Testimony of Dr. Gary L. Thomas
President, Prince William Sound Science Center
(Based on Meeting Transcript)

U.S. Commission on Ocean Policy
Alaska Regional Meeting
Anchorage, AK
August 22, 2002

Chairman Watkins, Ed Rasmuson, fellow members of the Commission, I would like to state that it's an honor to be able to make a presentation to you today. We've heard a lot about ecosystems, we've heard a lot about scales, ocean scale, and regional scale. I'm going to talk to you about a sub-regional scale, something that we have referred to as a bioregional scale, to do ecosystem actually information gathering.

I'd like to state that we've come a long ways in this area. We had a workshop actually last July at the Rayburn Building. There's a report that's forthcoming on ecosystem approaches around the United States and it'll be submitted to the Commission as soon as it's done.

As Dr. Dorman mentioned in his testimony, there's a tremendous interest in developing coastal observing systems in Alaska, and especially in the important bioregions, like Prince William Sound, Kodiak, Bristol Bay, Sitka Sound. There's a whole number of coastal communities that have -- are rich in resources and have populations of people that are very dependent upon those resources and are interested in getting better information.

When the oil spill occurred in 1989 in Prince William Sound it revealed really how little we knew about the resources that were supporting the local communities. In Prince William Sound the communities decided at that time that they basically lacked the information they needed to play an effective role in helping protect their resource based economies. That's when the Science Center got started and the Oil Spill Recovery Institute was established.

Well, the coastal community view was our ecosystem approach is to build the information system that provides us the kind of information we can make better decisions on in operating vessels, operating aircraft, managing fisheries, managing hatcheries. A lot of this information was either sparse or really non-existent.

By important we mean that -- we use local priorities to focus the research and monitoring efforts. In Prince William Sound, of course, to those communities what was causing collapses of fish populations or plankton or wildlife populations

was a very important concern to them and most of the research that we've focused on has tried to come up with some questions -- or some answers to those kinds of questions. Well, when we got started we adopted the established guidelines; we followed the GLOBEC program and focused on developing methods to improve detection and prediction of changes that were ongoing in the ecosystem. Eventually with the development of the NRC reports on stock assessment and sustainable fisheries we've developed methods that -- stock assessment methods that have high levels of precision and we are definitely taking a dominant species or multi-species approach.

Our formula for building a ecosystem program really is to implement a comprehensive circulation model based monitoring program in the Sound synoptically with acoustic optical monitoring based modeling program on the dominant animal populations. Now I say model based for the physics because the physical models are quite mature. I mean we have the Princeton Ocean Models and MM-5 models for winds and currants. So you can use those to really make smart decisions about how you're sampling.

On the other hand, the biological model, spatially explicit biological models especially, are very poorly developed at this time and the information that we can collect through applying new measurement tools far exceeds the -- what -- the demands for input from most of our models today. Finally, we're a local organization; we disseminate this information to the public and the stakeholders. Physical models, as I was mentioning, we have the Princeton Ocean Model, RAMS model for winds, Oscar model. The big point here is that we really don't depend on building a big staff; we network with institutions internationally to bringing the expertise we need to build the tools to provide information that'll answer questions. We had a met ocean workshop last -- or December in 2000, came up with this design that the black dots basically were instrumented met stations or buoys, moorings, the red locations were areas that were high priority for getting new instrumentation in, yellow areas were secondary.

Moving on into the biological monitoring. We've done extensive use of acoustic and optical technologies. We use those technologies also to do reconnaissance, aerial and sonar surveys to determine where the patches of the animals are so we can really create sort of an optimal survey design. Our optimization doesn't stop there; it goes into this use of the discreet samplers to sub-sample features that we find with our optics and acoustics.

Since 1993 we've found basically three major pelagic populations that were really large, dominant populations. This was neoclanus, copepods, Pacific herring and walleye pollock. They're shown here on an echogram that just happened to capture -- one of a million echograms we've collected. The biological modeling is definitely in -- is in a developmental stage. We're looking at development of spatially explicit population models and we're developing GIS maps basically of pelagic and shoreline resource distributions.

Well, we integrate this into what we call our now cast forecast information system. We basically have the observations linked with the numerical models for wind circulation and biological resources. And then because we're funded primarily by the Oil Spill Recovery Institute we link these with other numerical models like the Norwegian model for oil spill trajectory linked with a response software that gives us all of the information on inventory of oil spill response in the state and to exposure models that will tell us under different scenarios what kind of exposure we get to our national resources with different kinds of responses to spill.

Now, this all leads into oil spill prevention and response and the Oil Spill Recovery Institute has both industry and the Coast Guard, federal and state agencies and the public involved in helping to implement these technologies to make better decisions in the future. All of our information on the physics is going into the National Weather Service and the FAA for improved navigation and vessel operations on the Sound. And the information that's coming out of our biological program is going right into the Fish and Wildlife research and management phase. Finally, the institution we have builds a -- is building an archive and creating public access for this kind of information in the future.

Some initial findings that I've had are basically that we've developed high precision estimates of herring and pollock, we've improved historical understanding of Prince William Sound herring. We've essentially developed a -- found a missing mechanism for oil exposure to major fish populations. We've found pitfalls in current management and actually a double jeopardy situation. And this has restricted distributions in the winter and this is the kind of precision we get on our stock assessment of herring and we also do pollock and these are 95 percent confidence on this. This is what the NRC recommended happen.

Historically we can look at the herring and you can see there was basically a decline between 1988 and 1989. But there was no basic mechanism for exposure of oil. And since then we've seen and documented herring surfacing at night on a nightly basis. You can see here that there has been a -- there's fish come up at night, they're not feeding, basically this reveals a new exposure mechanism for fish to oil and other surface toxicants. The double jeopardy. Well, you can see there's a decline here and a decline here of the herring population. You can see the exploitation rates go up. Well, this was what happens when you have to make an assumption of constant natural mortality. The population starts to decline and you double whammy it by setting a higher exploitation rate.

We've published some information on the Stellar sea lion and herring behavior in Prince William Sound. And you can see we found in -- everywhere we were doing these surveys of herring in Prince William Sound we found aggregations of

Stellar sea lions, humpback whales, gulls, all kinds of fish eating predators herding these herring at night, this is all infrared video, and feeding on herring at night. Let's see. Again, this is basically the distribution of herring and distribution of pollock where we were doing our assessments. And you can see around these areas we had these concentrations of predators of all species including Stellar sea lions feeding on the herring.

And after a decade of information and after we'd published the paper in Nature that caused some controversy we went back and looked at some of the data on the Stellar sea lion counts in the region, and there's several ways that you can do these, put these counts together from the NOAA database. And they all show the same trend, that there's been sort of a parallel decline of Stellar sea lions and herring in Prince William Sound. So the question is does -- is this a case for food limitation of Stellar sea lions, does is apply to other fish eaters. And if it does is there a solution? Well, we think with the new precision of measuring herring that you can actually replace the preseason approaches within in season approaches. You can eliminate double jeopardy, you can manage sustainably the stock of herring in Prince William Sound without having to predict. And so the ability to now measure fish stocks with some accuracy in these coastal byregions are extremely important to the regions.

Now finally I'll close on the fact that coastal by regions really represent a scale that hasn't been addressed in a lot of the major programs that have been conducted by NOAA in the states, but they're extremely important to the public and they really deserve some consideration for programmatic funds in the future. Thank you.