Revealing The Value of Habitat
in NOAA Fisheries Programs

April 7-9, 2003
Long Beach, CA

Habitat Economics Workshop Proceedings
Office of Habitat Conservation, NOAA Fisheries

Compiled by:

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Executive Summary

NOAA Fisheries is a small agency with a big mission. Its responsibilities for the nation's fish, marine mammals, endangered species and their habitats are handled at many different scales. From the growing emphasis on ecosystem- scale to the precision of a biological reference point, NOAA Fisheries fulfills its stewardship mission with a tradition of using the very best in theoretical and applied science.

Although well known for experience in the biophysical sciences, less well known are NOAA Fisheries' initiatives in social science, which have received a boost in support from Assistant Administrator Dr. William Hogarth. Beginning with a small amount of funding in 2002, the Office of Habitat Conservation embarked on a project that is best expressed in the theme of the workshop: "Revealing the Value of Habitat". In an announcement in early in 2003, economists and ecologists hailing from the several regional offices, science centers, headquarters, management councils and other government offices, were challenged by Bill Hogarth to recommend strategic actions and proposals to make economics serve the habitat conservation mission. This report contains the descriptions of those strategic recommendations and how we got there.

Over the course of three days, the thirty-five workshop participants explored the nexus of ecology and economics in the context of NOAA Fisheries, jointly developing the framework for a set of proposals to further the habitat economics effort. The eighteen suggested initiatives highlight both technical and organizational challenges, as well as a high degree of consensus on the value of pursuing cross-disciplinary work in habitat economics.

Habitat Economics Workshop Participants
Revealing the Value of Habitat – April 7-9, 2003 Long Beach, CA

ORGANIZERS:		
Tom Bigford	Ecologist	Office of Habitat Conservation
Kathi Rodrigues	Habitat Policy Analyst	Office of Habitat Conservation
FACILITATORS:		
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Jay W. Vogt	Organizational Development	Peoplesworth
PANELISTS:		
Dr. Jim Boyd	Economist	Resources for the Future
Dr. Dan Huppert	Economist	U. Washington
Dr. Doug Lipton	Economist	U. Maryland
Dan Sulzer	Economist	Army Corps of Engineers
PARTICIPANTS:		
Jeffery Adkins	Economist	Southeast Region
Dr. Rebecca Allee	Biologist	Fisheries Restoration Center
Jennifer Boyce	Biologist	Southwest Region
Pam Castens	Biologist	Southwest Region
Ron Felthoven	Economist	Northwest Region
Marcia Hamilton	Economist	Pacific Island Area Office
Jeanne Hanson	Biologist	Alaska Region
Michael Johnson	Biologist	Northeast Region
Brett Joseph	Attorney	NOAA -OGC
Peter Leigh	Economist	Fisheries Restoration Center
Sara Lyons	Mar. Policy Analyst	MPA Center Science Inst.
Garry Mayer,	Biologists/Ecologist	Office of Habitat Cons.
Sean McDermott	Biologist	Northeast Region
Teresa McTigue	Ecologist	NOS
Scott Miller	Economist	Alaska Region
Jose Montanez,	Economist	Mid-Atlantic Fisheries Mgt. Council
Steven Morris	Biologist	Northwest Region
Dr. Mark Plummer	Economist	Northwest Fisheries Science Center
Dr. Lewis Queirolo	Economist	Alaska Region
Dr. Wesley Silverthorne	Economist	Southwest Region
Dr. James Sullivan,	Economist	International Coral Reef Center
Rusty Swafford	Biologist	Southeast Region
Cindy Thompson	Economist	Southwest Fisheries Science Center
Dr. Kristy Wallmo	Resource Economist	NOAA Fisheries Headquarters
Thomas Yocom, EPA	Biologist	EPA

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Background: NOAA Fisheries Habitat Economics Initiative

Good decision-making should provide the greatest benefits to society, yet many natural resource benefits, including those generated from habitat protection go unrecognized where they are not quantified. Economic tools should help NOAA Fisheries to quantify benefits in some cases or at least to move toward specificity in its comments and recommendations to other federal agencies regarding habitat protection and restoration. Habitat conservation should be strengthened by enumeration and by stating recommendations in a way that communicates the benefits of habitat services to society.

The Office of Habitat Conservation convened a study in 2002 that took aim at the project level of environmental review to answer two key questions:

1. Can NOAA Fisheries improve habitat protection through the use of economic tools?
2. Should we express the value of habitat losses and the costs to the public in more than biological or ecological terms?

The paper analyzed case examples to test the application of economic theory and valuation approaches, keying in on the legal requirements to provide the best strategy for using economics in habitat protection programs. The report written by Dennis King, Douglas Lipton, Ivar Strand and Katherine Wellman, and entitled *A Role for Economics in NOAA Fisheries Habitat Conservation Activities* is not yet published, but a draft is available on the Habitat Economics Workshop website at: http://www.nero.noaa.gov/ro/habcondiv/prewmain.html.

Using the results of this case study analysis as a starting point, the Office of Habitat Conservation (OHC) organized a national workshop around the theme: *Revealing the Value of Habitat*. OHC hired contractors with experience in marine policy and in helping government and private sector entities confront new ideas through creative exchange, to facilitate this effort.

A cross section of staff from Field Offices, Science Centers and partnering agencies came together to explore ways to use economic analysis to support stewardship of marine resources, and to develop specific proposals for research, staffing, training and other strategic activities to support this integration.

Habitat Economics Workshop: *Revealing the Value of Habitat*
April 7-9, 2003
Long Beach California

Tom Bigford, Chief of the Habitat Protection Division in NOAA Fisheries' Office of Habitat Conservation, set the stage at the opening session of the workshop by considering the factors driving NOAA Fisheries to delve more deeply into economics at this time. His remarks are a helpful prelude to discussing the mechanics and outcomes of the forum:

Why Economics, Why Now?

I want to welcome everyone and thank you for coming. It's nice to see colleagues from around the country, and to meet the newer members of NOAA Fisheries habitat programs. I'd also like to extend my appreciation to folks from other NOAA offices, federal agencies, and the private sector who will help us over the next day and a half. Finally, I'd like to thank Valerie Chambers and her colleagues in the NOAA Fisheries Southwest Regional Office for hosting this workshop and helping on local arrangements.

Before we begin, I want to make a few brief remarks about the workshop and our objectives. Let me start by saying that we couldn't accomplish it without you. How often have you said, "Why in the world did headquarters do THAT or spend money on THAT when it could have done something more useful like THIS!" During my 10 years in the Northeast Region and several months in the Northwest Region, I believe I uttered that same question a few times. Of course, there is a perfectly reasonable answer. While those of us in landlocked Silver Spring are clearly removed from your day-to-day operations and regional perspectives, we simply cannot involve you in all of the budget, policy, and program discussions that dominate our days. If we tried to include you in all of our work, we'd probably incite a revolt. However, this is one of those junctures or turning points in the evolution of a national program when regional and headquarters perspectives must be shared. The habitat program may be setting off in a new direction, and we need field input from NOAA Fisheries and others. This is the opportune time to get pragmatic input and seek the thoughts, suggestions, and opinions of those who face the daily challenges of habitat conservation. Simply put, we want you to influence the national decisions on this issue.

Why Are We Doing This?

So why economics and why now? One reason is to be responsive to Bill Hogarth's initiative to increase the consideration of socio-economics in NOAA Fisheries. Although largely a response to litigation on the comprehensiveness of our environmental documents under the National Environmental Policy Act, the habitat program needs to stay in step with policy changes and operate under consistent principles. Regulatory programs like Sustainable Fisheries and Protected Resources are setting a standard for socio-economic analyses

that will influence our interpretation of our mandates like NEPA that infuse socio-economics into our work. When commenting on projects and proposals, developing restoration or mitigation plans, it makes sense that our programs would operate with those same standards in mind. Essentially, we should do our best to keep pace as NEPA and other mandates shape our socio-economic policies.

The new direction I'm referring to is reflected in the title for this workshop, "Revealing Habitat Value." This theme has three interpretations:

- *Helping to understand the benefits of habitat services and expressing them in economic terms;*
- *Extrapolating to estimate the economic value of habitat programs; and,*
- *Incorporating that knowledge into ecosystem-based approaches to resource management*

On the first level, the title refers to our objective to quantify the often-hidden economic benefits of habitat protection and weigh them against the more obvious benefits of development. How do we attribute a value to habitat services when in most cases we can't quantify the services themselves? What is the productivity of an acre of a mangrove, for instance, or salt marsh, coral reef, or eelgrass? Can and should those values be expressed in dollars? What method of economic analysis will help us achieve our objective? The second interpretation of our workshop title is a natural outgrowth of the first. If we can express the benefits of habitat services in economic terms we will be closer to quantifying the benefits or value of our habitat programs. The third angle is more visionary. Economics could offer a common currency as we try to connect the many components of an ecosystem-based approach to resource management.

Hopefully one or more of these interpretations connects with you and your work. For me, I have no trouble recognizing that economics could add great value to our programs and our success. The Office of Habitat Conservation has been mulling these issues for about two years, dating back to when we were first appropriated funds. Since we were neophytes and couldn't pretend otherwise, the consensus was to use our initial funds to secure the advice of several respected and accomplished economists in the field of natural resource and environmental economics. With the help of Rodney Weiher (NOAA's Chief Economist), we asked Doug Lipton, Dennis King, Trina Wellman, and Ivar Strand to examine a handful of our projects and see if we could have employed economics as an additional line of argument in our technical comments. The resulting report, entitled "A Role for Economics in NOAA Fisheries Habitat Programs" is posted on the workshop website and an executive summary is in your folders. I found the report very intriguing. There seems to be ample opportunity to use economic tools to strengthen our biological arguments in habitat protection and restoration programs. This study was narrowly focused on permit review activities because they have been an integral part of our program for decades and we had to start somewhere.

We'll start our workshop with several background presentations. First, Doug will summarize the report mentioned above. For the many non-economists present, Dr. Dan Huppert from the University of Washington will provide a primer for the economically challenged. Dan Sulzer is here from the Los Angeles District Office and will update us on how the Army Corp of Engineers is approaching economics. And then Dr. Jim Boyd from Resources for the Future will offer some broader perspectives on the importance of economics in habitat protection. So, those of you who avoided those economics classes back in college should sit back and be prepared to be transformed into an expert. Your transition may not be perfectly smooth because there are some philosophical differences of opinion among economists; we've tried to weave that into our agenda. You may be left thinking there is no single or right answer. That's OK, and that's right.

Another complicating factor is that economics, like so many other disciplines, can be used inappropriately. One of the more exasperating reasons why we should develop some economic capability is to address the erroneous perception that our inability to quantify the value of ecosystem services implies that there are none. We need to attack that thought. Here's one example – the Federal Energy Regulatory Commission (FERC) rejected our recommendation to increase river flow to benefit salmon on the Columbia and Snake Rivers because it would "cost about $877,000 annually in terms of power generation impacts." FERC's position was that because the benefits to juvenile salmon are unknown, these "potential benefits are not worth the cost." They went on to say that monitoring to confirm project benefits was not worth the cost of $23,000 and therefore was against the public interest. Among the questions we would like to address through this workshop are "What are the best ways to refute this type of logic and how do we prepare for this role?" Do we need new tools, new staff, biological data, or something else?

The lack of biological data is certainly an obstacle to habitat protection and restoration, but economics offers some tools for appropriately dealing with uncertainty and risk. I will leave that topic to our experts to address. But the importance of having numbers or estimates for things that we consider to be in the public interest – like environmental goods and services, cannot be overstated. Such information would help us support efforts to defend habitat values.

Habitat is gaining respect, in part because society is becoming more accepting of the value of habitat services. Quantifying an issue in common terms often lends credibility and starts people thinking. In our case, public debate of how much habitat is best should create subtle pressure to do something about the trends that alarm us. This is not a vacuous thought. We have had some success in reporting numbers of acres restored. But simply reporting the number of acres restored or protected doesn't say enough about the quality of those acres and their ecosystem contributions. In the habitat field, we know that our technical arguments are bolstered when we can connect habitat services to an improved quality of life. This is generally true and leads to a second meaning of the

workshop title, and that is the value of habitat programs within NOAA Fisheries and other agencies. Some of you may have been involved in the strategic planning initiative undertaken by Admiral Lautenbacher. The Admiral's planning approach is to use performance "metrics" to instill organizational accountability and attain "budget alignment." Performance metrics offer a way to measure program success via a number. The Office of Habitat Conservation's existing strategic goals and performance metrics have been criticized for not conveying a clear and compelling message about NOAAs progress in protecting and conserving coastal habitats and for not conveying something meaningful to external audiences. In fact, for many habitat activities, there are no metrics at all!

