FINAL REPORT

Developing a Framework for Compensatory Mitigation Associated with Ocean Use Impacts on Commercial Fisheries

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Introduction

On May 28, 2008, Governor Deval Patrick signed landmark legislation designed to improve the management of Massachusetts' ocean ecosystems. The Commonwealth's statewide comprehensive ocean planning law mandates the development of an integrated ocean management plan for Massachusetts' state waters. In the development of this plan, the "Oceans Act" requires a balancing among uses – including offshore renewable energy development, fishing, maritime shipping, recreation, conservation and others – through consideration of stakeholder needs and scientific principles. The Oceans Act includes several provisions concerning fisheries. In particular, Section 2 – 4C(k)(2) states:

> A component of an ocean management plan which does not have as its primary purpose the regulation of commercial or recreational fishing but which has an impact on such fishing shall minimize negative economic impacts on commercial and recreational fishing. Prior to inclusion in an ocean management plan, a component with such a reasonably foreseeable impact shall be referred to the division of marine fisheries, which shall, in writing and in a timely and efficient manner, evaluate the component for its impact on commercial and recreational fishing and, if possible, develop and recommend to the secretary any suggestions or alternatives to mitigate or eliminate any adverse impacts.

In addition, Section 20 of the Act states:

> Any permit or license issued by a department, division, commission, or unit of the executive office of energy and environmental affairs and other affected agencies or departments of the commonwealth for activities or conduct consistent with this chapter shall be subject to an ocean development mitigation fee as shall be established by the secretary of energy and environmental affairs. . . . All the proceeds of the ocean development mitigation fee shall be deposited in the Ocean Resources and Waterways Trust Fund established pursuant to section 35HH of chapter 10.

Thus, the Act provides a mechanism for minimizing the adverse impacts of an offshore development project on commercial and recreational fishing. Where such impacts cannot be eliminated, it also provides for the payment of mitigation fees.

A key consideration in implementing these provisions of the Act is the appropriate means of establishing fees for the mitigation of economic impacts on commercial fisheries. The Commonwealth's experience with compensatory mitigation for commercial fishing impacts illustrates the dramatically varying perspectives on this issue. In light of the issue's importance, the Executive Office of Energy and Environmental Affairs (EOEEA) asked the Massachusetts Ocean Partnership (MOP) for assistance in reviewing the approaches employed in previous cases and to outline alternatives for EOEEA's consideration. In turn, MOP requested analytic support from Industrial Economics, Incorporated (IEc). This report presents the results of our efforts and is a preliminary product responsive to EOEEA's specific time sensitive needs. Future work should address a broader accounting of impacts to and tradeoffs among ecosystem services to support integrated ocean management decision making and to improve our understanding of the value of marine resources.

Methodology

In order to arrive at a useful set of findings that can inform the development of a framework for impact assessment and compensatory mitigation, we collected information from three sources. The first comprised Massachusetts Environmental Policy Act (MEPA)-related files for each of four marine development projects identified by EOEEA staff as potentially relevant to this effort:

- The Northeast Gateway liquefied natural gas (LNG) deepwater port in Massachusetts Bay;
- The Neptune LNG deepwater port in Massachusetts Bay;
- The Algonquin Gas Transmission Company's "HubLine" natural gas pipeline; and
- The Siasconset Shore Protection Project on Nantucket.

The second source comprised information collected through telephone interviews with people knowledgeable about analogous cases in political jurisdictions outside Massachusetts in which a project proponent provided compensatory mitigation based on known or anticipated fisheries (or other) impacts. We identified two such instances (described below) and supplemented our interviews with reviews of relevant, publicly-available documents. Appendix A lists the governmental and non-governmental entities we contacted in our effort to identify impact/mitigation analogues.

The third source comprised a series of in-person and telephone interviews with a range of people who have relevant knowledge regarding the assessment and mitigation of impacts to the Massachusetts commercial fishery resulting from marine development activity. EOEEA staff provided us with a list of potential interviewees. Appendix B lists those people with whom we were successful in arranging and completing interviews. In most instances, we were able to provide a short description of our objectives to the interviewees in advance of our meeting or telephone conversation (attached as Appendix C). The questions included in this description served as a starting point for our conversations; we invited and encouraged the interviewees to share any insights or ideas that they believed would be relevant to the development of an effective and equitable approach to assessing impacts and determining compensatory mitigation requirements.

Summary of Findings

MEPA File Review

The MEPA files are limited in their documentation of the impact assessments and compensatory mitigation determinations for the four specified projects. Of the four, two (the Northeast Gateway and Neptune LNG projects) provide documentation of the methodologies used by the proponents to assess economic impacts.[1] The Northeast Gateway project proponent commissioned an assessment that estimated the value of displaced fisheries (due to project construction and 25-year operation) by first calculating gross revenues per square nautical mile and then applying these "unit values" to the project area over the period of impact, with assumptions made regarding annual quantities of harvested fish during that time.

[1] It is our understanding that, for the purpose of developing a final agreement, the Neptune project essentially "piggybacked" on the agreement previously reached for the Northeast Gateway project, resulting in a mitigation package that was largely the same in scope and scale.

The results were presented in present value terms as both gross and net effects, with the latter accounting for the variable costs incurred by fishermen. The fishing interests viewed the proponent's results as an underestimate of what the actual impact would be. Ultimately, the proponent agreed to a mitigation package with a substantially larger dollar value. The process by which a resolution was reached can best be characterized as ad hoc negotiation and bargaining, rather than implementation of a formal process with established methods and procedures.

