Revamp of SSC's research priorities process
Update: March 2013

SSC's goals, articulated at June 2012 meeting:

1. Develop a more orderly process of submitting and prioritizing proposals for research priorities.
   - *The SSC prefers to have Plan Teams be the initial filter for research priorities that come to the SSC.*
   - *Sometimes EFH, protected species, and other issues relevant to a particular FMP may not be fully considered by each Plan Team, but the SSC recommends that Plan Teams make a more concerted effort to do so.*
   - *Research priority lists should be provided by the Plan Teams in their Plan Team report, ideally to be received by the SSC no later than two weeks prior to the Council meeting at which the Plan Team Report is presented.*
   - *The proposed research priorities should be entered in "Track Changes" in the Council's list of Research Priorities, as "published" in the minutes of the previous year's June Council meeting.*
   - *The SSC will update a working copy of the Research Priorities list at each meeting at which it receives a list of priorities from a Plan Team, and will provide the Council with the full revised list at the June NPFMC meeting.*

2. Adopt a process of evaluating and organizing the list of proposed Research Priorities using an Excel file or relational database type of system
   - *Research priorities would be submitted on an Excel-based form to collect information about the proposed priority.*
   - *The proposed research would include information on 1) the question or data need to be resolved, 2) whether the priority is an immediate concern or an ongoing need, 3) relative rank (high, medium, low) among all priorities submitted by that Plan Team, 4) impact on decision making, and 5) species or fishery affected.*
   - *Separate worksheets or database tables could be established for each Plan Team, the SSC, and the Council.*

Proposed process, based on SSC direction:

1. Each existing research priority, and new ones as they are added, will be expanded as necessary to include:
   a) a description of the priority, including the data need to be resolved;
   b) relative urgency of priority (immediate or ongoing concern);
   c) relative ranking of priority (high, medium, low);
   d) how it relates to a Council action;
   e) which species, fisheries, or issues it affects;
   f) what is the current status of research with respect to this priority
2. Each existing research priority has been assigned to one or multiple Plan Teams (Groundfish, Crab, or Scallop) for review and prioritization. New research priorities will only be accepted from the Plan Teams (or, of course, will be adopted by the SSC and Council directly). Priorities put forward by staff or the public must be submitted to the Plan Team review process.
3. Annually, the Plan Teams will review the priorities assigned to them. They will propose revisions to language, or adjustments to priority, and may update the status of research, as appropriate. They may also submit new research priorities. Assuming their current schedules remain unchanged, the Groundfish PT will review research priorities in September, the Crab PT will do so in May, and the Scallop PT will review priorities in February.

4. The SSC will consider revisions to the SSC/Council's master research priorities list, based on Plan Team input, on an ongoing basis, generally at the Council meeting that follows the Plan Team's deliberation. Once a year, likely in June, the SSC will adopt and forward its master list of research priorities to the Council.

Progress to date:

- Staff met with an SSC and Plan Team subgroup in August 2012 to discuss the proposed process
- Staff has created a spreadsheet (could be turned into a database) using the SSC/Council's 2012 list of research priorities.
    - Each of existing research priorities has been entered into spreadsheet. Content is unchanged. In some cases, if a 'single' 2012 research priority encompassed multiple issues, the priority was split in two.
    - For each priority in spreadsheet, staff added descriptive fields as requested by SSC above, (related council action, species/fisheries/issues affected), as well as 'status of research' fields. A full list of fields is included at the end of this document.
- Staff suggests that the Plan Teams/SSC go through a cycle of reviewing, prioritizing, and setting research priorities under this new process, and using the new spreadsheet and descriptive attributes. Once the new process is approved, and the useful fields are nailed down, we can work on automating the process so that it is easy for the Plan Teams and the SSC to use directly.
    - We are proposing that the spreadsheet/database will be maintained by Pacific States Marine Fisheries Commission (AKFIN); they can prepare a web interface and standardized reports that would allow authorized users to propose and make changes to the priorities as part of the process
- To date, the Scallop and Groundfish Plan Teams have met to review the 2012 research priorities, and the additional attributes that have been added with the transition to the new spreadsheet. Their feedback is included in the April 2013 meeting materials. The Crab Plan Team will meet in May.

Staff questions and comments for SSC consideration, as the new process is deliberated:

Comments about how existing research priorities are expressed, and what content we should track in the spreadsheet (which leads to how best we should design fields to track that content):

- There is often an inconsistency in the way the research priorities are described. In some cases, we identify the end product as the research priority (e.g., understanding life history), and in others, we identify the method to achieve it (e.g., tagging studies). Should this inconsistency be addressed among existing priorities? Should we be trying to identify both aspects for each research priority, or is it appropriate that some be expressed one way, and others another?
- How much explanation should be included to support each research priority? Currently, there are inconsistencies among the priorities with respect to whether a supporting rationale is provided. If we are encouraging a lengthy explanation, should we be considering a database that allows people to attach a supporting word document?
- Immediate vs ongoing categories. Should duplicates in the immediate and ongoing needs categories be addressed? Frequently, the application of a research priority to a single species may be an immediate need, but more generally, the research priority should continue as an ongoing need. Should these therefore be listed as separate research priorities? Is there a better way to distinguish among these? How does this category relate to the ranking of priorities (high-med-low)?
- In order to coordinate with other Council discussions, and with the concurrence of the SSC subgroup, staff added a section on 'Status of research' to the spreadsheet. This could be limited to the level of information that is currently in the list (e.g. no action, partially underway, etc.), or could include supporting information. How much detail should be captured?

- The 2012 SSC list had two levels of category headings, and the new spreadsheet only uses one. There was a mismatch between how Fish/ Stock Assessment headings were labeled versus those for the Habitat/ Ecosystem categories. We kept those headings including the most detail, but some of the habitat and ecosystem headings should probably be combined.
- The SSC may want to refine the fields/flags currently included for the 'Related Council action' and 'species/fisheries/issues affected' categories.

Comments about the proposed process:

- Under the SSC's proposed process, all research priorities must be reviewed through the Plan Teams. One pitfall with this process is that there are certain Council actions and research needs that may not be within the scope of Groundfish, Crab, or Scallop Plan Team expertise: for example, issues to do with halibut fishery allocation, or the Arctic FMP. There may also be other Council actions that engender research needs, but are not thoroughly vetted through any Plan Team, and therefore the Plan Teams' assessment of relative priority may not accurately reflect the Council's interest in a better understanding of a particular issue.
- If the Plan Teams are to be the sole arbiters of new research priorities to be considered by the SSC for including in the list, they may want to consider how public or staff input is provided for this agenda item.
- Should the process allow a particular research priority to be assigned to multiple plan teams? This may result in conflicting information regarding relative priority that the SSC will need to resolve. While some effort has been made to split out 2012 research priorities that can easily be separated into distinct fishery issues, there is still considerable overlap, particularly between issues that are pertinent both to the Groundfish and Crab Plan Teams.
- It may be useful to consider what the best timing is for Council input to the research priorities, especially with respect to prioritization. The SSC evaluates the importance of proposed research priorities with respect to the Council's management objectives. In order to inform the relative ranking of priorities, however, it may be helpful for the Council to provide the SSC with guidance on the relative priority of management actions in advance, which would then allow the SSC to best align research priorities with management priorities in determining a final ranking.

Next steps:

- It is expected that the SSC will provide feedback on this proposed process, and the content of the new spreadsheet/database, both at this meeting (April 2013) and following the SSC's adoption of a master list of research priorities for 2013 in June.
- Over the summer, staff will hopefully be able to revise the spreadsheet based on SSC feedback, and design a process to automate a web-based dashboard for revising and inputting new research priorities, and for the production of reports. This dashboard would have different tools for Plan Teams that are reviewing research priorities, and SSC members that are reviewing Plan Team comments and finalizing SSC recommendations. There would be automated reports available, e.g. for each Plan Team (including only those priorities assigned to each team); for the SSC (to review Plan Team recommended revisions and priorities); or for the Council (amalgamating the SSC's final list of recommended priorities, or perhaps reporting on research priorities that have been on the list for a long time but remain unaddressed.)
- Staff also envisions that there could potentially be multiple web-based report formats that would be publicly available, based on a user's interest. For example, a member of the public could search for all research priorities that are related to salmon, or view the status of all research priorities that are underway. These report formats would ideally also be developed and made available over the summer.

Fields for research priorities spreadsheet

Field Type	Fields	Notes
ID	ID number	*Unique ID number assigned to each research priority*
Category heading	Fish and fisheries monitoring Stock assessment Fishery management Bycatch issues Protected species Habitat mapping Function of habitat Evaluate HAPC Baseline habitat assessment Fishing effects on habitat Ecosystem indicator dev and maintenance Envtl influences on ecosystem processes Basic research on trophic interactions Ecosystem modeling	A, B, etc. headings from SSC's 2012 list. Ignores I, II-level category headings (i.e., Fisheries, Fishery Interactions, Habitats, Other Areas of Research). *Note, some of the habitat and ecosystem headings should probably be combined. There was a mismatch between how Fish/ Stock Assessment headings were done, and Habitat/ Ecosystem headings.*
Description	Short title Long title	*Need to revise description of priorities to focus on objective for research rather than research activity itself*
Urgency flags	Immediate concern Ongoing concern Removed (no longer a priority)	
Plan Team Assignment flags	Groundfish PT; Crab PT; Scallop PT; GPT/CPT; GPT/SPT; CPT/SPT; GPT/CPT/SPT	*Specifies which PT will annually review each research priority.* *Allow assignments to multiple teams? (If so, will need to modify spreadsheet for SSC to add individual columns for each PT's priority ranking.)*
SSC and PT priority flags	Highest High Moderate Longterm	*Currently, only 1 SSC priority identified – SSC's #1 highest priority is surveys*
Related Council action/ Impact on Decisionmaking	Harvest specifications Rebuilding plans Halibut allocations Bycatch reduction Salmon bycatch Crab bycatch SSL protection Other mammal/seabird interactions Arctic FMP Habitat issues Observer Program Impacts analyses Economic impacts Subsistence analyses Community impacts analysis Ecosystem impacts General	*This list is pretty long – perhaps categories should be refined to a more general list?*

Field Type	Fields	Notes
Species, Fisheries, Issues Affected flags	Groundfish Crab Scallop Salmon Halibut Arctic Habitat Econ/social Bycatch Protected Species Ecosystem/Environment Management	*Is this the right list of attributes?* *Other possibilities:* *BS* *AI* *GOA* *Stock assessment* *Modeling*
Year added		*(2012) means the priority was on the list in 2012 when spreadsheet was begun; in future will be more informative*
Research status flag	No action Listed on RFPs Partially underway Underway Completed	
	Comment field	*Can be used to provide additional detail, if appropriate*
Staff comments on 2012 list	[field to be deleted once SSC accepts new process)	*We tried to note priorities that had obvious duplication or needed to be reworded*
Spreadsheet tracking fields	Create Date, Updated By, Update Date, Update Type, Sequence, Comments	

Immediate
Flag   Y

2012 Research Priorities - Immediate Concerns

Res_Title

Fish and Fisheries Monitoring

101   Life history research on non-recovering crab stocks

Status: No Action

Non-recovering stocks. A pressing issue is why certain stocks have declined and failed to recover as anticipated (e.g., Pribilof Island blue king crab, Adak red king crab). Research into all life history components, including predation by groundfish on juvenile crab in nearshore areas, is needed to identify population bottlenecks, an aspect that is critically needed to develop and implement rebuilding plans.

CPT

102   Catch accounting of crab sex and size

Status: Partially Underway

Improvements are needed for catch accounting by sex and size for crab (genetic samples) in non-directed fisheries with high bycatch rates, particularly for blue king crab in the Pacific cod pot fishery in the Pribilof Islands. (currently under discussion)

CPT

103   Methods for reliable estimation of total removals

Status: No Action

Develop methods for reliable estimation of total removals (e.g., surveys, poorly observed fisheries) to meet requirements of total removals under ACLs.

GPT, CPT, SPT

104   Improve species identification

Status: No Action

Improve species identification, by both processors and observers, for priority species within species complexes in catches, to meet requirements of total removals under ACLs. Methods that quantify and correct for misidentifications are desired.

GPT

105   Spatial distribution of male snow crab

Status: Partially Underway

There is a need to characterize the spatial distribution of male snow crab relative to reproductive output of females in the middle domain of the EBS shelf (partially underway)

CPT

Stock Assesment

106   Improve handling mortality rate estimates for scallop

Status: No Action

Improve handling mortality rate estimates for scallops. Conduct field studies to estimate scallop discard mortality (specifically the relationship between capture, release condition, and survival of scallops). (crab studies are partially underway: Chionocetes RAMP study)

SPT

107	**Improve handling mortality rate estimates for crab**
	Status: Partially Underway
	Improve handling mortality rate estimates for crab. Improved understanding on the post-release mortality rate of discarded crab from directed and non-directed crab pot fisheries and principal groundfish (trawl, pot, and hook and line) fisheries is required. The magnitude of post-release mortality is an essential parameter in the determination of total annual catch used to evaluate overfishing in stock assessment and projection modeling. For example, assess discard mortality rates of Tanner crab by size, month, sex, and fishery type.
	CPT
108	**Tagging studies of Aleutian Islands Pacific cod and Atka mackerel**
	Status: Partially Underway
	Tagging studies of Aleutian Islands Pacific cod and Atka mackerel are needed to create models of short-term movement of fish relative to critical habitat (tagging for Atka mackerel partly underway).
	GPT
109	**Age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish**
	Status: Partially Underway
	Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. Conventional tagging studies of young of the year and/or one-year old Pacific cod would be useful in this regard (partially underway for cod and dogfish).
	GPT
110	**Maintain the core data from the eastern Bering Sea (e.g. biophysical moorings, stomach data, zooplankton, age 0 surveys)**
	Status: Underway
	Maintain the core data from the eastern Bering Sea needed to support a diverse suite of models used to support the integrated ecosystem assessment program for the Bering Sea. Core data include inputs for single- or multi-species management strategy evaluations, food web, and coupled biophysical end-to-end ecosystem models (e.g. biophysical moorings, stomach data, zooplankton, age 0 surveys).
	GPT, CPT
111	**Biomass indices and alternate methodologies for lowest tier species**
	Status: No Action
	Develop biomass indices for lowest tier species (Tier 5 for crab, Tier 6 for groundfish), such as sharks, and conduct net efficiency studies for spiny dogfish. Explore alternative methodologies for Tier 5 and 6 stocks such as length-based methods or biomass dynamics models.
	GPT, CPT

112	Analyses of fishery CPUE and observer data for scallop

Status: No Action

Owing to the lack of fishery-independent surveys for scallops, there is a need for analyses of fishery CPUE and observer data for use in assessing fishery performance and stock assessment. For instance, sharp declines in CPUE have occurred in some areas, such as Kayak Island and Alaska Peninsula, prompting concerns about local depletion. Additional new techniques may be desirable in regions with data-poor stocks.

SPT

113	Research on spawner - recruit relationship

Status: Underway

New information and data are needed that would inform our understanding of the spawner - recruit relationship for groundfish and crab with sufficient skill to project year-class strength (e.g., Tanner crab, GOA pollock, sablefish, halibut). (Underway)

GPT, CPT

114	Stock structure and potential spatial management for BSAI pollock

Status: No Action

Conduct studies to determine stock structure and potential spatial management for BSAI pollock (e.g., movement).

GPT

115	District-wide survey for demersal shelf rockfish in Southeast Alaska

Status: No Action

Conduct a district-wide survey for demersal shelf rockfish in Southeast Alaska in a single assessment year to help inform density estimates in specific subdistricts in other assessment years.

GPT

116	Tagging studies of king crab

Status: No Action

Conduct a tagging study of red king crab in the region north of Bristol Bay to assess the movement between this region and the Bristol Bay registration area. Similar work on blue king crab in Bristol Bay relative to the Pribilof Islands is needed.

CPT

117	Vertical distribution of Pacific cod

Status: Underway

Research is needed on the vertical distribution of Pacific cod relative to the EBS bottom trawl and comparisons between the EBS and GOA trawl gear. (Underway).

GPT

118	Pacific cod stock assessment for the Aleutian Islands

Status: No Action

Develop Pacific cod stock assessment for the Aleutian Islands region.

GPT

Fishery Management

119   Evaluation of salmon PSC mitigation measures

Status: No Action

Develop a research program that will facilitate evaluation of salmon (both chinook and non-chinook) PSC mitigation measures in the BSAI and GOA. This includes updated estimates of the amounts reasonably necessary for subsistence, timing of runs and openings relative to subsistence requirements, and access to cost data for the commercial pollock and salmon industries so that impacts on profits (not revenues) can be calculated.