Cost, performance metrics, and schedules are the new mantra for NOAA planning and budgeting exercises, including habitat. Our interests in resource economics could fit nicely into the same accountability trend that demands more quantification, measurement, and relevance. A common thread is, "Where is the value to the public?" This is a challenge to us because habitat protection is preventative and precautionary; measuring performance is difficult to do and seems an unfair question. How do we measure something that <u>did not</u> occur, and that habitat degradation was the forestalled and the extent to which the non-action benefited the public welfare? In the habitat restoration arena, how do we document benefits that accrue slowly for years after a degraded site is restored? How do we compare damage to one habitat type when restoration might improve a different type? Economic tools may help our efforts.

Revealing the value of habitat and our habitat programs are intertwined goals. They both hold us accountable for our environmental performance as it affects the public welfare.

The third and final meaning I would like to impart to our workshop is that economics is a key element of sustainable development and the "ecosystem approach" that aim toward holism and embrace the social sciences. This fits into the long-term trend that had us initially defending our programs based on the number of permits reviewed, then adding environmental metrics such as the number of acres restored or partnerships initiated - occasionally with a blend of quality or function related to those habitats - and now with glimpses of ecosystem implications.

We may be approaching an age of habitat scarcity -- or we may already be there. We are already witnessing the trend to use submerged land for things like windmill farms, cables, and pipelines. An economics program might support better decisions on trade offs between environmental services and other uses for marine resources.

The King et al. paper provides some recommendations to us on how economics could be used in our programs. I encourage you to use those ideas to generate your own thoughts. We are interested in both broad and long-range planning directions as well as specific short-term spending proposals that could be done in field offices. Our intention is to capture the

information needed to meet the "cost, performance metrics, schedule" mandate of Adm. Lautenbacher's budget and planning rules. We hope to leave here with a portfolio of proposals that we could submit as funding becomes available, and also the beginning of a plan to add economics capacity.

Thank you very much for coming. I hope you have some fun with this workshop and the tools we will employ to generate a spirited discussion. To secure our success, Kathi Rodrigues, Fara Courtney, and Jay Vogt have dedicated hours to planning this event. I greatly appreciate their efforts!"

- Tom Bigford, Chief of the Habitat Protection Division of NOAA Fisheries' Office of Habitat Conservation

Tom Bigford joins other workshop participants in checking out topics proposed for small group dialogue

WORKSHOP APPROACH

Revealing the Value of Habitat was designed to share knowledge and generate questions and proposals regarding habitat economics in the NOAA Fisheries context, through the interaction between biologists and economists from field offices and headquarters.

The intention of the gathering was to develop:

- A shared understanding - among Habitat conservation staff at all levels and their partners in other NOAA programs – of the opportunities and challenges involved in integrating economics into habitat conservation programs.
- Broad strategies for the Office of Habitat Conservation to pursue in developing a socio-economic framework that meets regional and national needs.
- A portfolio of specific projects than can be ready to go in the event of a targeted funding initiative aimed at integrating socio-economic tools and data into NOAA Fisheries habitat programs.

Participants

An invitation to join in the workshop came from Bill Hogarth, who emphasized to Regional Administrations and Science Center Directors that the goal was to have representation from all regions and across a range of disciplines, so that the dialogue would paint a rich picture of the challenges and opportunities inherent in bringing the science of economics to bear more fully in the traditional work of NOAA Fisheries Habitat Conservation Programs.

The group of thirty-five workshop attendees included biologists, ecologists, lawyers and economists from NOAA Fisheries regional offices, science centers and headquarters, joined by staff from EPA, Fishery Management Councils, USACE, Sea Grant and NOS.

Pre-Workshop Resources

Workshop registrants had access to a variety of relevant materials prior to the workshop, via a dedicated project website: http://www.nero.noaa.gov/ro/habcondiv/prewmain.html.

Several resources were aimed at the non-economists in the group, with a goal of helping them become familiar with the basic language and concepts underpinning various types of economic analysis. The draft paper by King et al was available in its entirety, along with a variety of other literature and links to habitat-related economics sources. (the King et al report's Executive Summary and Recommendations are found in Appendix D).

Workshop registration materials included an advance question aimed at helping the workshop's organizers understand prospective attendees' interest and concerns. The responses were thoughtful and wide-ranging, addressing both focused, pragmatic concerns and conceptual questions. The responses are compiled on the following pages.

Prioritizing outcomes and planning next steps

Enjoying challenging discussions in the California sunshine

"What do you see as the central issue regarding integrating economics into Habitat Conservation?"

Responses:

"Providing economics tools that are easily applied; Integrating economics and ecological assessments; improving the image of economic assessment with ecologists"

"How to integrate economic analysis and habitat conservation at the policy and decision-making levels – now it is after the fact."

"It is essential that economic valuation techniques are incorporated into habitat conservation plans in order to assure that current and future economic concerns that are likely to shape policy or decisions in the future be realistically accounted for. While it can be difficult to quantify the value of habitat preservation, some attempt must be made in order to compare these costs with the easily recognizable opportunity costs of forgoing economic development projects."

"One of the central issues I see concerns the total economic value of specific habitat types. Often in the literature I've seen valuation studies that focus on one or two specific services provided by a habitat, but the value falls short of representing the total economic value of a habitat. Additionally, there are a variety of habitat types that have received very little attention from valuation researchers, leaving a relatively large gap when looking for benefit estimates. It would be great if there were credible and reliable value estimates for an array of services that approximates total economic value for a variety of habitat types."

"Organizationally – need to establish economist positions in Habitat Conservation to coordinate with field economists and bring important economic issues to HQ attention.
Conceptually – need to critically evaluate costs and benefits of habitat restoration."

"We need credible estimates of the value of habitat conservation to justify in the political realm its conservation."

"1) Treatment of non-market values (in all their myriad forms), and their integration with other, more traditional, economic value information (e.g. market prices). 2) Meeting the mandates of "Benefit-Cost Analysis", when many habitat attributes are strictly "non-comparable". 3) doing a better job of "communicating" across lines of professional expertise (e.g., economists with biologists with attorneys). 4) Overcoming the "habitat side's" reluctance to think of environmental attributes as "quantifiable" in economic terms."

"Use of appropriate assumptions regarding human behavior and application of ecological principals to macroeconomic theory. I am interested in the formulation of NMFS policy regarding resource economic analysis in evaluating the socio-economic effects of laws and decisions implemented by the agency."

"Working with habitat professional (who are skilled ecologists) so that economics can become another preferred tool. That psychological and technical barrier could be significant to some attendees. Our challenge will be to identify those who are "pro-economics" and use them to spread enthusiasm to others. We also need to pursue this same path with other agencies who will receive ecological/economic comments from us."

"Calculating non-use (existence) values."

Responses (cont'd):

"Gaining agreement that economics is important (i.e. important enough to warrant reprogramming scarce resources) and identifying one or two issues that can be addressed to fill tangible, defensible needs."

"To familiarize myself with the application of economic tools when analyzing conservation issues."

"Developing tools and processes to improve environmental review of NEPA documents as it applies to cost/benefit analysis of action (i.e. cost/benefit of action on habitat and ecosystem)."

"We are interested in building economic data into success criteria to evaluate restoration projects and substantiate restoration needs."

"Providing decision-makers with tools that better justify conservation or compensatory mitigation for degraded or poorly-understood habitats, including those of species for which there is no clear economic value form the viewpoint of the general public or political leaders."

"How to incorporate economics with mitigation; to provide an economically sound mitigation plan that addresses environmental concerns. How to tie economics to long-term (temporal) impacts."
"The need to integrate economic, engineering and ecological considerations in planning for habitat conservation and restoration."

"Understanding how the socio-economic components of landscape-level resource management strategies such as the Northwest Forest Plan interact with salmon protection (ESA) to better integrate habitat valuation. Understanding interplay between socio-economics and salmon protection in general. For example, how economics and habitat valuation guide and effect critical habitat designation and development of recovery plans."
"Finding an applied mechanism with would allow day to day use of economics in our work"

"1) How to deal with a lack of data on habitat linkages to living marine resources;
2) Quantifying the value of habitat protection to the public; 3) Sorting out different economic approaches; 4) Designing an economics strategy to benefit habitat protection."

"Training and support; access to case studies and technical assistance; shift in culture"

"Identification of economic tools that are practically applicable, legally defensible and in compliance with any applicable national guidance regarding their use for evaluating habitat conservation. Simply put, what tools are in the toolbox, how do I tell the difference between them, and how do I know when I should use each tool available to me?"

Introductory Presentations and Panel Discussion

Welcome & Opening Remarks

Rod McInnis, Southwest Regional Administrator for NOAA Fisheries, and local workshop host, welcomed the gathering to Long Beach on the opening afternoon of the workshop. Garry Mayer, Deputy Director for OHC, represented NOAA Fisheries senior leadership.

Tom Bigford formally convened the workshop and, following his context-setting remarks (p. 5), introduced four expert speakers who provided a solid framework of information, observation and recommendations regarding the application of economic analysis to matters of habitat conservation, particularly in the context of NOAA Fisheries programs. The presentations and follow-up Q & A session primed the pump for the development of discussion topics for the following days.

Panel Presentations

Highlights from the presentations are summarized below. Copies of the Power Point presentations are available on the workshop website at: http://www.nero.noaa.gov/ro/habcondiv/prewmain.html

Dan Huppert, Dan Sulzer, Jim Boyd and Doug Lipton kick-off the workshop

Dr. Daniel D. Huppert, School of Marine Affairs, U. of Washington
The Value of Ecosystem Services: Principles for Valuing Fish Habitat

As an aid to the non-economists, Dr. Daniel Huppert opened the panel session with a primer on natural resource economics terminology and concepts. The same habitat-supported ecosystem services that are familiar to ecologists are considered "goods" in the economic world, or, in some cases "bads" as in diseases or predatory organisms. However, unlike ecology, the concept of value that is central to economics is unabashedly anthropocentric. Human needs and preferences are what give those ecosystem services positive economic "value" and that value is relative -- there is no "absolute" value.

To illustrate one of the several dimensions of value – “marginal” versus “total”, Dr. Huppert used the declining prices of Alaska salmon as an example. As the price of salmon declined from the late 1980's onward, the value of salmon habitat protection also declined. In other words, the value of enhancing habitat was very low because the marginal value of salmon was low. However, due to sheer volume of salmon sold, it is possible for the total value of salmon to have increased during this same period. Marginal value is based on an additional unit, e.g., one more salmon (or unit of habitat that supports salmon) and what one would be willing to pay for it. Since the value of an individual salmon is low when there is plenty, the addition of one more salmon -- it's marginal value, is also low. (The same concept applies to development; one more shopping mall where there are plenty has low marginal value).

Valuing habitat has another problem: it is a non-market good that is not priced through exchange. Natural resources, including habitat often have indirect value to consumers. Like farmland, the value of fish habitat depends upon production per acre and price, but unlike farmland, the production function is largely unavailable. To address the lack of information on value requires extensive specialized studies using "valuation methods" appropriate to the situation. Dr. Huppert emphasized the importance of understanding the ecosystem and ended with pointers on mistakes to look out for, such as the common misuse of economic impact for economic value.

Dan Sulzer, US Army Corps of Engineers, Los Angeles District
US Army Corps of Engineers Framework for Economic Analysis

Dan Sulzer introduced the framework within which the Army Corps of Engineers looks at the economic and environmental impacts of projects. This *Trade-off Analysis* weighs and seeks to balance two kinds of project outputs: National Economic Development (NED) outputs, which are measured in monetary terms; and National Ecosystem Restoration (NER) outputs, measured in non-monetary terms (e.g. Habitat Units). Increases in one type of output can result in reductions in the other (e.g. flood control vs. ecosystem restoration) – planners analyze the

trade-offs when formulating and evaluating plans. The evaluation process tries to realize a project that will maximize the sum of NED and NER benefits.

The *Incremental Cost Analysis* provides a structure for assessing the balance between NED and NER associated with a particular project. Through this process, planners can trade NED benefits in favor of NER outputs as long as the incremental value (a subjective measure) of the NER outputs exceeds the sum of NED benefits foregone, plus incremental costs. These incremental costs are the added expenditures necessary to achieve additional environmental outputs, minus any cost reduction achieved by reducing NED outputs. Project planners make all such trades of one output for another until the combined benefits are maximized.

Mr. Sulzer discussed the advantages and limitations of this balancing process, indicating that in the end the answer may still come down to subjective judgments, in particular because it is much more difficult to assess NER benefits than the directly quantifiable NED outputs.

Dr. Douglas Lipton, University of Maryland
Application of Economic Tools to Habitat Conservation Decision Making - Key Concepts and Case Studies

Dr. Douglas Lipton presented a study that offered recommendations for increasing the role that economics plays in NOAA Fisheries' habitat conservation programs[1]. This report was commissioned by the Office of Habitat Conservation to begin to understand how economic principles and techniques fit within Habitat's mission as the basis for its analysis and recommendations. The study used actual projects reviewed by NOAA Fisheries.

