Draft Summary
North Pacific Research Board
Science Panel Meeting
Seattle, WA
November 18-19, 2009

The Science Panel met November 18-19, 2009 in the Capitol Hill Room at the Sheraton Seattle in Seattle, Washington. The meeting was chaired by Doug Woodby with the following other members in attendance: Vera Alexander, Elizabeth Andrews, Dick Beamish, Jim Berner, Michael Dagg, Pat Livingston, Andre Punt, Tom Royer and Pat Tester. Bill Wilson joined the meeting as an ad-hoc Science Panel member. Dan Goodman also attended the Science Panel meeting to represent NPRB's Ecosystem Modeling Committee. The meeting was staffed by Clarence Pautzke, Francis Wiese, and Carrie Eischens.

1. Call to Order and Approve Agenda
   a. The agenda for the meeting was approved with no changes.
   b. Staff reviewed the conflict of interest procedures for proposal reviews and asked that any Science Panel Member with a conflict relevant to a specific proposal make their conflict known to the group at the start of each review.

2. Gulf of Alaska Integrated Ecosystem Research Program
   a. Background
      i. Review GOAIERP process to date and objectives of current meeting

Staff gave a review of the intent and implementation of the GOAIERP up to this point, indicating that the Moss et al. proposal had been selected by the Board in May 2009 as the upper trophic level (UTL) component for the GOAIERP program. This was followed in early June 2009 by a call for proposals to the three remaining components of the GOAIERP program: the Forage-base component, the Lower Tropic Level and Oceanography component and the Ecosystem Modeling component. Proposals for these components were originally due on October 2, 2009. This deadline was later extended to October 12, 2009.

To ensure an open competition the Board instructed staff to hold 2 webinars in which all potential applicants could participate and benefit from a review of the UTL component chosen. The webinars would also review the data needs of the UTL component from the other components of the program and allow for a question and answer session between potential applicants and the lead PIs of the UTL component. The first webinar was held July 17, 2009 and was attended by 34 individuals. All webinar materials (presentations, meeting summary and recording of meeting) are available on the NPRB website (http://goaierp.nprb.org/meetings.html). In the question and answer period two substantial and related issues arose that resulted in programmatic changes to the RFP released in June. Potential applicants questioned whether ichthyoplankton and euphausiid research should be included (and thus funded) in the “forage base” or “lower trophic level” component. Some argued that the work required to sample and analyze ichthyoplankton and euphausiids, and the lower funding level specified for the LTL component, dictated that the two groups should be considered under the forage base ($2M compared to $1.5M for LTL). Conversely, it was noted that ecologically and in terms of gear and sampling methods, they should be grouped with the LTL component. After considering all arguments and consulting with others, staff decided that ichthyoplankton and euphausiids should be included in the LTL proposals. To address the potential funding shortfall resulting from this decision (issue #2), staff revised the RFP to note equal funding caps of $1.75M for the forage base and LTL.
components. This re-allocation of funds to the components did not increase the overall costs of the program. A second webinar was held on September 2, 2009. This webinar was attended by 18 participants. Staff gave a brief recap of process issues raised at the July 17 meeting. The remainder of the time was an open question and answer forum between potential applicants, the NPRB staff and the UTL investigators. A meeting summary and all meeting documents are available at the GOAIERP website. One substantial programmatic change resulted from this second webinar. Due to field studies and the timing of other conferences, potential applicants requested an extension in the deadline for proposal submission. After consideration of the various review timelines, staff agreed to extend the submission deadline to October 12, 2009.

Five proposals were submitted to the GOAIERP RFP by the October 12 deadline – one to the forage-base component, two to the LTL component and two to the Ecosystem Modeling component. These proposals were sent out for technical peer-review with the goal of obtaining three peer-reviews for each proposal. Two technical reviews were received for one proposal, three reviews for three of the proposals and one proposal received four technical reviews.

The purpose of this Science Panel meeting was to (1) evaluate the received proposals for technical merit; (2) determine if the proposals fit within a vertically integrated ecosystem program as framed by the previously selected UTL component; (3) identify scientific/ecological gaps in the best vertically integrated program available; and (4) formulate a recommendation to the Board on how to proceed with the GOAIERP program. Staff noted that the SP should not feel “stuck” with the proposals that came in and the option to re-complete one (or more) of the components was available.

ii. Overview of Moss et al. proposal for Upper Trophic Level Component

Staff provided an overview of the Moss et al. upper trophic level component which the Board selected to frame the GOAIERP. Several gaps and shortfalls of the UTL component were noted by panel members, including:

1. Proposal elements related to diet analyses are not clear,
2. Seabirds selected as study species did not seem representative of the fish environment to be studied,
3. The POP data needed to model recruitment of this species are not available and not likely to be gained during the course of this program,
4. The genetic analysis of POP needs to be addressed as it seems that the analysis by Gharrett et al. people were depending on may not produce the needed results, and
5. The onshore to inshore transport is assumed for all 5 focal fish species but not necessarily applicable to all 5 species (e.g. POP and sablefish).