The deepwater port license application submitted by the Neptune proponent describes a similar analysis of projected economic impact. As described further below, many of the comments that interview participants offered originated in their experiences as participants in the development of the Northeast Gateway and Neptune projects.

The Algonquin HubLine MEPA file did not include specific documentation of economic impact assessment methodologies nor of the process that led to agreement on compensatory mitigation. Publicly available information describes a second mitigation payment made by the proponent as the result of a permit violation.

The Siasconset project file did not contain any record of an economic impact assessment. Our review of publicly available information indicates that the project was unsuccessful in its initial attempt to secure a permit.

Non-Massachusetts Analogues

Our research led to the identification of two analogues with potential relevance to the development of Massachusetts impact assessment and compensatory mitigation frameworks: the creation of Santa Barbara (CA) County "mitigation funds," and the efforts undertaken in Oregon by the Oregon Fishermen's Cable Committee.

Santa Barbara County Fisheries Enhancement Fund

Santa Barbara County has established two mitigation funds in response to ocean and coastal development. The "Fisheries Enhancement Fund" (FEF), established in 1987, is for the exclusive benefit of commercial fishermen.[2] The "Coastal Resource Enhancement Fund" (CREF), established soon thereafter, benefits users of coastal resources.

The County created the FEF with fees paid by the proponents of four offshore oil and gas projects:

- Exxon/Santa Ynez Unit
- Chevron/Point Arguello
- Gaviota Terminal Company/Gaviota Marine Terminal
- Union/Point Pedernales

[2] "Based on the impacts to commercial fishing identified in the EIR/S documents prepared for individual oil and gas projects in Santa Barbara County, a condition of approval requires each applicant to contribute to the Fisheries Enhancement Fund. The Fisheries Enhancement Fund, a 'mitigation' fund, is designed to provide mitigation for project-specific impacts and cumulative impacts to affected commercial fisheries. The fundamental target of the Enhancement Fund is the affected commercial fishermen" (Santa Barbara County Fisheries Enhancement Fund Guidelines. May 14, 1987).

For each project, the County assessed a fee for the project construction period, paid at project onset, as well as an annual fee paid over the project lifetime. According to the Fund guidelines, the fee was to be based on an examination of historical catch data for the blocks in which the project is located and, in some instances, interviews with fishermen as a means to determine the size of the area within which fishing would be precluded and an estimate of lost harvest. The fee assessment and collection process was to include the following steps:

1. Recommendation of fee amounts by County project managers.
2. Final fee determination by the County Planning Commission during public permit hearings.
3. Establishment of a contract with the project proponent and issuance of annual invoices for payment.
4. Reassessment hearings when projects are modified or when information becomes available suggesting that the "initial assessment may not be equitable, either to the contributor or to the commercial fishing industry."
5. Five year reviews of actual impacts to determine whether an adjustment to the fee is warranted.

Monies collected in the Fund are intended for projects to enhance affected fisheries beyond the mitigation required by project permits, with priority given to "local" (i.e., Santa Barbara County-focused) projects. The Fund guidelines called for the completion of a Needs Assessment as the basis for the development of a Mitigation Plan, which would guide expenditures by describing a range of eligible projects that are consistent with County priorities and goals. The guidelines identified five categories of potential projects, including:

- Pier or harbor improvements that benefit affected commercial fishermen;
- Research and development with direct application to commercial fishing and fish marketability (e.g., alternative gear development, market development for underutilized species);
- Commercial fishery resource enhancement;
- Contribution toward administration of a Commercial Fishermen's Liability Insurance Pool; and
- Fishermen communication and education (e.g., hearings, travel monies, library).

The FEF has been sustained solely through payments (totaling just under $800,000 to date) from the four original projects. The County has used approximately $573,000 to fund the direct costs of 19 mitigation projects.[3]

[3] Telephone conversation with Kathy Pfeifer, County of Santa Barbara Planning and Development, Energy Division, March 24, 2009.

The CREF exists to mitigate impacts to non-fishing coastal resources and applies a more formulaic process to the assessment of fees.[4] This process includes the following steps:

1. Identification of residual impacts associated with coastal recreation, tourism, visual aesthetics, or environmentally sensitive resources (i.e., impacts that remain after project-related mitigation). The impact assessment is required to address (1) all onshore or offshore impacts that affect residents of or visitors to Santa Barbara County and (2) all project phases, from construction through decommissioning and site restoration, and should be net of directly related benefits.
2. Assignment and summation of individual impact values ranging from zero (low) to five (high) based on a consideration of several factors (e.g., area, duration, frequency, baseline resource quality).
3. Multiplication of the impact "score" by an inflation-adjusted dollar value (currently $35,000; adjustments occur every five years) to determine the annual contribution.

The Santa Barbara County Planning and Development Department is responsible for the assessment of impacts.

The County Board of Supervisors is responsible for decisions regarding the use of the fund. The general public, public agencies, municipalities, and non-profit organizations, among others, are invited to submit proposals for fund-supported projects. The Planning and Development Department uses eight criteria to evaluate proposals before making funding recommendations to the Board.[5] The Board has the discretion to use the fund in the form of grants, loans, matching funds, and loan guarantees.