GPT

120   Improve knowledge for salmon bycatch impact assessment

Status: Partially Underway

Improve the resolution of Chinook and chum salmon genetic stock identification methods (e.g., baseline development, marker development), improve precision of salmon run size estimates in western Alaska, and initiate investigations of biotic and abiotic factors influencing natural mortality rate during ocean migration in the GOA and BSAI. (baseline development is nearing completion, more work on Cook Inlet chum needed)

GPT

121   Investigate factors affecting the guided angler sector of the halibut fishery

Status: Underway

Develop improved catch monitoring methods of fishery interactions including direct and alternative options (e.g., electronic logbooks, video monitoring), particularly on smaller groundfish, halibut, and commercially guided recreational fishing vessels, including an assessment of feasibility for small vessels.Investigate factors that affect angler demand in the guided angler sector of the halibut fishery resulting from regulatory changes or general economic conditions.(Underway)

GPT

122   Improve methods of monitoring fishery interactions

Status: No Action

Develop improved catch monitoring methods of fishery interactions including direct and alternative options (e.g., electronic logbooks, video monitoring), particularly on smaller groundfish, halibut, and commercially guided recreational fishing vessels, including an assessment of feasibility for small vessels.

GPT

123   Develop bioeconomic models

Status: No Action

Develop bioeconomic models with explicit age- or size-structured population dynamics for BSAI and GOA groundfish fisheries to estimate maximum economic yield and other bioeconomic reference points under uncertainty.

GPT

124   Benefits and costs of halibut and halibut PSC utilization

    Status: Partially Underway

Research the benefits and costs of halibut and halibut PSC utilization in different fishing sectors. For halibut and other PSC and bycatch species, conduct research to better identify where regulations restrict the utilization of fish from its most beneficial use and evaluate how changes in existing regulations would affect different sectors and fisheries. (partially underway)

    GPT

125   Thresholds for ecosystem indicators

    Status: No Action

Initiate/continue research on developing and evaluating thresholds for ecosystem indicators, including ecosystem-level management strategy evaluation.

    GPT, CPT

Protected Species

126   Localized interactions between fisheries and protected species

    Status: No Action

Studies of the localized interactions between fisheries and protected species, such as interactions between Steller sea lions and commercial fish species in the Central and Western Aleutian Islands (particularly areas 541, 542, 543), are needed. These studies should be conducted at appropriate spatial and temporal scales with an emphasis on seasonal prey fields, diet, and movement of sea lions and their prey.

    GPT

127   Age- and size-specific vital rates of Steller sea lions

    Status: No Action

Assess age- and size-specific vital rates (i.e., reproduction and survival) of Steller sea lions in the western and central Aleutians at sufficient frequency to track population dynamics in the western DPS.

    GPT

128   Indirect effects of fisheries removals on Steller sea lions

    Status: No Action

Assess possible indirect effects of fisheries removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and pup-non pup ratios of Steller sea lions in the Eastern DPS.

    GPT

129   Killer whale predation of Steller sea lions

    Status: No Action

Quantify killer whale predation of Steller sea lions, particularly in the western and central Aleutian Islands.

    GPT

130   Methods to estimate sea lion abundance

    Status: No Action

Develop new methods to estimate sea lion abundance, such as the use of unmanned aerial vehicles, which could increase the probability of acquiring abundance estimates in remote areas. (underway)

    GPT

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131   Impact of the displacement of the groundfish fleet on Northern fur seals

   Status: Partially Underway

   Assess the impact of the displacement of the groundfish fleet due to Steller sea lions
   protection measures on the prey availability, foraging ecology, diet, movements, and vital
   rates for Northern fur seals (partially underway).

   GPT

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132   Impact of seabird bycatch in fisheries on bird populations, and methods to reduce

   Status: No Action

   Assess the extent and impact of seabird bycatch in fisheries on bird populations, and
   develop methods to reduce seabird bycatch, particularly protected species, such as short-
   tailed albatross.

   GPT

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133   Impacts of fishing activities on whales

   Status: No Action

   Determine potential impacts of fishing activities on North Pacific right whales and the
   Eastern North Pacific blue whales in the GOA, particularly in identified critical (NPRW) or
   essential (NPBW) habitat.

   GPT

Evaluate habitats of particular concern

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134   Assess whether Bering Sea canyons are habitats of particular concern

   Status: Partially Underway

   Assess whether Bering Sea canyons are habitats of particular concern, by assessing the
   distribution and prevalence of coral and sponge habitat, and comparing marine
   communities within and above the canyon areas, including mid-level and apex predators to
   neighboring shelf/slope ecosystems. (partially underway)

   GPT, CPT

Baseline Habitat Assessment

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135   Arctic assessment of current baseline conditions

   Status: No Action

   Dynamic ecosystem and environmental changes in the northern Bering Sea and Arctic are
   occurring on a pace not observed in recorded time. In response to the new Arctic FMP,
   assessment of the current baseline conditions and trophic interactions is imperative. This
   effort, while of great scientific importance, should not supplant the regular surveys in the
   BSAI and GOA, which are of critical importance to science and management. (partially
   underway)

   GPT

Fishing Effects on Habitat

136   **Effects of trawling on female red king crab and subsequent recruitment**

     Status: Partially Underway

Research is needed on the effects of trawling on the distribution of breeding and ovigerous female red king crab and subsequent recruitment. Relevant studies include effects of potential habitat modifications on the distribution of females, particularly in nearshore areas of southwest Bristol Bay (partially underway), and environmental effects (e.g., trawling overlap in warm vs. cold years). Retrospective studies, the use of pop-up tags to identify larval release locations, and larval advection using Regional Ocean Modeling System would help address this need.

     GPT, CPT

137   **Impact of bottom trawl fisheries on benthic habitat**

     Status: No Action

Impact of bottom trawl fisheries on invertebrate abundance and species composition in benthic habitats, especially as might be relevant to the foraging ecology of walrus (candidate species for listing under ESA), but also bearded seals (ESA determination due in July), and gray whales.

     GPT

Ongoing	
_Flag	Y

2012 Research Priorities - Ongoing Concerns

Res_Title

Fish and Fisheries Monitoring

138 Continuation of State and Federal annual and biennial surveys

Status: Underway

Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including BASIS surveys and crab pot surveys, is a critical aspect of fishery management off Alaska. It is important to give priority to these surveys, in light of recent federal budgets in which funding may not be sufficient to conduct these surveys. Loss of funding for days at sea for NOAA ships jeopardizes these programs. These surveys provide baseline distribution, abundance, and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. Although an ongoing need, these surveys are considered the highest priority research activity, contributing to assessment of commercial groundfish and crab fisheries off Alaska.

GPT, CPT

139 Conduct routine subsistence use, fish, crab, and oceanographic surveys

Status: Partially Underway

Conduct routine subsistence use, fish, crab, and oceanographic surveys of the northern Bering Sea and Arctic Ocean. These surveys will become increasingly important under ongoing warming ocean temperatures because range expansions of harvested fishery resources may occur. If range expansions or shifts occur, data will be needed to adjust standard survey time series for availability.

GPT, CPT

140 Identification and integration of archived data (e.g., surveys)

Status: No Action

Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys) should be pursued. Investigate integrating these data into stock and ecosystem assessments.

GPT, CPT

141 Fishery-independent surveys of scallops

Status: No Action

There is a need for fishery-independent surveys of scallops on major fishing grounds, e.g., Yakutat, other areas.

SPT

142 Survey capability for forage fish

Status: No Action

Develop a long-term survey capability for forage fish (partially underway).

GPT

143   Alternative approaches to acquire fishery-independent abundance data for Aleutian Islands golden king crab

Status: No Action

Explore alternative approaches to the triennial ADF&G Aleutian Islands golden king crab pot survey to acquire fishery-independent abundance data on stock distribution and recruitment, including the potential for future cooperative research efforts with Industry.

CPT

144   Expand cooperative research efforts to assess seasonal diets and movements of fish and shellfish

Status: No Action

Continue and expand cooperative research efforts to supplement existing surveys to provide seasonal or species-specific information for use in improved assessment and management. The SSC places a high priority on studies that provide data to assess seasonal diets and movements of fish and shellfish, for use in studies of species interactions in spatially explicit stock assessments.

GPT, CPT

145   Monitor skate egg case concentration sites

Status: No Action

The HAPC action for skate egg case concentration sites included two recommendations that the Council suggested should be addressed during the annual research priority discussion: (a) skate egg case concentrations should be monitored every 2 to 3 years using non-invasive research design, such as in situ observation; and (b) skate conservation and skate egg concentration areas remain a priority for EFH and HAPC management and within Council and NMFS research plans.

GPT

146   Improve surveys in untrawlable habitat, particularly for rockfish

Status: No Action

For groundfish in general, and rockfish in particular, continue and expand research on trawlable and untrawlable habitat to improve resource assessment surveys. For example, improved surveys, such as hydro-acoustic surveys, are needed to better assess pelagic rockfish species that are found in untrawlable habitat or are semi-pelagic species such as northern and dusky rockfish.

GPT

147   Effects of the environment on survey catchability, particularly for Tanner crab and Aleutian Islands golden king crab

Status: No Action

Studies are needed to evaluate effects of the environment on survey catchability. For groundfish and crabs, studies are needed on catchability, as it directly bears on estimates of the stock size for setting of catch quotas. Research to refine the estimates of survey catchability, q, used to infer absolute, rather than relative, abundance would substantially improve the quality of management advice. Particular emphasis should be placed on Tanner crab because of recent trends in stock status and on fishery and fishing gear selectivity for Aleutian Island golden king crab to improve the stock assessment model.

GPT, CPT

148   **Research on survey analysis techniques for species that exhibit patchy distributions**
     Status: No Action
     Continue research on the design and implementation of appropriate survey analysis
     techniques, to aid the Council in assessing species (e.g., some crabs and rockfish) that exhibit
     patchy distributions and, thus, may not be adequately represented (either over- or under-
     estimated) in the annual or biennial groundfish surveys.
          GPT, CPT

149   **Quantitative female reproductive index for the surveyed BSAI crab stocks**
     Status: No Action
     Advance research towards developing a quantitative female reproductive index for the
     surveyed BSAI crab stocks. Research on mating, fecundity, fertilization rates, and, for snow
     and Tanner crab, sperm reserves and biennial spawning, is needed to develop annual indices
     of fertilized egg production that can be incorporated into the stock assessment process and to
     model the effects of sex ratios, stock distribution, and environmental change on stock
     productivity. Priority stocks for study are eastern Being Sea snow and Tanner crab and Bristol
     Bay red king crab. (Ongoing for snow crab and red king crab)
          CPT

150   **Collect maturity scans during fisheries that target spawning fish**
     Status: No Action
     Expand existing efforts to collect maturity scans during fisheries that target spawning fish
     (e.g., pollock). Time series of maturity at age should be collected to facilitate the assessment
     of the effects of density-dependence and environmental conditions on maturity.

          GPT

Stock Assesment

151   **Acquire basic life history information (e.g., natural mortality, growth, size at maturity) for**
     data-poor stocks.
     Status: No Action
     Acquire basic life history information needed for stock assessment and bycatch management
     of data-poor stocks, such as scallops, sharks, skates, sculpins, octopus, grenadiers, squid, and
     blue king crab (Bering Sea), golden king crabs (Aleutian Islands), and red king crab (Norton
     Sound). Specifically, information is needed on natural mortality, growth, size at maturity, and
     other basic indicators of stock production/productivity).
          GPT, CPT, SPT

152   **Acquire estimates of mortality and abundance for octopus**
     Status: No Action
     For octopus, there is particular need for estimates of mortality and abundance, including
     verification of the cod consumption-based approach.

          GPT

153   **Acquire information on growth, movement, and abundance of scallops and golden king crab**
     Status: No Action
     Tagging studies would provide information on growth and movement of scallops and growth
     and absolute abundance estimates for golden king crab.
          SPT

154 **Conduct multivariate analysis of bycatch data from the scallop observer program**

Status: No Action

Conduct multivariate analysis of bycatch data from the scallop observer program (haul composition data) to estimate abundance and trends of benthic communities on scallop beds.

SPT

155 **Conduct computerized image processing from camera sled (CamSled) data.**

Status: No Action

Conduct computerized image processing to facilitate scallop stock assessments from camera sled (CamSled) data.

SPT

156 **Improve estimates of natural mortality (M) for Pacific cod and crab stocks.**

Status: No Action

Improve estimates of natural mortality (M) for several stocks, including Pacific cod and BSAI crab stocks.

GPT, CPT

157 **Develop and validate aging methods for crabs.**

Status: No Action

Develop and validate aging methods for crabs to improve estimates of M, including improved independent estimates of stage-specific M (e.g., large red king crab in Norton Sound).

CPT

158 **Validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish**

Status: Partially Underway

Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. (partially underway for Pacific cod and spiny dogfish)

GPT

159 **Evaluate hybridization of snow and Tanner crabs.**

Status: No Action

Evaluate the assessment and management implications of hybridization of snow and Tanner crabs.

CPT

160 **Develop and evaluate standard climate variability scenarios on recruitment and growth**

Status: No Action

Quantify the effects of historical climate variability and climate change on recruitment and growth, and develop standard environmental scenarios for present and future variability based on observed patterns.

GPT, CPT, SPT

161 **Climate information overing a wider range of seasons is needed.**

Status: No Action

There is also a clear need for climate information that covers a wider range of seasons than is presently available.

GPT, CPT, SPT

162 **Development of projection models to evaluate (a) the performance of different management strategies and (b) to forecast seasonal and climate related population shifts**

Status: Partially Underway

There is a need for the development of projection models to evaluate the performance of different management strategies relative to the Council's goals for ecosystem approaches to management. Projection models are also needed to forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish. (partially underway)

GPT, CPT

163 **Expanded studies to identify stock boundaries**

Status: No Action

To identify stock boundaries, expanded studies are needed in the areas of genetics, mark-recapture, reproductive biology, larval distribution, and advection.

GPT, CPT, SPT

164 **Develop spatially explicit stock assessment models**

Status: No Action

Develop spatially explicit stock assessment models, where appropriate. High priority species for spatially explicit models include: snow crab, walleye pollock, Pacific cod, sablefish, yellowfin sole, rock sole, arrowtooth flounder, Pacific ocean perch, black spotted rockfish, rougheye rockfishand Atka mackerel. (partially underway for some species)

GPT, CPT

165 **Genetic studies to understand the rate of larval exchange between scallop beds.**

Status: No Action

Genetic studies to provide information on sources and sinks for scallop larvae are needed to improve our understanding of the rate of larval exchange between scallop beds.

SPT

166 **Age-structured models for scallop assessment are needed.**

Status: No Action

Also needed are age-structured models for scallop assessment.

SPT

Fishery Management

167 **Refine methods to incorporate uncertainty into harvest strategies for groundfish**

Status: No Action

Refine methods to incorporate uncertainty into harvest strategies for groundfish for ACL estimation. Continue existing management strategy evaluations at the stock level. (underway)

GPT

168 **Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change**

Status: No Action

Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort, in response to management actions (e.g., time/area closures, marine reserves, PSC and other bycatch restrictions, co-ops, IFQs).

GPT

169	**Develop a framework for collection of economic information**
	Status: No Action
	Develop a framework for collection of economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.
	GPT
170	**Continue to evaluate the economic effects from crab rationalization programs on coastal communities.**
	Status: No Action
	Continue to evaluate the economic effects from crab rationalization programs on coastal communities. This includes understanding economic impacts (both direct and indirect) and how the impacts are distributed among communities and economic sectors.
	CPT
171	**Improve estimation of fishery interactions with marine mammals, seabirds, non-target groundfish, and protected species.**
	Status: No Action
	Improve estimation of fishery interactions (including catch) with marine mammals (e.g., state managed gillnet fisheries), seabirds, and non-target groundfish (e.g., sharks, skates), and protected species.
	GPT
172	**Conduct studies documenting the subsistence harvest (patterns, norms, quantities) in communities affected by Council actions.**
	Status: No Action
	Conduct studies documenting the subsistence harvest patterns, norms and quantities in communities that depend upon resources that may be affected by Council action.
	GPT
173	**Evaluate the effectiveness of setting ABC and OFL levels for data-poor stocks**
	Status: Partially Underway
	Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab, e.g., squid, octopus, shark, sculpins, other flatfish, other rockfish, skates, grenadier, and crab). Research is needed to refine the basis for setting gamma for Tier 4 crab stocks. (partially underway)
	GPT, CPT
174	**Examine interactions between coastal communities and commercial fisheries**
	Status: No Action
	Examine interactions between coastal communities and commercial fisheries (e.g. subsistence-commercial linkages, adaptations to changes in resource use, economic opportunities for coastal communities).
	GPT, CPT

175	**Retrospective analysis of the impact of Chinook salmon bycatch measures on the BSAI pollock fishery**

Status: No Action

Conduct retrospective analyses to assess the impact of Chinook salmon bycatch measures on the BSAI pollock fishery. Analyses should include an evaluation of the magnitude and distribution of economic effects of salmon avoidance measures for the Bering Sea pollock fishery. In this case, it is important to understand how pollock harvesters have adapted their behavior to avoid bycatch of Chinook and "other" salmon, under various economic and environmental conditions and incentive mechanisms.

