Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
144	District-wide survey for demersal shelf rockfish in Southeast Alaska	Conduct a district-wide survey for demersal shelf rockfish in Southeast Alaska on a biennial or triennial basis. Survey information is becoming extremely dated.	Critical Ongoing Monitoring		Stock Assessment
145	Continuation of State and Federal annual and biennial surveys	Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including 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. Budgetary concerns have resulted in cuts to not only days at sea, which increases uncertainty, but also sampling the deepest strata, which threatens the value of trawl surveys as a synoptic ecological survey. 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.	Critical Ongoing Monitoring		Fish and Fisheries Monitoring
146	Improve surveys in untrawlable habitat, particularly for rockfish, Atka mackerel, and sculpins	For groundfish in general, and rockfish and Atka mackerel 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 routine stock assessment routine survey designs.	Urgent		Fish and Fisheries Monitoring
147	Life history research on non-recovering crab stocks	Why certain stocks have declined and failed to recover as anticipated is a pressing issue (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.	Important (Near Term)		Fish and Fisheries Monitoring
148	Spatial distribution of male snow crab	There is a need to characterize the spatial distribution of male snow crab at time of mating relative to reproductive output of females in the middle domain of the EBS shelf.	Delete?	Make sure covered elsewhere	Fish and Fisheries Monitoring
149	Improve handling mortality rate estimates for crab	Improve estimate of discarded crab handling mortality rate. These studies should include an assessment of the long-term mortality due to injury. This will require improving understanding of 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. The magnitude of post-release mortality is an essential parameter in the determination of the overfishing level used to evaluate overfishing in stock assessment and projection modeling. Empirical data exist for snow crab so new handling mortality data are needed for Tanner and king crab by size, sex, and fishery type with consideration of temperature. Methodology needed for king crab.	Important (Near Term)		Stock Assessment
150	Maintain the core biological and oceanographic data (e.g., biophysical moorings, stomach data, zooplankton, age 0 surveys) necessary to support integrated ecosystem assessment	Maintain the core data and process studies needed to support integrated ecosystem assessments. 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 (i.e. BASIS surveys)). Develop and maintain indices of sea ice formation, sea ice retreat, and timing/extent of the spring bloom for the EBS. For this, maintenance of moorings, especially M-2, is essential. If recent changes in ice cover and temperatures in the Bering Sea persist, these may have profound effects on marine communities.	Critical Ongoing Monitoring		Ecosystem indicator development and maintenance. , Stock Assessment
151	Develop a spatially-explicit model for BSAI pollock	Conduct studies to determine stock structure and potential spatial management for BSAI pollock (e.g., movement). Evaluate interactions of BSAI pollock with those in Russian waters. These studies should lead to a detailed spatial age-structured stock assessment model with at least 3 regions (Russia, NW EBS, SE EBS].	Important (Near Term)	mark status as completed - change "develop" to "apply"	Stock Assessment

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
153	Study vertical distribution of Pacific cod to better understand catchability	Research is needed on the vertical distribution of Pacific cod relative to the EBS bottom trawl and comparisons of gear between the EBS and GOA trawl gear. This is because there is controversy about fishery and survey catchability.	Important (Near Term)		Stock Assessment
154	Pacific cod stock assessment for the Aleutian Islands	Develop an age-structured Pacific cod stock assessment for the Aleutian Islands region. In 2014 the Aleutian Islands and eastern Bering Sea regions were split and have separate ABCs and OFLs. There is need to develop an assessment model for cod in the Aleutians.	Urgent		Stock Assessment
155	Evaluation of salmon PSC mitigation measures	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.	Urgent	likely can't be done in one or two years, could be listed as ongoing monitoring but not a survey	Fishery Management
156	Improve knowledge for salmon PSC impact assessment	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, but more work on Cook Inlet chum is needed.	Urgent	consistent with examples	Fishery Management
157	Improve methods of monitoring fishery interactions	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.	Urgent	consistent with examples	Fishery Management
158	Research ecosystem indicators and their thresholds for inclusion in ecosystem-level management strategy evaluation.	Initiate/continue research on the synthesis of ecosystem indicators, developing and evaluating thresholds for ecosystem indicators, and ecosystem-level management strategy evaluation.	Important (Near Term)	consistent with examples	Fishery Management
159	Evaluate interactions between fisheries and pinnipeds	Studies of the interactions between fisheries and protected species, such as Steller sea lions in the Central and Western Aleutian IslandsÂ (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 pinnipeds.Â	Urgent	consistent with examples, but unlikely to be done in 1-2 yrs	Protected Species