Oregon Fishermen's Cable Committee[6]

In 1995, AT&T laid two undersea cables from Bandon, Oregon to China and Japan and advised commercial fishermen in Oregon by letter not to fish in the (highly productive) area of construction and operation. In response to a second AT&T cable proposal two years later, a group of Oregon fishermen created the Oregon Fishermen's Cable Committee in order to represent and protect their interests. After negotiations with the Committee, AT&T used the proposed project's footprint and the annual production value within the affected area to calculate an impact, and pay a mitigation fee, of $1.25 million. This payment seeded the creation of a fisheries improvement fund for the enhancement of affected fisheries. However, Oregon fishermen have reportedly been displeased with the fund, as it does not address the principal concern of a loss of fishing grounds. In addition, they reportedly viewed AT&T as uncooperative in its communications and negotiations.

[4] Santa Barbara County, Planning and Development Department, Coastal Resource Enhancement Fund Guidelines. Adopted June 6, 1988; most recently revised on February 12, 2008.

[5] Projects are evaluated for the degree to which they (1) are located in the coastal area and are consistent with the County's Local Coastal Program and Comprehensive Plan; (2) compensate for coastal impacts due to oil and gas development; (3) provide broad public benefit; (4) focus on coastal acquisition and capital improvement; (5) utilize matching funds and/or in-kind services; (6) are self-supporting; (7) lack other viable funding mechanisms; and (8) have a high probability of success.

[6] Information in this subsection was obtained through a telephone conversation with Scott McMullen, Oregon Fishermen's Cable Committee, March 24 , 2009.

When WCI Cable, Inc. and Alaska Northstar Communications proposed to lay cable off Oregon in 1997, they immediately engaged in cooperative communications with the Oregon Fishermen's Cable Committee. The principal conflict arising from the two parties' shared ocean use was expected to be the potential for commercial fishermen's gear to snag underwater cable. Typically in such an instance commercial fishermen would have to choose between dislodging their snagged gear at the risk of being held liable for damages to the cable, or cutting loose their snagged gear at the cost of replacement. The project proponents indicated that their principal interest was avoiding damage to their cables, rather than retaining the right to bring suit against fishermen for negligence.

Negotiations between the parties produced the Oregon Fishermen's Undersea Cable Committee Agreement (the Agreement). Via two mechanisms, the Agreement provides commercial fishermen an incentive to sacrifice possibly snagged gear. First, it grants a waiver of liability for ordinary negligence on the part of commercial fishermen who snag the proponents' cable with gear. Second, it establishes a $150,000 "sacrificed gear trust fund" funded by the proponents and dedicated to immediate compensation for sacrificed gear. The Agreement defines a procedure for fishermen to file a claim and for the proponents to authorize the resulting compensation.

In the opinion of the Oregon Fishermen's Cable Committee, the Agreement was preferable to the fisheries enhancement fund because of its simplicity and cooperative nature. To them, an accord was more valuable than monetary compensation. In addition, the Agreement reduced the need for and cost of possible litigation, effectively eliminated the would-be exclusion zone (80 square miles, in this case), and provided quick replacement of sacrificed gear.

Massachusetts Interviews

We conducted interviews over a four-week period with individuals or groups across a range of relevant interests, including government regulators and resource managers (state and federal), the commercial fishing industry, a representative of project development proponents, and third-party economists. While the views expressed by interview participants diverged, as could be expected given the actual or perceived use conflicts that marine development can generate, they also reflected agreement on some fundamental beliefs. Namely:

- Successful mitigation of residual impacts depends on credible impact assessments, which in turn depend on the acquisition and availability of credible data.
- Transparency and effective two-way communication are critical to the success of impact assessment and mitigation processes.
- A clear nexus should exist between impact and mitigation.

In general, the information and insights that interview participants provided fit into three categories: impact assessment; scope and scale of compensatory mitigation; and use of compensatory mitigation funds.

Impact Assessment

Although we initiated our work with a focus on economic impact assessment (i.e., assessments of lost or diminished use of commercial fishery resources), several interview participants also commented, sometimes exclusively, on habitat- and resource-focused impact assessments. The following summarizes the input we received on this topic:

- The person or entity responsible for the impact assessment should have credibility with all parties at the outset of the process. In any case, the assessment should never be accepted without intense scrutiny, which should occur early enough (i.e., no later than the draft environmental impact review) to enable corrective action.
- Available use data do not provide a level of resolution sufficient to characterize baseline catch, effort or potential impacts within a particular project footprint. While this data weakness is well-known, it bears highlighting given that estimates of economic impacts can only be as good as the data upon which they are based.
- In particular, state data that indicate a lack of fishing activity in a particular area could, but should not, be interpreted to suggest the area is unimportant to the fishery, especially when resource conservation is in fact the reason for the decreased activity.
- It is important to note that impacts can be location-specific (i.e., similar projects may result in different impacts).
- Opinions varied on the significance of expanding the scope of economic impact assessments beyond a relatively simple analysis of value per unit area over an area of impact and a period of time. Examples of the views expressed included:
  - The importance of considering the multiplier effect on shoreside commerce, particularly since the fragility of the fishing industry makes even small impacts noticeable.
  - The possibility that the multiplier (on a regional basis) associated with recreational fishing is larger than that associated with commercial fishing.
  - The need for a regional economic impact assessment would be necessary only in cases where the impacts are “large” and result in fishermen ceasing to fish rather than moving to alternate locations.
  - Models that predict individual behaviors could be useful tools for estimating the redirection of fishermen’s efforts due to a project’s impact.
- The lack of comprehensive, high quality resource presence and baseline habitat data is also an impediment to accurate impact assessment.
- Impact assessments, whether they are focused on the fishing industry or on fishery resources/habitats, should distinguish between short-term (i.e., construction-related) and longer-term (i.e., operational phase) economic and ecological impacts. Many interviewees emphasized the need for longer-term monitoring of habitat impact/recovery.
- While it is appropriate to focus on residual impacts for which compensatory mitigation would be required, it is also important not to lose sight of the fact that projects can also have beneficial impacts, particularly with respect to habitat (e.g., through the creation of an artificial reef).
- The nature of unavoidable impacts, and the need for compensatory mitigation, is the last issue that should be addressed during the permitting process. The completion of rigorous alternatives analyses would make it easier to minimize, but also for all parties to accept, the resultant unavoidable impacts.