To illustrate how economic arguments are embedded in project proposals, Dr. Lipton presented a case study that involved channel dredging to accommodate a marina and ferry service. The project pitted a contaminated mudflat against commercial enterprises that were likely to produce a stream of public and private economic benefits. The developers claimed that some new habitat would be gained and that the economic benefits of the development would far outweigh any environmental impacts from dredging.

In its review, NOAA Fisheries argued that the mudflat habitat, though contaminated, nevertheless was important and its loss required mitigation. The project, however was approved without the mitigation despite having gone through an elevation procedure.

Dr. Lipton explained that although NOAA Fisheries' argument to seek mitigation was sound, it may have been strengthened by employing a risk framework. It is

[1] "A Role for Economics in NOAA Fisheries Habitat Programs" by Dennis King, Douglas Lipton, Ivar Strand and Katherine Wellman and edited by Rodney Weiher and Douglas Lipton

becoming accepted that created habitat is not as productive biologically as the original. The performance of created habitat is uncertain and should probably never be mitigated one for one by created habitat. Dr. Lipton then explained that classic economics literature provides a basis for assuming that the public prefers a risk free outcome to the same outcome that is uncertain (i.e. risk aversion). Keeping in mind that preferences reflect value, the public would experience a loss of some value if the lost mudflat and the created habitat were equal, because created habitat should be debited for its uncertain performance.

The fact that benefits might exceed environmental costs is often employed as a reason to approve a project and implies that consideration of the public interest ends when the ratio is greater than one. But in the above example, the benefit/cost ratio could have been improved upon by adding the cost of mitigation to the cost side and the expected benefits from mitigation to the benefits side of the ledger. The bottom line then, would be the highest *net* benefit, which is clearly more in the public interest. Shifting the burden of risk it seems, is in many ways a shifting of cost.

Other topical areas that emerged from the study and that are more thoroughly addressed in the paper were: decision processes (e.g. structured decision approach and collaborative learning), replacement cost used as value, mitigation ratios, cumulative effects and risk.

In his closing points, Dr. Lipton noted that NOAA Fisheries has a role in ensuring that habitat alterations are appropriately valued. If developers are allowed to inflate the economic benefits of development out of proportion to habitat protection benefits, then the public interest is not compensated adequately and a systematic undervaluing of habitat assets occurs over time. NOAA Fisheries should challenge developers and permitting authorities to choose alternatives with reduced habitat impacts. Although NOAA Fisheries does this all the time, it could augment its biological expertise with the tools economics provides.

Dr. James Boyd, Resources for the Future
The Role and Importance of Economics in NOAA fisheries Habitat Conservation Programs

Dr. Boyd took a step back to reflect on the motivation for NOAA Fisheries Habitat Conservation programs to pursue integrating economics in their decision-making process, and highlighted some of the practical considerations for doing so.

He suggested that statutory requirements and rules-based pressures are one driver for incorporating economic frameworks, for example, pushing an agency more comfortable with biology into expressing values in dollars. Dr. Boyd noted, however, that numbers do have power, and can be helpful in expanding credibility and winning arguments for habitat protection. Since economics is the

most commonly used proxy for social value, ignoring it can give the appearance of ignoring the social impact of project decisions.

Good economics is expensive and time-consuming, and even despite significant investment, people will still question the conclusions because the discipline is technically complex and still maturing from a scientific standpoint.

In the absence of significant dollars to be invested in economic analysis over the long-term, Dr. Boyd suggested that NOAA Fisheries could benefit from *adopting the attitude and language of economics* within the context of habitat conservation. This means co-opting some key economic concepts, for example, talking about environmental *services* rather than *functions,* and discussing environmental impacts in terms of scarcity, productivity and economies of scale. Rather than applying specific economic analytic techniques, Dr. Boyd pointed out the less expensive alternative of developing economic *principles* and *indicators* to apply to the practice of habitat conservation: GIS data married to principles can yield defensible indicators of ecosystem benefits.

Specifically, he proposed identifying service-rich hot spots on the basis of both biophysical and socio-economic characteristics; building in the notion of priorities, scarcity, complements, demand and risk. Dr. Boyd stated that "economics is what happens when you can't have everything." Saying everything - all habitat - is equally valuable is not helpful. However, he noted that it is important to argue effectively about the difficulty of ascribing economic value to goods that are not publicly traded and which function in complex underlying systems that are highly idiosyncratic to local conditions.

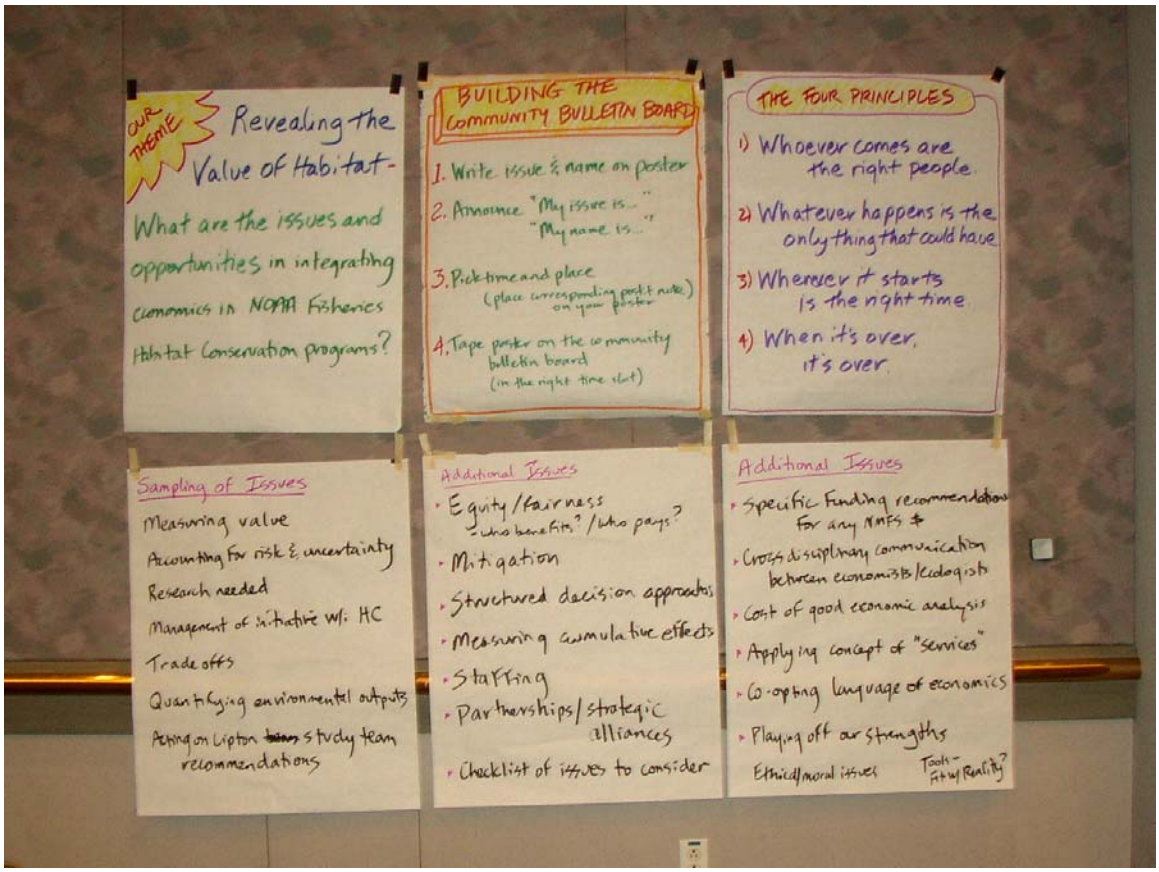
Finally, Dr. Boyd urged the group to resist any temptation to have non-economists actually do economic analysis in the absence of trained economists.

Panel Q & A

Following the four presentations, the speakers came together for a lively joint question and answer period. A number of issues were raised that would become the subject of more intensive discussion the following day, including:

- *When we're talking about economic value and habitat, we're still talking apples and oranges. How can we develop a common economic-ecological language?*
- *Agencies like EPA have teeth – they can just say no. How can NOAA Fisheries operate most effectively, acknowledging that we're not the lead dog in the regulatory pack?*
- *Economics is being used as a surrogate for social impact analysis – we need a broader way of defining "the public interest".*
- *We all know we need to be thinking about ecosystem-scale analysis – how do we do that when we're reviewing little projects, under deadline?*

Significant material for discussion was generated by the time the group retired for the evening. Most of the panelists were able to join the session as participants to continue the dialogue the following morning.



MEETING IN *OPEN SPACE*

Using a simple and highly participatory framework called *Open Space Technology*, the facilitator guided the workshop group in collectively setting the agenda for the duration of the session.

What is 'Open Space'?

Open Space is a self-managed gathering of people with common interests oriented toward a shared challenge of strategic importance. There are no speeches, formal presentations, or panel discussions. Instead, using a simple process, participants create their own agenda, convene their own sessions, and generate their own proceedings.

Though simple, Open Space is powerful and fun. At the start, the facilitator explains a few short principles that create the optimal conditions for creativity and free exchange. Individuals who care passionately about an issue, and are willing to provide some leadership for it, are invited to post their topic, assign it a time and place, and then convene the group of participants it attracts.

Each work group records its discussion on computers and shortly after the event all participants will have a complete record of the proceedings. The facilitator assists the whole group at the end in agreeing on priorities, next steps, timelines, and point persons for action.

Although every meeting in Open Space is unique, typical results include:
- **Wide spread sharing of critical information**
- **Intuitive breakthroughs that address daunting organizational challenges**
- **Opportunities to network, build alliances, and find allies**
- **A sense of community, connection, and spirit**

Open Space has a remarkable track record of success over twenty years on every continent, in every sector, with government being no exception. Notable examples include the US Forest Service, the US Internal Revenue Service, the US Army, and the World Bank.

For more information on Open Space Technology, see this book by Harrison Owen, developer of the methodology:

Open Space Technology, A User's Guide, 2nd Edition, Barrett-Koehler, 1998; and
the website of the Open Space Institute, www.openspaceworld.org

With the group seated in a circle, the facilitator briefly explained the agenda-setting process and simple ground rules for meeting in Open Space. Participants were asked to step forward with a question or issue they felt committed to exploring, and to take leadership for that topic. The facilitator provided a structure for scheduling sessions throughout the day, and individuals signed-up for several discussion rounds, based on their interest, and were free to change groups at any time.

Jeanne Hanson proposes a discussion topic as facilitator Jay Vogt leads the group during the opening session in "Open Space"

Participants posed the following topics for discussion sessions and small groups met in several rounds throughout the day:

- Does Headquarters need more help [regarding economics], or should the field offices be the focus? Who is the customer? What do they want?
- How can we tap into similar efforts throughout NOAA (and perhaps elsewhere) to connect economics to habitat programs?
- How could economics be applied, for example, in a specific permit review case in Alaska: bank stabilization – hard vs. bioengineering approach?
- How can we develop economic/ecological information in such a way that it is useful and relevant to decision-makers and the political process?
- What are the inherent conflicts in economics vs. ecology?
- How do we adequately capture the costs of mitigation, monitoring and construction impacts (permanent and temporary)? How do we tie these together?
- How will economic analysis within OHC be implemented given a finite and shrinking budget? Can ecologists effectively comment on economic issues and how much/how far can this be done?
- Issues in interagency coordination and integration – getting beyond the apples and oranges in economics v. ecology.
- How can we integrate economic analysis into habitat and protected species issues using a team approach?

The session leaders and note-takers were provided with laptop computers equipped with templates (discussion notes are reprinted in appendix E). Each discussion group was asked to take the next step and suggest *specific initiatives* for addressing questions/problems identified during their session, including research projects, budget actions and organizational improvements - short term and long term; strategic and conceptual.

WORKSHOP OUTPUTS

Emerging Themes

Given the breadth of subjects nominated for discussion, there was a surprising convergence of priorities among the sessions, as reflected in the discussion notes. We identified five cross cutting themes that arose repeatedly throughout the workshop:

Theme #1: Developing the Conceptual Framework

Developing the conceptual framework for integrating the biological and economic aspects of Habitat Conservation appears to be at the heart of both the enthusiasm and trepidation regarding the expanded application of economic assessment in habitat programs. These issues, aggregated from the small group discussions, illustrate the challenging *big picture* context within which specific strategic actions will be implemented:

- How do we raise the profile of “habitat for habitat’s sake” in an agency focused primarily on human use values (e.g. fisheries, tourism)

- How do we develop a shared mission, given the fear among biologists that economics will be used against them; and among economists that biologists only want information that will support "saying no" to development projects?
- The definition of *public interest* differs among agencies and within NOAA programs, leading to different definitions of project acceptability. How should Habitat Conservation work to expand the notion of public interest to better encompass the full range of habitat values? How do we express these in economic terms?
- Economics deals in tradeoffs; how do we prioritize habitat in a project review context? Should we?
- Habitat Conservation needs new metrics for evaluating success that focus on quality and function of habitat, not simply quantity. Can we express habitat quality in economic terms?