160	Assess vital rates of Steller sea lions	Assess vital rates (i.e., reproduction and survival) of Steller sea lions in the western DPS (including Russia) at sufficient frequency to track population dynamics.Â	Urgent	consistent with examples, but unlikely to be done in 1-2 yrs. Could be crit ongoing monitoring, but not a major survey.	Protected Species
161	Assess the health of Stellar sea lions	Assess possible indirect effects of fisheries removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and natality of Steller sea lions in the western DPS.	Urgent	consistent with examples, but unlikely to be done in 1-2 yrs. Could be crit ongoing monitoring, but not a major survey.	Protected Species
162	Quantify killer whale predation of Steller sea lions (M)	Quantify killer whale predation of Steller sea lions, particularly in the western and central Aleutian Islands.	Urgent		Protected Species
163	Conduct routine fish, crab, and oceanographic surveys in the northern Bering Sea and Arctic Ocean	Dynamic ecosystem and environmental changes in the northern Bering Sea and Arctic are occurring. Assessment of the current baseline conditions and trophic interactions is important. This effort should not supplant the regular surveys in the BSAI and GOA, which are of critical importance to science and management.	Critical Ongoing Monitoring		Baseline Habitat Assessment
164	Effects of trawling on female red king crab and subsequent recruitment	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.	Important		Fishing Effects on Habitat
165	Conduct routine surveys of subsistence in the northern Bering Sea and Arctic Ocean	Conduct routine surveys of subsistence use of marine resources in 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.	Critical Ongoing Monitoring		Fish and Fisheries Monitoring, Anthropology, Humans, Salmon, Communities, Subsistence

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
166	Estimate scallop stock abundance	Estimate scallop stock abundance in unsurveyed areas using fishery independent methods including analysis of current camera sled data.	Critical Ongoing Monitoring		Ecosystem Modeling, Fish and Fisheries Monitoring, Fishing Effects on Habitat
167	Alternative approaches to acquire fishery-independent abundance data for Aleutian Islands golden king crab	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 of Aleutian Islands golden king crab, including the potential for future cooperative research efforts with Industry.	Urgent	Focus on data-limited	Fish and Fisheries Monitoring
168	Assess seasonal diets and species interactions of fish and shellfish	Collect seasonal or species-specific information for use in improved assessment and management (e.g., expand or continue cooperative research). The data would be useful in studies of species interactions in spatially explicit stock assessments.	Important (Near Term)	Seems like two different things	Fish and Fisheries Monitoring
169	Studies on factors that affect catchability particularly for King and Tanner crab	For groundfish and crabs, studies are needed on factors that affect catchability, as they directly bear on estimates of the stock assessment. 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 and Red King Crab because of recent trends in stock status, and on fishery and for Aleutian Island golden king crab to improve the stock assessment model.	Important (Near Term)		Fish and Fisheries Monitoring
170	Quantitative reproductive index for the surveyed BSAI crab stocks	Advance research towards developing a quantitative reproductive index for 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.	Urgent		Fish and Fisheries Monitoring
171	Acquire basic life history information (e.g., natural mortality, growth, size at maturity) for data-poor stocks	Basic life history information is needed for stock assessment and 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 rates, size at maturity, and other basic indicators of stock production/productivity.	Urgent		Stock Assessment
172	Develop and validate aging methods for crabs.	Develop and validate aging methods for crabs to improve estimates of M for stock assessments.	Urgent		Stock Assessment
173	Expand studies to identify stock and management boundaries	To identify and refine stock boundaries and understand source/sink dynamics (e.g., scallop metapopulations). Conduct studies to evaluate all crab stock boundaries relative to management boundaries (e.g, Bristol Bay red king crab, Adak red king crab, Pribilof blue king crab). 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 the risks and consequences of management actions are clear.	Urgent		Stock Assessment
174	Develop spatially explicit stock assessment models	Develop spatially explicit stock assessment models. High priority species for spatially explicit models include: walleye pollock, snow and Tanner crab, Pacific cod, sablefish, yellowfin sole, rock sole, arrowtooth flounder, Pacific ocean perch, black spotted rockfish, rougheye rockfish, and Atka mackerel.	Urgent	This is underway.	Stock Assessment
175	Develop age-structured models for scallop assessment	Age structured models for scallops are needed to increase understanding of population dynamics and harvestable surpluses.	Important (Near Term) - or drop?	Awaiting ADF&G comments. This was suggested for dropping but the SSC has consistently encouraged development of the age-structured model (no progress though)	Stock Assessment
176	Refine methods to incorporate uncertainty into harvest strategies for groundfish	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.	Urgent		Fishery Management
177	Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change	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).	Strategic		Fishery Management

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