- It should be possible for an assessment to conclude that any form of mitigation would be inadequate (e.g., if a project were to cause the loss of a unique habitat that cannot simply be replicated elsewhere).

Based on the above, we note that MOP's continuing work in this area might consider a broader ecosystem-based management context to support biological, abiotic, and socioeconomic data collection and analysis to account for changes in and tradeoffs among ecosystem services.

Scope and Scale of Compensatory Mitigation

We received more comments on the scope and scale of compensatory mitigation than we did on the process of assessing the residual impacts for which mitigation would be required. We summarize this input below for the purpose of informing future consideration of compensatory mitigation processes and objectives:

- The need to provide monetary compensation to fishermen for lost use of ocean resources, at least during a project's construction phase, is a widely shared principle.
- As indicated above, the manner in which compensation would be provided to fishermen for longer-term, unanticipated impacts is a subject of far less agreement. Fishing interests emphasized the need, and preference, for what would amount to an insurance policy rather than an up-front payment based on assumptions. The development community's perspective is quite different. Cost certainty, obtained during the permitting process, is an important element of project viability.
- From the developer's perspective, critical elements of a mitigation package negotiation also include (1) assurances that an agreement will be binding on and inclusive of all state interests, and (2) reasonability of scale, such that the goal is not viewed simply as making the final package "bigger than the last one."
- Fishing industry and project development interests share the belief that a clear nexus should exist between assessed impacts and compensatory mitigation outcomes.
- Strong two-way communication was a frequently noted need, particularly by those who are affected by project activities. This communication should occur beginning with impact assessment but continuing both as part of mitigation negotiations and during the construction phase itself. The latter need was identified based on past experience, specifically very short notice of project activities that had a direct and negative effect on fishing.
- The need for better communication is directly related to the need to build trust between negotiating parties. Absent a higher level of trust, mutually satisfactory outcomes will be harder to achieve.
- A widely agreed upon principle is that an overly standardized, or formulaic, method for determining the scale of necessary compensation would be ill-advised, in large part because it would inhibit the creativity that can be the key to successful outcomes.
- It is important to make a distinction between public and private (i.e., for profit) projects. Federal navigational dredging projects illustrate the need for this distinction. Federal entities are sensitive to the possibility of large mitigation packages in a private context setting precedents that would present significant financial challenges to a public project, perhaps threatening the project's viability and sacrificing the project's public benefits.
- Several programs offer analogues that might be worth considering in the context of mitigation, including MMS' collection of royalties under the Deepwater Ports Act, Chapter 91 licensing fees, the auction mechanism (for alternative energy projects) contained in new MMS regulations pursuant to the Outer Continental Shelf Lands Act, and the new "in-lieu fee mitigation system" instituted by the Army Corps of Engineers and the Division of Marine Fisheries (DMF). If a system were created to collect "rents" for ocean uses, the funds collected could be used to compensate displaced users or to pay for the continuous collection of data critical to impact assessments (resource/habitat characterization, use data, etc.).

Use of Compensatory Mitigation Funds

Although not the focus of our research, we heard several comments during our interviews on the disbursement of mitigation payments and on evaluation of the results of mitigation activities. In summary, interview participants noted that:

- A better standard is needed to direct mitigation funds to specific organizations or projects (again, with the goal of ensuring a nexus between impact and mitigation).
- A "neutral" third party could best serve to develop recommendations for, or to manage, the disbursement of mitigation payments.
- Clear benefit is seen in carefully monitoring mitigation-related activities, primarily for the purpose of informing future decisions about what "works" and what does not.

It should also be noted that other programs and cases (Santa Barbara, MMS, Army Corps, and previous cases in MA) offer models for the use of mitigation funds to address impacts beyond those to commercial fishing. They also provide examples of the use of mitigation funds to pay for data collection, research on affected resources, and a better understanding of those who benefit from those resources.

Summary of Key Themes

Several themes emerged from our research and interviews:

- Though based largely on limited, anecdotal evidence, our impression is that the ad hoc nature of previous impact assessments and compensatory mitigation negotiations for Massachusetts projects has failed to produce satisfactory outcomes, at least from the perspective of the affected parties.
- Few efforts exist nationally to "systematize" the impact assessment and compensatory mitigation process. The analogues we did identify highlight the need for processes that are transparent and facilitate two-way information flow.
- Nearly everyone we interviewed, including the fishermen, commented on the importance of assessing resource/habitat impacts along with dollar impacts associated with lost fishing opportunities, particularly over the longer term.
- Fishermen are particularly concerned about long term impacts that don't conform to "predictions" and say they are more interested in "insurance" against such impacts than in being paid upfront for what might happen. The developer perspective is quite different -- cost certainty is needed up front. These differences are not unexpected. Further development of impact assessment and mitigation methodologies may yield approaches that more completely account for such differences.
- Not surprisingly, we heard a lot about the quality of the data available to assess impacts. Whether it's fishing pressure or baseline habitat condition, good data simply aren't available at a fine enough resolution to produce assessments that all agree are credible.