Staff noted that all of these things would be discussed and worked through at the focal meeting stage when all components had been selected.

b. Review of Individual Proposals

Staff gave an overview of each of the proposals in turn and a summary of the technical reviews. After this general overview and discussion of the technical reviews, the Science Panel discussed each proposal individually and in great detail. The main points of these discussions are summarized as follows:
**Forage-base Component:**

**Proposal #14 – Ormseth et al.**

Ormseth et al. have written a strong proposal to do middle trophic level sampling that is, for the most part, responsive to the needs of Moss et al. and the overall GOA IERP. The Science Panel appreciates the synoptic sampling design and the cross-shelf sampling from the shore to the outer shelf (although the SP would like to see additional cross-shelf sampling lines added).

The SP recommends that this proposal be funded, with the following modifications:

1. Spring sampling must be included in the field work plan. The authors explain the importance of the spring season, but do not propose to sample then. Spring is crucial in the GOA ecosystem as it relates to production of forage species and the spring feeding by seabirds and marine mammals on newly available forage fishes, and sampling this season should not be omitted from the GOA IERP. If budget is an issue, the SP recommends that they drop some or all of the first-year pilot project work, and apply those funds to a much more crucial spring sampling program. The need for testing the forage fish sampling approach may be unnecessary, as this kind of work has been done before.

2. The proposal is vague in the design of plankton sampling, and should specify clearly how plankton will be sampled near shore to help define “habitat”. Who will conduct this sampling, and how will plankton data be linked to the UTL component?

3. Ormseth et al. should clarify which forage species are linked to the gauntlet. Some forage species are not present in offshore habitats, and thus are not going to traverse the gauntlet (e.g. eulachon), and sampling these species in some of the gauntlet habitat may not be possible. Similarly, Ormseth et al. propose to include the five species of fish included in Moss et al. in their sampling of the “forage base” in the Gulf of Alaska. The SP notes that the young life history stages of Pacific ocean perch are not likely in the “gauntlet” as they are mostly deep water demersal species that do not occur in shallower nearshore areas. The SP strongly encourages studies of forage fish, and requests that the proposal clarify the intended forage base species sampling approach.

Other areas of the proposal where the SP suggests clarity include:

- A Post Doc program that appears too short a term, and insufficiently funded for a quality student recruitment process; Applicants might consider having the Post Doc’s work be longer and integrated with the modeling component.
- Proposed community involvement is good but without detail.
- Program should be more hypothesis driven. The stated hypotheses are too vague and general. Applicants need clearer, refined, and focused hypotheses linked clearly to program details.
- Sampling forage species both near and distant from predator sites (e.g. seabird colonies) is vague; proposal should better define reasoning for sampling both areas.
- Budget for equipment seems high; instead of purchasing skiffs, it may be more cost effective to charter small vessels for nearshore fish sampling and acoustic studies.
- Consider the GLOBEC program data base for the retrospective studies.
- As with other GOA IERP components, the MTL program should meet with the UTL and LTL groups to develop a common strategy for sampling the focus species, to clearly define which species will be “gauntlet species” and to give an appropriate emphasis to nearshore versus cross-shelf and outer shelf sampling.
In summary, the **Science Panel recommends funding this proposal** once the above issues (1-3) are addressed and notes that if spring sampling is not included in a revised proposal this proposal should not be funded.

**Lower Trophic Level & Physical Oceanography Component:**

**Proposal #12 – Kline**

Kline proposes to use stable isotope analysis to delineate green water produced carbon associated with coastal areas and eddies from blue water produced carbon in the high nitrate (nutrient) low chlorophyll regions of the GOA to inform the lower trophic level food web component of the GOAIERP. Both the science panel and peer reviewers had concerns about the validation of the isotope method for the species of interest in the GOAIERP especially if they do not have life histories like salmon. Reviewers were not convinced that pelagic and demersal linkages in the same geographic regions could be distinguished using isotope analysis. Further, it is not clear how the trophic vs. geographic isotope signal differences will be interpreted. The proposal included relating eddy activity to production, however there were problems with the satellite data analysis including a lack of correction for tides. Overall it was not clear how this analysis fit in with the rest of the proposal. Kline put forward correlations with no explanation of the complex links that tie productive regimes together. This led the Science Panel and peer reviewers to conclude the proposal was overly simplistic and there was a significant risk of over-interpretation of the data.