178	Develop a framework for collection of economic information	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.	Critical Ongoing Monitoring	The description for this research topic is rather vague given that economic information is currently collected. Perhaps what is needed here is a description of how the current framework for economic data collection is not consistent with the requirements of the MSFCMA.	Fishery Management
179	Conduct pre- and post-implementation studies of the benefits and costs, and their distribution, associated with dedicated access privileges	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.	Urgent	Important and relevant for the impending design of GOA trawl bycatch management measures.	Fishery Management
180	Economic, social, and cultural valuation research on protected species	Economic, social, and cultural valuation research on protected species is needed (i.e., non-market consumptive use, passive use, non-consumptive use).	Important (Near Term)	Important but does not seem to meet the criteria for urgent.	Protected Species
181	Foraging ecology studies of Steller sea lions	Foraging ecology studies of Steller sea lions in the Gulf of Alaska, Aleutian Islands, and Russia are needed, including at-sea tracking of older animals, and diet composition of sea lions throughout the region.	Important (Near Term)	Been done ad nauseum Leave for Jennifer Burns	Protected Species
182	Evaluate current and alternative Council PSC/bycatch reduction initiatives	Analyze the effects of recent Council actions on PSC and bycatch, including the interaction among PSC and bycatch reduction initiatives (e.g., halibut, salmon, crab). Attention should be given to different incentives that have the potential to cost-effectively reduce PSC.	Important (Near Term)	Add "for non-halibut, non-salmon species"	Bycatch Issues
183	Research the role of habitat in population dynamics and ecosystem processes	Research is needed on the role of habitat in population dynamics 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.	Important (Near Term)		Function of Habitat
184	Evaluate efficacy of habitat closure areas and habitat recovery	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 an objective of EFH research approach for the Council FMPs).	Important (Near Term)		Function of Habitat
186	Collect and maintain zooplankton and meroplankton biomass and community composition time series	Collect and maintain zooplankton and meroplankton 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.	Critical Ongoing Monitoring	Differs from other plankton surveys that focus on primary producers	Ecosystem indicator development and maintenance.
187	Maintain indicator-based ecosystem assessment for EBS.	Maintain indicator-based ecosystem assessment for EBS.	Important (Near Term)	Being done	Ecosystem indicator development and maintenance.
188	Develop indicator-based ecosystem assessments for AI (in progress), GOA, Arctic.	Develop indicator-based ecosystem assessments for AI (in progress), GOA, and the Arctic.	Important (Near Term)	Being done	Ecosystem indicator development and maintenance.
189	Develop stock-specific ecosystem indicators and incorporate into stock assessments	Develop stock-specific ecosystem indicators and incorporate into stock assessments. (in progress)	Important (Near Term)		Ecosystem indicator development and maintenance.
190	Collect and maintain time series of ocean pHÂ	Collect and maintain time series of ocean pH in the major water masses off Alaska to improve understanding of ocean acidification and its effects on managed species, upper level predators and lower trophic levels	Critical Ongoing Monitoring		Environmental Influences on Ecosystem Processes
191	Assess whether changes in pH and temperature would affect managed species, upper level predators, and lower trophic levels.	Assess whether changes in pH and temperature would affect managed species, upper level predators, and lower trophic levels. Laboratory studies are needed to assess the synergistic effects of ocean acidification and changes in temperature on productivity of marine species.	Strategic (Future Needs)		Environmental Influences on Ecosystem Processes
192	Collect, analyze, and monitor diet information	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.	Critical Ongoing Monitoring	Being done	Basic research on trophic interactions

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
193	Improve species identification	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.	Strategic (Future Needs)	Seems like a minor issue at present	Fish and Fisheries Monitoring
194	Identification and integration of archived data	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 have been cataloged, and most trawl surveys have been included in databases. Some one-time research surveys remain neglected.	Strategic (Future Needs)		Fish and Fisheries Monitoring
195	Conduct multivariate analysis of bycatch data from the scallop observer program	Analyze benthic communities associated with scallop beds by conducting multivariate analysis of bycatch data from the scallop observer program (haul composition data) and camera sled data.	Strategic (Future Needs)		Stock Assessment
196	Evaluate hybridization of snow and Tanner crabs.	Evaluate the assessment and management implications of hybridization of snow and Tanner crabs.	Strategic (Future Needs)	Been done ad nauseum	Stock Assessment
197	Develop methodologies to monitor for new/emerging diseases and/or parasites among exploited species and higher trophic levels	Develop methodologies to monitor for new/emerging diseases and/or parasites among exploited species and higher trophic levels.	Critical or Urgent	Develop methodology (urgent) then monitor (Critical)	Ecosystem indicator development and maintenance.