GPT

176	**Develop forecasting tools evaluating climate and market demands.**

Status: No Action

Develop forecasting tools that incorporate ecosystem indicators into single or multispecies stock assessments, to conduct management strategy evaluations under differing assumptions regarding climate and market demands. Standardization of "future scenarios" will help to promote comparability of model outputs.

GPT, CPT

177	**Develop an ongoing database of product inventories**

Status: No Action

Development of an ongoing database of product inventories (and trade volume and prices) for principal shellfish, groundfish, Pacific halibut, and salmon harvested by U.S. fisheries in the North Pacific and eastern Bering Sea.

GPT, CPT

178	**Analyze current determinants of demand for principal seafood products**

Status: No Action

Analyze current determinants of ex vessel, wholesale, international, and retail demand for principal seafood products from the GOA and BSAI.

GPT, CPT

179	**Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with dedicated access privileges**

Status: No Action

Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with changes in management regimes (e.g., changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation) as a consequence of the introduction of dedicated access privileges in the halibut/sablefish, AFA pollock, and crab fisheries. "Benefits and costs" include both economic and social dimensions.

GPT, CPT

180	**Conduct prospective analyses of the robustness and resilience of alternative management strategies under varying environmental and ecological conditions.**

Status: No Action

Conduct prospective analyses of the robustness and resilience of alternative management strategies under varying environmental and ecological conditions.

GPT, CPT

Protected Species

181   Economic, social, and cultural valuation research on protected species
Status: No Action

Economic, social, and cultural valuation research on protected species (i.e., non-market consumptive use, passive use, non-consumptive use), particularly in the Arctic.

GPT

182   Foraging ecology and vital rate studies of Steller sea lions
Status: No Action

Foraging ecology and vital rate studies of Steller sea lions in the Gulf of Alaska, Russian Far East, and Commander Islands , including at-sea tracking of older animals, and diet composition of sea lions throughout the region. Emphasis should be placed on the use of methods that allow population abundance estimates to be directly compared between Russia and Alaska.

GPT

183   Fishery-induced impacts on northern fur seals
Status: No Action

Linkages between fishery-induced disturbance or local prey depletion for northern fur seals in the Pribilof Islands region. (underway)

GPT

184   Gear modifications and fishing practices to reduce bycatch
Status: Partially Underway

Gear modifications and fishing practices to reduce bycatch, particularly of PSC species (e.g., salmon and crab). (partly underway)

GPT

185   Studies of sperm whale depredation of catch in long-line fisheries and surveys
Status: Underway

Studies of sperm whale depredation of catch in long-line fisheries and surveys to improve the quality of long-line abundance estimates. (underway)

GPT

186   Monitor interactions between fishing fleet and protected seabirds
Status: No Action

Monitor interactions between fishing fleet and protected seabirds, particularly in Aleutian Islands and the eastern Bering Sea shelf edge where albatross have increased.

GPT

187   Assess the potential for increased interactions between protected species and fishing efforts in essential habitats
Status: No Action

Assess the potential for increased interactions between protected species (ie, large whales and post-breeding/migrating seabirds) and fishing efforts in essential habitats, in particular throughout migratory routes, and with respect to changes in fish stock distribution and/or expansion into Arctic waters.

GPT

Bycatch Issues

188   **Evaluate interaction among Council bycatch reduction initiatives**

Status: No Action

There is a need to analyze the effects of recent Council actions on bycatch, including interaction among bycatch reduction initiatives (e.g., halibut, salmon),

GPT

189   **Quantify the effects of bycatch reduction of PSC species in groundfish fisheries on target fisheries**

Status: No Action

There is a need to analyze the effects of recent Council actions on bycatch, including quantifying the effects of bycatch reduction of PSC species in groundfish fisheries to the target fisheries (e.g., charter and commercial halibut fisheries, salmon fisheries)

GPT, CPT

190   **Research approaches to create bycatch and PSC reduction incentives.**

Status: No Action

There is a need to analyze the effects of recent Council actions on bycatch, including research approaches to create bycatch and PSC reduction incentives.

GPT

Habitat Mapping

191   **Improved habitat maps**

Status: No Action

Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna, and epifauna in the GOA, BS, and Arctic. (partially underway)

GPT, CPT

192   **Develop a GIS relational database for habitat, to include a historical time series of the spatial intensity of interactions between commercial fisheries and habitat.**

Status: No Action

Develop a GIS relational database for habitat, including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat. Such time series areneeded to evaluate the impacts of changes in fishing effort and type on EFH.

GPT, CPT

193   **Assess the extent of the distribution of Primnoa corals and skate egg case concentration sites in the GOA**

Status: No Action

Assess the extent of the distribution of Primnoa corals and skate egg case concentration sites in the GOA, and conduct routine monitoring of these areas.

GPT

Function of Habitat

194 **Research the role of habitat in fish population dynamics, fish production (growth, reproduction), and ecosystem processes**

> **Status: No Action**

Research is needed on the role of habitat in fish population dynamics, fish production (growth, r reproduction), and ecosystem processes. Such research will improve the capability to identify and protect important habitats (including essential fish habitat and habitat areas of particular concern); help design effective habitat restoration efforts; improve the design and management of marine protected areas; improve fishery-independent population surveys; and improve stock assessments. Studies are needed to evaluate relationships between, and functional importance of, habitat-forming living substrates to juvenile and adult age classes of commercially important species and their preferred prey (forage fish). (partially ongoing)

> GPT, CPT

195 **Evaluate efficacy of habitat closure areas and habitat recovery**

> **Status: No Action**

Establish a scientific research and monitoring program to understand the degree to which impacts (habitat, benthic infauna, etc.) have been reduced within habitat closure areas, and to understand how benthic habitat recovery of key species is occurring. (This the objective of EFH research approach for the Council FMPs).

> GPT, CPT

Ecosystem indicator development and maintenance.

196 **Develop a multivariate index of the climate forcing of the Bering Sea shelf**

> **Status: No Action**

Climatic Indicators a.) Develop a multivariate index of the climate forcing of the Bering Sea shelf. Three biologically significant avenues for climate index predictions include advection, setup for primary production, and partitioning of habitat with oceanographic fronts and temperature preferences.

> GPT, CPT

197 **Develop bottom and water column temperature database**

> **Status: No Action**

Climatic Indicators b) Develop bottom and water column temperature database for use in EBS, GOA, and AI stock assessments.

> GPT, CPT

198 **Maintain sea ice formation and retreat index for the EBS**

> **Status: No Action**

Climatic Indicators c) Maintain sea ice formation and retreat index for the EBS.

> GPT, CPT

199 **Collect and maintain primary production time series**

> **Status: No Action**

Lower trophic level community production data a.) Collect and maintain primary production time series in the EBS, AI, GOA, and Arctic; particularly in relationship to key climate and oceanographic variables.

> GPT

200	Collect and maintain zooplankton biomass and community composition time series

Status: No Action

Lower trophic level community production data b.) Collect and maintain zooplankton biomass and community composition time series in the eastern Bering Sea. Develop, collect and maintain time series of zooplankton biomass and community composition for the GOA, AI, Arctic.

GPT

201	Collect and maintain data on forage fish community composition and abundance

Status: No Action

Lower trophic level community production data c.) Collect and maintain data on forage fish community composition and abundance in the Bering Sea, GOA, AI, Arctic.

GPT

202	Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna.

Status: No Action

Lower trophic level community production data d.) Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna.

GPT

203	Maintain indicator-based ecosystem assessment for EBS.

Status: No Action

Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. a.) Maintain indicator-based ecosystem assessment for EBS.

GPT

204	Develop indicator-based ecosystem assessments for AI (in progress), GOA, Arctic.

Status: Partially Underway

Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. b.) Develop indicator-based ecosystem assessments for AI (in progress), GOA, Arctic.

GPT

205	Develop stock-specific ecosystem indicators and incorporate into stock assessments.

Status: Partially Underway

Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. c.) Develop stock-specific ecosystem indicators and incorporate into stock assessments. (in progress)

GPT

206	Develop methodologies to monitor for new/emerging diseases among exploited species and higher trophic levels.

Status: No Action

Develop methodologies to monitor for new/emerging diseases among exploited species and higher trophic levels.

GPT

207	Assess the impact of increases in recovering whale populations on lower trophic level energy pathways.

Status: No Action

Assess the impact of increases in recovering whale populations (e.g. gray, humpback and fin) on lower trophic level energy pathways.

GPT

208	Ecosystem indicator synthesis research.

Status: No Action

Ecosystem indicator synthesis research.

GPT, CPT

209	Cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels

Status: No Action

Continue and expand cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels (seabirds and marine mammals). Updated surveys to monitor distribution and abundance of seabirds and marine mammals are needed to assess impacts of fisheries on apex predators, improve the usefulness of apex predators as ecosystem indicators, and to improve ecosystem management.

GPT

210	Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations.

Status: No Action

Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations.

GPT

211	Assess the relative importance of non-commercially exploited species to human communities

Status: No Action

Assess the relative importance of non-commercially exploited species (invertebrates, fish, marine mammals and seabirds) to human communities, particularly in Arctic.

GPT

Environmental Influences on Ecosystem Processes

212	Maintain moorings.

Status: No Action

Climate variability: monitor and understand how changes in ocean conditions influence managed species. a) Maintain moorings. Development and maintenance of indices of the timing and extent of the spring bloom is a high priority. For this, maintenance of moorings, especially M-2, is essential. (underway)

GPT, CPT

213 **Monitor seasonal sea ice extent and thickness**

    Status: No Action

Climate variability: monitor and understand how changes in ocean conditions influence managed species. b) Monitor seasonal sea ice extent and thickness: If recent changes in ice cover and temperatures in the Bering Sea persist, these may have profound effects on marine communities.

    GPT, CPT

214 **Measure and monitor fish composition**

    Status: No Action

Climate variability: monitor and understand how changes in ocean conditions influence managed species. c) Measure and monitor fish composition: Evaluate existing data sets (bottom trawl surveys, acoustic trawl surveys, and BASIS surveys) to quantify changes in relative species composition of commercial and non-commercial species, identify and map assemblages, and monitor changes in the distribution of individual species and assemblages. Additional monitoring may be necessary in the Aleutian Islands, northern Bering Sea, and areas of the Gulf of Alaska.

    GPT, CPT

215 **Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.**

    Status: No Action

Climate variability: monitor and understand how changes in ocean conditions influence managed species. d) Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.

    GPT, CPT

216 **Collect and maintain time series of ocean pH**

    Status: No Action

Improve understanding of ocean acidification and its effects on managed species. a) Collect and maintain time series of ocean pH in the major water masses off Alaska. (partially underway)

    GPT, CPT

217 **Assess whether changes in pH would affect managed species, upper level predators, and lower trophic levels.**

    Status: No Action

Improve understanding of ocean acidification and its effects on managed species. b) Assess whether changes in pH would affect managed species, upper level predators, and lower trophic levels. (partially underway for some species)

    GPT, CPT

218 **Assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species.**

    Status: No Action

Species' responses to multiple environmental stressors. a) Laboratory studies are needed to assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species.

    GPT, CPT

219 **Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates.**

Status: No Action

Species' responses to multiple environmental stressors. b) Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates.

GPT, CPT

Basic research on trophic interactions

220 **Collect, analyze, and monitor diet information**

Status: No Action

Collect, analyze, and monitor diet information (species, biomass, energetics), from seasons in addition to summer, to assess spatial and temporal changes in predator-prey interactions, including marine mammals and seabirds. The diet information should be collected on the appropriate spatial scales for key predators and prey to determine how food webs may be changing in response to shifts in the range of crab and groundfish.

GPT, CPT

221 **Ecosystem structure studies**

Status: No Action

Ecosystem structure studies: Studies are needed on the implications of food web interactions of global warming, ocean acidification, and selective fishing. For instance, studies are needed to evaluate differential exploitation of some components of the ecosystem (e.g., Pacific cod, pollock, and crab) relative to others (e.g., arrowtooth flounder).

GPT, CPT

222 **Evaluate how whale increases in abundance have the potential to alter lower trophic level energy pathways**

Status: No Action

In the last decade, many whale populations (e.g., gray, humpback and fin) have increased dramatically after being depleted by whaling. These increases in abundance have the potential to alter lower trophic level energy pathways in the region. In addition, we should investigate potential impacts to other upper trophic level groups (ie, pinnipeds, seabirds, large predatory fish).

GPT

Ecosystem Modeling

223 **Modeling studies of ecosystem productivity**

Status: No Action

Modeling studies of ecosystem productivity in different regions (EBS, GOA and AI).

GPT

ID	PT assignment	Related Council Action	Species, Fisheries, Issues Affected												Status of research			Staff Comments on 2012 list
Res_ID	Assigned to Plan Team	Related_Council_Action	Groundfish_Flag	Crab_Flag	Scallop_Flag	Salmon_Flag	Halibut_Flag	Arctic_Flag	Habitat_Flag	Econ/Social_Flag	Bycatch_Flag	Protected_Spec_Flag	Ecosystem/Environm	Management_Flag	Year added	Status	Comment	Staff comment
101	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
102	CPT	Crab bycatch, Rebuilding plans	N	Y	N	N	N	N	N	N	Y	N	N	Y	(2012)	Partially Underway		
103	GPT, CPT, SPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	Y	(2012)	No Action		
104	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
105	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	Partially Underway		
106	SPT		N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action		
107	CPT		N	Y	N	N	N	N	N	N	Y	N	N	N	(2012)	Partially Underway		
108	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	Partially Underway		
109	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	Partially Underway		
110	GPT, CPT	General, harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	Underway		Vague
111	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
112	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action		
113	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	Underway		
114	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
115	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
116	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
117	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	Underway		
118	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action		
119	GPT	Salmon bycatch	Y	N	N	Y	N	N	N	Y	Y	N	N	N	(2012)	No Action		consider splitting?
120	GPT	Salmon bycatch	N	N	N	Y	N	N	N	Y	N	N	N	N	(2012)	Partially Underway		consider splitting?
121	GPT	Halibut allocations	N	N	N	N	Y	N	N	Y	N	N	N	N	(2012)	Underway		
122	GPT	Observer program, harvest specifications, bycatch	Y	N	N	N	Y	N	N	Y	N	N	N	Y	(2012)	No Action		
123	GPT	Harvest specifications	Y	N	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action		
124	GPT	Halibut allocations	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	(2012)	Partially Underway		
125	GPT, CPT	General, harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action		
126	GPT	Steller sea lion protection	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action		

ID	PT assignment	Related Council Action	Species, Fisheries, Issues Affected												Status of research		Staff Comments on 2012 list
127	GPT	Steller sea lion protection	N	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
128	GPT	Steller sea lion protection	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
129	GPT	Steller sea lion protection	N	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
130	GPT	Steller sea lion protection	N	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
131	GPT	Other mammal/seabird interactions	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	Partially Underway	
132	GPT	Other mammal/seabird interactions	Y	N	N	N	N	N	N	N	Y	Y	N	N	(2012)	No Action	split?
133	GPT	Other mammal/seabird interactions	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
134	GPT, CPT	Habitat issues	Y	Y	N	N	Y	N	Y	N	N	N	N	N	(2012)	Partially Underway	
135	GPT	Arctic FMP	Y	Y	N	N	N	Y	N	N	N	N	N	N	(2012)	No Action	
136	GPT, CPT	Crab bycatch, habitat issues	Y	Y	N	N	N	N	Y	N	Y	N	N	N	(2012)	Partially Underway	
137	GPT	Habitat issues, other mammal/seabird interactions	Y	N	N	N	N	N	Y	N	N	Y	N	N	(2012)	No Action	
138	GPT, CPT	General, harvest specifications	Y	Y	N	Y	N	N	N	N	N	N	Y	N	(2012)	Underway	
139	GPT, CPT	General, harvest specifications	Y	Y	N	N	N	Y	N	Y	N	N	N	N	(2012)	Partially Underway	
140	GPT, CPT	General, harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
141	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
142	GPT	Harvest specifications	Y	N	N	Y	N	N	N	N	N	N	Y	N	(2012)	No Action	
143	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
144	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
145	GPT	Habitat issues	Y	N	N	N	N	N	Y	N	N	N	N	N	(2012)	No Action	reword, strike (b)
146	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
147	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
148	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
149	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
150	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
151	GPT, CPT, SPT	Harvest specifications	Y	Y	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	duplicative with Res_ID 111 (old I.A.1.)