Kline is considered as a very capable stable isotope researcher but none of the reviewers considered the SI work as “stand alone” or capable of supporting the needs (e.g. mechanistic links) of a complex ecosystem proposal like the GOAIERP. There were concerns about the budget because $178K in consulting fees was not explained and the ½ time salary for Kline was seen as excessive for the work described. The lack of a team/collaborative approach was also seen as a detriment to the success of the project. The proposal did not include any field work and asked that the UTL and MTL components collect all necessary samples. A peer reviewer commented that the community involvement was “ill explained”.

Overall, **the Science Panel recommends not considering this proposal** for funding because it was not responsive to the RFP and had major flaws in the underpinning assumptions.

**Proposal #13 – Hopcroft et al.**

This group of well-qualified PIs proposed to examine primary production, distribution of zooplankton and larval fish, and physical mechanisms that determine their spatial and temporal patterns in the two proposed study regions. They will use moorings, drifters and field observations to identify physical transport processes and link these to the biology. New observations will be supplemented by retrospective analyses, especially for ichthyoplankton. Proposed work includes process/rate measurements as well as distribution and abundance measurements. The proposed work is framed by three hypotheses that provide a good guiding structure for the work. The PIs clearly demonstrate their knowledge and familiarity with this system.

In terms of responsiveness, this proposal responded to most of the requirements of the UTL group. The exception is this project’s plan to carry out ship board field observations during only one year. They will be able to provide estimates of the cross-shelf transport of water, eggs and larvae and provide information on the LTL differences between the eastern and western GOA. It is questionable as to whether a single field year will be able to address all of the UTL concerns about the LTL interannual variability especially if anomalous marine conditions take place in the Gulf of Alaska in 2013.
Most of the PIs and organizations have worked together in previous GOA studies. The groups have extensive experience and Hopcroft can manage them. Their experience in participating in interdisciplinary research programs was demonstrated in the NEP GLOBEC program. However, some duties of individuals are not well defined or not defined at all, such as those of Rolf Sonnerup, Miriam Doyle, Stockmar, and Peter Proctor. The issue of commitment to the project by the PIs was also raised with no PIs contributing much of their time to the project in non-field years. Some SP members felt that the amount of time dedicated to the project did not mesh with the amount of work being proposed and more PI time needs to be dedicated to the project.

The costs adequately reflect the amount of work that will be done. There is considerable matching from NOAA in personnel costs and ship time. It is well coordinated with other ongoing NOAA work in the Gulf of Alaska. Overall, however, the SP had the sense that this group will be short on funds by the time the final analyses and write ups are attempted. That is, there are insufficient funds available to accomplish fully, the work proposed.

The main concerns discussed by the Science Panel were:

1. Retrospective analysis deals mostly with fish larvae and only vague connections are made to other components. Statements like "to the extent possible..." do not convince anyone that much will be done. Yet this is very important because the proposal includes only one field year so any understanding of interannual variability will depend heavily on comparison with information from other years using data from the Seward Line. The PIs should clarify and expand this aspect of the proposal as it will be critical to the success of this project with only a single field year.

2. Only one field season is proposed, primarily because of costs. The panel agreed that this approach was necessary but was especially concerned that the field season was too late (2013) in the program to be of much use to other program components before the end of the IERP in 2014. Data would be especially important to the numerical modeling component, yet most of the biological data take at least 1 year to analyze. The PIs noted this same problem yet due to logistical reasons (mostly due to the NOAA Dyson schedule) kept it in 2013. In order for the field work part of this component to have relevance to this program, however, the field season needs to be moved forward one year even if, in the worst case, some of the leveraged cruises are lost as a result. This needs to be worked out with the MTL and UTL components. The high degree of leverage was viewed as a very positive aspect of the field work and efforts to maintain as much of it as possible should be made.

3. The PIs need to use the QuikSCAT winds rather than the gridded NCEP geostrophic winds. Along this line, they need to rethink the use of upwelling indices for the GOA. The availability of 25 km and possibly 12.5 km satellite winds over the last decade reveals a lot of spatial wind structure across this shelf that is very important to cross-shelf and vertical nutrient fluxes.