198	Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations	Initiate and expand non-market valuation research of habitat, ecosystem services, and passive use considerations.	Strategic (Future Needs)		Ecosystem indicator development and maintenance.
200	Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates.	Monitor contaminant flux and loads in lower and higher trophic levels, and assess potential for impact on vital rates. Laboratory studies are needed to assess the effects of oil dispersants on the productivity of marine species.	Strategic (Future Needs)		Environmental Influences on Ecosystem Processes
202	Methods for reliable estimation of total removals	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. Improvements are needed for catch accounting by sex and size for crab in non-directed fisheries with high bycatch or PSC rates, particularly for blue king crab in the Pacific cod pot fishery in the Pribilof Islands.	Urgent	Improve description, Split methodology from monitor	Fish and Fisheries Monitoring
203	Improve discard mortality rate estimates for scallops	Field and laboratory studies are needed to estimate Alaskan scallop discard mortality by evaluating relationship between capture, release condition and deck time, and subsequent survival.	Critical Ongoing Monitoring	Check on progress	Stock Assessment
204	Tagging studies of Aleutian Islands Pacific cod and Atka mackerel	Tagging studies of Aleutian Islands Pacific cod, Atka mackerel, Alaska skate, and walleye pollock are needed to create models of short-term movement of fish relative to critical habitat (tagging for Atka mackerel and skates are partly underway).	Important (Near Term)		Stock Assessment
205	Age determination methods for Pacific cod, Pacific sleeper sharks, and spiny dogfish	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).	Important, near term		Stock Assessment
206	Biomass indices and alternate methodologies for lowest tier groundfish species	Develop biomass indices for lowest tier species (Tier 6 for groundfish), such as sharks and octopus. Explore alternative methodologies for Tier 6 stocks such as length-based methods, catchability experiments (e.g., net selectivity), or biomass dynamics models.	Important (Near Term)		Stock Assessment
207	Analyses of fishery effort and observer data for scallops	As fishery independent surveys are conducted on only a few beds in Central Region, it is important to confirm the validity of fishery-dependent CPUE as an index of local abundance. Concerns about the utility of CPUE as an abundance index for fishery management are compounded by the limited number of vessels in the current fishery. Emerging methods from other data-limited stock assessments should be explored as alternatives to CPUE as indices of stock status.	Critical Ongoing Monitoring		Stock Assessment
208	Research on stock- recruit relationships	New information and data are needed that would inform our understanding of the stock- recruit relationship for groundfish, Pacific halibut, and crab to project year-class strength.	Urgent	We are getting close on predicting pollock year-class strength in the EBS; We have not really started on the other specie or regions	Stock Assessment
209	Investigate factors affecting the guided angler sector of the halibut fishery	Continue to investigate factors that affect angler demand and trip supply in the guided angler sector of the halibut fishery.	Should be evaluated as socio-economic	Give to Matt	Fishery Management

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
210	Develop bioeconomic models	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.	Important (Near Term)	This is distinct from 251. Appears to meet the criteria for Important.	Fishery Management
211	Benefits and costs of directed halibut catch and halibut PSC utilization	Research the benefits and costs of directed halibut catch 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	Important (Near Term)	This is distinct from 210. Clearly important for impending halibut PSC measures, but probably not urgent.	Fishery Management
212	Develop methods to estimate sea lion abundance	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.	Important (Near Term)		Protected Species
213	Assess the impact of the displacement of the groundfish fleet on Northern fur seals	Assess the impact of the displacement of the groundfish fleet due to Steller sea lion protection measures on the prey availability, foraging ecology,Â diet, movements,Â and vital rates for Northern fur seals.	Urgent	This may take a while, but N Fur Seals are a time bomb. Need to assess what is pushing them down before they go critical	Protected Species
214	Evaluate the impact of seabird bycatch in fisheries on bird populations, and methods to reduce	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.	Important (Near Term)		Protected Species
215	Determine potential impacts of fishing activities on marine mammals	Determine potential impacts of fishing activities on marine mammals (e.g., state managed gillnet fisheries), and in particular on North Pacific right whales and the Eastern North Pacific blue whales, particularly in identified critical (NPRW) or essential (NPBW)Â habitat.	Urgent		Protected Species