- Much of the input we received addressed the post-assessment phase -- where does the money go? who decides? what kind of follow up should there be to ensure the money was well spent? A common concern is the lack of a nexus, in some cases, between impact and mitigation.
- Better systems of communication are sorely needed, and not just during the scoping and implementation of an assessment. A basic level of trust is missing, which makes "successful" outcomes that much harder to achieve.

We heard little if any resistance to the idea of making the impact assessment/ compensatory mitigation process less ad hoc, and got a clear sense that an important complement to the consideration of alternative economic impact assessment methodologies (presented later in this report) is the establishment of basic assessment parameters and expectations as a foundation upon which to build trust among the various parties.

Development of An Assessment and Mitigation Framework

Our research and interviews lead us to the conclusion that a framework for impact assessment should address four questions as part of an effort to improve the credibility of each assessment among all stakeholders:

- Who should be responsible for guiding and conducting the assessment?
- What is the appropriate scope of the assessment?
- What are the assessment's data needs and how can they be met?
- What are the key elements of a system for establishing and maintaining communication between the stakeholders?

We expand on each of these questions further below and briefly describe alternative approaches, as appropriate.

Analyst

In at least one of the MEPA cases we reviewed, the project proponent retained a consultant to complete an impact assessment. Other parties may or may not have the foresight, or the resources, to engage their own expert. In any case, the selection of an individual or firm to conduct assessment work provides an early opportunity to establish a degree of trust in the process. Several options are available, including:

- The proponent identifies a preferred expert and provides advance notice of its selection to the state and representatives of other stakeholders. A process would be required for consideration of the legitimacy of any expressed concerns and the appropriate response, if any.
- The proponent reimburses the state for an assessment completed by state personnel.
- The state establishes criteria for the "pre-approval" of potential experts and facilitates the creation of a pool from which a proponent can make a selection. This approach could also be employed for the purpose of selecting a third-party reviewer who, at the state's direction, would evaluate the quality of an impact assessment and would, if necessary, reconcile assessments completed by different interests.

Making this early decision more collaborative, or at least neutral, can address a shortcoming of current practices.

Scope

Having agreed upon who will conduct an assessment, consensus should be reached on the assessment's scope. The assessment framework should establish clear scoping guidelines for economic assessments based on the nature of the impact(s), perhaps scaled to the size of the proposed project. These guidelines should address two key questions:

- Should the scope be limited to direct effects (e.g., the loss of fishing opportunities) or should it be extended, at least in some instances, to include indirect or induced effects as well? In addressing this question, the guidelines should also specify basic analytic parameters such as whether impacts should be addressed on a net or gross basis.
- Should the assessment be a "snapshot" that does its best to account for impacts over the life of a project or should it establish a process for ongoing monitoring and assessment? Given proponents' need for cost certainty, the latter approach would require the ability to make an up-front payment, or perhaps establish an annuity, that insures the proponent against any long-term increases in liability.

While the immediate focus is on a framework for the assessment of economic impacts based on the market value of lost commerce, the need for a framework that links the socioeconomic impacts to the ecological impacts is equally clear. In the ecological context the question of direct versus indirect impacts may be less relevant; however, the question of a "snapshot" versus continuous assessment and monitoring would need to be answered. As data and methods improve, assessments should consider a more complete accounting of impacts to (1) the full range of ecosystem services in a given area and (2) those who benefit from those services.

Data

The framework should establish minimum standards for the "acceptability" of data used in any analysis. Beyond these basic guidelines, however, initiatives to improve data quality will need to proceed on multiple fronts and should consider:

- Dedicating a portion of compensatory mitigation fees paid by a proponent to baseline economic or ecological research that would fill important data gaps or help to ensure that economic and ecological characterization data are current and readily available.
- Requiring more precise effort and catch data reporting by fishermen.
- Moving toward prescribed data collection methods that ensure adequate spatial and temporal coverage of economic or ecological conditions.

Regardless of the final approach(es), all impact assessments would likely benefit from access to data collected as part of previous assessments. If possible, the framework should include a mechanism by which these data can be stored in and shared from a central repository. MOP is currently working with state and regional data owners and users to facilitate development of an integrated, dynamic ocean data network. This tool will significantly improve data interoperability and accessibility, thereby enhancing the capacity to conduct rigorous impact assessments.

Communication

The need for an improved system of communication among stakeholder interests is clear. In fact, it would be appropriate to view this element as a prerequisite to the development of better systems for data collection and analysis (as well as better systems for compensatory mitigation negotiations and implementation). A key element of improved communications is the timing of those interactions. The assessment framework should incorporate some combination, if not all, of the following mechanisms:

- **Scoping.** Potentially affected parties should have a meaningful opportunity to help structure the scope of and approach to data collection and analysis. In exchange, there would presumably need to be an agreement to accept the results of the assessment barring any material deviations from the approved assessment plan. A "conformance" evaluation could be completed by a mutually agreed upon external reviewer.
- **Interim progress.** Opportunities for ongoing, advisory "dialogue" can complement more formal, one-time input opportunities (such as document reviews). Key to the success of such a dialogue would be clear specification of the mechanics of regular communications (e.g., electronic, teleconference, in-person), and the identification of designated stakeholder representatives (who have the authority to speak on behalf of a particular interest).
- **Review and revision.** Better communication prior to and during the analysis should minimize disagreements at later stages. The opportunity to provide feedback on a draft impact assessment in a manner that goes beyond traditional public review and comment (which can lead to a decrease in trust if legitimate concerns are not, or appear not to be, addressed) is critical. The challenge is enabling sufficient time after a review to allow for modifications or additional analysis, as necessary.