Theme # 2: Internal Collaboration & Support

Participants noted that NOAA Fisheries Habitat Conservation operations are compartmentalized horizontally (limited interaction between Headquarters and the Regions) and vertically (limited communication among regions, or between divisions within the regions). It was observed that within NOAA Fisheries, fisheries management typically overshadows habitat issues. Competition for limited funds further inhibits cooperative efforts among sub-units. These aspects of internal agency culture were highlighted as potential barriers to innovation in the area of habitat economics.

More broadly, within NOAA, several agencies (e.g. NOS and OCRM) are working independently to bring socio-economic tools to bear on habitat protection; however, there is little if any coordination among these efforts.

Theme #3: External Collaboration & Support

The active participation in the opening panel, and in the workshop discussions, by staff from other NOAA programs, and regulators from outside the agency, highlighted the value of communication between NOAA Habitat Conservation staff and external partners at many levels in developing a long-term habitat economics initiative.

In particular, a key question is whether other agencies will accept economic arguments for habitat protection from an agency that traditionally expresses value biological terms.

Secondly, workshop participants recognized the opportunities to engage resources from outside NOAA – academic institutions, other regulatory agencies and advocacy groups - in providing expertise to support economic research and training efforts, as well as sharing available habitat information. In a time of

shrinking budgets and competing priorities, opportunities for efficiency, to build synergy among programs and to leverage new resources should be fully explored.

Theme #4: Making Economics Work in the Field: Developing Tools for Project Review

Without direct regulatory authority over development proposals, Habitat Conservation typically uses the comment process to express the biological aspects of habitat and the potential biological consequences of development proposals, with the goal of convincing the permitting authority to deny or modify destructive projects. Project reviewers are often confronted by economic arguments in support of a project, and are unprepared to assess those arguments or counter them with adequate economic expressions of the *multiple values* of healthy habitat. Strengthening the Habitat Conservation Program's prospects for effectively influencing the permitting process should be a central objective of the habitat economics initiative.

Field scientists would benefit from access to economists with appropriate skill sets, along with the specific guidelines for critiquing the economic assessments provided by project proponents.

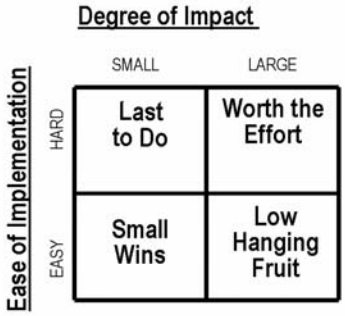
Theme #5: Research and Information Needs

A successful habitat economics initiative must be supported by good data. Broad research areas emerged from workshop discussions, targeting ecological data collection, economic analysis and policy analysis. Overall, a NOAA Fisheries Habitat Economics Initiative should develop a process for refining and prioritizing research/information needs.

- Develop the biophysical data sets necessary to quantify, and assign appropriate economic value to, ecosystems services.
- Bridge the gap between the language of economics and the language of ecology in order to apply economic models, by developing *comparable benefit units*; new ways to express ecological values in economic terms.
- Explore the application of other social sciences (in addition to economics) to defining the public benefit of habitat.
- Learn from experience; develop protocols for post-project monitoring, including mitigation and procedures for assessing cumulative impacts in the field.
- Advance the application of technical tools, like GIS.
- Design valuation techniques appropriate to the needs of Habitat Conservation Programs.

INITIATIVES

The nine discussion sessions yielded 18 proposed initiatives for promoting the integration of economics in the work of habitat conservation programs. During the final gathering of the workshop, the group reviewed the results and conducted a simple ranking process based on anticipated benefit and level-of-effort necessary to accomplish the task. The initiatives were categorized as *low-hanging fruit, worth the effort, small win* or *last to do*, based on the matrix below.



Pay Off Matrix

The ranking process was helpful in highlighting that some of the smaller actions could leverage significant value, while recognizing the significant effort and commitment of resources that will be required to realize all the possible benefits identified through the initiatives. The chart that follows outlines the 18 proposed initiatives, notes their relevance to the themes that collectively emerged from the discussion sessions and indicates the value- ranking conferred by the workshop group. More detailed notes on each initiative, developed in the discussion groups, are found in Appendix E.

Small group sessions generated ideas for applying the tools of habitat economics

The closing session explored common themes and priorities

NOAA Fisheries Habitat Economics Workshop

Themes & Initiatives

Initiative	Develop Conceptual Framework	Internal Collaboration/ Support	External Collaboration/ Support	Develop Resources for Project Review	Research/ Information	Investment / Benefit Ranking
#1.Develop a detailed framework for evaluating impacts on the broadest range of public interests – incorporate knowledge of interests/procedures from ACOE, EPA, OCRM, NOS, etc.		X	X	X	X	*Worth the Effort*
#2.Create avenues to partner with the ACOE on data sharing			X	X		*Worth the Effort*
#3.Identify what issues/problems exist(ed) that led to poor success in the project review process				X	X	*Low Hanging Fruit*
#4. Develop guidelines for integrating economic analysis into environmental decision making				X	X	*Worth the Effort*

Initiative	Develop Conceptual Framework	Internal Collaboration/ Support	External Collaboration/ Support	Develop Resources for Project Review	Research/ Information Needs	Investment / Benefit Ranking
#5. Develop Economic Review checklist for Habitat Conservation				X	X	*Low Hanging Fruit*
#6. Research validity of claims relative to economic benefits/costs of projects				X	X	*Low Hanging Fruit*
# 7. Conduct research to develop science-based mitigation ratios to ensure adequate compensation to the public for projects with unavoidable impacts				X	X	*Worth the Effort*
#9.Convene discussions between HQ and field programs to identify and overall plan to infuse economics into habitat restoration and protection		X				*Worth the Effort*

Initiative	Develop Conceptual Framework	Internal Collaboration/ Support	External Collaboration/ Support	Develop Resources for Project Review	Research/ Information Needs	Investment / Benefit Ranking
#10.Develop NOAA fisheries habitat economics budget initiatives linked to outcomes and metrics		X				*Worth the Effort*
#11. Identify *biophysica*l research needs to support analysis and application					X	*Worth the Effort*
#12. Establish a policy that each Regional Center pursue opportunities for collaboration between economists and biologists on habitat issues		X				*Worth the Effort*
#13. Test the utility of using broader social value info. in habitat valuations– pilot projects	X			X	X	*Worth the Effort*

Initiative	Develop Conceptual Framework	Internal Collaboration/ Support	External Collaboration/ Support	Develop Tools for Project Review	Research/ Information Needs	Investment / Benefit Ranking
#14. Inventory socio-economic habitat-valuation initiatives currently underway in all NOAA programs		X				*Small Win*
#15. NOAA-wide Initiative to coord. & support socio-economic efforts		X				*Small Win*
#16. Identify/cultivate outside cooperation – e.g. academic institutions to assist/compliment hab-econ effort	X					*Small Win*
#17. Assign at least one economist to Habitat cons per region		X				*Worth the Effort*
#18. Increase communication among divisions within each region		X				*Small Win*

Conclusions and Next Steps

The habitat economics initiative marks a new policy development area for habitat conservation. As in any other program, the resources necessary to accomplish the workshop-generated proposals are limited. Most likely for the near term, resources will be sporadic and activities will remain ad hoc. However, with the workshop report for a blueprint, the Habitat Conservation Office will pursue funding, approvals where necessary and partnership opportunities to make progress on the ideas provided by our habitat and economics professionals.

One of the most important results of *Revealing the Value of Habitat* was relationship building: several participants noted the benefits of interacting on a personal level with people from different disciplines and different regions, particularly in a setting where hierarchy was not an issue. The group was focused and engaged throughout the session. Economists and biologists alike expressed an improved understanding of each other's perspectives, and with that understanding came inspiration for ways to find synergy between the two disciplines.

We closed the workshop with a commitment to pursue the discussion of how to better use economic tools in the work of habitat conservation. We will be looking for ways to continue the interaction and leverage the positive energy of this gathering to move the habitat economics initiative forward.

As we build a work plan for habitat economics, we will keep in mind several fundamental observations made at the end of the workshop:

- The field of habitat conservation can never have enough information; however, we need to act within the uncertainty and evolve our programs as we learn from experience.
- There are complex tasks that require significant resources and are long-term undertakings, but which we believe will be worth the effort.
- Despite the complexities, there are simple steps we can take that will be helpful immediately.
- The success of this habitat economics initiative will depend on a interdisciplinary joint effort between Headquarters and the regions – we need to address the obstacles inherent in our agency's structure that make such cross-cutting activities difficult.

Here are some tangible, short-term actions:

- The first step is to brief Rollie Schmitten, Office Director for Habitat Conservation, and other senior leaders as appropriate.
- Next, we will start to attack the "small wins", such as developing an economics checklist for habitat project review and an inventory of the

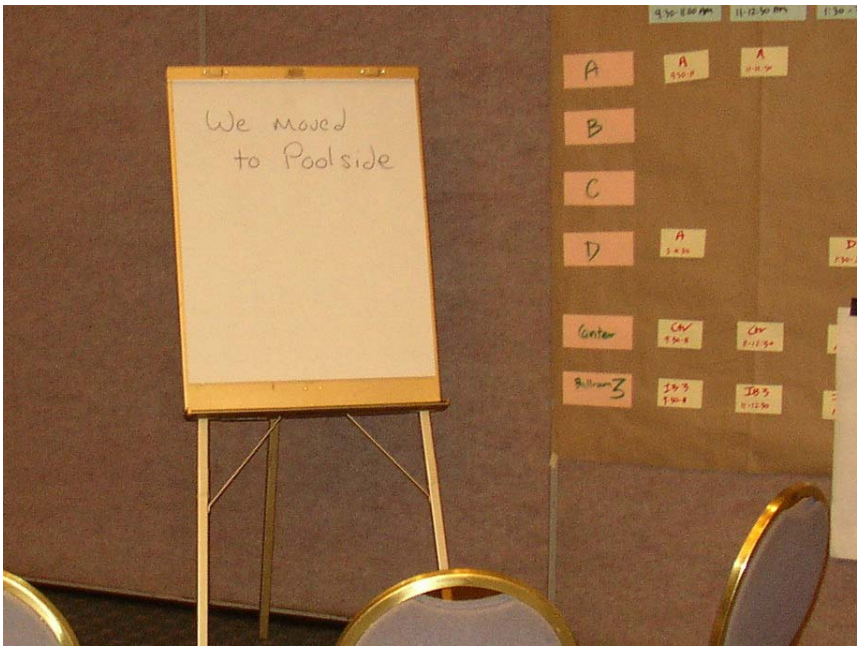
ongoing socio-economic habitat valuation initiatives currently underway in NOAA.

- We also look forward to a report from Jim Boyd of Resources for the Future that will help us develop the conceptual framework for policy development, identified in the report at Theme #1.
- We will continue to inventory socio-economics projects and research occurring throughout NOAA, so we have a full understanding of the resources and directions of our own agency regarding habitat economics.
- To take advantage of the teamwork generated at the workshop, we will explore options for web-based virtual meetings to help bring together interested participants to help us refine the strategies and projects.

Meanwhile, Tom Bigford's Division will provide some central coordination for the initiative and work to stay in close association with policy development underway in the NOAA Fisheries Office of Science and Technology and elsewhere in NOAA. We will keep in contact with workshop participants and report on progress.

One of the operating principles of Open Space Technology is: *"Whoever comes are the right people…"* We certainly believe this to be true of our Habitat Economics workshop. We could not have anticipated the wealth of experience, the willingness to thoughtfully consider other points of view, and the candid, energetic discussion that emerged from our brief time together in Long Beach. We look forward to engaging with the workshop group and other interested staff to turn the talk into strategic, effective action in support of habitat stewardship.

- Workshop Organizers
  Tom Bigford & Kathi Rodrigues



Appendix A: Workshop Advance Materials

- *Workshop Invitation from Bill Hogarth*
- *Web-based habitat economics background materials*
- *Panel Discussion Agenda (Day #1)*

INVITATION

(sent by NOAA Assistant Administrator Dr. William Hogarth)
Habitat Economics Workshop: Revealing Habitat Value
April 7-9, 2003
Long Beach, California

Sponsored by the Office of Habitat Conservation
Hosted by the Southwest Region

I am pleased to announce the next step in our effort to expand the use of socio-economics in NOAA Fisheries. On April 7-9, the Office of Habitat Conservation will convene a workshop to discuss the use of socio-economic information in habitat programs related to all NOAA trust resources. The theme of the meeting, "Revealing Habitat Value," conveys a sense of the task ahead -- to uncover and express the economic value of marine, estuarine, and riverine habitats. The Habitat Economics Workshop will begin that task by gathering a cross section of ideas and expertise from regions, science centers, and headquarters to explore ways to infuse socio-economic theory into our habitat programs. NOAA Fisheries representatives will be joined by colleagues from other NOAA offices and the private sector.