216	Assess whether Bering Sea canyons are habitats of particular concern	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 a comparison of mid-level and apex predators to neighboring shelf/slope ecosystems.	Important (Near Term)		Evaluate habitats of particular concern
217	Impact of fisheries on benthic habitat and trophic interactions	Conduct studies to assess the impact of bottom trawl fisheries on invertebrate abundance and species composition in benthic habitats. This is especially relevant to the foraging ecology of walrus (candidate species for listing under ESA), but also bearded seals, and gray whales.	Urgent		Fishing Effects on Habitat
218	Survey capability for forage fish	Develop a long-term survey capability for forage fish (partially underway). The NPRB funded GOA and Bering Sea projects are currently describing the 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.	Critical Ongoing Monitoring		Fish and Fisheries Monitoring
219	Monitor skate egg case concentration sites	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.	Critical on-going monitoring / Important	split into two (a) Critical, (b) Important	Fish and Fisheries Monitoring
220	Research on survey analysis techniques for species that exhibit patchy distributions	Continue research on the design and implementation of appropriate survey analysis techniques, to aid the Council in assessing species (e.g., Pribilof Island king 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.	Important (Near Term)		Fish and Fisheries Monitoring
221	Collect maturity scans during fisheries that target spawning fish	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 pollock and Pacific cod is collected by observers and should be analyzed. Maturity information for rockfish species near Kodiak has been collected recently, both during the fishery and dedicated scientific cruises, and should be analyzed. A dedicated survey to examine spawning sablefish has also been conducted. Efforts to collect maturity data, and then analyze for rockfish and other species should continue. In particular, retrospective studies to identify factors (e.g., fishing, climate, prey quality and quantity) influencing the maturity schedule should be conducted.	Strategic (Future Needs)		Fish and Fisheries Monitoring
222	Improve estimates of natural mortality (M) for Pacific cod.	Improve estimates of natural mortality (M) for several stocks, including Pacific cod.	Important (Near Term)		Stock Assessment

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
223	Develop and evaluate global climate change models (GCM) or downscaled climate variability scenarios to assess impacts to recruitment, growth, and spatial distributions.	Quantify the effects of historical climate variability and climate change on recruitment, growth, and spatial distribution. Develop standard environmental scenarios (e.g., from GCMs) for present and future variability based on observed patterns.	Strategic (Future Needs)		Stock Assessment
224	Climate and oceanographic information covering a wider range of seasons	There is a need for climate and oceanographic information that covers a wider range of seasons than is presently available.	Strategic (Future Needs)		Stock Assessment
225	Development of projection models to evaluate (a) the robustness and resilience of different management strategies under varying environmental and ecological conditions and (b) to forecast seasonal an	There is a need for the development of projection models to evaluate the robustness and resilience of different management strategies under varying environmental and ecological conditions. Projection models are also needed to forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish.	strategic	fix title - drop (b)	
226	Continue to evaluate the economic effects from fishery policy changes on coastal communities.	Continue to evaluate the economic effects from fishery policy changes on coastal communities. This includes understanding economic impacts (both direct and indirect) and how the impacts are distributed among communities and economic sectors.	Urgent	overlap with 230. Consider combining.	Fishery Management
227	Improve estimation of fishery interactions with non-target groundfish, and prohibited species.	Improve estimation of fishery interactions (including catch) and non-target groundfish (e.g., sharks, skates), and prohibited species.	Urgent		Fishery Management
228	Conduct studies documenting the subsistence harvest (patterns, norms, quantities) in communities affected by Council actions.	Conduct studies documenting the subsistence harvest patterns, norms and quantities in communities that depend upon resources that may be affected by Council action.	GLH Critical on-going monitoring	Need Matt	Fishery Management
229	Evaluate the effectiveness of setting ABC and OFL levels for data-poor crab stocks	Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tiers 4 and 5 for crab).	Urgent		Fishery Management
230	Examine social and economic interactions between coastal communities and commercial and recreational fisheries	Examine social and economic interactions between coastal communities and commercial and recreational fisheries (e.g. subsistence-commercial linkages, adaptations to changes in resource use, economic opportunities for coastal communities).	Important (Near Term)	Overlap with 226. Consider Combining.	Fishery Management