4. While cloudiness was mentioned as important for phytoplankton production, the difference in E-W cloudiness needs to be considered. Also the eastern GOA warms earlier in the year than the western. Blooms might be expected to begin earlier in SE Alaska than in the western GOA. The stalling of storms in the eastern GOA is different and there is relatively rapid passage of wind systems over the Kodiak area. Kodiak has significant winds from nearly all directions whereas Sitka has significant southern winds. Applicants should also compare and contrast the coastal sea levels between east and west.
5. To use the satellite bio-optical measurements, ground truthing is necessary especially since there are considerable glacial sediments in the coastal and shelf waters that affect the optical signals. The information in the proposal on the satellite tracked drifters was sparse to nonexistent. Applicants should be using the ARGO drifters for an assessment of the deep ocean conditions.

6. Zooplankton sampling, while extensive as proposed, still lacks the necessary vertical resolution if data are to be useful for describing prey fields for larval fish. It also appears that euphausiids are not being properly sampled in this or any of the other proposed field programs in the GOAIERP, and this should be addressed by the program somewhere. Questions arose about the timing of the zooplankton and ichthyoplankton data return from Poland and the resulting lack of usefulness of these data for the overall program. This is especially true if the field work occurs in 2013, but the timing issue must also be addressed and clearly delineated if the field season gets moved to 2012.

7. The panel agrees with the PIs that the iron issue is important and efforts should be made to incorporate appropriate measurements into the field program. Primary production will be limited by iron in the offshore and there needs to be a dedicated person and plan to study this aspect. Additional funds will be needed to fill this gap.

**Summary overview:** The team that is assembled is excellent. They have a reasonable hypothesis and might be able to test it successfully. The tradeoff is to do an intense study over a short period of time (a year) or to do less intense work over more of the program. The extensive archive of historical work available for the Seward Line leads to the choice of the focused approach since the earlier work can place the new work in a temporal context. During the out years (no field work) they should seek some ongoing monitoring such as high resolution atmospheric forcing, coastal temperatures and sea levels, and ARGO drifters to address interannual variability.

The **Science Panel recommends funding this proposal** once the above issues (1-7) are addressed and notes that if the field year cannot be shifted to 2012 then this proposal should not be funded.

**Ecosystem Modeling Component:**

**Proposal #11 – Fiechter et al.**

The three peer-reviewers rated this proposal with two Excellents and one Very Good. One of the peer-reviewers noted that there were limited data on larval survival, that it would be difficult to make the link between larval settlement and recruitment to fisheries in any subsequent projects, and expressed concern regarding how predation on larvae would be implemented.

The Science Panel agreed with the latter comments. In common with the peer-reviewers, the Science Panel agreed that the ROMS and NPZ components of the proposal, and in particular the data assimilation aspects, were the strong parts of this proposal, while the IBM component and the links to fisheries management were the major weakness of the proposal. The proposal did not address all of the issues raised for consideration in the modeling component in the UTL project, but did address the EMC questions related to validation, although few details were provided on how the IBMs would be validated.

In relation to the physical modeling, the Science Panel noted that inshore bathymetry was needed, but is not available at the scale required, that the proposal is not clear on how (or even whether) coastal run-off will be included in the model, and that it is unclear regarding how close to the coast the model will go even though this is likely to be important for modeling inshore settlement of larvae. In
addition, the Panel was unclear whether satellite-collected data would be appropriate to parameterize the NPZ model for the eastern Gulf.

The Panel agreed that this proposal did not adequately consider, and hence account for, the biology of the two fish species for which IBMs will be constructed. For example, Pacific ocean perch produce larvae as live bearers and not free-floating eggs, so the basic assumption that transport to the settlement areas can be modeled as passive transport seems invalid. The proposal is also likely to require biological data (such as feeding rates) which are unlikely to be available. The proposal includes three competing NPZ models. However, it was unclear whether sufficient data would be available to parameterize the most complex (50 component) model and how the IBM would then be linked to the NPZ models.

Modeling top down control was stated as an objective by the applicants but it is not clear how these objectives would be met with the data that is available. They also do not propose to do management strategies evaluation (MSE) of other fisheries models due to the funding limitation.

The Science Panel noted that the team is very dispersed, and the roles of the various investigators are unclear. Given the nature of the proposal, there is a need for strong and effective project management, but the proposal does not provide sufficient information to assess whether the team will be able to work together sufficiently well to develop, link, and parameterize the various models. There is also only vague information provided on integration of the field data into the models and no timeline is provided for data feedback to the field program.

