matter went off the record at 5:22 p.m.)
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This is to certify that the foregoing transcript

In the matter of: Hydrographic Services Review Panel

Before: NOAA

Date: 05-05-11

Place: Honolulu, HI

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