ID	PT assignment	Related Council Action	Species, Fisheries, Issues Affected												Status of research		Staff Comments on 2012 list
152	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
153	SPT	Harvest specifications	N	Y	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
154	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
155	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
156	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
157	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
158	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	Partially Underway	
159	CPT	Harvest specifications	N	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
160	GPT, CPT, SPT	Harvest specifications	Y	Y	Y	N	N	N	N	N	N	N	Y	N	(2012)	No Action	very general; split
161	GPT, CPT, SPT	Harvest specifications	Y	Y	Y	N	N	N	N	N	N	N	Y	N	(2012)	No Action	very general; split from I.C.5.
162	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	Partially Underway	
163	GPT, CPT, SPT	Harvest specifications	Y	Y	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
164	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
165	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
166	SPT	Harvest specifications	N	N	Y	N	N	N	N	N	N	N	N	N	(2012)	No Action	
167	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	N	N	(2012)	No Action	
168	GPT	Impacts analysis	Y	Y	N	Y	Y	N	N	Y	Y	N	N	N	(2012)	No Action	similar theme as ongoing I.D.8
169	GPT	Economic impacts	N	N	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action	
170	CPT	Economic impacts	N	Y	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action	related to ongoing I.D.8
171	GPT	Impacts analysis	Y	Y	N	N	N	N	N	N	Y	Y	N	N	(2012)	No Action	very generic
172	GPT	Bycatch reduction, subsistence analyses	N	N	N	Y	Y	N	N	Y	Y	Y	N	N	(2012)	No Action	
173	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	N	N	(2012)	Partially Underway	
174	GPT, CPT	Community impacts analysis	N	N	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action	(think combining these was an accident)
175	GPT	Salmon bycatch	Y	N	N	N	N	N	N	Y	Y	N	N	N	(2012)	No Action	related to Immediate I.C.1
176	GPT, CPT	Harvest specifications, impacts analysis	Y	Y	N	N	N	N	N	Y	N	N	Y	N	(2012)	No Action	
177	GPT, CPT	Economic impacts	Y	Y	N	Y	Y	N	N	Y	N	N	N	N	(2012)	No Action	
178	GPT, CPT	Economic impacts	N	N	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action	
179	GPT, CPT	Economic impacts	Y	Y	N	N	N	N	N	Y	N	N	N	N	(2012)	No Action	
180	GPT, CPT	Harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	related to Ongoing I.D.5, I.C.5, I.D.1

ID	PT assignment	Related Council Action	Species, Fisheries, Issues Affected													Status of research		Staff Comments on 2012 list
181	GPT	Impacts analysis	N	N	N	N	N	Y	N	Y	N	N	N	N	(2012)	No Action	
182	GPT	Steller sea lion protection	N	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	related to immediate II.A.2
183	GPT	Marine mammal impacts	Y	Y	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
184	GPT	Bycatch reduction	Y	Y	N	Y	N	N	N	N	Y	N	N	N	(2012)	Partially Underway	
185	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	Underway	
186	GPT	Seabird impacts	Y	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	related to imm.II.A.6
187	GPT	Marine mammal impacts, seabird impacts	Y	N	N	N	N	N	Y	N	N	Y	N	N	(2012)	No Action	
188	GPT	Bycatch impacts	Y	N	N	Y	Y	N	N	Y	Y	N	N	N	(2012)	No Action	
189	GPT, CPT	Bycatch reduction	Y	N	N	Y	Y	N	N	Y	Y	N	N	N	(2012)	No Action	
190	GPT	Bycatch reduction	Y	N	N	N	N	N	N	N	Y	N	N	N	(2012)	No Action	general
191	GPT, CPT	Habitat issues	N	N	N	N	N	Y	Y	N	N	N	N	N	(2012)	No Action	
192	GPT, CPT	Habitat issues	Y	Y	N	N	N	N	Y	N	N	N	N	N	(2012)	No Action	
193	GPT	Habitat issues	N	N	N	N	N	N	Y	N	N	N	N	N	(2012)	No Action	related to ongoing I.A.4
194	GPT, CPT	Harvest specifications, habitat issues	Y	Y	N	N	N	N	Y	N	N	N	Y	N	(2012)	No Action	
195	GPT, CPT	Habitat issues	N	N	N	N	N	N	Y	N	N	N	N	Y	(2012)	No Action	
196	GPT, CPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
197	GPT, CPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
198	GPT, CPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
199	GPT	Ecosystem impacts	N	N	N	N	N	Y	N	N	N	N	Y	N	(2012)	No Action	
200	GPT	Ecosystem impacts	N	N	N	N	N	Y	N	N	N	N	Y	N	(2012)	No Action	
201	GPT	Ecosystem impacts	N	N	N	N	N	Y	N	N	N	N	Y	N	(2012)	No Action	related to ongoing I.A.12
202	GPT	Ecosystem impacts, habitat issues	N	N	N	N	N	N	Y	N	N	N	Y	N	(2012)	No Action	related to ongoing III. A. 1
203	GPT	Harvest specifications	Y	N	N	N	N	Y	N	N	N	N	Y	N	(2012)	No Action	
204	GPT	Harvest specifications	Y	N	N	N	N	Y	N	N	N	N	Y	N	(2012)	Partially Underway	suggest merging with EBS above
205	GPT	Harvest specifications	Y	N	N	N	N	N	N	N	N	N	Y	N	(2012)	Partially Underway	
206	GPT		Y	Y	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	
207	GPT	Impacts analysis	Y	N	N	N	N	N	N	N	N	Y	Y	N	(2012)	No Action	
208	GPT, CPT	Ecosystem impacts, harvest specifications	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	related to ongoing IV.A.1(a), also ongoing IV.A.3. (a,b)
209	GPT	Impacts analysis	N	N	N	N	N	N	N	N	N	Y	N	N	(2012)	No Action	related to ongoing I.A.3

ID	PT assignment	Related Council Action	Species, Fisheries, Issues Affected												Status of research		Staff Comments on 2012 list
210	GPT	Habitat issues, economic impacts	N	N	N	N	N	N	Y	Y	N	N	Y	N	(2012)	No Action	related to ongoing II.A.1
211	GPT	Economic impacts	N	N	N	N	N	Y	N	Y	N	N	Y	N	(2012)	No Action	related to ongoing II.A.1
212	GPT, CPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	related to immediate I.B.12
213	GPT, CPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
214	GPT, CPT	Ecosystem impacts, harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	Y	(2012)	No Action	
215	GPT, CPT	Ecosystem impacts, harvest specifications	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	related to imm I. B.5
216	GPT, CPT	Ecosystem impacts	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
217	GPT, CPT	Ecosystem impacts	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
218	GPT, CPT	Ecosystem impacts	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
219	GPT, CPT	Ecosystem impacts	Y	Y	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
220	GPT, CPT	Ecosystem impacts	Y	Y	N	N	N	N	N	N	N	Y	Y	N	(2012)	No Action	
221	GPT, CPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	
222	GPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	Y	Y	N	(2012)	No Action	same as ongoing IV.A.5
223	GPT	Ecosystem impacts	N	N	N	N	N	N	N	N	N	N	Y	N	(2012)	No Action	

Minutes of the Joint Plan Teams for the Groundfish Fisheries of the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI)

March 26, 2013
North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

BSAI Team		GOA Team	
Mike Sigler	AFSC (BSAI co-chair)	Jim Ianelli	AFSC REFM (GOA co-chair)
Grant Thompson	AFSC REFM (BSAI co-chair)	Diana Stram	NPFMC (GOA co-chair)
Kerim Aydin	AFSC REFM	Sandra Lowe	AFSC REFM
Lowell Fritz	AFSC NMML	Chris Lunsford	AFSC ABL
Chris Siddon	ADF&G	Jon Heifetz	AFSC ABL
Alan Haynie	AFSC REFM	Mike Dalton	AFSC REFM
Jane DiCosimo	NPFMC (Coordinator)	Kristen Green	ADF&G
Bill Clark	IPHC (retired)	Tom Pearson	NMFS AKRO
Brenda Norcross	UAF	Mark Stichert	ADF&G
Mary Furuness	NMFS AKRO	Paul Spencer	AFSC REFM
David Barnard	ADF&G	Nancy Friday	AFSC NMML
Leslie Slater	USFWS	Leslie Slater	USFWS
Dana Hanselman	AFSC ABL	Craig Faunce	AFSC FMA
Vacant	WDFW	Ian Stewart	IPHC
		Elisa Russ	ADF&G
		Vacant	WDFW

Introduction

The joint meeting of the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI) Groundfish Plan Teams convened Tuesday, March 26, 2013 at 1:00 pm (ADT) via webex. Team members who attended all or part of the meeting are noted above in **bold**. Others in attendance included Diana Evans from NPFMC.

Agenda

The Joint Groundfish Plan Teams convened to adopt recommendations to revise groundfish (and halibut) research priorities. Jim Ianelli chaired the meeting on behalf of both teams.

In response to a SSC request in June 2012, Council and AKFIN staff (Diana Stram, Diana Evans, and Mike Fey) developed a new approach that has been endorsed by the Plan Teams, Advisory Panel, SSC, and Council. This new process allows for evaluation of an organized list of research priorities using a relational database; the proposed research includes information on the question or data need to be resolved, whether the priority is an immediate concern or an ongoing need, relative rank (high, medium, low), impact on decision making, and species or fishery affected. The SSC is scheduled to consider the Teams' recommendations during the April 2013 meeting, as it develops its recommendations for Council consideration of research priorities for 2013 through 2017.

Plan Team members were organized into 7 groups based upon categories of research prior to the meeting in order to facilitate the review by the Joint Teams. The categories are listed below. Each group provided

draft revisions to the existing priorities and proposed prioritization. The meeting then consisted of a summary of draft revisions, by individual group, followed by comments and recommended changes by additional PT members on proposed revisions and prioritization.

Group	Category description
1	Fish and Fisheries Monitoring
2	Stock Assessment
3	Fishery Management
	Bycatch issues
4	Protected Species
5	Habitat mapping
	Function of Habitat
	Evaluate Habitats of Particular Concern
	Baseline Habitat Assessment
	Fishing Effects on Habitat
6	Ecosystem indicator development and maintenance
	Environmental influences on Ecosystem Processes
7	Basic research on trophic interactions
	Ecosystem modeling

Overall summary and discussion of process

While the Teams evaluated over 100 items and prioritized them *within* categories, time was insufficient to complete a comparison of rankings *across* categories. Highest priorities items across categories will be extracted for review and discussion at the April SSC meeting. The Teams noted some ambiguity in using "immediate needs" versus "ongoing needs" as categories. It was noted that these classifiers would likely disappear after prioritization (since some immediate needs are also ongoing).

The Teams summarized some issues to be considered by the SSC and Council:

1. Some clarification on the relationship between SSC (and Plan Team) stock-specific requests to authors and these research priorities would be useful. For example, whether SSC requests for individual SAFE chapters should appear in the list of research priorities?
2. When a priority is deemed to be sufficiently well underway, what would be the process for removing it from the list?
3. Prioritization: the Teams were unable to compare the final priorities over all categories during the meeting (time ran short). Had the Teams been able to compare over all categories it is likely that some of the rankings would have changed. Guidance on the process for evaluating the relative rankings would be welcome; in particular, how best to relate and align the Council's management priorities to research priorities.
4. Some priorities cross categories and it was noted that this would be easily dealt with given that a database has been designed and developed.
5. The Teams were unsure when to categorize things as "*partially* underway" versus "underway."
6. Halibut issues could be put into a separate category.

Halibut research priorities

The Teams noted that the SSC requested that the Groundfish Plan Teams provide research priority recommendations based on research recommendations that were compiled during the 2012 Halibut Bycatch Workshop, as part of its groundfish recommendations. A joint Plan Team halibut subgroup was tasked with developing halibut research priorities at the next opportunity.

Wrap-up and timing for report finalization

Diana Stram noted that the report must be finalized prior to the SSC meeting convening on April 1. Comments noted in the research priorities will not be provided as part of the report to the SSC but will be provided verbally in explanation should the SSC require additional information regarding the noted modifications to the existing descriptions. The final report was approved by the Chairs of the Teams.

Adjourn

The meeting adjourned at 4:30pm on March 26th, 2013.

Table of "high" priority items identified from the meeting:

ID	Category	Description
103	Fish and Fisheries Monitoring	Methods for reliable estimation of total removals
109	Stock Assessment	Age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish
117	Stock Assessment	Vertical distribution of Pacific cod
118	Stock Assessment	Pacific cod stock assessment for the Aleutian Islands
119	Fishery Management	Evaluation of salmon PSC mitigation measures
120	Fishery Management	Improve knowledge for salmon bycatch impact assessment
126	Protected Species	Localized interactions between fisheries and protected species
127	Protected Species	Age- and size-specific vital rates of Steller sea lions
128	Protected Species	Indirect effects of fisheries removals on Steller sea lions
138	Fish and Fisheries Monitoring	Continuation of State and Federal annual and biennial surveys
151	Stock Assessment	Acquire basic life history information (e.g., natural mortality, growth, size at maturity) for data-poor stocks.
163	Stock Assessment	Expanded studies to identify stock boundaries
164	Stock Assessment	Develop spatially explicit stock assessment models
167	Fishery Management	Refine methods to incorporate uncertainty into harvest strategies for groundfish
168	Fishery Management	Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change
169	Fishery Management	Develop a framework for collection of economic information
175	Fishery Management	Retrospective analysis of the impact of Chinook salmon bycatch measures on the BSAI pollock fishery
179	Fishery Management	Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with dedicated access privileges
181	Protected Species	Economic, social, and cultural valuation research on protected species
182	Protected Species	Foraging ecology and vital rate studies of Steller sea lions
184	Protected Species	Gear modifications and fishing practices to reduce bycatch
191	Habitat Mapping	Improved habitat maps
194	Function of Habitat	Research the role of habitat in fish population dynamics, fish production (growth, reproduction), and ecosystem processes
195	Function of Habitat	Evaluate efficacy of habitat closure areas and habitat recovery
203	Ecosystem indicator development and maintenance.	Maintain indicator-based ecosystem assessment for EBS.
204	Ecosystem indicator development and maintenance.	Develop indicator-based ecosystem assessments for AI (in progress), GOA, Arctic.
205	Ecosystem indicator development and maintenance.	Develop stock-specific ecosystem indicators and incorporate into stock assessments.
214	Environmental Influences on Ecosystem Processes	Measure and monitor fish composition
215	Environmental Influences on Ecosystem Processes	Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.
218	Environmental Influences on Ecosystem Processes	Assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species.
NEW - GPT	Bycatch Issues	Evaluate current and alternative Council PSC / bycatch reduction measures
NEW - GPT	Fish and Fisheries Monitoring	Effects of changes to the observer program

Fish and Fisheries Monitoring

~~2012~~2013 Research Priorities - Immediate Needs

Res_Title

Fish and Fisheries Monitoring

103	Methods for reliable estimation of total removals (H)

Underway

Develop methods for reliable estimation of total removals (e.g., surveys, poorly observed fisheries) to meet requirements of total removals under ACLs. Catch Accounting System now provides total removals annually. Improved reporting on some data such as subsistence catches and Pacific cod bait in crab fisheries is needed.

XXX	Effects of changes to the observer program (M) [also included in stock assessment]

Partially underway

Evaluate the effects of changes to data collection protocols that occur because of the observer restructuring. Ensure that data can be compared easily to the previous data collection methods and time series remain intact. Improved biological data collection including representative length and age samples from ~~the~~ all sectors of the fleet.

104	Improve species identification (L)

Partially underway [include in ongoing]

Improve species identification, by both processors and observers, for priority species within species complexes in catches, to meet requirements of total removals under ACLs. Methods that quantify and correct for misidentifications are desired.

~~2012~~2013 Research Priorities - Ongoing Needs

Res_Title

Fish and Fisheries Monitoring

138	Continuation of State and Federal annual and biennial surveys (H)

Underway

Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including BASIS surveys and crab pot surveys, is a critical aspect of fishery management off Alaska. It is important to give priority to these surveys, in light of recent federal budgets in which funding may not be sufficient to conduct these surveys. Loss of funding for days at sea for NOAA ships jeopardizes these programs. These surveys provide baseline distribution, abundance, and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. Although an ongoing need, these surveys are considered the highest priority research activity, contributing to assessment of commercial groundfish and crab fisheries off Alaska. Budgetary concerns have resulted in cuts to not only days at sea, which increases uncertainty, but also the deepest strata have been commonly cut, which threatens the value of trawl surveys as a synoptic ecological survey.