Tom Bigford recently sent you a draft report comprising a set of case studies examining the current and potential "Role of Economics in NMFS Habitat Conservation Activities." The report and other background materials will help to catalyze a discussion of the practical challenges and opportunities involved in broadening our analysis of proposed projects to include economic factors and natural resource valuation. The report's authors--all former NOAA staff intimately familiar with the agency's structure and function--will begin the workshop with a presentation of their findings and recommendations. Other guests will provide brief presentations of economic concepts before we shift into specific opportunities in the habitat arena. Contractors with extensive experience in helping government and private sector entities confront new ideas through creative exchange will facilitate the working session.

We need full, national participation to ensure a successful workshop. Relying on your base socio-economic budget and travel funds, I request that you invite up to three staff from your Region, Center, or Office. Our goal is to assemble about 50-60 habitat professionals, research ecologists, economists, policy analysts, and other experts who can participate in robust discussions to develop recommendations for future directions. Since we seek a diverse audience, please consider both experienced and newer employees and representation by employees including staff through supervisors.

Background information and registration instructions are posted on the web at: http://www.nero.nmfs.gov/ro/habcondiv/prewmain.html. For more information, contact Kathi Rodrigues 978-281-9324 or Tom Bigford 301-713-4300.

I look forward to receiving recommendations for strategic action and specific proposals to strengthen our habitat conservation efforts.

Web-based Pre-Workshop Resources:

Non-Technical Background on Resource Economics
http://www.ecosystemvaluation.org
Resource for non-economists, focusing on expressing the benefits of ecosystem conservation in economic terms; applying economic analysis. Excellent basic presentation of resource economic concepts.

http://www.mdsg.umd.edu/Extension/valuation/handbook.htm
Economic Valuation of Natural Resources: A Guidebook for Coastal Policy Makers (hyper-linked table of contents – entire text) includes illustrative examples and case studies.

http://www.nmfs.noaa.gov/prot_res/PR/biodiversityvalues.html
Office of Protected Resources discussion of marine diversity values: direct use, indirect use and option values

http://ahf331b.usc.edu/nonmarket.html
Coastal and Ocean Resource Economics (Core) Program: brief background on market and non-market values

Case Studies and Data
http://www.mdsg.umd.edu/Extension/valuation/
NOAA – National Sea Grant Office: *Internet Resource Guide for Coastal Environmental Economics* (includes regional studies from New England, Chesepeake Bay, Great Lakes and Southern Florida)

http://www.st.nmfs.gov
Fisheries economics resources

http://www.marineeconomics.noaa.gov
Coastal and Ocean Resource Economics (CORE) Program: Case Studies and data sets

http://biology.usc.edu/NOEP/index.html
The National Ocean Economics Project (includes portal on non-market values)

http://www.epa.gov/waterscience/316b/casestudy/
Cooling Water Intake Structures - Proposed Section 316(b) Phase II Existing Facilities Rule: Case Study Analysis

http://www.ncseonline.org/nle/crsreports/natural/nrgen-24.cfm?&CFID=4062108&CFTOKEN=79218423#Empirical%20Criticisms
Congressional Research Service Report: Natural Resources: Assessing Non-market Values through Contingent Valuation

Habitat Economics: Revealing the Value of Habitat
April 7th Panel Discussion
2 PM – 5:30 PM

Convener: Thomas Bigford, Director, NOAA Fisheries Office of Habitat Conservation

2:00 - Welcome and Introductions

Dan Huppert, University of Washington
The Value of Ecosystem Services: Principles for Valuing fish Habitat

Dan Sulzer, US Army Corps of Engineers
USACOE Framework for Economic Analysis

3:30 – Break

Doug Lipton, University of Maryland
Application of Economic Tools to Habitat Conservation Decision Making - Key Concepts and Case Studies

Jim Boyd, Resources for the Future *The Role and Importance of Economics in NMFS Habitat Conservation*

5:00 – Panel Q & A

5:30 – Wrap-up & Adjourn

Appendix B: Participant Contact Information:

Habitat Economics: Revealing the Value of Habitat

Workshop Participants

(includes individuals who registered but did not attend)

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Appendix C: Speaker & Consultant Background

Speakers (in agenda order):

Daniel D. Huppert received a PhD. in Economics at University of Washington, after which he was employed as a fishery economist and program leader at NMFS in La Jolla, California, 1974 – 1989, where he advised on US tuna policy, helped develop fishery management plans for coastal pelagic species (anchovies, mackerel, squid) for the Pacific Fishery Management Council, and conducted economics research on the commercial fishing industry and on marine recreational fishing. He served for 10 years on the Scientific and Statistical Committee for PMFC, chairing the SSC twice, and organized a committee to consider limited entry options for the Pacific groundfish fishery. Since moving to the School of Marine Affairs, University of Washington, in 1989, he has been teaching courses in economics of marine policy, fisheries management, and marine resources management. He served on the North Pacific Fishery Management Council's Scientific and Statistical Committee (1990-94), chaired NMFS's Economics Technical Committee on Snake River Salmon recovery (1992-96), and is currently chair of the Northwest Power Planning Council's Independent Economic Analysis Board. Current research interests include social science of Pacific Northwest coastal ecosystems management, fisheries management and marine protected areas, economics of salmon conservation and recovery, economics of climate change and climate forecast information, and economics of outdoor recreation. During the late 1990's, Dr. Huppert worked with Dr. Dave Fluharty in organizing the SMA-Fishing Industry seminar series.

Dan Sulzer, has been a Regional Economist with the Army Corps Of Engineers, Los Angeles District since 1988. His specialty is in Urban Flood Damage Economics, and he was the lead Economist on the Flamingo Tropicana Flood Control Project in Las Vegas, NV. As Team Leader of the Economics Group in the Los Angeles District, Mr Sulzer is currently involved in many Civil Works projects involving environmental restoration as well as flood control. Environmental Sustainability is a vital issue in today's Army Corps Planning Studies. Mr. Sulzer graduated with a B.A. degree in Economics from Occidental College in 1984.

Doug Lipton is an associate professor in the Department of Agricultural and Resource Economics, College Park, and Leader of the Maryland Sea Grant Extension Program. Prior to coming to College Park in 1988, Dr. Lipton was a fisheries biologist and fisheries economist at NOAA Fisheries headquarters from 1979-1988. He holds a M.S. degree in Marine Science from the College of William & Mary, Virginia Institute of Marine Science and a Ph.D. in resource economics from the University of Maryland College Park.

Jim Boyd became a senior fellow at Resources for the Future, in the Energy and Natural Resources division, in December 2000. Previously he was a fellow, a

position he held since 1992. His research focus is in the area of law and economics. Specifically, Boyd's research analyzes issues in liability law, policies to promote land use conservation, environmental issues associated with privatization in formerly command economies, and the implementation of water and wetland regulatory programs. His work in these areas has spurred other research projects on regulatory takings, the deregulation of electric utilities, the optimal design of damages, and the use of financial bonding to improve environmental compliance.

His work also includes analyses of the optimal design of regulatory programs and mechanisms. Jim has analyzed regulatory flexibility initiatives, such as Project XL, and is interested in the effects of regulation on technological innovation. His work in this area places a particular emphasis on the ways in which corporate decision-making evaluates the profitability of environmental investments and responds strategically to changes in regulatory policy.

Jim received his Ph.D. in Public Policy and Management from the Wharton Business School at the University of Pennsylvania (1993). In addition, he has served as a visiting professor at the Olin Business School of Washington University in St. Louis, Missouri.

Workshop Consultants:

Fara Courtney, Principal of *Good Harbor Consulting,* has over 20 years experience in coastal policy, environmental planning and community involvement. She served as Regional Manager for the Massachusetts Coastal Zone Management Office for 11 years, providing cities and towns with technical assistance in state and federal regulatory matters, harbor planning, watershed protection and consensus building. Since 1995, Fara has worked as a consultant and project manager in environmental policy, coastal management and program development, with a focus on collaborative efforts linking environmental, economic and social objectives. Partnering with colleagues in a variety of specialties, Fara designs the right team to meet the challenges of each project, providing personalized, responsive service. Her clients include state and federal agencies, municipalities and non-governmental organizations. Fara has an MS in Science Communications from Boston University, and a BA in Sociology/Environmental Studies from Cornell University.

Jay W. Vogt is an organizational and human development consultant with over twenty years of experience working with government, nonprofit organizations, corporations, and small businesses. He founded *Peoplesworth*, a private practice in consulting, training, and counseling, in 1982. Jay is an accomplished facilitator, mediator, trainer, management consultant and coach. He especially enjoys working with large groups in Open Space forums or Future Search Conferences. He holds a master's degree in counseling from Antioch/New England and a B.A. from Hampshire College.

Appendix D:

A Role for Economics in NOAA Fisheries Habitat Conservation Activities

Authors:
Dennis King
Douglas Lipton
Ivar Strand
Katharine Wellman

Executive Summary

This study recommends ways for NOAA Fisheries to improve its stewardship role for fisheries habitat protection by incorporating more economic analysis when carrying out its statutory responsibilities related to fisheries habitat protection and conservation. Six case studiesare used to explore the role that economic analysis is currently playing in NOAA Fisheries treatment of habitat protection issues. The case studies also portray the use of economics by interest groups, including other federal agencies, who are involved in activities that affect fisheries habitat. The role that economics played in each of the cases was critically evaluated and recommendations were made regarding how economics could have been used within the case study to improve the decision process. Each case study was also used to illustrate more general applications of economic analysis that could help NOAA Fisheries carry out its stewardship responsibilities.

Our study concludes that there are tremendous opportunities to use economic analysis to improve the way NOAA Fisheries approaches fisheries habitat protection. NOAA Fisheries already does an excellent job of developing convincing arguments regarding the biological impacts of proposed projects, but these are often cast by others as standing in the way of economic progress. NOAA Fisheries needs the capability to both challenge the often exaggerated claims of economic benefits associated with proposed projects that are likely to have adverse impacts on fish habitats, as well as the capacity to demonstrate the economic costs that result from habitat degradation or loss. We recognize that NOAA Fisheries may have a minor role in the ultimate decision regarding habitat change but also recognize that it is important that providing appropriate economic information may enhance NOAA Fisheries role in the process.

The two issues that are often the focus of habitat protection activities and link environmental and economic impacts are risk and cumulative effects. The economic consequences of cumulative biological effects are often significant but our inability to quantify many of these biological effects, hamper our ability to say anything very meaningful about them from an economic perspective. The situation with respect to risk and uncertainty is different because evaluating risk is an inherent component of economic analysis and is useful even when evidence regarding biological impacts is weak. The unique role of risk in economic analysis has some potentially powerful applications in

habitat protection because it can be used to demonstrate that over and above any direct project costs that are being measured; there are additional costs due to the fact that a project may also be expected to increase society's risks. Risk has implications for such issues as habitat mitigation ratios, where the number of
replacement acres required per acre of impact must reflect not only the delay in the replacement of habitat services, but the risks that the mitigation project will not perform as expected. Because there is so much risk and uncertainty associated with biological and economic impacts of the activities that affect fisheries habitats, and with the activities that can be used to mitigate for adverse fishery habitat impacts, risk should play a very significant role in NOAA Fisheries attempts to improve the decision process.

Specific recommendations for how NOAA Fisheries can improve the use of economics in the habitat protection area are as follows:

1) Development of inventories and comprehensive literature reviews of habitat values to evaluate the existing state of knowledge regarding the value associated with various habitat types.

2) Eliminate the vast gaps (that will be found in task 1 above) in our knowledge regarding economic values of different habitat types in different regions and at different scales through an active research program.

3) Begin a research program that attempts to quantify the risk-related social costs associated with projects with highly uncertain environmental and economic impacts.

4) Create bio-economic models that quantify cumulative effects of habitat degradation and loss, as well as the economic consequences from beneficial uses of dredge materials.

5) Work with other agencies to encourage development of a regional decision making processes using techniques such as the Structured Decision Approach (section III.C) to develop a comprehensive framework that will guide individual project decisions so that they are not evaluated in isolation from other proposed projects and include a full range of stakeholder objectives and values.

6) Staff NOAA Fisheries headquarters and regions (one economist in each region, coordinated by a headquarters economist) to form a critical mass of economists within the agency working on habitat conservation and protection issues, similar to the staffing strategy for economists working on fisheries management.

7) Coordinate with other NOAA components working on economics of coastal habitat issues (e.g. CZM, Damage Assessment, Coastal Ocean Program, Sea Grant)., and the development of strategic alliances with university centers and non-profit organizations involved in related research.
8) Interact with the Office of Management and Budget to assure that Executive Orders guiding the implementation of benefit-cost analysis and cost-effectiveness analysis reflect the concerns of NOAA Fisheries.