231	Retrospective analysis of the impact of Chinook salmon PSC avoidance measures on the BSAI pollock fishery	Conduct retrospective analyses to assess the impact of Chinook salmon PSC avoidance 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 â€œotherâ€ salmon, under various economic and environmental conditions and incentive mechanisms.	Important (Near Term)		Fishery Management
232	Develop management strategy evaluations that incorporate changing climate and market economic conditions.	Develop management strategy evaluations under differing assumptions regarding climate and economic conditions. Promote the standardization of â€œfuture scenariosâ€ from different models to promote comparability of model outputs.	Urgent	Change examples in definition	Fishery Management
233	Develop an ongoing database of product inventories	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.	Strategic (Future Needs)		Fishery Management
234	Analyze current determinants of demand for principal seafood products	Analyze current determinants of ex vessel, wholesale, international, and retail demand for principal seafood products from the GOA and BSAI.	Strategic (Future Needs)		Fishery Management
235	Investigate gear modifications and changes in fishing practices to reduce bycatch and PSC	Gear modifications and changes in fishing practices to reduce bycatch and PSC are needed.	Urgent	This type of research can be conducted through foucsed studies	Protected Species
236	Conduct studies of sperm whale and killer whale depredation of catch in long-line fisheries and surveys	Studies of sperm and killer whale depredation of catch in long-line fisheries and surveys are needed to improve the quality of long-line abundance estimates.	Important (Near Term)		Protected Species
237	Improved habitat maps	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.	Important (Near Term)		Habitat Mapping
238	Develop a GIS relational database for habitat, to include a historical time series of the spatial intensity of interactions between commercial fisheries and habitat.	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.	Strategic (Future Needs)	This research is already underway	Habitat Mapping

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
239	Assess the extent of the distribution of corals	Assess the extent of the spatial distribution of corals and conduct routine monitoring of these areas.	Urgent	If corals were treated as a species complex within the FMP rather than as habitat, this should be Critical	Habitat Mapping
240	Develop a multivariate index of the climate forcing of the Bering Sea shelfÂ	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.	Important (Near Term)	Very close call	Ecosystem indicator development and maintenance.
241	Develop bottom and water column temperature database and indices	Develop bottom and water column temperature database and indices for use in EBS, GOA, and AI stock assessments.	Important (Near Term)		Ecosystem indicator development and maintenance.
242	Collect and maintain primary production time series	Collect and maintain primary production time series in the EBS, AI, GOA, and Arctic; particularly in relationship to key climate and oceanographic variables.	Strategic (Future Needs)	If threshold for Council action were associated with this project then this could be moved to critical	Ecosystem indicator development and maintenance.
~~243~~	~~Collect and maintain data on forage fish community composition and abundance~~	~~Collect and maintain data on forage fish community composition and abundance in the Bering Sea, GOA, AI, Arctic.~~	~~Critical Ongoing Monitoring~~	~~Even though forage fish are in the ecosystem component, these populations should be monitored.~~ DELETE	~~Ecosystem indicator development and maintenance.~~
244	Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna	Collect and maintain time-series data on the community composition, production and biomass of benthic invertebrate and vertebrate fauna.	Strategic (Future Needs)	The value of this exercise lies in the time series, and thus is not consistent with the important categorization	Ecosystem indicator development and maintenance.
245	Assess the impact of increases in recovering whale populations on lower trophic level energy pathways	Assess the impact of increases in recovering whale populations (e.g., gray, humpback and fin) on lower trophic level energy pathways.	Important (Near Term)		Ecosystem indicator development and maintenance.
246	Cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels	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.	Important (Near Term)	Given the Council's new categorization, we need to split this into two projects. One for development of an ecosystem indicator and one to assess the severity of impacts	Ecosystem indicator development and maintenance.
247	Assess the relative importance of non-commercially exploited species to human communities	Assess the relative importance of non-commercially exploited species (invertebrates, fish, marine mammals, and seabirds) to human communities, particularly in Arctic.	Important (Near Term)	A lot of overlap with 180. Consider combining with some rewording.	Ecosystem indicator development and maintenance.