139   **Conduct routine subsistence use, fish, crab, and oceanographic surveys (M)**

Partially Underway

Conduct routine subsistence use, fish, crab, and oceanographic surveys of the northern Bering Sea and Arctic Ocean. These surveys will become increasingly important under ongoing warming ocean temperatures because range expansions of harvested fishery resources may occur. If range expansions or shifts occur, data will be needed to adjust standard survey time series for availability.

140   **Identification and integration of archived data (e.g., surveys) (L)**

Partially underway

Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys) should be pursued. Investigate integrating these data into stock and ecosystem assessments. Some archival acoustic data has been cataloged, and most trawl surveys have been included in databases. Some one-time research surveys remain neglected.

142   **Survey capability for forage fish (M)**

Partially underway

Develop a long-term survey capability for forage fish (partially underway). The NPRB funded GOA and Bering Sea Projects are~~is~~ currently describing the ~~spaitial~~spatial and temporal variability in the structure of forage fish communities and the effect of this variability on predators. This work should be continued and methods for long-term monitoring should be developed.

144   **Expand ~~cooperative~~research efforts to assess seasonal diets and movements of fish and shellfish (M)**

No Action

2

Continue and expand ~~cooperative~~ research efforts to supplement existing surveys to provide seasonal or species-specific information for use in improved assessment and management. The SSC places a high priority on studies that provide data to assess seasonal diets and movements of fish and shellfish, for use in studies of species interactions in spatially explicit stock assessments.

| ~~145~~ | ~~Monitor skate egg case concentration sites (L) or strike?~~[move to HAPC section as appropriate] |

~~No Action~~

~~The HAPC action for skate egg case concentration sites included two recommendations that the Council suggested should be addressed during the annual research priority discussion: (a) skate egg case concentrations should be monitored every 2 to 3 years using non-invasive research design, such as in situ observation; and (b) skate conservation and skate egg concentration areas remain a priority for EFH and HAPC management and within Council and NMFS research plans.~~

| 146 | **Improve surveys in untrawlable habitat, particularly for rockfish (M)** |

Partially underway

For groundfish in general, and rockfish in particular, continue and expand research on trawlable and untrawlable habitat to improve resource assessment surveys. For example, improved surveys, such as hydro-acoustic surveys, are needed to better assess pelagic rockfish species that are found in untrawlable habitat or are semi-pelagic species such as northern and dusky rockfish. A number of publications specific to untrawlable grounds and rockfish sampling have been published recently, but have not been incorporated directly into stock assessment our routine survey designs.

| 147 | **Effects of the environment on survey catchability, particularly for Tanner crab and Aleutian Islands golden king crab (M)** |

Partially underway

Studies are needed to evaluate effects of the environment on survey catchability. For groundfish and crabs, studies are needed on catchability, as it directly bears on estimates of the stock size for setting of catch quotas. Research to refine the estimates of survey catchability, q, used to infer absolute, rather than relative, abundance would substantially improve the quality of management advice. Particular emphasis should be placed on Tanner crab because of recent trends in stock status and on fishery and fishing gear selectivity for Aleutian Island golden king crab to improve the stock assessment model. Empirical estimates of catchability have been estimated for some groundfish species, including rockfish, Pacific cod, and flatfish.

| ~~148~~ | ~~Research on survey analysis techniques for species that exhibit patchy distributions (L) or strike~~ |

3

No ActionUnderway

~~Continue research on the design and implementation of appropriate survey analysis techniques, to aid the Council in assessing species (e.g., some crabs and rockfish) that exhibit patchy distributions and, thus, may not be adequately represented (either over- or under-estimated) in the annual or biennial groundfish surveys. A number of publications have examined survey designs for patch distributions, specifically with respect to rockfish. No changes have been incorporated directly into routine surveys.~~

XXX

150   **Collect maturity scans during fisheries that target spawning fish (M)**

Underway[reword to improving maturity estimates]

Expand existing efforts to collect maturity scans during fisheries that target spawning fish (e.g., pollock). Time series of maturity at age should be collected to facilitate the assessment of the effects of density-dependence and environmental conditions on maturity. Maturity information for rockfish species near Kodiak has been collected recently both during the fishery and dedicated scientific cruises. A dedicated survey to examine spawning sablefish was also conducted. Continued efforts to collect maturity for rockfish and other species should continue

Stock Assessment

~~2012~~2013 Research Priorities - Immediate Needs

Res_Title

Stock Assessment

108	**Tagging studies of Aleutian Islands Pacific cod and Atka mackerel (M)**

Partially Underway

Tagging studies of Aleutian Islands Pacific cod and Atka mackerel are needed to create models of short-term movement of fish relative to critical habitat (tagging for Atka mackerel partly underway).

109	**Age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish (H)**

Partially Underway

Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. Conventional tagging studies of young of the year and/or one-year old Pacific cod would be useful in this regard (partially underway for cod and dogfish).

110	**Maintain the core <u>biological and oceanographic</u> data ~~from the eastern Bering Sea~~ (e.g. ~~biophysical~~moorings, stomach data, zooplankton, age 0 surveys) (M)<u> [Move to ongoing]</u>**

Underway

Maintain the core data ~~from the eastern Bering Sea~~ needed to support ~~a diverse suite of models used to support the~~ integrated ecosystem assessment ~~programs~~<u>s for the Bering Sea</u>. Core data include inputs for single- or multi-species management strategy evaluations, food web, and coupled biophysical end-to-end ecosystem models (e.g. biophysical moorings, stomach data, zooplankton, age 0 surveys).

111	**Biomass indices and alternate methodologies for lowest tier species (M)**

Underway

Develop biomass indices for lowest tier species (Tier 5 for crab, Tier 6 for groundfish), such as sharks<u> and octopus.</u>~~, and conduct net efficiency studies for spiny dogfish.~~ Explore alternative methodologies for Tier 5 and 6 stocks such as length-based methods<u>, catchability experiments (e.g., net selectivity),</u> or biomass dynamics models.

113	**Research on ~~spawner~~<u>stock</u>-recruit relationship (L)**

Underway

New information and data are needed that would inform our understanding of the ~~spawner~~ stock-recruit relationship for groundfish and crab with sufficient skill to project year-class strength (e.g., Tanner crab, GOA pollock, sablefish, ~~halibut~~). ~~(Underway)~~

114	**Stock structure and potential spatial management for BSAI pollock (M)**

Underway

Conduct studies to determine stock structure and potential spatial management for BSAI pollock (e.g., movement). Evaluate interactions with Russian waters.

115	**District-wide survey for demersal shelf rockfish in Southeast Alaska (M)**

No Action

Conduct a district-wide survey for demersal shelf rockfish in Southeast Alaska in a single assessment year to help inform density estimates in specific subdistricts in other assessment years.

117	**Vertical distribution of Pacific cod (H)**

Underway

Research is needed on the vertical distribution of Pacific cod relative to the EBS bottom trawl and comparisons between the EBS and GOA trawl gear..

118	**Pacific cod stock assessment for the Aleutian Islands (H)**

Underway

Develop Pacific cod stock assessment for the Aleutian Islands region.

XXX	**Effects of changes to the observer program (M)**

No Action [also appears in Subgroup 1 priorities]

Evaluate the effects of changes to data collection protocols that occur because of ~~the~~ observer restructuring. Ensure that data can be compared easily to the previous data collection methods and time series remain intact.

~~2012~~2013 Research Priorities - Ongoing Needs

	Res_Title
Stock Assessment	
151	Acquire basic life history information (e.g., natural mortality, growth, size at maturity) for ~~data-poor and data-moderate~~ lower information stocks. (H)

Underway

Acquire basic life history information needed for stock assessment and bycatch management of data-poor stocks, such as scallops, sharks, skates, sculpins, octopus, grenadiers, squid, and blue king crab (Bering Sea), golden king crabs (Aleutian Islands), and red king crab (Norton Sound). Specifically, information is needed on natural mortality, growth, size at maturity, and other basic indicators of stock production/productivity).

152   ~~Acquire estimates of mortality and abundance for octopus~~ (M)

~~No Action~~[see 151]

~~For octopus, there is particular need for estimates of mortality and abundance, including verification of the cod consumption-based approach.~~

156   **Improve estimates of natural mortality (M) for Pacific cod and crab stocks. (M)**

Partially underway

Improve estimates of natural mortality (M) for several stocks, including Pacific cod and BSAI crab stocks.

158   ~~Validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. (H for cod, L for others)~~

[see immediate needs]

~~Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. (partially underway for Pacific cod and spiny dogfish)~~

160   **Develop and evaluate ~~standard~~ GCM climate variability scenarios on recruitment and growth (M)**

Underway

Quantify the effects of historical climate variability and climate change on recruitment and growth, and develop standard environmental scenarios (e.g., from global climate change models (GCMs) for present and future variability based on observed patterns.

161   **Climate information covering a wider range of seasons is needed. (L)**

No Action [cloudy, needs clarification]

There is also a ~~clear~~ need for climate information that covers a wider range of seasons than is presently available.

162   **Development of projection models to evaluate (a) the performance of different management strategies and (b) to forecast seasonal and climate related population shifts (M)**

Underway

There is a need for the development of projection models to evaluate the performance of different management strategies relative to the Council's goals for ecosystem approaches to management. Projection models are also needed to forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish.

163	**Expanded studies to identify stock and management boundaries (H)**

Underway

To identify stock boundaries, expanded studies are needed in the areas of genetics, mark-recapture, reproductive biology, larval distribution, and advection. Such boundaries are to be evaluated so that consequences of management and risks are clear.

164	**Develop spatially explicit stock assessment models (H)**

Partially underway for some species, No Action on others

Develop spatially explicit stock assessment models, where appropriate. High priority species for spatially explicit models include: snow crab, walleye pollock, Pacific cod, sablefish, yellowfin sole, rock sole, arrowtooth flounder, Pacific ocean perch, black-spotted rockfish, rougheye rockfish and Atka mackerel.

Fishery Management

~~2012~~2013 Research Priorities - Immediate Needs

Res_Title

Fishery Management

119	**Evaluation of salmon PSC mitigation measures**

Underway (H)

Develop a research program that will facilitate evaluation of salmon (both chinook and non-chinook) PSC mitigation measures in the BSAI and GOA. This includes updated estimates of the amounts reasonably necessary for subsistence, timing of runs and openings relative to subsistence requirements, and access to cost data for the commercial pollock and salmon industries so that impacts on profits (not revenues) can be calculated.

120	**Improve knowledge for salmon bycatch impact assessment**

Underway (H)

Improve the resolution of Chinook and chum salmon genetic stock identification methods (e.g., baseline development, marker development), improve precision of salmon run size estimates in western Alaska, and initiate investigations of biotic and abiotic factors influencing natural mortality rate during ocean migration in the GOA and BSAI. (baseline development is nearing completion, more work on Cook Inlet chum needed)

121	**Investigate factors affecting the guided angler sector of the halibut fishery**

Underway (M)

~~Develop improved catch monitoring methods of fishery interactions including direct and alternative options (e.g., electronic logbooks, video monitoring), particularly on smaller groundfish, halibut, and commercially guided recreational fishing vessels, including an assessment of feasibility for small vessels.~~ Continue to iInvestigate factors that affect angler demand in the guided angler sector of the halibut fishery resulting from regulatory changes or general economic conditions.~~(Underway)~~

122	**Improve methods of monitoring fishery interactions**

Underway (H)

Develop improved catch monitoring methods of fishery interactions including direct and alternative options (e.g., electronic logbooks, video monitoring), particularly on smaller groundfish, halibut, and commercially guided recreational fishing vessels, including an assessment of feasibility for small vessels.

123	**Develop bioeconomic models**

Partially Underway (M)

Develop bioeconomic models with explicit age- or size-structured population dynamics for BSAI and GOA groundfish fisheries to estimate maximum economic yield and other bioeconomic reference points under uncertainty.

| 124 | **Benefits and costs of halibut and halibut PSC utilization** |

Underway (M)

Research the benefits and costs of halibut and halibut PSC utilization in different fishing sectors. For halibut and other PSC and bycatch species, conduct research to better identify where regulations restrict the utilization of fish from its most beneficial use and evaluate how changes in existing regulations would affect different sectors and fisheries

| 125 | **Thresholds for ecosystem indicators** |

No Action (M)

Initiate/continue research on developing and evaluating thresholds for ecosystem indicators, including ecosystem-level management strategy evaluation.

~~2012~~2013 Research Priorities - Ongoing Needs

Res_Title

Fishery Management

| 167 | **Refine methods to incorporate uncertainty into harvest strategies for groundfish** |

Underway (H)

Refine P* and decision theoretic methods to incorporate uncertainty into harvest strategies for groundfish for ACL estimation. Continue existing management strategy evaluations at the stock level.

| 168 | **Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change** |

Underway (H)

Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort, in response to management actions (e.g., time/area closures, marine reserves, PSC and other bycatch restrictions, co-ops, IFQs).

| 169 | **Develop a framework for collection of economic information** |

Partially underway (H)

Develop a framework for collection of economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.

171   **Improve estimation of fishery interactions with marine mammals, seabirds, non-target groundfish, and protected species.**

No Action (L) [overlaps with protected resource priority, L for non-target, high for PR]

Improve estimation of fishery interactions (including catch) with marine mammals (e.g., state managed gillnet fisheries), seabirds, and non-target groundfish (e.g., sharks, skates), and protected species.

172   **Conduct studies documenting the subsistence harvest (patterns, norms, quantities) in communities affected by Council actions.**

No Action (L)

Conduct studies documenting the subsistence harvest patterns, norms and quantities in communities that depend upon resources that may be affected by Council action.

~~173~~   ~~Evaluate the effectiveness of setting ABC and OFL levels for data-poor stocks~~

~~Partially Underway (H)~~[covered in stock assessment]

~~Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab, e.g., squid, octopus, shark, sculpins, other flatfish, other rockfish, skates, grenadier, and crab). Research is needed to refine the basis for setting gamma for Tier 4 crab stocks. (partially underway)~~

174   **Examine interactions between coastal communities and commercial fisheries**

Underway (M)

Examine interactions between coastal communities and commercial fisheries (e.g. subsistence-commercial linkages, adaptations to changes in resource use, economic opportunities for coastal communities).

175   **Retrospective analysis of the impact of Chinook salmon bycatch measures on the BSAI pollock fishery**

Partially Underway (H)

Conduct retrospective analyses to assess the impact of Chinook salmon bycatch measures on the BSAI pollock fishery. Analyses should include an evaluation of the magnitude and distribution of economic effects of salmon avoidance measures for the Bering Sea pollock fishery. In this case, it is important to understand how pollock harvesters have adapted their behavior to avoid bycatch of Chinook and "other" salmon, under various economic and environmental conditions and incentive mechanisms.

176   **Develop stock forecasting tools ~~evaluating~~that incorporate changing climate and market ~~demands~~conditions.**

Partially Underway (M)

Develop forecasting tools that incorporate ecosystem indicators into single or multispecies stock assessments, to conduct management strategy evaluations under differing assumptions regarding climate and market demands. Promote the sStandardization of "future scenarios" from different models to will help to promote comparability of model outputs.

| 177 | **Develop an ongoing database of product inventories** |

No Action (L)

Development of an ongoing database of product inventories (and trade volume and prices) for principal shellfish, groundfish, Pacific halibut, and salmon harvested by U.S. fisheries in the North Pacific and eastern Bering Sea.

| 178 | **Analyze current determinants of demand for principal seafood products** |

Underway (L)

Analyze current determinants of ex vessel, wholesale, international, and retail demand for principal seafood products from the GOA and BSAI.

| 179 | **Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with dedicated access privileges** |

Underway (H)

Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with changes in management regimes (e.g., changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation) as a consequence of the introduction of dedicated access privileges in the halibut/sablefish, AFA pollock, and crab fisheries. "Benefits and costs" include both economic and social dimensions.

| 180 | **Conduct prospective analyses of the robustness and resilience of alternative management strategies under varying environmental and ecological conditions.** |

No ActionUnderway [bsierp MSE and crab]

Conduct prospective analyses of the robustness and resilience of alternative management strategies under varying environmental and ecological conditions.

Protected Species

| 181 | Economic, social, and cultural valuation research on protected species |

No ActionPartially underway [already covered in PR]

Economic, social, and cultural valuation research on protected species (i.e., non-market consumptive use, passive use, non-consumptive use), particularly in the Arctic.