Appendix E: Small Group Notes and Initiative Templates

The following notes are the unedited products of each discussion session, as provided by the convener and note-taker. They were recorded on pre-set templates using laptop computers. Some of the initiatives generated by the small groups were collectively refined during the closing session of the workshop; these refinements are reflected in the Initiative Summaries at the end of this section.

Session Notes

Session Topic: **Does HQ need more help, or field offices? Who is the customer? What do they want?**

Convener: **Jim Boyd**

Participants: **Rusty, Wesley, Sean, Kristy Wallmo, Tom Bigford, Rebecca Allen, Sarah Lyons**

Discussion Notes

- There is demand for help in field, biologists are negotiating and are confronted with econ arguments that may not be legitimate.
- In other regions, reviewing huge numbers of permits on short notice.
- COE ignores, or just looks at bottom line, mAy not pay attention.
- It would useful at a high level (Damage Assessment Center) to have general guidelines for dollar values.
- We need econ guidelines for EFH. How to do a social impact study of EFH.
- Field office is responding to HG guidelines. It can be kind of an unfunded mandate.
- Guidelines can become meaningless if filled out as a low-priority task. Paper pushing.
- Need to search for things that are meaningful
- Econ analysis done by NMFS could be used against it.
- See it being helpful at regional and hq level.
- Get comments accepted, just because they are already accepted doesn't mean you shouldn't do it more and do it better.
- Get comments in early to preclude bad projects.
- Is econ the strategy to help you do that ?
- Civil works projects, pre-application projects.
- Examples : we could have gotten more if we'd had econ.
- Key q: DOES ferc, coe, buy what we're doing ?
- Getting other agencies to do a better job of doing their own economic analysis from the beginning. Or at least be able to respond once it's already done.
- Having economists to call on is the key. Give people the time to devote to stuff other than fisheries mgmt. (It would also be good to have a lawyer and an engineer to call on.)
- Tools to use when we need it versus tools to use every single time. The former is preferable.
- A more diverse workforce.
- We are being told to do this, to justify our existence. What are restoration projects giving back to society ? We need that information ? The big picture.

- Assertion : you'll have to have the field office stuff in place to be able to get the big picture analysis done. A feedback mechanism.
- Assertion : no, they're totally different, project-by-project stuff.
- Basic research is a big need. And it's not just economic research, but the bio-physical systems that generate the services.
- Monitoring the effects of programs to show what you're accomplishing. But we probably can't link that to dollars.
- There is an underlying issue : we don't know the underlying biophysical functions and systems. You can't give the economists a good basic for doing service analysis.
- How does species population react to habitat changes. Species by species.
- A research planning issue. Basic ecological building blocks for economic argument are not there.
- The research program would have to be defined both topdown adn bottom up.
- The top-down, bottom-up dichotomy is unfair.
- Establish a baseline, don't know what to compare a change to. What is the economic baseline.
- Economics doesn't have to wait on all the biophysical study.
- Get feedback from economists on where we need to go. (example, people aren't fishing as much demographically).
- There has to be a connection between field activities and what HQ needs to justify. That's where budgets get determined and defended.
- We have got to be able to defend the program with metrics. Only if we succeed in that task can we ask for more $.
- We're not going to turn everything into an economic argument, because lots of people aren't moved by that.
- Field wants tools that are available rather than to be told you have to use this tool.
- The equity in all of this : habitat shoud have access to same econ, research respources that are avilable to fisheries. Habitat deserves a secondary push. Fisheries has 2 economists per region. We need 1 !
- Another pet peeve : we are not aligned with habitat of a marine mammal, we're only concerned with finfish or shellfish. We've got to connect ourselves to other marine stuff. Particularly stuff that is more visible. Gravitate toward the important species.

RESEARCH NEEDS

Biophysical research to support a wider assessment of projects and activites, including economic assessment.

Assigning an economist to habitat in each region.

Session Notes

Session Topic: **How can we tap into similar efforts thoughout NOAA (and perhaps elsewhere) to connect economics to habitat programs.**

Convener: **Tom Bigford**

Participants: **Jeff Adkins, Terry McTigue, Sarah Lyons, Sean McDermott, Brett Joseph, Jeanne Hanson, Scott Miller, Kristy Wallmo, Garry Mayer, Mark Plummer, Mike Johnson, Becky Allee, Kathi Rodrigues, Tom Bigford**

Discussion Notes

- ERA economics workshop pending this fall with Terry McTigue and Gordon Thayer, with focus on socio-economic variables that are used to justify restoration.
- Also agreement with Umassachusetts.
- Another in the NOAA Restoration Center on trends and analyses
- All of these efforts will expand our discussions on economics yet focus it on restoration; could yield metrics and help to set priorities for transferring funds.
- Who would be a logical lead? F/ST in NMFS as lead on this issue. Rodney Wieher for all of NOAA. No set lead in NOS, but Bob Leeworthy and David Chapman could be « lead. » Also likely to be a community economic development group in OAR; Sea Grant week later this month.
- Might also want to expand outside, but do so in stages. First step could be NOAA habitat programs.
- Use our piece to drive our angle and needs so our issues are covered.
- Need to know who's doing what and what they're doing. Could use websites, conference calls, workshop, etc.
- Could the NOAA « matrix » approach be helpful ? If all of NOAA habitat programs are to be matrixed, then perhaps we can use that vehicle to integrate economics discussions and programs across NOAA. Could help to gain control over related programs through spending plans.
- Caution not to « compartimentalize » ourselves from other fields like sustainable fisheries and protected resources. Economists were hired to service all programs, altho they are often focused on fishery management.
- First effort is to identify the « choir » throughout NOAA who would then collaborate on a broader dialog that could lead to institutional change.
- Don't rely on headquarters offices to gather information. Need informal communications throughout so that all are involved.

Recommended Initiative

- Talk with other NOAA programs in NOS, OAR, and NMFS to begin a habitat economics dialog

- Consider a second step after our informal NOAA habitat discussion that would expand beyond habitat to include all NOAA economics efforts, again with possible application to habitat (methods, tools, etc.).
- We also may have ideas to share with economists working on fishery management. They seek our advice on EFH re benefits. Work with regional fishery management councils. Share with EDA.
- After our informal work, we need to address need for institutional change.
- Develop a budget initiative to cross all NOAA needs for the FY06 process. (Was there an initiative in FY05)

Schedule

- Conduct informal habitat discussion within months, i.e., end of FY03.
- Develop a budget initiative for FY06 by early FY04.
- Develop plan for institutional change over the next couple years.

Session Notes

Session Topic: **2 cases/ AK economics input**

Convener: **Jeanne Hanson**

Participants: **Tom Yokum, Jeff Adkins, Lou Quirolo, Sean McDermott, Steve Miller, Steve Morris, Kathi Rodrigues**

Discussion Notes

- Look at both the most economically feasible and environmentally sound.
- Is there a certaain amount of profitaqbility we need to allow ? EPA typically looks at the market, what actual costs are out ther and standard of parofitability in that industry ? 'cross compare'
- Army Corp is supposed to do that .
- If others similarly situated are making a profit doing X, then assume that this project can as well (log hauling).
- Look at other log haulers.
- Look at their ability to externalize costs ; another economic tool you can add to the checklist – their ability to make otherspay such as safety of log hauler trucks on *roads.*? Make externalities clear to ecologists.

Recommended Initiative

- Develop a checklist of things for biologists to look for.
-

Session Notes

Session Topic: **Typical permit review case: Juneau, AK: bank stabilization to protect property, hardening surface makes water run faster, downstream property owners impacted; NMFS position- bioengineering technique preferred.**

Convener: **Jeanne Hanson**

Participants: **Tom Yokum, Jeff Adkins, Lou Quirolo, Sean McDermott, Steve Miller, Steve Morris, Kathi Rodrigues**

Discussion Notes

- Applicants claim that bioengineering would cost more; want to do riprap
- How to capture that others pay the cost of not accepting NMFS' recommendation, is there a checklist?
- The area is already degraded
- Hold the Army Corp of Engineers (ACE) to requiring that projects meet their guidelines, not just "consider them" [Tom Yokum of EPA explained that the ACE was not applying its own guidance, judging from their response letter]
- NMFS offered mitigation, but don't know how to set "how much"
- Note trail on other side, riprap would affect recreational values due to aesthetic loss
- Speak qualitatively to those issues
- Try to organize all property owners along there to reduce bioengineering costs and "do all at once"
- Can't compel downstream property owners to incur these costs, however
- Downstream property owners may sue if there are downstream costs; there is a flood argument
- Need to establish the nexus between mitigation and what they are mitigating for
- Look at the affected entities, identify the relevant interested parties; look for ways to work with them
- ACE should make existing data available and integrate it; need to "get it out of their file cabinets and available to the public".
- Take what the applicants say at face value, but push for what it means
- Look for a better place to put the project? Look at the alternatives analysis
- Need economic counter-language that would grab their attention
- On a site-specific case like this, you probably could value the habitat in terms of dollars.
- Make arguments about the benefits streams
- The issue is one of cumulative impacts.
- Do the basics, look at their math; don't need an economist to do that.

- Take the next step after describing the biological losses, and translate it into economic terms – describe these in terms of economic loss to the community; at least qualitatively
- Also, look at any transfer of costs to disadvantaged communities, if any.
- Additional arguments, loss of subsistence bed for claming, if you can demonstrate subsistence fishing; also will lose the beachhead
- Degrading 5 acres of bay in an area that has many similar beds, difficult to argue that those 5 acres are important
- Need to outline the impacts better (not here in these letters provided)
  - " This is so flawed it makes me crazy"; the core regulations are not correctly cited ; has old language that no longer applies
  - way costs are calculated, haul cost doesn't make the difference, lease costs do
  - only really a $1million difference [between nmfs recommendation and applicant's?].
  - If you drop the lease fee, the alternatives are probably all roughly the samed
  - Need to expose the economic analysis for what it is, don't need to make the arguments about habitat, can attack this one on the basis of flawed economic analysis.
  - It is sound economically to trade something that is abundant for something that is scarce. But need to consider the cummulative in this consideratiion
  - one way to get at this without having biologists "dabbling" in economics is to just have a list of good questions to pose, e.g., did you consider the externalities and how are they incorporated into the anaylsis ?
  - Share across NMFS to find out how other ACE districts address natural revegetation/hardscaping for instance, and note the advantageous differences to this ACE issue; look for their internal inconsistencies.

Initiatives

identify all interested parties to be affected by a proposed action

- convene economists to provoke economic thinking
- convene economists to come up with a checklist, e.g., check math, identify externalities, look for what was left out to make similar proposals easier to evaluate [Note, need to find another term for "checklist ", economists don't like it]
- undertake development of guidance to incorporate economic review guidelines into the permit review process
- ACE should make existing data available and integrate it; need to "get it out of their file cabinets and available to the public".

Recommended Initiative

- Develop a checklist of things for biologists to look for to help integrate economic thinking in permit review.
- The ACE has a wealth of information and data that would help in fact-finding for permit reviews such as this one. We need an initiative to get that information out of their file cabinets and into the hands of people who can use it.

Session Notes

Session Topic: **How to Develop Economic/Ecological Information in Such a Way that it is Useful/Relevant to Decision-makers and the Political Process?**

Convener: **Dan Huppert**

Participants: **Highlight and type participants names here, please use commas between names**

Discussion Notes

- Within the EA/EIS framework (including RIR/IRFA documents) – these are the vehicles for providing economic analysis
- Analysis goes to SSC/Council/Public – however, given lack of economic expertise by audience, we are constrained in level of analysis – need to keep it simple and do an extremely good job of qualitative assessment (quantitative can come after if data/technique allow).
- Incorporate fishing industry views re EFH closures.
- Collect crucial data (e.g. by-catch) via 3rd party (fishery observers).
- Understand decision-makers view of their responsibilities so that studies address information needs as defined by decision-makers
- In addition, identify information that is crucial but not known by decision-maker.
- Provide information that addresses public interests (vs. interest of applicant)
- Public interest tends to be assumed by decision-maker (e.g. Corp of Engineers) rather than informed by relevant socio-economic data. (Development assumed always to be in public interest unless Corps determines a particular project is contrary to public interest) – therefore information gaps need to be filled that allow for an affirmative determination as to whether any particular project is in the genuine public interest.
- Develop a detailed review/compilation of economic and ecological consequences of projects in aquatic habitats to flesh out concept of "public interest".
- Discover why opinions of COE, NMFS, EPA differ in determining project acceptability. Do these divergent views reflect differences in "culture" between agencies or between disciplines (hydrologist/engineer vs. biologist).

Initiatives

- Develop a detailed framework for assessing broad "public interest" (interest in enhancing overall quality of life parameters in public at large) stemming from

economic & ecological consequences of modifications of aquatic habitats.

- Framework should identify information relevant to broad public (ecological/economic) interest and offer means by which information can/should be used in decision-making.
- Framework should focus on public interest as it pertains to NMFS habitat responsibilities, while incorporating knowledge of interests and procedures in ACOE, FERC, EPA, OCRM, NOS.