248	Conduct focused studies to map and understand assemblage distribution and the spatial importance of predator-prey interactions in response to environmental variability	Measure and monitor large scale 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, monitor changes in the distribution of assemblages, and understand the spatial importance of predator-prey interactions in response to environmental variability. Additional monitoring may be necessary in the Aleutian Islands, northern Bering Sea, and areas of the Gulf of Alaska.	Strategic (Future Needs)	Possibly split into two	Environmental Influences on Ecosystem Processes
249	Assess the movement of Steller sea lions, northern fur seals, Tanner crab, snow crab, and Pacific cod	Assess the movement of Steller sea lions, northern fur seals, Tanner crab, snow crab, and Pacific cod in response to environmental variability to understand the spatial changes of predator-prey interactions.	Critical Ongoing Monitoring		Environmental Influences on Ecosystem Processes
250	Conduct ecosystem structure studies	Studies are needed to evaluate the effects of global warming, ocean acidification, and selective fishing on food webs. 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).	Important (Near Term)		Basic research on trophic interactions
251	Modeling studies of ecosystem productivity	Modeling studies of ecosystem productivity in different regions (EBS, GOA, and AI). For example, studies could evaluate the appropriateness of the 2 million t OY cap.	Important (Near Term)	Important with respect to 2 million t cap. Should be merged with MSE lines	Ecosystem Modeling
361	Effects of Ocean Acidification on Scallops	Laboratory studies are needed to understand the mineralization of scallop shells through their life cycle and under current spatial variability and future scenarios of ocean acidification.	Strategic (Future Needs)		Baseline Habitat Assessment
362	Monitoring potential water quality impacts	Seasonal water quality monitoring in known scallop areas are needed to determine whether conditions are detrimental to scallop growth and survival.	Important (Near Term)		Baseline Habitat Assessment
363	Area-specific variability in scallop population processes	Investigate area-specific variability in vital population processes including growth, recruitment, natural mortality and movement including mark-recapture tagging studies.	Important (Near Term)	Note: Project description should be re-named Area-specific variability in population processes	Function of Habitat

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
364	Updated sperm whale stock assessment	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 occursÂ in the longline fishery.	Critical Ongoing Monitoring		Protected Species
365	Retrospective analysis of the impact of Chinook PSC avoidance measures on communities of western Alaska	Conduct retrospective analysis using qualitative and quantitative methods on salmon dependent communities of western Alaska that may be affected by Chinook salmon PSC avoidance measures in the BSAI. Analysis should evaluate long-term changes in local Chinook abundance and uses, and provide detailed ethnographic work exploring the meaning of salmon to these communities in the context of industrialized offshore fisheries.	Urgent		Protected Species
366	Continue to investigate time variation and the shape of fishery and survey selectivity models	There is considerable controversy about (1) whether selectivity should be dome-shaped or asymptotic, and (2) whether selectivity should be time-varying by default. Using a dome-shaped curve can create a large increase in biomass which may not be real. Treating selectivity as time-varying increases the number of model parameters greatly, which may lead to confounding among parameters. Better scientific guidance through research studies is needed to address these two problems.	Urgent		Ecosystem Modeling
367	Continue to improve stock assessment methodology with respect to uncertainty	Recent studies have made advances in determining effective sample size, effective number of parameters, Bayesian parameterizations, and how to weight datasets in assessments with multiple datasets. However, results appear to vary from paper to paper, and no general rules have emerged. Thus, our ability to characterize uncertainty remains elusive.	Urgent		Stock Assessment
368	Develop a simulation model of Steller sea lion fishery interactions	Management strategy evaluation tools based on coupled bio-physical models with fishing and top trophic level foragers (e.g., Steller sea lions) should be developed to evaluate the performance of different harvest strategies, to inform future management decisions, and to prioritize field studies.	Urgent		Protected Species
381	Effects of changes to the observer program	Evaluate the effects on biological parameter estimates and on estimated catch, bycatch, and PSC from 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 so that time series remain intact. Improve biological data collection including representative length and age samples from all sectors of the fleet. Attempt to separate temporal changes from sampling design effects.	Urgent		Statistics
382	Investigate in situ methods of tagging species that experience barotrauma	Species with swim bladders experience barotrauma, so that tagging studies result in high mortality and little information. Icelandic and Norwegian scientists have developed in situ methods for tagging, so that these fish never change depth. This could provide precise estimates of movement rates from tagging studies needed for spatial stock assessments. Such a recommendation for walleye pollock is found in a 2011 Report of a Workshop on Spatial Structure and Dynamics of Walleye pollock (AFSC Processed Report 2011-04).	Important (Near Term)		Fish and Fisheries Monitoring