Bycatch Issues

188   ~~Evaluate interaction among Council bycatch reduction initiatives~~

             ~~No Action (H)~~

                  ~~There is a need to analyze the effects of recent Council actions on bycatch,~~
             ~~including interaction among bycatch reduction initiatives (e.g., halibut, salmon),~~

189   ~~Quantify the effects of bycatch reduction of PSC species in groundfish fisheries on~~
             ~~target fisheries~~

             ~~No Action (H)~~

                  ~~There is a need to analyze the effects of recent Council actions on bycatch,~~
             ~~including quantifying the effects of bycatch reduction of PSC species in groundfish~~
             ~~fisheries to the target fisheries (e.g., charter and commercial halibut fisheries,~~
             ~~salmon fisheries)~~

190   ~~Research approaches to create bycatch and PSC reduction incentives.~~

             ~~No Action (H)~~

                  ~~There is a need to analyze the effects of recent Council actions on bycatch,~~
             ~~including research approaches to create bycatch and PSC reduction incentives.~~

188-190   Evaluate current and alternative Council PSC / bycatch reduction measures.
             [merged from 188-190]

             Partially underway (H)

             **Analyze the effects of recent Council actions on bycatch, including the interaction
             among bycatch reduction initiatives (e.g., halibut, salmon, crab). Attention
             should be given to different incentives that have the potential to cost-effectively
             reduce PSC.**

Protected Species

Protected Species

126	~~Localized~~ Interactions between fisheries and pinnipeds (H)~~rotected species~~
	Underway

Studies of the localized interactions between fisheries and protected species, such as interactions between Steller sea lions and commercial fish species in the Central and Western Aleutian Islands (particularly areas 541, 542, 543), and northern fur seals on the eastern Bering Sea shelf are needed. These studies should be conducted at appropriate spatial and temporal scales with an emphasis on seasonal prey fields, diet, and movement of fisheries and pinnipedssea lions and their prey.

| 127 | Age- and size-specific Vvital rates of Steller sea lions (H) |

Underway

Assess age- and size-specific vital rates (i.e., reproduction and survival) of Steller sea lions in the western DPS (including Russia) and central Aleutians at sufficient frequency to track population dynamics in the western DPS.

| 128 | Indirect effects of fisheries removals on Steller sea lions (H) |

Underway

Assess possible indirect effects of fisheries removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and pup-non pup ratios of Steller sea lions in the Eastern western DPS.

| 129 | Killer whale predation of Steller sea lions (M) |

Underway

Quantify killer whale predation of Steller sea lions, particularly in the western and central Aleutian Islands.

| 130 | Methods to estimate sea lion abundance (L) |

Underway

Develop new methods to estimate sea lion abundance, such as the use of unmanned aerial vehicles, which could increase the probability of acquiring abundance estimates in remote areas.

| 131 | Impact of the displacement of the groundfish fleet on Northern fur seals |

Partially Underway (L)

Assess the impact of the displacement of the groundfish fleet due to Steller sea lions protection measures on the prey availability, foraging ecology, diet, movements, and vital rates for Northern fur seals (partially underway).

| 132 | Impact of seabird bycatch in fisheries on bird populations, and methods to reduce (M) |

Underway

Assess the extent and impact of seabird bycatch in fisheries on bird populations, and develop methods to reduce seabird bycatch, particularly protected species, such as short-tailed albatross.

| 133 | **Impacts of fishing activities on <u>endangered</u> whales (M)** |

No Action

Determine potential impacts of fishing activities on North Pacific right whales and the Eastern North Pacific blue whales in the GOA, particularly in identified critical (NPRW) or essential (NPBW) habitat.

**Protected
Species**

| 181 | **Economic, social, and cultural valuation research on protected species (H)** |

Underway

Economic, social, and cultural valuation research on protected species (i.e., non-market consumptive use, passive use, non-consumptive use), particularly in the Arctic.

| 182 | **Foraging ecology ~~and vital rate~~ studies of Steller sea lions (H)** |

Underway

Foraging ecology ~~and vital rate~~ studies of Steller sea lions in the Gulf of Alaska, <u>Aleutian Islands, and</u> Russia~~n Far East, and Commander Islands~~ , including at-sea tracking of older animals, and diet composition of sea lions throughout the region. ~~Emphasis should be placed on the use of methods that allow population abundance estimates to be directly compared between Russia and Alaska.~~

| ~~183~~ | ~~**Fishery-induced impacts on northern fur seals**~~ |

~~**No Action**~~

~~Linkages between fishery-induced disturbance or local prey depletion for northern fur seals in the Pribilof Islands region. (underway)~~

| 184 | **Gear modifications and fishing practices to reduce bycatch [cover in bycatch issues]** |

Partially Underway

Gear modifications and fishing practices to reduce bycatch, particularly of PSC species (e.g., salmon and crab). (partly underway)

| 185 | **Studies of sperm <u>and killer</u> whale depredation of catch in long-line fisheries and surveys (M)** |

Underway

Studies of sperm <u>and killer</u> whale depredation of catch in long-line fisheries and surveys to improve the quality of long-line abundance estimates.

186   ~~Monitor interactions between fishing fleet and protected seabirds~~

~~No Action~~[covered elsewhere in research priorities, need to list]

~~Monitor interactions between fishing fleet and protected seabirds, particularly in Aleutian Islands and the eastern Bering Sea shelf edge where albatross have increased.~~

187   ~~Assess the potential for increased interactions between fisheries and protected whale and seabird species and fishing efforts in essential habitats~~

[covered elsewhere in research priorities, need to list]

~~No Action~~

~~Assess the potential for increased interactions between protected species (ie, large whales and post-breeding/migrating seabirds) and fishing efforts in essential habitats, in particular throughout migratory routes, and with respect to changes in fish stock distribution and/or expansion into Arctic waters.~~

XXX

Updated sperm whale stock assessment (H)

Updated sperm whale abundance estimates are needed. Sperm whale depredation interactions with longline fisheries have increased but little is known about sperm whale populations. Updated population estimates and defined PBR's are needed to effectively respond if a take occurs in the longline fishery

Habit

~~2012~~2013 Research Priorities - Immediate Needs

Res.Title

Evaluate habitats of particular concern

134	Assess whether Bering Sea canyons are habitats of particular concern(M)

Underway

Assess whether Bering Sea canyons are habitats of particular concern, by assessing the distribution and prevalence of coral and sponge habitat, and comparing marine communities within and above the canyon areas, including mid-level and apex predators to neighboring shelf/slope ecosystems. (partially underway)

Baseline Habitat Assessment

135	Arctic assessment of current baseline conditions (L)

Partially underway

Dynamic ecosystem and environmental changes in the northern Bering Sea and Arctic are occurring. ~~on a pace not observed in recorded time. In response to the new Arctic FMP, a~~Assessment of the current baseline conditions and trophic interactions is ~~imperative~~important. This effort, ~~while of great scientific importance,~~ should not supplant the regular surveys in the BSAI and GOA, which are of critical importance to science and management.

Fishing Effects on Habitat

136	**Effects of trawling on female red king crab and subsequent recruitment Crab PT not GPT**

Partially Underway[came from EFH review]

Research is needed on the effects of trawling on the distribution of breeding and ovigerous female red king crab and subsequent recruitment. Relevant studies include effects of potential habitat modifications on the distribution of females, particularly in nearshore areas of southwest Bristol Bay (partially underway), and environmental effects (e.g., trawling overlap in warm vs. cold years). Retrospective studies, the use of pop-up tags to identify larval release locations, and larval advection using Regional Ocean Modeling System would help address this need.

137	**Impact of bottom trawl fisheries on benthic habitat (M)**

Underway

Impact of bottom trawl fisheries on invertebrate abundance and species composition in benthic habitats, especially as might be relevant to the foraging ecology of walrus (candidate species for listing under ESA), but also bearded seals (ESA determination due in July), and gray whales.

~~2012~~2013 Research Priorities - Ongoing Needs

Res. Title

Habitat Mapping

191	Improved habitat maps (H)

Underway

Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna, and epifauna in the GOA, -BS, and Aleutian Islands ~~and Arctic. (partially underway)~~

192	Develop a GIS relational database for habitat, to include a historical time series of the spatial intensity of interactions between commercial fisheries and habitat. (M)

Underway

Develop a GIS relational database for habitat, including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat. Such time series are needed to evaluate the impacts of changes in fishing effort and type on EFH.

193	Assess the extent of the distribution of Primnoa corals and skate egg case concentration sites in the GOA (L)

~~No Action~~Underway

Assess the extent of the distribution of Primnoa corals and skate egg case concentration sites in the GOA, and conduct routine monitoring of these areas.

Function of Habitat

194	Research the role of habitat in fish population dynamics, fish production (growth, reproduction), and ecosystem processes (H)

Partially underway

Research is needed on the role of habitat in fish population dynamics, fish production, and ecosystem processes. Specifically, studies are needed to evaluate how habitat-forming species (e.g. corals) influence life history parameters (e.g., mortality, growth, movement) of FMP species and their preferred prey. Such research will identify key habitats (including essential fish habitat and habitat areas of particular concern), improve the design and management of marine protected areas, and ultimately improve stock assessments and restoration efforts.~~Research is needed on the role of habitat in fish population dynamics, fish production (growth, r reproduction), and ecosystem processes. Such research will improve the capability to identify and protect important habitats (including essential fish habitat and habitat areas of particular concern); help design effective habitat restoration~~

~~efforts; improve the design and management of marine protected areas; improve fishery-independent population surveys; and improve stock assessments. Studies are needed to evaluate relationships between, and functional importance of, habitat-forming living substrates to juvenile and adult life stages~~age classes of commercially ~~FMP~~important species and their preferred prey (forage fish). (partially ~~ongoing~~

195	Evaluate efficacy of habitat closure areas and habitat recovery (H)

~~No Action~~Partially underway

Establish a scientific research and monitoring program to understand the degree to which impacts on (habitat, benthic infauna, etc.) have been reduced within habitat closure areas, and to understand how benthic habitat recovery of key species is occurring. (This is the an objective of EFH research approach for the Council FMPs).

Ecosystem indicator development and maintenance
~~2012~~2013 Research Priorities - Immediate Needs

Res_Title

~~2012~~2013 Research Priorities - Ongoing Needs

Res_Title

Ecosystem indicator development and maintenance.

196	Develop a multivariate index of the climate forcing of the Bering Sea shelf (M)

Partially Underway

~~Climatic Indicators a.)~~ Develop a multivariate index of the climate forcing of the Bering Sea shelf. Three biologically significant avenues for climate index predictions include advection, setup for primary production, and partitioning of habitat with oceanographic fronts and temperature preferences.

197	Develop bottom and water column temperature database (M)

Partially Underway

~~Climatic Indicators b)~~ Develop bottom and water column temperature database for use in EBS, GOA, and AI stock assessments.

198	Maintain sea ice formation and retreat index for the EBS (M)

Underway

~~Climatic Indicators c)~~ Maintain sea ice formation and retreat index for the EBS.

| 199 | **Collect and maintain primary production time series (M)** |

No Action

~~Lower trophic level community production data a.)~~ Collect and maintain primary production time series in the EBS, AI, GOA, and Arctic; particularly in relationship to key climate and oceanographic variables.

| 200 | **Collect and maintain zooplankton biomass and community composition time series (M)** |

Partially Underway

~~Lower trophic level community production data b.)~~ Collect and maintain zooplankton biomass and community composition time series in the eastern Bering Sea. Develop, collect and maintain time series of zooplankton biomass and community composition for the GOA, AI, Arctic.

| 201 | **Collect and maintain data on forage fish community composition and abundance (M)** |

Partially Underway

~~Lower trophic level community production data c.)~~ Collect and maintain data on forage fish community composition and abundance in the Bering Sea, GOA, AI, Arctic.

| 202 | **Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna (M).** |

Partially Underway

~~Lower trophic level community production data d.)~~ Collect and maintain time-series data on the -community composition, production and biomass of benthic invertebrate and vertebrate fauna.

| 203 | **Maintain indicator-based ecosystem assessment for EBS and AI (H).** |

Underway

~~Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. a.)~~ Maintain indicator-based ecosystem assessment for EBS.

| 204 | **Develop indicator-based ecosystem assessments for ~~AI,~~ GOA, Arctic (H).** |

Underway

~~Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. b.)~~ Develop indicator-based ecosystem assessments for GOA, <u>and the</u> Arctic.

205   **Develop stock-specific ecosystem indicators and incorporate into stock assessments (H).**

           Partially Underway

           ~~Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. c.)~~ Develop stock-specific ecosystem indicators and incorporate into stock assessments. (in progress)

206   **Develop methodologies to monitor for new/emerging diseases among exploited species and higher trophic levels (L).**

           No Action

           Develop methodologies to monitor for new/emerging diseases and/or parasites among exploited species and higher trophic levels.

207   **Assess the impact of increases in recovering whale populations on lower trophic level energy pathways (M).**

           No Action

           Assess the impact of increases in recovering whale populations (e.g. gray, humpback and fin) on lower trophic level energy pathways.

208   **Ecosystem indicator synthesis research (M).**

           Partially Underway

           Ecosystem indicator synthesis research.

209   **Cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels (M)**

           Partially Underway

           Continue and expand cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels (seabirds and marine mammals). Updated surveys to monitor distribution and abundance of seabirds and marine mammals are needed to assess impacts of fisheries on apex predators, improve the usefulness of apex predators as ecosystem indicators, and to improve ecosystem management.

210   **Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations (L).**

           No Action [overlap w/ Fish Mgt group?]

           Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations.

211   **Assess the relative importance of non-commercially exploited species to human communities (M).**

              Partially Underway [commercially exploited species covered Fish Mgt]

              Assess the relative importance of non-commercially exploited species (invertebrates, fish, marine mammals and seabirds) to human communities, particularly in Arctic.

Environmental Influences on Ecosystem Processes

212   **Maintain moorings. (M)**

              Underway [overlap with Fish Monitoring]

              Maintain moorings. Development and maintenance of indices of the timing and extent of the spring bloom is a high priority. For this, maintenance of moorings, especially M-2, is essential.

213   **Monitor seasonal sea ice extent and thickness (M)**

              Underway

              Monitor seasonal sea ice extent and thickness: If recent changes in ice cover and temperatures in the Bering Sea persist, these may have profound effects on marine communities.

214   **Measure and monitor fish composition(H)**

              Underway [overlap with Fish Monitoring]

              Measure and monitor fish composition: Evaluate existing data sets (bottom trawl surveys, acoustic trawl surveys, and BASIS surveys) to quantify changes in relative species composition of commercial and non-commercial species, identify and map assemblages, and monitor changes in the distribution of individual species and assemblages. Additional monitoring may be necessary in the Aleutian Islands, northern Bering Sea, and areas of the Gulf of Alaska.

215   **Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability. (H)**

              Partially Underway [overlaps with stock assessment and fish monitoring]

              Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.

216   **Collect and maintain time series of ocean pH (M)**

              Underway

              Collect and maintain time series of ocean pH in the major water masses off Alaska.

217   **Assess whether changes in pH would affect managed species, upper level predators, and lower trophic levels. (M)**

   Partially Underway

   Assess whether changes in pH would affect managed species, upper level predators, and lower trophic levels.

218   **Assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species. (H)**

   No Action [in planning stages]

   Laboratory studies are needed to assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species.

219   **Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates. (L)**

   No Action

   Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates.

Ecosystem modeling

~~2012~~2013 Research Priorities - Immediate Needs

Res_Title

~~2012~~2013 Research Priorities - Ongoing Needs

Res_Title

Basic research on trophic interactions

220   **Collect, analyze, and monitor diet information (M)**

   Underway

   Collect, analyze, and monitor diet information (species, biomass, energetics), from seasons in addition to summer, to assess spatial and temporal changes in predator-prey interactions, including marine mammals and seabirds. The diet information should be collected on the appropriate spatial scales for key predators and prey to determine how food webs may be changing in response to shifts in the range of crab and groundfish.

221   **Ecosystem structure studies (M)**

Underway

Ecosystem structure studies: Studies are needed on the implications of food web interactions of global warming, ocean acidification, and selective fishing. For instance, studies are needed to evaluate differential exploitation of some components of the ecosystem (e.g., Pacific cod, pollock, and crab) relative to others (e.g., arrowtooth flounder).

| 222 | ~~Evaluate how increases in whale increases in abundance have the potential to alter lower trophic level energy pathways~~ [move to Group 6 replacing #] |

~~No Action~~

~~In the last decade, many whale populations (e.g., gray, humpback and fin) have increased dramatically after being depleted by whaling. These increases in abundance have the potential to alter lower trophic level energy pathways in the region. In addition, we should investigate potential impacts to other upper trophic level groups (ie.g., pinnipeds, seabirds, large predatory fish).~~

Ecosystem Modeling

| 223 | Modeling studies of ecosystem productivity (M) |

Underway

Modeling studies of ecosystem productivity in different regions (EBS, GOA and AI). For example, evaluating the appropriateness of the 2 million t OY.