Performance Measures

- More frequent denials and/or modifications of project applications (by Corps)
- Framework is well-distributed and publicized

Resources

- Team of 10-12 NMFS Staff (from all regions).
- Contract for lit. review, meeting prep, report writing, etc.

Schedules

- 4 mtgs in 1 year.
- Implementation in year 2.

Session Notes

Session Topic: **Economics v Ecology conflicts**

Convener: **Kathi Rodrigues**

Participants: **Garry Mayer Cindy Thomson, Dan Huppert, Tom Yocom, Terry McTigue, Mike Johnson, Scott Miller, Brett Johnson, James Sullivan, Marcia Hamilton**

Discussion Notes

- Do ecologists lose ground by including economic consideration? Can economics be used against the ecologists?
- Will well-established ecological evaluations/tenets come into question? Local economy more important than ecology during a recession?
- How do we establish the value of conservation for conservation sake? Is supported by society.
- Can we better define the conflict between economics and ecology to better address the conflict?
- Are we looking for economic info on a case by case basis or within the regulatory process (broader view). Does the applicant do the eval or does nmfs ? value of habitat protection needs to be part of the info that nmfs puts forward.
- Will going through the valuation of habitat lead to fewer acres of habitat restored as mitigation ? Do we have the power to enforce standards for performance in mitigation projects ?
- Will consideration of both ecological and economic issues be supported in the regulatory structure ? command and control versus evaluation
- Need to resolve conflict betwn economic and ecological analysis
- What piece of puzzle can we supply to bring in broad economic argument ? economics and ecology both need to «bend » to need
- Economics and ecology conflict on a basic level : ecology doesn't deal with people, economics deals with the people.
- « because the otters are better off, we are too » need to bring in the details that support the argument, not just insist that it is. Put argument in terms that are understandable and shows value to people. «(preserving riparian boundaries is good for the environment, but also provides a flood buffer, provides water for livestock, and reduces erosion)
- human benefits from projects are there, but are disjunct and need to be brought together as a convincing story.
- If we use economics, we may provide evidence against ecological projects
- Economics deals in trade offs, protection doesn't often deal in trade offs
- Need to look at economic evaluations differently. Removing coral reefs opens

coastal areas up to large scale coastal erosion and storm impacts.

- If we had indicators for a project type, would that be helpful ? Need studies to support arguments
- We'll never have the data for some projects and will have to rely on integrity of habitat/environment as argument
- Would we lose MORE if we include economic assessments fully.
- Can the two discplines compliment each other ? strengthen each other
- Political realities can override both ecology and economics
- If we just use the terminology of economics to strenghten our argument, we're going to lose. We need to play part in taking economic analysis and turning back into something we can use, something compatable with ecology. Broaden economic assessment beyond cost to developer.
- Underlying assumption is that society would like to see ecosystem whole. We're allowed to exploit this to the extent that we don't negatively impacty economy/society. No mechanism to assess habitat change, which makes our job more difficult. No context against which to assess economic argument. If we had data/evaluations on habitat extent within a watershed, we could make cogent arguments. Where do we put our scarce resources to increase bang for buck. By showing progress, we could work to increase available financial resources.
- By including both economic and ecology, you expand your tools.
- We don't have data to support mitigation ratios we follow (3 :1 ratio for some habitats, for instance)
- How do we do this, not should we do this ?
- Should we insist on economic monitoring to evaluate claims made by developers, etc ?
- Development of indicators may help in evaluating claims
- There are case studies that show ecological outcome IS the economic outcome. Looting versus reinvesting in future use and viability of resources.
- Need to bring the idea of cumulative impacts and scarcity to the forefront.
- How do we calculate the value of habitat protection ? Ecologists can't provide the numbers or won't rank the values within the ecosystem
- Ecologists don't feel we better off by defining these kind of things. Ecological functions are so complex. How can we put dollar values on something you don't yet understand.
- Do economics have the same level of complexity ? an economic argument that oversimplifes cannot carry the day when confronted with complex ecological argument.
- Secondary and tertiary costs of habitat loss have direct and substantial impact on economy and quality of life. These costs don't get considered. Need to be part of our arsenal. Habitat protection eliminates those societal costs
- Economic cumulative pressures are part of why we are interested in protecting habitat. Putting it in that context could be useful in rebutting other economic arguments. There is common ground between economists and ecologists
- Immediately broaden economic argument to see the regional context, scarcity.
- Private market actions are very narrow and circumscribed. Ignores broader

public externalities. Conceptual framework exists to broaden economic argument.

- Fundamental mistrust of economic assesssment among ecologists. No guarantee that results of economic analysis will turn out to support ecology. Ecologists must do both qualitative and quantitative assessments (in economics and ecology). How will this project impact society at large ? Negatively impact drinking water, degrade view ? Make externalities clear to ecologists.
- How do you deal with negative economic impacts ? ie : improve water resources in Guam, better drinking water, but the bottled water industry that has sprung up due to poor water availablity would suffer
- Will all this lead to a greater questioning of the evaluation of mitigation benefits ?
- Need to do a good job on the quantitative side before rushing into the qualitative side
- Why should worry about negative results in economic analysis be a concern when the same possibility exists in ecological analysis ? you can't go into an asssessment with the idea of only accepting your preconceived result.
- All projects impact habitat. How bad are they and which ones do you try to stop. You have to prioritize your habitat values. What is the implication of losing this habitat or resource ? how do you define cumulative effects ?
- EFH is an object lesson of not being willing to give up any ground and an example of how things shouldn't work. EFH shouldn't mean that you can't build, but it should provide a means of prioritizing areas.
- EPA has similar program : advance warning. Gives developers etc an idea before starting process of where not to build. Functionally, though, some regions had no areas identified as potentially available for development
- EFH left the science arena and went into a political arena
- We need to get away from the idea that its all important. Some parts are more important that others.
- Go through old cases and do the economic assessments, provide outcomes to people working on new, active projects.
- You may not always have to move from qualitative to quantitative
- How do we bring in quality of life issues ? how macro do we go ? sometimes its not until we get to the demographics and quality of life issues to we get to the point of accurately assessing impacts of action/project. « the cost of living in this community is high because…….. »
- NOAA's economists may not have the broad background required for the types of broad assessments we're talking about. Fisheries economists working on community impacts, anthropology, etc.

Recommended Initiative - 1

- Define the conflict and common ground between economics and ecology

Economics and ecology appear have different objectives. The above discussion needs to be more clearly articulated, i.e., the concern that economics can undermine ecology, and a path must be shown where NMFS can move forward in developing an economics policy that would *strengthen* habitat protection.

Performance Measures

- A discussion document that results in a consensus between economists and ecologists in NMFS or NOAA, and which NOAA agrees to adopt as a policy or plan to move forward.

Resources

- Consultants under contract to do the research (<$25,000)
- Some in-house coordination to identify appropriate economists/ecologists for their review and opinions.

Schedules

- If folded into ongoing economics research/contracts, can possibly be completed by end of FY03.

Actions

What	Who	When
Broach idea with Resources for the Future contractors to consider adding to work statement?		

Recommended Initiative - 2

- Need to research and determine science-based mitigation ratios to ensure adequate compensation to public for projects with unavoidable impacts.

Performance Measures

- Published national guidelines for mitigation ratios by project type, location, etc.

Resources

- This is a fairly large project that would require participation, buy-in and likely, additional resources for NMFS Science Centers (perhaps in partnership with other NOAA offices).
- Once the research portion is complete, Habitat Conservation Office staff would draft the guidance for publication in the Federal Register.

Schedules

- A multi-year initiative

Actions

What	Who	When
Draft a project statement and request approval from the AA for Fisheries	Habitat Cons. Office	2-3 months
Seek partners within NOAA, NOS, science centers, restoration program, etc.	Habitat Cons. Office	3-4 months
Determine and obtain science/research resource needs		UK
Research mitigation ratios/draft report	Scientists	1 year
Vet science results		
Draft proposed guidelines		

Recommended Initiative - 3

- Research the validity of claims made by developers relative to the economic gains/losses, benefits/costs of projects. Post project evaluation.
- If possible, develop economic indicators to use for this purpose on a continuing basis and to help evaluate future claims.
- Or, develop economic indicators for habitat projects in general.

Performance Measures

- Sound economic indicators to use to evaluate projects
- A factual reference document to help permit reviewers dispel exaggerated claims of project developers and politicians.

Resources

- Consultants under contract to do the research (<$25,000)
- Some in-house coordination and contract management

Schedules

- With funding, could be completed in 1-2 years.

Actions

What	Who	When
Draft a project statement	HCO with advice from NMFS economists	
Contract out the research		

Session Notes

Session Topic: **How do we adequately capture the costs of mitigation, monitoring and construction impacts (permanent and temporary)? How do we tie these together**

Convener: **Sean McDermott**

Participants: **Mike Johnson, Garry Mayer, Tom Bigford, Rusty Swafford, Terry McTigue, Cindy Thomas, Mark Plummer, Kristi Wallmo, Rebecca Allee, Lewis Queirolo, others**

Discussion Notes

- Trade off: reduce construction costs vs. increased monitoring
- Resource streams affected by construction activities
- Time of recovery? Need for better basis for mitigation requirements. Use of habitat equivalency as a basis for calculating mitigation based on service. Does not include risk.
- Monitoring: How do we determine the amount of monitoring? Why monitor? What are the protocols for identifying costs? What is the expense of doing adequate monitoring
- Monitoring for recovery with tiered approach for mitigation. Is that a valid approach? What are the advantages/disadvantages?
- Monitoring does not bring back resources; overhead vs part of mitigation costs.
- NSA report on mitigation

No further initiatives or recommendations were developed. This was a good discussion on the topic.

Session Notes

Session Topic: **How will economic analyses within HCD be implemented given a finite and shrinking budget? Can ecologists effectively comment to economic issues and how much/far can this be done?**

Convener: **Michael Johnson**

Participants: **Gary Mayer, Jose, Wes Silverthorne, Ron Felthoven, Michael Johnson, James Sullivan, Rusty Swaford, Terry McTigue,**

Discussion Notes

- Do we train ecologists or hire economists ?
- Training ecologists may not be most fruitful means
- Need acceptable, applicable tools
- Both should get better understanding of others' disciplines
- When to bring in an economist ? How to get help when we need it ?
- Review the successes and failures (both for permits and the projects themselvels) and how they may have been affected by having better economic information
- Set up some forum (non-burdensome) to conduct these reviews on a defined or regular basis.
- Avoid processes that provide no results, just process
- How to implement economic review so that it is taken seriously
- Template/white paper could be developed that describes/defines which types of analyses should be undertaken for certain types of projects
- May not want to make these descriptions too rigid; involving economists from the beginning may be a better way to determine the type of analyses that are necessary.
- Cooperative extension economists or visiting scholars could be used to help with economic analyses
- The services of economists shouldn't just be pulled off the shelf once and a while for large projects ; it might better be considered as a standard part of analyses that may or may not play a significant role in the decision (and thus, may not require much work by economists and could be underaken in some cases by biologists).
- Isolate and identify consistent problems and direct resources in this direction. Quantify the effects of these problems/shortcomings so that we can justify directing the resources.
- We will likely have to sell the inclusion of higher 'economic standards' to folks around the country – is it necessary to direct resources in this area ?

Initiatives

-

1) Develop or identify sources for outside cooperation or assistance
2) Complement habitat-economics assessments
3) Identify what issues/problems exist(ed) that let to poor success in a review process (and look at role of economics in this assessment).

Recommended Initiative

- Identify what issues/problems exist(ed) that let to poor success in a review process (and look at role of economics in this assessment).

Session Notes

Session Topic: **Interagency Coordination & Integration (getting beyond apples and oranges)**

Convener: **Lew Queirolo**

Participants:

Discussion Notes

- National Habitat Policy provides some indicators of relative scarcity in « comparable benefits units »
- Economists may need to be prepared to accept that their current « tools » won't always bit the habitat needs
- Economists need to articulate really sound, clear questions to express ecosystem tradeoffs – biologists need to work on the answers
- EO 12866
- - benefits streams measured in a consistent way
- - biological quantification of repsonse
- - expected physical output (how the production « changes »)
- - « counting things »
- What habitat metric can be identified ?
- The economists is charged with a « net national welfare » perspective, while the ecologist may be more narrowly focused on a specieis, habitat type, region
- National Habitat Policy Statement
- Regional Communication across divisions

Session Notes

Session Topic: **How to intergrate economic analysis into habitat and protected species issues using a team approach?**

Convener: **Wes Silverthorne**

Participants: **Wes, Cindy Thomson, Marcia Hamilton, Mark Plummer, Kathi Rodrigues, Ron Felthoven, Lew Q.**

Discussion Notes

- Should economists be integrated into Habitat offices ? Working togeth*er* builds synergy and cross pollination.
- Can the agency afford this or should current NMFS economists be assigned to « teams » with biologists etc.,and have structured meetings.
- There would be one team per region.
- Right now it is sometimes difficult for economists to get involved in habitat issues.
- It may be easier to get involved if the appeal is made to higher levels as they see the bigger issues.
- Need a proper economic analysis of alternatives.
- At this time economic data is sometimes used inappropriately either by other agencies or by NMFS biologists or other non-economists.
- Would like to see economists work at the ground level with biologists
- Biologists want the biological data used to be good and used appropriately, economists have the same desire.
- Economists are not included in many projects but have the feeling that there is a lot of information that is not being considered.
- Think there should be an economist on every recovery team.
- Physical projects (permit applications) are mostly seen as technical (physical) issues that don't have a need for economics.
- The role of economics in policy formation needs to come from above, should economic analyses just be used to justify desired outcomes, or should it be used to to make decisions ?
- Some want economists to help biologists to get what they are wanting
- Economists consider themselves to be scientists and likely would not participate in justifying decisions after the fact.
- But they will participate in helping biologists to quantify benefits that have not been considered before.
- Perhaps working one on one informally will build trust, rather than mandating from above.
- There have been positive experiences of this.
- Finding ways to work together will reduce the mystery and help each group

understand the other.