383	Determine quantitative indicators of spatial structure, particular for walleye pollock and Pacific cod	The next generation of stock assessment models will be spatial age- and length-structured assessment models, in line with the goal of ecosystem-based fishery management. Current distributions of spatial location have been empirically summarized, but methods should be explored to convert these to movement patterns for biological and/or management regions.	Important (Near Term)		Pollock
384	Effects of changes to the observer program	Evaluate the effects on biological parameter estimates and on estimated catch, bycatch, and PSC from 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 so that time series remain intact. Improve biological data collection including representative length and age samples from all sectors of the fleet. Attempt to separate temporal changes from sampling design effects.	Delete and put description into 381	Merge with 381	Fishery Management
385	Study Pacific halibut PSC, bycatch, and discard behavior in fisheries	Continue to explore management actions that reduce the incentives for PSC-, bycatch- and discard-related mortality of Pacific halibut. Evaluation of observer coverage, accuracy, and representativeness of PSC and bycatch estimates should be included.	Urgent		Protected Species
386	Investigate long term effects of fishing on Pacific halibut	Collect genetic samples for future comparison.	Strategic (Future Needs)		Halibut

Research ID	Title	Description	SSC Subgroup Priority	SSC Subgroup Comments	Keywords
387	Determine effects of migration on the Pacific halibut population and management	Extend existing analyses of tagging studies to include age-specific components. Continue to evaluate the role of migration in contributing to population dynamics and trends associated with area-specific catch, PSC levels, and downstream effects.	Important (Near Term)	Change to strategic if long term	Protected Species
388	Study temporal and spatial patterns in size-at-age of Pacific halibut	Reanalyze historical records of Pacific halibut size-at-age. Requires identifying samples from consistent spatial areas as well as re-ageing of older samples that utilized differing methods for age determination. Relate observed patterns to somatic growth via otolith increment analysis and development of bioenergetics model relating long-term environmental and ecological drivers to halibut size-at-age. Continue to explore the potential role of fishing in observed size-at-age trends via direct or evolutionary pathways and the interaction with size-selective fishing, include these analyses in harvest policy analyses.	Urgent		Halibut
389	Investigate ecosystem effects and inter-species interactions of halibut	Investigate potential ecosystem effects and inter-species interactions on Pacific halibut recruitment and size-at-age. Includes integration of existing IPHC and NOAA trawl survey observations of size-at-age, diet, and population distribution and trends for multiple species in the GOA and BS.	Important (Near Term)		Halibut
390	Assess the population status of harbor seals in the Aleutian Islands and determine factors affecting their population trajectories	Assess the population status of harbor seals in the Aleutian Islands and determine factors affecting their population trajectories	Critical Ongoing Monitoring	Should split assessment from process	Marine Mammal
391	Investigate spatial stock dynamics and population connectivity for Tanner Crab (2 stocks)	Investigate spatial stock dynamics and population connectivity for Tanner Crab (2 stocks)	Important (Near Term)		Crab
431	Develop tools for analyzing coastal community vulnerability to fisheries management changes	Develop tools for for assessing and predicting coastal community vulnerability to fisheries management changes. Assess changes in community vulnerability over time by FMP and individual catch share fishery.	Important (Near Term)	There is overlap with 226 and 230 (related to, but separate from, 177 and 179). Consider combining.	Fishery Management
451	Pending - Arrowtooth flounder stock structure and movement	Arrowtooth flounder studies to support information related to stock structure and movement for Alaskan flatfish species	Important (Near Term)		Stock Assessment
452	Pending - Dusky Rockfish and Shortspine Thornyhead genetics research for improved population structure	Genetic research to better study dusky rockfish and shortspine thornyhead population structure.	Important (Near Term)		Stock Assessment, Biology - Genetics
453	Pending - Cod density in untrawlable areas in the AI	Evaluation of survey data (including IPHC long line, AFSC long line and NMFS trawl) in comparison with fishery data to better understand the proportion of cod biomass in untrawlable areas of the NMFS trawl survey.	Important (Near Term)		Stock Assessment
454	Pending - Sculpin natural mortality, seasonal food habits	Research to determine natural mortality for sculpin species in the GOA. Data gaps exist in sculpin species life history characteristics, spatial distribution, and abundance. GOA-specific morality estimates would be beneficial, rather than using the M derived from BSAI sculpin species. Additionally, the collection of seasonal food habits data would help clarify the role of both large and small sculpin species within the GOA ecosystem	Important (Near Term)		Stock Assessment
455	Pending - Shark aging, size at maturity, natural mortality	For sharks - data needed on size at maturity, natural mortality, better aging methodology. May be possible to collect age data from large" sleeper sharks that are caught in IPHC surveys. Access to those animals could enhance size and maturity data."	Important (Near Term)		Stock Assessment
471	Develop assessment methods for data poor and data moderate stocks		Pending	Pending	Stock Assessment
472	Evaluate causes of variable meat size, undersize meats in scallops	Exploratory tows in the Bering Sea (District Q) and some areas open to harvest around Yakutat (District D) have shown scallops with disproportionately small meats relative to shell height. The cause of this condition as well as potential for recovery is unknown to industry.	Pending	Pending	Growth, Habitat