~~2012~~ 2013 Research Priorities - Scallop

~~Res~~ Title

Fish and Fisheries Monitoring

~~103~~ ~~Methods for reliable estimation of total removals~~

~~**No Action**~~

~~Develop methods for reliable estimation of total removals (e.g., surveys, poorly observed fisheries) to meet requirements of total removals under ACLs.~~

141 ~~Fishery-independent surveys of scallops~~Estimate scallop stock abundance (H)

No Action

Estimate scallop stock abundance in unsurveyed areas using fishery independent methods.~~There is a need for fishery-independent surveys of scallops on major fishing grounds, e.g., Yakutat, other areas.~~

NEW Area-specific variability in population processes (H)

Investigate area-specific variability in vital population processes including growth, recruitment,

natural mortality and movement.

Stock Assessment

106 Improve ~~handling~~ discard mortality rate estimates for scallop (M)

~~No Action~~Partially underway

Field studies estimating Alaskan scallop discard mortality: relationship between capture, release

condition and survival of scallops~~Improve handling mortality rate estimates for scallops. Conduct field studies to estimate scallop discard mortality (specifically the relationship between capture, release condition, and survival of scallops). (crab studies are partially underway: Chionocetes RAMP study)~~

112 Analyses of fishery ~~CPUE~~ effort and observer data for scallop (M)

No Action

Assess impacts of temporal and spatial effort by a limited number of vessels on CPUE and observer data for management purposes.~~Owing to the lack of fishery-independent surveys for scallops, there is a need for analyses of fishery CPUE and observer data for use in assessing fishery performance and stock assessment. For instance, sharp declines in CPUE have occurred in some areas, such as Kayak Island and Alaska Peninsula, prompting concerns about local depletion. Additional new techniques may be desirable in regions with data-poor stocks.~~

151

~~No Action~~[covered in other priorities for scallop]

~~Acquire basic life history information needed for stock assessment and bycatch management of data-poor stocks, such as scallops, sharks, skates, sculpins, octopus, grenadiers, squid, and blue king crab (Bering Sea), golden king crabs (Aleutian Islands), and red king crab (Norton Sound). Specifically, information is needed on natural mortality, growth, size at maturity, and other basic indicators of stock production/productivity).~~

~~153~~ ~~Acquire information on growth, movement, and abundance of scallops and golden king crab~~

~~**No Action**~~

~~Tagging studies would provide information on growth and movement of scallops and growth and absolute abundance estimates for golden king crab.~~

154 **Conduct multivariate analysis of bycatch data from the scallop observer program (L)**

No Action

Conduct multivariate analysis of bycatch data from the scallop observer program (haul composition data) ~~to estimate abundance and trends of benthic communities on scallop beds~~and camera sled data.

NEW **Ocean Acidification: water quality (L)**

No action

Seasonal water quality monitoring in known scallop areas (Ocean Acidification)

NEW **Ocean Acidification (L)**

No action

Studies to understand the mineralization of scallop shells through life cycle and across spatial variability (Ocean Acidification)

155 ~~Conduct computerized image processing from camera sled (CamSled) data.~~

~~No Action~~

~~Conduct computerized image processing to facilitate scallop stock assessments from camera sled (CamSled) data.~~

~~160~~ ~~Develop and evaluate standard climate variability scenarios on recruitment and growth~~

~~No Action~~

~~Quantify the effects of historical climate variability and climate change on recruitment and growth, and develop standard environmental scenarios for present and future variability based on observed patterns.~~

~~161~~ ~~Climate information overing a wider range of seasons is needed.~~

~~No Action~~

~~There is also a clear need for climate information that covers a wider range of seasons than is presently available.~~

163 **Expanded studies to identify stock boundaries (H)**

No Action

Verify stock structure and source/sink dynamics including physical oceanographic, genetic and life-history studies ~~To identify stock boundaries, expanded studies are needed in the areas of genetics, mark-recapture, reproductive biology, larval distribution, and advection.~~

165 ~~Genetic studies to understand the rate of larval exchange between scallop beds.~~ **[merged with 163]**

~~No Action~~

~~Genetic studies to provide information on sources and sinks for scallop larvae are needed to improve our understanding of the rate of larval exchange between scallop beds.~~

166 ~~Age-structured models for scallop assessment are needed.~~

~~No Action~~ **[delete because plan underway for Central region]**

~~Also needed are age-structured models for scallop assessment.~~

2

North Pacific Fishery Management Council

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EXCERPT - FINAL REPORT
SCIENTIFIC AND STATISTICAL COMMITTEE
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
June 4th – June 6th, 2012

The SSC met from June 4th through June 6th at the Kodiak Inn Harbor Room, Kodiak AK.

Members present were:

Pat Livingston, Chair
NOAA Fisheries—AFSC

Robert Clark, Vice Chair
Alaska Department of Fish and Game

Jennifer Burns
University of Alaska Anchorage

Henry Cheng
Wash. Dept. of Fish and Wildlife

Alison Dauble
Oregon Dept. of Fish and Wildlife

Sherri Dressel
Alaska Department of Fish and Game

Anne Hollowed
NOAA Fisheries—AFSC

George Hunt
University of Washington

Gordon Kruse
University of Alaska Fairbanks

Kathy Kuletz
US Fish and Wildlife Service

Seth Macinko
University of Rhode Island

Franz Mueter
University of Alaska Fairbanks

Jim Murphy
University of Alaska Anchorage

Lew Queirolo
NOAA Fisheries—Alaska Region

Terry Quinn
University of Alaska Fairbanks

Kate Reedy-Maschner
Idaho State University Pocatello

Farron Wallace
NOAA Fisheries—AFSC

Members absent were:

Ray Webster
International Pacific Halibut Commission

D-1(e) Review and approve 5-year research priorities
During the June 2012 SSC meeting, it became clear that a more orderly process of submitting and prioritizing proposals for research priorities is needed. The SSC received the Council's list of research priorities from June 2011 and research priority lists from three Plan Teams, a halibut workshop report, a stakeholder-based research plan for the Aleutians, and staff summaries of EFH and protected species research. The lists were in different formats and some were quite lengthy. Thus, the SSC did not have time to fully consider all the lists and requested changes. In particular, we did not have sufficient time to review the research in the halibut workshop report and incorporate that into our priorities. We recommend that the BSAI/GOA Plan Teams consider the research recommended in that report and, as appropriate, incorporate those of merit into their research priorities list this fall. **The SSC provides its recommended list of research priorities to the Council in Appendix A,** which follows at the end of this June SSC report and will provide Council staff with a track changes and commented version of the

list. **In addition, the SSC proposes the following be considered for adoption by the Council as policy for the submission of Research Priorities to the SSC.**

The SSC will consider research priorities for inclusion in the annual NPFMC list of Research Priorities from the Plan Teams and members of the SSC. The SSC prefers to have Plan Teams be the initial filter for research priorities that come to the SSC. Sometimes EFH, protected species, and other issues relevant to a particular FMP may not be fully considered by each Plan Team, but the SSC recommends that Plan Teams make a more concerted effort to do so. Research priority lists should be provided by the Plan Teams in their Plan Team report, ideally to be received by the SSC no later than two weeks prior to the Council meeting at which the Plan Team Report is presented. The proposed research priorities should be entered in "Track Changes" in the Council's list of Research Priorities, as "published" in the minutes of the previous year's June Council meeting. The SSC will update a working copy of the Research Priorities list at each meeting at which it receives a list of priorities from a Plan Team, and will provide the Council with the full revised list at the June NPFMC meeting.

The SSC suggests that the Council consider adopting a process of evaluating and organizing the list of proposed Research Priorities using an Excel file or relational database type of system, with research priorities submitted on an Excel-based form to collect information about the proposed priority. When such a system is operational, the proposed research would include information on the question or data need to be resolved, whether the priority is an immediate concern or an ongoing need, relative rank (high, medium, low) among all priorities submitted by that Plan Team, impact on decision making, and species or fishery affected. Separate worksheets or database tables could be established for each Plan Team, the SSC, and the Council.

Appendix A.

SSC's Five-Year Research Priorities: 2012 through 2016 (as proposed in June 2012)

The Scientific and Statistical Committee (SSC) has identified priorities for research in the next 1 to 5 years as those activities that are the most important for the conservation and management of fisheries in the Gulf of Alaska, Aleutian Islands, eastern Bering Sea, and the Arctic. This listing of priorities has two purposes: 1) to meet the requirements of the revised Magnuson-Stevens Act for the Councils to identify research that is needed in the next 5 years, and 2) to provide guidance on research priorities to the research community and to funding agencies.

The research priorities are separated into two categories: **Immediate Concerns** and **Ongoing Needs**. **Immediate Concerns** include research activities that must be addressed to satisfy federal requirements and to meet pressing fishery management and ecosystem issues related to fishery management. Within these categories, the SSC has indicated those Research Priorities for which **Research is Underway**. These are Research Priorities for which NPRB grants have been awarded or for which it is known to the SSC that one or more other agencies have undertaken the recommended research. These priorities will remain on the list until the recommended research is complete and evaluated in terms of its meeting the Research Priority that had been listed. **Ongoing Needs** include research to advance the Council's fisheries management goals as defined in the Groundfish PSEIS, other strategic documents of the Council (i.e., FMPs, AI FEP, and EFH, crab, salmon PSC, and other EISs) and NMFS. **Ongoing Needs** include efforts on which the assessment models depend for their annual updates. For example, without the survey information, the annual process of setting ABCs and OFLs for the managed stocks would be compromised. The Council sees these efforts as needed on an ongoing basis, and constituting the time series on which management is based. It should be recognized that research in these categories is being conducted or may be conducted through Federal, State of Alaska, North Pacific Research Board, and other funding sources.

Five-Year Research Priorities: 2012-2016

Immediate Concerns

I.   Fisheries

A.   Fish and Fisheries Monitoring

1.   Non-recovering stocks. A pressing issue is why certain stocks have declined and failed to recover as anticipated (e.g., Pribilof Island blue king crab, Adak red king crab). Research into all life history components, including predation by groundfish on juvenile crab in near-shore areas, is needed to identify population bottlenecks, an aspect that is critically needed to develop and implement rebuilding plans.

2.   Improvements are needed for catch accounting by sex and size for crab (genetic samples) in non-directed fisheries with high bycatch   or PSCrates, particularly for blue king crab in the Pacific cod pot fishery in the Pribilof Islands.

3.   Develop methods for reliable estimation of total removals (e.g., surveys, poorly observed fisheries) to meet requirements of total removals under ACLs. Improve species identification, by both processors and observers, for priority species within species complexes in catches. Methods that quantify and correct for misidentifications are desired.

4.   There is a need to characterize the spatial distribution of male snow crab relative to reproductive output of females in the middle domain of the EBS shelf (partially underway)

B.   Stock Assessment

1.   Improve handling mortality rate estimates for crab and scallops. For crab, improved understanding on the post-release mortality rate of discarded crab from directed and non-directed crab pot fisheries and principal groundfish (trawl, pot, and hook and line) fisheries is required. The magnitude of post-release mortality is an essential parameter in the determination of total annual catch used to evaluate overfishing in stock assessment and projection modeling. For example, assess discard mortality rates of Tanner crab by size, month, sex, and fishery type. For scallops, conduct field studies to estimate scallop discard mortality (specifically the relationship between capture, release condition, and survival of scallops). (crab studies are partially underway: *Chionocetes* RAMP study)

2.   Develop biomass indices for lowest tier species (Tier 5 for crab, Tier 6 for groundfish), such as sharks, and conduct net efficiency studies for spiny dogfish. Explore alternative methodologies for Tier 5 and 6 stocks, such as length-based methods or biomass dynamics models.

3.   Owing to the lack of fishery-independent surveys for scallops, there is a need for analyses of fishery CPUE and observer data for use in assessing fishery performance and stock assessment. For instance, sharp declines in CPUE have occurred in some areas, such as Kayak Island and Alaska Peninsula, prompting concerns about local depletion. Additional new techniques may be desirable in regions with data-poor stocks.

4.   New information and data are needed that would inform our understanding of the spawner - recruit relationship for groundfish and crab with sufficient precision to project year-class strength (e.g., Tanner crab, GOA pollock, sablefish, halibut). (Underway)

5.   Conduct studies to determine stock structure and potential spatial management for BSAI pollock (e.g., movement).

6.   Conduct district-wide surveys for demersal shelf rockfish in Southeast Alaska on an annual, biennial, or triennial basis.

7.   Conduct a tagging study of red king crab in the region north of Bristol Bay to assess the movement between this region and the Bristol Bay registration area. Similar work on blue king crab in Bristol Bay relative to the Pribilof Islands is needed.

8.   Research is needed on the vertical distribution of Pacific cod relative to the EBS bottom trawl and comparisons between the EBS and GOA trawl gear. (Underway).

9.   Develop Pacific cod stock assessment for the Aleutian Islands region.

10.   Tagging studies of Aleutian Islands Pacific cod and Atka mackerel are needed to create models of short-term movement of fish relative to critical habitat (tagging for Atka mackerel partly underway).

11.   Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. Conventional tagging studies of young of the year and/or one-year old Pacific cod would be useful in this regard (partially underway for cod and dogfish).

12.   Maintain the core data from the eastern Bering Sea needed to support a diverse suite of models used to support the integrated ecosystem assessment program for the Bering Sea. Core data include inputs for single- or multi-species management strategy evaluations, food web, and coupled biophysical end-to-end ecosystem models (e.g. biophysical moorings, stomach data, zooplankton, age 0 surveys).

C.   Fishery Management

1. Develop a research program that will facilitate evaluation of salmon (both Chinook and non-Chinook) PSC mitigation measures in the BSAI and GOA. This includes updated estimates of the amounts reasonably necessary for subsistence, timing of runs and openings relative to subsistence requirements, and access to cost data for the commercial pollock and salmon industries so that impacts on profits (not gross revenues) can be calculated.

2. Improve the resolution of Chinook and chum salmon genetic stock identification methods (e.g., baseline development, marker development), improve precision of salmon run size estimates in western Alaska, and initiate investigations of biotic and abiotic factors influencing natural mortality rate during ocean migration in the GOA and BSAI. (baseline development is nearing completion, more work on Cook Inlet Chinook and chums is needed)

3. Develop improved catch monitoring methods of fishery interactions including direct and alternative options (e.g., electronic logbooks, video monitoring), particularly on smaller groundfish, halibut, and commercially guided recreational fishing vessels, as well as an assessment of feasibility for small vessels. Investigate factors that affect angler demand in the guided angler sector of the halibut fishery resulting from regulatory changes or general economic conditions.(Underway)

4. Develop bioeconomic models with explicit age- or size-structured population dynamics for BSAI and GOA groundfish fisheries to estimate maximum economic yield and other bioeconomic reference points under uncertainty.

5. Research the benefits and costs of halibut and halibut PSC utilization in different fishing sectors. For halibut and other PSC and bycatch species, conduct research to better identify where regulations restrict the utilization of fish from its most beneficial use and evaluate how changes in existing regulations would affect different sectors and fisheries. (partially underway)

6. Initiate/continue research on developing and evaluating thresholds for ecosystem indicators, including ecosystem-level management strategy evaluation.

II. Fisheries Interactions

A. Protected species

1. Studies of the localized interactions between fisheries and protected species, such as interactions between Steller sea lions and commercial fish species in the Central and Western Aleutian Islands (particularly areas 541, 542, 543), are needed. These studies should be conducted at appropriate spatial and temporal scales with an emphasis on seasonal prey fields, diet, and movement of sea lions and their prey.

2. Assess age- and size-specific vital rates (i.e., reproduction and survival) of Steller sea lions in the western and central Aleutians at sufficient frequency to track population dynamics in the western DPS.

3. Assess possible indirect effects of fisheries removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and pup-non pup ratios of Steller sea lions in the eastern DPS.

4. Quantify killer whale predation of Steller sea lions, particularly in the western and central Aleutian Islands.

5. Develop new methods to estimate sea lion abundance, such as the use of unmanned aerial vehicles, which could increase the probability of acquiring abundance estimates in remote areas. (underway)

6.   Assess the impact of the displacement of the groundfish fleet due to Steller sea lions protection measures on the prey availability, foraging ecology, diet, movements, and vital rates for Northern fur seals (partially underway).

7.   Assess the extent and impact of seabird incidental takes in fisheries on bird populations, and develop methods to reduce seabird incidental takes, particularly of protected species, such as short-tailed albatross.

8.   Determine potential impacts of fishing activities on North Pacific right whales and the Eastern North Pacific blue whales in the GOA, particularly in identified critical (NPRW) or essential (NPBW) habitat.