- This requires having an open mind.
- Perhaps a pilot project could provide a concrete example and give guidance on how to go forward.
- Center economists tend to be more research oriented, are they open to being on teams looking at problem solving ?
- I don't care where economists or biologists come from (Center or Region), just want them to work together.
- Sometimes the habitat folks are focused (appropriately) on narrow issues but the issue of most concern is much larger.
- It is incumbent on economists to go to biologists rather than the other way around, see the biologists as potential clients and try to sell them your product.
- Where are the opportunities to make economic products, and previously successful teamwork known ?
- Needs to be an institutional change, perhaps this meeting is a first step.
- In some regions, habitat doesn't want to talk to protected species and neither wants to talk to SF.
- This is partly due to competition for resources.
- Need an initiative to cross the divide and learn to work together.
- Some biologists don't know that they CAN call on/work with economists, they need to be told. But this is a policy decision that must come from above. Some regions don't want this cross contact.
- Proximity helps break down walls but often the habitat folks are in the regions while most economists are in the science centers.
- Pressure to separate science from management makes it difficult to communicate.
- At the least professional courtesy requires some level of cooperation.
- Providing the least cost combination (method) to achieve ecological objectives may be an acceptable way to include economics (economists would not set the objective, just analyze the most cost-effective way to get there).
- Need to inform biologists as to how economics can add value to what they are doing.
- Working together can help avoid lose-lose outcomes that may result from litigation or negotiated outcomes.
- Internal conflicts weaken the agency and each group's position, we cannot afford infighting when there are such big problems facing fisheries and the environment.
- Can ride the ecosystem bandwagon to get money for habitat and protected resource economics.
- Need to have economists in HC at HQ.
- Rodney Weihrs is NOAA chief economist, many NMFS economists don't even know who he is and certainly don't interact with him.
- Better public relations would inform fishery participants that NMFS is also working to protect habitat (not just to regulate them)
- EPA may be willing to fund some economic analysis that is related to their mission

Recommended Initiative

- Establish a national policy that each region make resources available to incorporate economics into habitat conservation and protected resources.
- Establish a national policy for science centers and regions to pursue opportunities where economists can positively contribute to habitat conservation and protected species projects (perhaps a more positive presentation of the above).
- Should use some S and T money for this, don't reserve it all for fisheries (or is it earmarked by Congress?).

Performance Measures

- The number of collaborative work products completed and dessminated (not just stuck in a file somewhere)
- A meeting where these products are presented and discussed.
- Funds are allocated to support these activities (don't expect lots of products with no budget!)
- Improved decision making.

Resources

- Committed funding for including economics and other ecosystem principles in HC and PR issues
- FTE positions to work on these issues (may need to reallocate current funds/people due to limited budgets).

Schedules

- Reallocation of existing resources by 2004 to do this work.
- Work products begin to be available in 2005, annual meetings also begin at this time.

Initiatives *(as refined in the final workshop session):*

Initiative: Develop a detailed framework for evaluating impacts on the broadest range of *public interests,* stemming from economic and ecological consequences of modifications of aquatic habitats. Incorporate knowledge of interests and procedures in the Army Corps of Engineers, EPA, OCRM, NOS.

(Dan Huppert)

Performance Measures:

- More frequent denials and/or modifications of project applications (by the Corps)
- Report is well-publicized and widely distributed

Resources:	**Scheduling:**
▪ Team of 10-12 NOAA Fisheries Staff (from all regions) ▪ Contractor for literature review, meeting prep., report writing, etc.	▪ 4 Meetings in 1 year ▪ Implementation in year-2

Initiative: Create avenues to partner with the Corps (Regulatory Division) on data sharing and integration.

Worth the Effort

(Jeanne Hanson)

Performance Measures:

- Partnering Agreement developed - within a year
- GIS/data base – 3-5 years
- Streamlining Process – 2 years

Resources:	**Scheduling:**
▪ Staff ▪ Allocation of time	▪ High Priority – multi-year

Initiative: Identify what issues/problems exist(ed) that led to poor success in the project review process

Low Hanging Fruit

(Michael Johnson)

Performance Measures:

- Key issues/problems creating obstacles to successful outcomes identified
- Strategy for addressing these issues is developed and implemented

Resources:	**Scheduling:**
▪ NOAA Fisheries staff expertise/time allocation to identify representative cases ▪ Outside review of past cases to evaluate problems, recommend remedies	▪ Intermediate term

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Initiative: Develop guidelines for integrating economic analysis into environmental decision making.

****Worth the Effort****

(Lewis Queirolo)

Performance Measures:

- Working Group organized
- Indicators of relative scarcity, expressed in "comparable benefit units" – units of numeric exchange – agreed upon
- Clear questions to express ecosystem tradeoffs articulated
- Guidance document produced and widely distributed

Resources:	**Scheduling:**
▪ Staff expertise / allocation of time (biologists & economists) from Protected Resources & Habitat Conservation	▪ Long-term (based on 3 yrs. to negotiate similar guidelines for fisheries mgt.)

Initiative: Develop Economic Review Guidelines (Checklist) for Habitat Conservation e.g.: "identify affected parties, check proponent's math, transfer of economic impact (who pays?)" etc.

****Low Hanging Fruit****

(Jeanne Hanson)

Performance Measures:

- Checklist developed and tested
- Dissemination to NOAA Fisheries staff
- Training on application of guidelines

Resources:	**Scheduling:**
▪ National review of existing guidelines (e.g. oil spill/Damage Assessment) ▪ Staff time and funding ▪ Interagency Coordination ▪ Regional sharing of information	▪ High Priority - > 1 yr.

Initiative: Research validity of claims made by developers relative to the economic gains/losses, benefits/costs of projects. If possible, develop economic indicators to use for this purpose on a continuing basis and to help evaluate future claims

(Kathi Rodrigues)

Performance Measures:

- Sound economic indicators to use to evaluate projects
- A factual reference document to help permit reviewers dispel exaggerated claims of project developers and politicians
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Resources:	**Scheduling:**
▪ consultants under contract to do the research (<$25,000) ▪ some in-house coordination and contract management	▪ with funding, could be completed in1-2 years

Initiative: Conduct research to develop science-based mitigation ratios to ensure adequate compensation to public for projects with unavoidable impacts

****Worth the Effort****

(Kathi Rodrigues)

Performance Measures:

- Published national guidelines for mitigation ratios by project type, location, etc.

Resources:	**Scheduling:**
▪ This is a fairly large project that would require participation, buy-in and additional resources for NOAA Fisheries Science Centers (perhaps in partnership with other NOAA offices) ▪ Once the research phase is complete, Habitat Conservation Office staff would draft the guidance for publication in the Federal Register	▪ A multi-year initiative

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Initiative: Define the conflict and common ground between economics and ecology. Economics and ecology appear to have different objectives: identify a path NOAA fisheries can follow in developing an economics policy that would *strengthen* habitat protection.

Performance Measures:

- A discussion document that results in a consensus between economists and ecologists in NMFS or NOAA, and which NOAA agrees to adopt as a policy or plan to move forward.

Resources:	**Scheduling:**
▪ Consultants under contract to do the research (<$25,000) ▪ Some in-house coordination to identify appropriate economists/ecologists for review and opinion	▪ If folded into ongoing economics research/contracts, can possible be completed by end of FY 03

Initiative: Convene discussions between Headquarters and Field Programs to identify an overall plan to infuse economics into habitat restoration and protection

(Tom Bigford)

Performance Measures:

- Develop a clear direction and set of expectations
- Establish the mechanism(s) to meet those expectations

Resources:	**Scheduling:**
▪ Active involvement from the regions, centers and headquarters	▪ Discussions by end of FY 03 ▪ Plan developed by mid-FY 04

Initiative: Develop NOAA Fisheries economics budget initiative linked to outcomes and metrics

****Worth the Effort****

(Tom Bigford)

Performance Measures:

Resources:	**Scheduling:**
	▪ Discussion on FY 06 NOAA Fisheries budget initiative should occur in FY 04

Initiative: Identify biophysical research needs to support economic analysis and application

****Worth the Effort****

(Tom Bigford)

Performance Measures:

- Achieve "level 3" information (connect habitat quantity & quality to species productivity) for priority species (key commercial, recreational, protected & forage species)

Resources:	**Scheduling:**
▪ Research dollars ▪ Data synthesis	▪ Develop initiative as part of FY 06 budget process ▪ Seek redirection/reassignment beginning immediately ▪ Seek leadership support NOW

Initiative: Establish policy that each regional center pursue opportunities for collaboration between economists & biologists on habitat issues

****Worth the Effort****

(Wes Silverthorne)

Performance Measures:

- Number of collaborative work products completed and disseminated
- Meeting/workshop where these products are discussed
- Funds allocated to support these activities
- Improved decisions on projects documented

Resources:	**Scheduling:**
▪ Committed funding for including economics & other ecosystem principles into habitat and protected resource issues ▪ FTE positions to work on these issues (may need to reallocate existing FTEs and budget)	▪ Allocation of existing resources by 2004 ▪ Work products by 2005 ▪ Annual meetings to present/discuss the products annually thereafter

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Initiative: Test feasibility/utility of using broader *social value* information (beyond economics) in habitat valuations:

- Conduct pilot projects using experts in workshop setting to address quality of life/resource values from interdisciplinary perspective: 1) assess an existing protected area to establish values; 2) assess an area under development threat to analyze trade offs.

****Worth the Effort****

(Brett Joseph)

Performance Measures:

- Paper providing well-documented social valuation of habitat
- Evaluation of feasibility/usefulness of this type of analysis a compliment to biological information

Resources:	**Scheduling:**
▪ Research dollars ▪ Staff coordination	▪ Two year project ▪ Conduct workshop(s) at the local/regional level (keep it manageable)

Initiative: Inventory socio-economic habitat valuation initiatives currently underway in all NOAA programs

****Small Win****

Performance Measures:

- Comprehensive list of ongoing habitat-related economic/social valuation efforts within the agency
- Synergy and/or redundancy revealed
- More efficient application of economics-related research/analysis
- Development of consistent approaches and metrics throughout NOAA

Resources:	**Scheduling:**
▪ Allocation of staff time	▪ Can begin immediately

Initiative: NOAA-wide initiative to coordinate and support socio-economic efforts

****Small Win****

(Tom Bigford)

Performance Measures:

- Cross-agency cooperation on economic efforts
- Productive communication among economists throughout NOAA
- Comprehensive budget initiative

Resources:	**Scheduling:**
▪ Support/directive from leadership	▪ Informal discussions within Habitat Conservation start immediately ▪ Partners throughout NOAA identified (see Initiative # 14) ▪ Outreach to economists beyond Habitat ▪ Institutional change and budget FY 06

Initiative: Identify/cultivate outside cooperation – e.g. academic institutions - to assist, complement habitat-economics assessment

****Small Win****

(Michael Johnson)

Performance Measures:

- Develop guidance for NOAA Fisheries, based on recommendations
- Improved success in conserving/protecting habitat by integrating recommendations

Resources:	**Scheduling:**

Initiative: Assign at least one economist to Habitat Conservation issues in each region:

- Provide economic input on cases
- Provide training for co-workers
- Build database of regional economic information

****Worth the Effort****

(Jim Boyd)

Performance Measures:

- New positions filled
- Improved integration of economic information
- Improved success in project outcomes

Resources:	**Scheduling:**
▪ Staff salary/benefits ▪ Support expenses ▪ May be achieved through reassignment if necessary, in some cases	▪ By 2004

Initiative: Increase communication among divisions within each region

****Small Wins****

(Lew Queirolo)

Performance Measures:

- More collaboration across disciplines
- More exchange of regional information
- More efficient use of resources

Resources:	**Scheduling:**