Use of Mitigation Funds

The issue of credibility and trust extends beyond the impact assessment to the use of compensatory mitigation funds. Therefore, in designing an assessment framework it is also appropriate to consider several post-assessment questions, including:

- Is it appropriate, or necessary, to prepare a "needs assessment" (similar to that prepared by Santa Barbara County) as a way to provide some initial definition to the range of activities to which compensatory mitigation funds may be applied?
- Should the state develop guidance for the project-level evaluation and screening of alternative uses of compensatory mitigation funds, particularly with respect to the establishment of a suitable connection between actual or projected impact(s) and compensatory measures?

- What are the appropriate mechanisms for monitoring and reporting on activities supported by compensatory mitigation funds?
- How should mitigation funds be used beyond compensation to commercial fisherman?

Alternatives for Economic Impact Assessment

As summarized in the following table, we have identified four general methods for determining the appropriate amount of monetary compensation when a project has an unavoidable impact on commercial fishing and related interests.

Method	Description	Minimum Data Requirements
HISTORICAL PRECEDENT	Use of past compensatory mitigation packages as a basis for establishing a standard compensation rate.	• Mitigation package value • Size of project impact area
GROSS REVENUE	Use of market data on ex-vessel revenues to estimate losses per unit area, with or without consideration of regional impacts.	• Aggregate landings per unit area, by fishery • Market values, by fishery • Size of project impact area
NET INCOME	Calculation of the net economic loss incurred by individual fishermen, with or without consideration of regional impacts.	• Number of affected fishermen • Annual revenues • Annual fixed and variable costs • Size of project impact area
SOCIAL WELFARE	Application at the project level of a broad measure of the value society places on potentially affected resources and services.	• Use is dependent upon completion of formal survey research

Though varying in scope and analytical rigor, each of the four methods offers a systematic approach to economic impact assessment. Below we describe each of the alternatives and potential variations on them, as well as their key advantages and disadvantages.

Historical Precedent

The simplest of the four methods would rely on the outcomes of previous project-related negotiations to establish a standard rate as compensation for unavoidable commercial fishing impacts. This approach would require identification of appropriate precedents (e.g., the Northeast Gateway, Neptune, and Hubline projects) and compilation of data on the mitigation payments associated with each. This information, coupled with an estimate of the geographic area affected by each project, could be used to calculate an average compensation rate for future projects (e.g., dollars per affected acre). The compensation required for a new development would then be determined by applying this standard rate, requiring only an estimate of the extent of the area the new project would affect. Over time, the standard compensation rate could be adjusted for inflation. It would also be possible to scale the standard rate to take into account differences between the value of the fishing grounds affected in the base case and the value of the fishing grounds that may be affected by a new project. This would require calculation of annual fishing revenues per acre for each of DMF's 14 Statistical Reporting Areas (SRAs), and comparison of these values to develop an appropriate scalar.

The primary advantages of this approach are its simplicity and its basis in historical precedent. The primary disadvantage is the assumption that precedent alone is a sufficient basis for establishing the appropriate rate of compensation. As previously noted, the ad hoc nature of previous impact assessments and compensatory mitigation negotiations has left many affected parties dissatisfied with the outcome. Use of these cases to establish a standard rate for compensatory mitigation in the future is unlikely to address this underlying dissatisfaction, and would likely raise the question of whether payments based on a generic rate can reasonably reflect the impacts of different projects.

Gross Revenue

The gross revenue method is similar to the historical precedent method in its simplicity, using a single measure of value over a specified area to arrive at an estimate of economic impacts. In this case, data on annual fishing revenues per acre for each SRA, coupled with an estimate of the location and extent of the area a new project would affect, would provide the basis for calculating impacts on commercial fishing. For a proposed project, the required compensation would equal the "area of impact" multiplied by the appropriate value per unit area. Note that this calculation would provide an estimate of the project's direct economic impacts. The approach could be expanded to include the indirect (i.e., regional) impact of the loss of commercial landings. The generally accepted method for assessing regional impacts is the use of input-output models, such as IMPLAN.[7]

The primary advantage of the gross revenue method is its simplicity and transparency. The simplicity of the approach is also its greatest weakness. For the following reasons, the method may overestimate project impacts:

- The method implicitly assumes that the entire catch that otherwise would be taken within a project's zone of impact is lost. This may not be the case; fish that might have been caught within the project's impact zone could simply be caught elsewhere.

[7] Impact Analysis for Planning (IMPLAN) is a software-based tool, originally developed by the U.S. Forest Service and currently owned and managed by the Minnesota IMPLAN Group, Inc., that models the interactions between industries and commodity purchases within a local economy. The model's output is a regional "multiplier" that can be used to determine the "total" economic impact that can be expected as a result of a particular change in the economy, such as a decrease in commercial fishery revenues.

- The method does not take into account the costs that fishermen incur to land their catch. By ignoring these costs, the method overstates the net economic value of any reduction in catch.

At the same time, relying on catch data as a basis for valuing commercial fishing impacts runs the risk of underestimating the importance of areas that are not heavily fished but provide essential habitat for spawning or juvenile fish. It also may underestimate the long-term importance to the fishing industry of areas that do not currently account for a significant catch, but have the potential to do so in the future, when stocks are rebuilt and/or current regulatory constraints on effort are reduced. For these reasons, both developers and fishermen may find this approach overly simplistic.