III.   Habitats

A.   Evaluate habitats of particular concern:

1.   Assess whether Bering Sea canyons are habitats of particular concern, by assessing the distribution and prevalence of coral and sponge habitat, and comparing marine communities within and above the canyon areas, including mid-level and apex predators to neighboring shelf/slope ecosystems. (partially underway)

B.   Baseline Habitat Assessment

1.   Dynamic ecosystem and environmental changes in the northern Bering Sea and Arctic are occurring on a pace not observed in recorded time. In response to the new Arctic FMP, assessment of the current baseline conditions and trophic interactions is imperative. This effort, while of great scientific importance, should not supplant the regular surveys in the BSAI and GOA, which are of critical importance to science and management. (partially underway)

C.   Fishing Effects on Habitat

1.   Research is needed on the effects of trawling on the distribution of breeding and ovigerous female red king crab and subsequent recruitment. Relevant studies include effects of potential habitat modifications on the distribution of females, particularly in near-shore areas of southwest Bristol Bay (partially underway), and environmental effects (e.g., trawling overlap in warm vs. cold years). Retrospective studies, the use of pop-up tags to identify larval release locations, and larval advection using Regional Ocean Modeling System would help address this need.

2.   Impact of bottom trawl fisheries on invertebrate abundance and species composition in benthic habitats, especially as might be relevant to the foraging ecology of walrus (candidate species for listing under ESA), but also bearded seals (ESA determination due in July), and gray whales.

Ongoing Needs

I.   Fisheries

A.   Fish and Fishery Monitoring

1.   Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including BASIS surveys and crab pot surveys, is a critical aspect of fishery management off Alaska. It is important to give priority to these surveys, in light of recent federal budgets in which funding may not be sufficient to conduct these surveys. Loss of funding for days at sea for NOAA ships jeopardizes these programs. These surveys provide baseline distribution, abundance, and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. *Although an ongoing need, these surveys are considered the highest priority research activity, contributing to assessment of commercial groundfish and crab fisheries off Alaska.*

2.   Conduct routine subsistence use, fish, crab, and oceanographic surveys of the northern Bering Sea and Arctic Ocean. These surveys will become increasingly important under ongoing warming ocean temperatures because range expansions of harvested fishery resources may occur. If range expansions or shifts occur, data will be needed to adjust standard survey time series for availability.

3.   Explore alternative approaches to the triennial ADF&G Aleutian Islands golden king crab pot survey to acquire fishery-independent abundance data on stock distribution and recruitment, including the potential for future cooperative research efforts with industry.

4.   Continue and expand cooperative research efforts to supplement existing surveys to provide seasonal or species-specific information for use in improved assessment and management. The SSC places a high priority on studies that provide data to assess seasonal diets and movements of fish and shellfish, for use in studies of species interactions in spatially explicit stock assessments.

5.   The HAPC action for skate egg case concentration sites included two recommendations that the Council suggested should be addressed during the annual research priority discussion: (a) skate egg case concentrations should be monitored every 2 to 3 years using non-invasive research design, such as in situ observation; and (b) skate conservation and skate egg concentration areas remain a priority for EFH and HAPC management and within Council and NMFS research plans.

6.   For groundfish in general, and rockfish in particular, continue and expand research on trawlable and untrawlable habitat to improve resource assessment surveys. For example, improved surveys, such as hydro-acoustic surveys, are needed to better assess pelagic rockfish species that are found in untrawlable habitat or are semi-pelagic species, such as northern and dusky rockfish.

7.   Studies are needed to evaluate effects of the environment on survey catchability. For groundfish and crabs, studies are needed on catchability, as it directly bears on estimates of the stock size for setting of catch quotas. Research to refine the estimates of survey catchability, q, used to infer absolute, rather than relative, abundance would substantially improve the quality of management advice. Particular emphasis should be placed on Tanner crab, because of recent trends in stock status, and on fishery and fishing gear selectivity for Aleutian Island golden king crab to improve the stock assessment model.

8.   Continue research on the design and implementation of appropriate survey analysis techniques, to aid the Council in assessing species (e.g., some crabs and rockfish) that exhibit patchy distributions and, thus, may not be adequately represented (either over- or under-estimated) in the annual or biennial groundfish surveys.

9. Advance research towards developing a quantitative female reproductive index for the surveyed BSAI crab stocks. Research is needed on mating, fecundity, fertilization rates, and, for snow and Tanner crab, sperm reserves and biennial spawning, to develop annual indices of fertilized egg production that can be incorporated into the stock assessment process and to model the effects of sex ratios, stock distribution, and environmental change on stock productivity. Priority stocks for study are eastern Being Sea snow and Tanner crab and Bristol Bay red king crab. (Ongoing for snow crab and red king crab)

10. Expand existing efforts to collect maturity scans during fisheries that target spawning fish (e.g., pollock). Time series of maturity at age should be collected to facilitate the assessment of the effects of density-dependence and environmental conditions on maturity.

11. Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys) should be pursued. Investigate integrating these data into stock and ecosystem assessments.

12. There is a need for fishery-independent surveys of scallops on major fishing grounds, e.g., Yakutat, other areas.

13. Develop a long-term survey capability for forage fish (partially underway).

C.   Stock Assessment

1. Acquire basic life history information needed for stock assessment and bycatch/PSC management of data-poor stocks, such as scallops, sharks, skates, sculpins, octopus, grenadiers, squid, and blue king crab (Bering Sea), golden king crabs (Aleutian Islands), and red king crab (Norton Sound). Specifically, information is needed on natural mortality, growth, size at maturity, and other basic indicators of stock production/productivity). For octopus, there is particular need for estimates of mortality and abundance, including verification of the cod consumption-based approach. Tagging studies would provide information on growth and movement of scallops and growth and absolute abundance estimates for golden king crab.

2. Improve estimates of natural mortality (M) for several stocks, including Pacific cod and BSAI crab stocks. **Develop and validate aging methods for crabs to improve estimates of M, including improved independent estimates of stage-specific M (e.g., large red king crab in Norton Sound).**

3. Studies are needed to validate and improve age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish. (partially underway for Pacific cod and spiny dogfish)

4. Evaluate the assessment and management implications of hybridization of snow and Tanner crabs.

5. Quantify the effects of historical climate variability and climate change on recruitment and growth, and develop standard environmental scenarios for present and future variability based on observed patterns. There is also a clear need for information that covers a wider range of seasons than is presently available.

6. There is a need for the development of projection models to evaluate the performance of different management strategies relative to the Council's goals for ecosystem approaches to management. Projection models are also needed to forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish. (partially underway)

7. To identify stock boundaries, expanded studies are needed in the areas of genetics, mark-recapture, reproductive biology, larval distribution, and advection.

8. Develop spatially explicit stock assessment models, where appropriate. High priority species for spatially explicit models include: snow crab, walleye pollock, Pacific cod, sablefish, yellowfin sole,

rock sole, arrowtooth flounder, Pacific ocean perch, black spotted rockfish, rougheye rockfish, and Atka mackerel. (partially underway for some species)

9. Genetic studies to provide information on sources and sinks for scallop larvae are needed to improve our understanding of the rate of larval exchange between scallop beds. Age-structured models for scallop assessment are also needed.

10. Conduct multivariate analysis of bycatch data from the scallop observer program (haul composition data) to estimate abundance and trends of benthic communities on scallop beds and computerized image processing to facilitate scallop stock assessments from camera sled (CamSled) data.

D.   Fishery Management

1. Refine methods to incorporate uncertainty into harvest strategies for groundfish for ACL estimation. Continue existing management strategy evaluations at the stock level. (underway)

2. Conduct studies documenting the subsistence harvest patterns, norms, and quantities in communities that depend upon resources that may be affected by Council action.

3. Examine interactions between coastal communities and commercial fisheries (e.g., subsistence-commercial linkages, adaptations to changes in resource use, economic opportunities for coastal communities).

4. Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab, e.g., squid, octopus, shark, sculpins, other flatfish, other rockfish, skates, grenadier, and crab). Research is needed to refine the basis for setting gamma for Tier 4 crab stocks. (partially underway)

5. Conduct retrospective analyses to assess the impact of Chinook salmon PSC measures on the BSAI pollock fishery. Analyses should include an evaluation of the magnitude and distribution of economic effects of salmon avoidance measures for the Bering Sea pollock fishery. In this case, it is important to understand how pollock harvesters have adapted their behavior to avoid Chinook and "other" salmon, under various economic and environmental conditions and incentive mechanisms.

6. Develop forecasting tools that incorporate ecosystem indicators into single or multispecies stock assessments, to conduct management strategy evaluations under differing assumptions regarding climate and market demands. Standardization of "future scenarios" will help to promote comparability of model outputs.

7. Development of an ongoing database of product inventories (and trade volume and prices) for principal shellfish, groundfish, Pacific halibut, and salmon harvested by U.S. fisheries in the North Pacific and eastern Bering Sea.

8. Analyze current determinants of ex vessel, wholesale, international, and retail demand for principal seafood products from the GOA and BSAI.

9. Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with changes in management regimes (e.g., changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation) as a consequence of the introduction of dedicated access privileges in the halibut/sablefish, AFA pollock, and BSAI crab fisheries. "Benefits and costs" include both economic and social dimensions.

10. Conduct prospective analyses of the robustness and resilience of alternative management strategies under varying environmental and ecological conditions.

11. Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort, in response to management actions (e.g., time/area closures, marine reserves, PSC and other bycatch restrictions, co-ops, IFQs).

12. Develop a framework for collection of economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.

13. Continue to evaluate the economic effects from crab rationalization programs on coastal communities. This includes understanding economic impacts (both direct and indirect) and how the impacts are distributed among communities and economic sectors.

14. Improve estimation of fishery interactions (including catch) with marine mammals (e.g., state managed gillnet fisheries), seabirds, and non-target groundfish (e.g., sharks, skates), and protected species.

II.   Fisheries Interactions

A.   Protected Species Interactions

1. Economic, social, and cultural valuation research on protected species (i.e., non-market consumptive use, passive use, non-consumptive use), particularly in the Arctic.

2. Foraging ecology and vital rate studies of Steller sea lions in the Gulf of Alaska, Russian Far East, and Commander Islands, including at-sea tracking of older animals, and diet composition of sea lions throughout the region. Emphasis should be placed on the use of methods that allow population abundance estimates to be directly compared between Russia and Alaska.

3. Linkages between fishery-induced disturbance or local prey depletion for northern fur seals in the Pribilof Islands region. (underway)

4. Gear modifications and fishing practices to reduce bycatch and, particularly, PSC (e.g., salmon and crab). (partly underway)

5. Studies of sperm whale depredation of catch in long-line fisheries and surveys to improve the quality of long-line fish abundance estimates. (underway)

6. Monitor interactions between fishing fleet and protected seabirds, particularly, in Aleutian Islands and the eastern Bering Sea shelf edge where numbers of albatross have increased.

7. Assess the potential for increased interactions between protected species (i.e., large whales and post-breeding/migrating seabirds) and fishing efforts in essential habitats, in particular throughout migratory routes, and with respect to changes in fish stock distribution and/or expansion into Arctic waters.

B.   Bycatch/PSC Issues

1. There is a need to analyze the effects of recent Council actions on bycatch and PSC, including:
    a.   interaction among PSC reduction initiatives (e.g., halibut, salmon)
    b.   quantifying the effects of PSC reduction in groundfish fisheries to the target fisheries (e.g., charter and commercial halibut fisheries, salmon fisheries)
    c.   Research approaches to create bycatch and PSC reduction incentives.

III.   Habitat

A.   Habitat Mapping

1. Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna, and epifauna in the GOA, BS, and Arctic. (partially underway)

2. Develop a GIS relational database for habitat, including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat. Such time series are needed to evaluate the impacts of changes in fishing effort and type on EFH. Assess the extent of the distribution of *Primnoa* corals and skate egg case concentration sites in the GOA, and conduct routine monitoring of these areas.

B.   Function of Habitat

1. Research is needed on the role of habitat in fish population dynamics, fish production (growth, reproduction), and ecosystem processes. Such research will improve the capability to identify and protect important habitats (including essential fish habitat and habitat areas of particular concern); help design effective habitat restoration efforts; improve the design and management of marine protected areas; improve fishery-independent population surveys; and improve stock assessments. Studies are needed to evaluate relationships between, and functional importance of, habitat-forming living substrates to juvenile and adult age classes of commercially important species and their preferred prey (forage fish). (partially ongoing)

2. Establish a scientific research and monitoring program to understand the degree to which impacts (habitat, benthic infauna, etc.) have been reduced within habitat closure areas, and to understand how benthic habitat recovery of key species is occurring. (This the objective of the EFH research approach for the Council FMPs).

IV.   Other Areas of Research Necessary for Management

A.   Ecosystem indicator development and maintenance.

1. Climatic indicators

a) Develop a multivariate index of the climate forcing of the Bering Sea shelf. Three biologically significant avenues for climate index predictions include advection, setup for primary production, and partitioning of habitat with oceanographic fronts and temperature preferences.
b) Develop bottom and water column temperature database for use in EBS, GOA, and AI stock assessments.
c) Maintain sea ice formation and retreat index for the EBS.

2. Lower trophic level community production data

a. Collect and maintain primary production time series in the EBS, AI, GOA, and Arctic; particularly in relationship to key climate and oceanographic variables.
b. Collect and maintain zooplankton biomass and community composition time series in the eastern Bering Sea. Develop, collect, and maintain time series of zooplankton biomass and community composition for the GOA, AI, and Arctic.
c. Collect and maintain data on forage fish community composition and abundance in the Bering Sea, GOA, AI, and Arctic.
d. Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna.

3. Develop methods for incorporating ecosystem indicators into stock assessments and ecosystem assessments. Specifically:

  a. Maintain indicator-based ecosystem assessment for EBS.
  b. Develop indicator-based ecosystem assessments for AI (in progress), GOA, and Arctic.
  c. Develop stock-specific ecosystem indicators and incorporate into stock assessments. (in progress)

4. Develop methodologies to monitor for new/emerging diseases among exploited species and higher trophic levels.

5. Assess the impact of increases in recovering whale populations (e.g. gray, humpback, and fin) on lower trophic level energy pathways.

6. Ecosystem indicator synthesis research.

7. Continue and expand cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels (seabirds and marine mammals). Updated surveys to monitor distribution and abundance of seabirds and marine mammals are needed to assess impacts of fisheries on apex predators, improve the usefulness of apex predators as ecosystem indicators, and to improve ecosystem management.

8. Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations.

9. Assess the relative importance of non-commercially exploited species (invertebrates, fish, marine mammals, and seabirds) to human communities, particularly in Arctic.

B. Research on Environmental Influences on Ecosystem Processes

1. Climate variability: monitor and understand how changes in ocean conditions influence managed species.

  a) Maintain moorings. Development and maintenance of indices of the timing and extent of the spring bloom is a high priority. For this, maintenance of moorings, especially M-2, is essential. (underway)
  b) Monitor seasonal sea ice extent and thickness: If recent changes in ice cover and temperatures in the Bering Sea persist, these may have profound effects on marine communities.
  c) Measure and monitor fish composition: Evaluate existing data sets (bottom trawl surveys, acoustic trawl surveys, and BASIS surveys) to quantify changes in relative species composition of commercial and non-commercial species, identify and map assemblages, and monitor changes in the distribution of individual species and assemblages. Additional monitoring may be necessary in the Aleutian Islands, northern Bering Sea, and areas of the Gulf of Alaska.
  d) Assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.

2. Improve understanding of ocean acidification and its effects on managed species
  a) Collect and maintain time series of ocean pH in the major water masses off Alaska. (partially underway)
  b) Assess whether changes in pH would affect managed species, upper level predators, and lower trophic levels. (partially underway for some species)

3. Species' responses to multiple environmental stressors

a) Laboratory studies are needed to assess the synergistic effects of ocean acidification, oil, dispersants, and changes in temperature on productivity of marine species.

b) Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates.

C.   Basic research on trophic interactions

1.   Collect, analyze, and monitor diet information (species, biomass, energetics), from seasons in addition to summer, to assess spatial and temporal changes in predator-prey interactions, including marine mammals and seabirds. The diet information should be collected on the appropriate spatial scales for key predators and prey to determine how food webs may be changing in response to shifts in the range of crab and groundfish.

2.   Ecosystem structure studies: Studies are needed on the implications of food web interactions of global warming, ocean acidification, and selective fishing. For instance, studies are needed to evaluate differential exploitation of some components of the ecosystem (e.g., Pacific cod, pollock, and crab) relative to others (e.g., arrowtooth flounder).

3.   In the last decade, many whale populations (e.g., gray, humpback, and fin) have increased dramatically, after being depleted by whaling. These increases in abundance have the potential to alter lower trophic level energy pathways in the region. In addition, we should investigate potential impacts to other upper trophic level groups (i.e., pinnipeds, seabirds, large predatory fish).

D.   Ecosystem Modeling

1.   Modeling studies of ecosystem productivity in different regions (EBS, GOA and AI).