In summary, the Science Panel found this proposal to have critical flaws and recommends against funding it as written.

**Proposal #10 – Gibson et al.**

Three technical reviewers found this proposal to have merit, albeit with certain limitations, and rated this proposal Fair, Excellent, and Very good. The technical reviewers recognized that the scientific team is strong with considerable experience with the proposed models; however, reviewer #1 noted that project management responsibilities were not specified. Conceptual deficiencies noted by reviewer #1 include a lack of integration of higher trophic level interactions, particularly for sea lions and seabirds, and little evidence for model evaluation and projection. Reviewer #3 made several suggestions, including the consideration of ocean acidification, and encouraged the proponents to consider constructing an eastern GOA ecosystem model (including higher trophic levels) to allow comparison of the two sides of the Gulf.

The Science Panel found this proposal to have substantial merit as well, especially in the description of the current state of knowledge of the 5 focal groundfish species and of the ecosystem dynamics; however, the proposal failed to meet specific expectations for this component. In particular, the proposal did not clearly and directly address the 12 model design criteria questions as outlined in the RFP, despite the RFP's specific allowance for an additional 5 pages in the research plan to address these criteria. As a result, the proposal lacks a lot of information regarding model runs, validation, IPCC scenario selection and data integration. The IBM models, as described, are designed to provide spatial estimates of settlement, but the proposal does not provide a method to evaluate that output. More to the point, what is needed are predictions of recruitment to young-of-the-year (YOT) fish, and it is important that testable predictions of recruitment be produced in order to meet the intent of the UTL component. With regard to the IBM output, the Science Panel requests justification that spatial averages are an appropriate way to summarize the results of the IBM for use in the multispecies model. In regards to higher trophic levels, the proposal chose not to address the comparison of eastern and central Gulf systems, citing the lack of an multi-species model (MSM) for the eastern Gulf.
Other conceptual and implementation issues included the need to more fully investigate the actual availability of environmental data, which is limited, to consider the use of QuikScat data for winds, to consider the use of stripped down spatial models to allow for a sufficient number of runs to meet project goals, and to clarify the model linkages to Steller sea lions and seabirds.

In terms of the research team, the PIs seem committed to the project and well integrated with good knowledge of what is happening in the Gulf. The timeline for work is of some concern with some of the work not starting until 2012. This is a concern that needs to be addressed as modeling and field data should be working simultaneously and integrated.

In summary, the Science Panel found this proposal to have critical flaws and recommends against funding it as written.

**Ecosystem Modeling Committee Review:**

Following the review of the individual proposals by the Science Panel, Dan Goodman (EMC chair) provided a review of the two modeling proposals (#10 and #11) from the perspective of the Ecosystem Modeling Committee. Similar to the Science Panel review, the EMC felt that neither of the two modeling proposals should be funded as written because neither proposal will achieve what was requested – a MSE and a clear fisheries application. Both proposals have many, but different issues:

Proposal #10 provides a nice summary of the biological background which is critical to understanding and validating the models. However the proposal does not address the question of how the proposed models will be validated or does it properly address any of the other EMC criteria (number and length of runs, etc.). More concerning, the proposers state that model runs should not be used for prediction or management application, one of the main goals of the IERP.

Proposal #11, on the other hand, has directly addressed the question of model validation and the other EMC issues. However, this model is restricted to the physical oceanography (ROMS) and lower trophic level (NPZ) and hardly gets to fish at all. It does not propose any type of fisheries management model (MSE) and there is a strong feeling of indifference about the reality of use of the model.

In summary, the EMC feels that neither proposal does what was requested. One speaks the language of modeling but is restricted to ROMS and NPZ with very little biology, while the other does not give the essence of model criteria. It will therefore be a challenge to develop a recommendation based on the proposals submitted and a new approach may be needed for the modeling component of GOAIERP.