Net Income

The net income method would look more carefully at actual changes in economic activity and aggregate losses across the community of fishermen affected by a project. Two variations of this method are possible: general and case-specific. The general model would follow and improve upon the approach used by consultants to the Northeast Gateway and Neptune LNG projects, determining economic impact based on projections of the value of foregone landings, on a net income basis, over a specified period of time and number of fishermen. The general method would draw upon aggregate activity and market data reported to the state (or federal government). Notwithstanding its reliance on these sources, careful estimation of several other factors would be required. These include but are not limited to:

- The area of impact, including consensus projections of how that area will, or could, change over the period of analysis.
- The number of fishermen who would have operated within the area of impact, as indicated by catch reports submitted to DMF, Vessel Trip Reports submitted to NMFS, and permits issued to those operating in fisheries that are not subject to DMF or NMFS reporting requirements. In addition to estimating the number of fishermen to include in the analysis, it would be necessary to account for those fishermen who respond to the project impact by exiting the market separately from those who respond by adjusting their activity (i.e., either reducing their activity within the area of impact or shifting their activity to another location).
- Changes in specific fisheries (e.g., through management practices) that might increase or decrease catch rates over time.
- The fixed and variable costs incurred by the affected fishermen.

The case-specific method would be similar to the general method, but rather than relying on project-area estimates extracted from statewide data it would rely on aggregated activity, revenue, and cost data collected from individual fishermen who operate within the area of impact.

Similar to the gross revenue method, the results of a net income analysis could be an input to a regional impact model, such as IMPLAN, that estimates the indirect effects of income reductions. The output of the regional model would be added to the calculated loss of net income to produce a final compensation value.

The advantage of the net income method is that it can provide the most accurate assessment of market impacts and can do so in a way that is already familiar to many stakeholders. It is important to recognize, however, that this method can produce widely varying results, depending upon the assumptions it employs. A systematic and detailed approach to the estimation of specific parameters would be required to produce results considered credible by all parties.

Social Welfare Value

The final approach is quite different from the first three in that it would estimate compensation requirements based on a broader assessment of the value to society of commercial fishing (and potentially affected resources and services) in Massachusetts. In this context, value, more specifically consumer surplus, is measured by what individuals are *willing to pay* for maintenance or improvement of a specified resource (e.g., a commercial fishery that is not affected by ocean-based projects). This notion of value is recognized in federal guidelines and regulations as the appropriate measure to compare the costs and benefits of policy alternatives and measure damages resulting from injury to natural resources.[8] In short, rather than calculating the appropriate scale of compensation solely on the basis of market impacts, this approach incorporates non-market values as well (e.g., the value that society places on marine habitat or on commercial fishing as a cultural asset).

The key to this approach is the successful completion of primary research, independent of a particular development proposal, that uses formal survey techniques and statistical procedures to estimate average individual or household willingness to pay. These values are then aggregated to the relevant population (e.g., some portion of, or perhaps all, Massachusetts residents), the sum of which would constitute the required compensation.

A study by Wiersma (2008) offers an example of this type of research, though with a specific focus on the value of fishing within a defined geographic area (the Cape Wind project area).[9] It is not reasonable, however, to expect that primary research should be undertaken each time a project is proposed. The alternative is a single, state-wide study structured so that the results could be applied to the assessment of impacts from a variety of projects.

Survey-based studies such as these are referred to as "stated-preference" studies, in which values are elicited from respondents under hypothetical conditions. One stated-preference method that has been applied extensively in recent years is the conjoint-choice or attribute-based method. This approach provides respondents with multiple choices that vary in terms of one or more attributes, as well as cost. This allows for recovery of values for individual components of the choice scenarios, which can then be applied to a wide variety of situations. For example, one design might provide questions that vary in terms of the amount of harvest that is affected by a project, the extent of habitat disturbance, and location. Values for these component attributes can then be applied to any number of potential projects – in effect estimating a customized value for that situation.

[8] For example, see U.S. Environmental Protection Agency's Guidelines for Preparing Economic Analyses (2000) and U.S. Department of the Interior Natural Resource Damage Assessment Regulations (43 CFR Part 11).

[9] Wiersma, J. University of Rhode Island and Massachusetts Fishermen's Partnership, Inc. An Economic Analysis of Mobile Gear Fishing Within the Proposed Wind Energy Generation Facility Site on Horseshoe Shoal in Nantucket Sound. 2008.

Overall, a compensation strategy based on social welfare values for commercial fishing and marine resources offers the advantage of capturing any residual losses that remain if/after commercial losses are mitigated. It should be noted, however, that in this same framework society likely holds value for renewable energy sources (indeed, this has also been investigated in the economic literature); thus, any study design would need to appropriately reflect those tradeoffs. There is substantial precedent for use of this type of information in policy and litigation settings at the state and federal level.

The integrity of values from such a study depends on the quality of the survey's design and implementation as well as the reputation and objectivity of the study team. In addition, the execution of such studies is often resource-intensive. Development of an appropriate survey instrument typically entails conduct of several focus groups and pre-testing to ensure that it is working properly. Depending on implementation mode, administration of the final survey can also be time-consuming.

A Note on the Temporal Dimension of Impact Assessments

A determination of compensatory mitigation requirements during the permitting phase of a project typically requires a projection of economic impacts during the project's construction phase as well as its operational and decommissioning phases. Since a project can have an operational lifetime of twenty years or more, an impact analysis will require assumptions that inject a potentially significant degree of uncertainty into the results. At a minimum, an analysis that spans a project's lifetime should carefully describe how it accounts for this uncertainty. Alternatively, the analysis could focus on near-term impacts, which can presumably be assessed with a higher degree of certainty, and then use those results as the basis for a payment into an escrow fund created for the purpose of mitigating future, less certain impacts. For example, if the near-term impact were expressed as an annual value that is assumed to remain constant over the project's lifetime, the payment could be the present value (at an appropriate discount rate) of the stream of future values.

Appendix A: List of Entities Contacted in order to Identify Analogous Impact Assessment/Compensatory Mitigation Frameworks

Federal

- National Marine Fisheries Service, Northeast Regional Office
- National Marine Fisheries Service, Southeast Regional Office – Fisheries Regulations Branch
- NOAA – National Policy and Evaluation Division, Office of Ocean and Coastal Resource Management, Marine Protected Areas

State

- Alabama Department of Environmental Management
- Alaska Department of Natural Resources – Division of Coastal and Ocean Management
- California Coastal Commission
- California State Coastal Conservancy – all regions
- Florida Fish and Wildlife Conservation Commission – Division of Marine Fisheries Management
- Florida Sea Grant
- Georgia Department of Natural Resources – Coastal Zone Management Program
- Louisiana Department of Wildlife and Fisheries
- Maryland Department of Natural Resources
- Mississippi Department of Marine Resources – Permits Office
- New York Department of Environmental Protection – Division of Fish, Wildlife, and Marine Resources
- North Carolina Department of Environment and Natural Resources – Division of Coastal Management
- Oregon Department of Fish and Wildlife – Fish Division, Marine Resources Program
- Texas Parks and Wildlife Department
- Washington Department of Ecology

Other Government

- California Department of Fish and Game – Marine Region
- Caribbean Fisheries Management Council
- County of San Louis Obispo, California – Planning and Development, Environmental Division
- County of Santa Barbara – Planning and Development, Energy Division
- Gulf of Mexico Fisheries Management Council
- Gulf States Marine Fisheries Commission
- Los Angeles County – Planning Division, Impact Analysis
- Pacific Fisheries Management Council
- San Francisco Bay Conservation and Development Commission
- Ventura County – Planning Division

Quasi-Public/Non-Profit

- California Fisheries Coalition
- Central California Joint Cable/Fisheries Liaison Committee
- Coastal Conservation Association
- Oregon Fishermen's Cable Committee
- Pacific Coast Federation of Fishermen's Associations
- Southeastern Fisheries Association

Private

- Ad Hoc Industry Natural Resource Damages Group
- Environmental Defense Fund

Appendix B: List of Stakeholder Interviews

Name	Affiliation	Date
IN-PERSON INTERVIEWS		
Paul Diodati	Massachusetts Division of Marine Fisheries	8 April 2009
Randy Sigler	Massachusetts Marine Fisheries Advisory Commission	9 April 2009
Bill Adler Bernie Feeny Steve Holler	Massachusetts Lobstermen's Association	10 April 2009
Chuck Casella	Massachusetts Marine Fisheries Advisory Commission	14 April 2009
Chris Mantzaris Mary Colligan Lou Chiarella Chris Boelke Sara Thompson	National Marine Fisheries Service	5 May 2009
TELEPHONE INTERVIEWS		
Porter Hoagland	Woods Hole Oceanographic Institute	13 April 2009
Dave Terkla	University of Massachusetts, Boston	15 April 2009
Mark Amorello	Massachusetts Marine Fisheries Advisory Commission	20 April 2009
Jackie O'Dell	Northeast Seafood Coalition	21 April 2009
Kathryn Ford	Massachusetts Division of Marine Fisheries	23 April 2009
Joseph Huckemeyer	Helen H Offshore Fishing Corporation	28 April 2009
Angela San Fillipo	Gloucester Fishermen's Wives Association	29 April 2009
Deborah Hadden	Massport	30 April 2009
Tom McShane	Dewey Square Group	4 May 2009
Ed Barrett	Massachusetts Fishermen's Partnership	20 May 2009

Appendix C: Massachusetts Ocean Management Plan -- Fisheries Impact and Mitigation: Interview Guide

Purpose of the interviews: Industrial Economics (IEc) seeks to interview individuals who, on the basis of prior project-related experience as well as their general knowledge of Massachusetts coastal fisheries and the fishing industries, can inform the Commonwealth's development of a standardized method for assessing and mitigating the economic impact of a marine development project on commercial fisheries.

Additional context: While the Oceans Act contemplates mitigation, as necessary, for impacts to marine habitats and public navigation, our immediate focus is on commercial fisheries (both the resources and the users of those resources).

While we are interested in discussing experiences associated with the development of specific mitigation measures for past projects, we do not seek to revisit or comment on negotiations that may have occurred in permitting these projects, nor do we seek simply to document what is already in the public record.

Our intent is to gather input, from a variety of perspectives, at a more general level in order to identify and then reconcile alternative views on the best path forward.

Questions:

1. What are the most important principles, or objectives, that should guide (a) an impact assessment and (b) a determination of the necessary type and amount of mitigation?

2. Looking back on the projects with which you are familiar, do you think the impact assessment and the terms of the compensatory mitigation package were consistent with those principles or objectives?

3. What do you think are the major roadblocks to the development of "standard" methods that all interested parties would agree are transparent and fair?

4. What specific recommendations would you make, if any, for the development of impact assessment and mitigation determination methods?