c. **Assembling GOAIERP Program**

After considering the EMCs review of these two proposals, the SP discussed the options available to them. It was felt that there were good proposals to work with for the field components of the GOAIERP (UTL – Moss et al, MTL – Ormseth et al, LTL – Hopcroft et al). Based on the proposals submitted the Science Panel felt that the field program was robust enough to go forward, although the 3 trophic level components need to be aligned and modified to fill gaps and function cohesively (see gaps below). The proposals to the Ecosystem Modeling component however were not sufficient. This led to a discussion on the pros and cons of sequential vs. simultaneous field program and modeling efforts. The results of this discussion led to the resolution that the Science Panel does not want to go forward with the GOAIERP program unless modeling is included simultaneously from the beginning.
However, the Science Panel recognized that a complete, vertically integrated, ecosystem model for the Gulf of Alaska, similar to what is being accomplished for BSIERP, may not be possible in this GOAIERP due to data and funding limitations. Specifically it was noted that the modeling efforts may not be able to incorporate the higher level trophic levels to include seabirds, mammals and fisheries at this time but that the Upper Trophic Level component and/or the modeling component needs to, at minimum, be able to provide predictions of larval settlement and recruitment as originally stated in the Upper Trophic Level component. These models and predictions should include validation up to the settlement level, even if it needs to be slightly more speculative in the final step to recruitment. Modelers should identify what data they would need to make the last link less speculative. It was also noted that the modeling may need to focus on some, and not all, of the key species identified in the UTL component but that POP and sablefish are probably the wrong ones (even though those were the ones stated in the UTL proposal).

Given that both modeling proposals were considered insufficient, the Science Panel considered the following options:

1. A directed modeling effort where NPRB staff assembles a modeling team,
2. Invite the two modeling groups to resubmit based on the Science Panels feedback and the more focused direction of concentrating on factors up to and including recruitment of YOY fish, or
3. Issue a new RFP for the modeling component of the GOAIERP with a more focused call for an integrated ecosystem model concentrating on factors up to and including recruitment of YOY fish.

After a lengthy discussion of the pros and cons of these options, the Science Panel concluded that the most efficient way forward was to invite the two modeling groups to resubmit based on the new focus and review comments. The revised proposals would be due in mid-March, so that a Science Panel and EMC review could be folded into the regular April Science Panel meeting when the regular program proposals are considered. This would result in a few months delay of the current timeline, with the final selection of GOAIERP components during the May 2010 Board meeting, and focal meetings to follow in the late spring and early summer of 2010.

Program gaps

Panel members addressed the issue of identifying gaps in the field program of the GOAIERP as assembled based on the UTL of Moss et al., the MTL proposal of Ormseth et al. and the LTL proposal of Hopcroft et al. These gaps included:

- POP genetics analysis and general biological information
- Inclusion and analysis of iron
- The need for LTL work in 2012 instead of 2013
- Improved vertical and species resolution of zooplankton
- Additional Seward line sampling between 2010 and 2012 or 2013
- Spring sampling for the MTL
- Clearer links between the seabird and SSL work and the rest of the field program
- Better integration of timelines and datasets between components (specifically with the modeling component)
- Establishment of a clear link between settlement and recruitment and fisheries management in field collection and modeling

Science Panel members were particularly concerned about the potential gap in Seward line sampling. Both of the modeling proposals stated that they would need the Seward line data to validate their models; and if not the Seward Line at least a similar line like that sampled during the 2010-2014 period. The
recommended LTL component does include Seward line sampling, but only for one year. Assuming that the LTL field year is shifted to 2012, there would be at least a two year gap in Seward line data leading up to the GOAIERP LTL field year. Ideally there should be no more than a one year gap, if at all, so that questions such as “what might be the influence of the potential 2009-10 ENSO event on the subsequent fish biomasses in the Gulf of Alaska?” could at least be partially addressed. Thus it would be important to fill in for 2010 so that there is time to integrate data into the models. The Science Panel strongly recommends that the researchers involved in the Seward line explore a consortium approach (similar to the one taken by the CPR) where the Board contributes $100K for 2010 or 2011, and the support of others agencies be sought to fund the remainder of that effort. Failure to sample the Seward line in 2010-2011 would not be ideal for the GOAIERP program, although the program could continue without it if absolutely necessary.

d. **Recommendations to the Board**

In summary the Science panel recommends the following to the Board with regard to the GOAIERP program:

- Fund the Ormseth et al. proposal for the Forage-base component of the GOAIERP, with the most important caveat that spring sampling should be included in the revised proposal, otherwise this proposal should not be funded.

- Fund the Hopcroft et al. proposal for the Lower Trophic Level & Physical Oceanography component, with the most important caveat that the one field year be shifted to 2012, otherwise this proposal should not be funded.

- Do not fund either of the proposals submitted to the Ecosystem Modeling component, but provide feedback to both groups and ask that they resubmit a revised proposal focusing on factors up to and including recruitment of VOY fish. The Science Panel recommends that modeling beyond recruitment be taken up later in a future iteration of a GOAIERP.