

Research priorities in existing Council database that are relevant to BS FEP team expertise

Research Title	Description	Council Priority	SSC Priority	Plan Teams	Research Status	Year Added	Notes	
732	LK and TK data collection	This research priority would support more structured and consistent sources of ecosystem information for use in annual reports (such as ESRs), specific fishery management actions, or future development of conceptual models, especially as there are some areas that are data poor. Ultimately want to build systematic onramps into the Council process, but need data to be able to populate those onramps also.	Strategic	Strategic		Partially underway	2021	BSFEP Priority
733	Climate change: Develop predictive tools to inform management options related to resilience and adaptation.	This research priority supports the work of the Climate Change Taskforce to identify and map out climate and environment change drivers and their likely response within fishery management, and specifically work on management options that provide a management response. Might support with groundfish specifications risk tables, and can also use these predictive tools to be able to evaluate the potential risk of different management responses related to potential scenarios.	Strategic	Strategic		Partially underway	2021	BSFEP Priority
147	Life history research on data poor or 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	Important	Crab PT - Priority: Urgent	Partially underway	2012	
148	Spatial distribution, habitat requirements, and movement of crabs relative to life history events and fishing	There is a need to characterize the spatial distribution and movement of crab stocks. For example, information is needed to understand the distribution of male/female snow crab at time of mating, a better understanding of spatial stock dynamics and population connectivity for Tanner Crab east and west of 166, and to understand the distribution and movement of golden king crab in the Aleutian Islands in areas historically fished and not fished. 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. Additionally there is a need to investigate spatial stock dynamics and population connectivity for Tanner Crab (2 stocks).	Urgent	Urgent	Crab PT - Priority: Urgent	Partially underway	2012	2018 - Top Ten CPT Apr 2015 - rename as movement of crabs relative to life history events and fishing" SSC May 2015 - consider deleting if covered elsewhere"
150	Maintain the core biological and oceanographic data (e.g., biophysical moorings, diet data, zooplankton, age 0 surveys, benthic production) 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), benthic production). 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	Critical Ongoing Monitoring	Joint Groundfish PT - Priority: Critical Ongoing Monitoring, Crab PT - Priority: Urgent	Underway	2012	
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	Urgent	Joint Groundfish PT - Priority: Urgent	Underway	2012	
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	Important	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Urgent	Partially underway	2012	
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 Islands (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.	Critical Ongoing Monitoring	Critical Ongoing Monitoring		Underway	2012	

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163	Conduct routine fish, crab, and oceanographic surveys in the Arctic Ocean	Dynamic ecosystem and environmental changes in the Arctic Ocean 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.	Important	Important	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Urgent	Partially underway	2012	2018 - Top Ten
165	Conduct routine surveys of subsistence use 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	Critical Ongoing Monitoring	Joint Groundfish PT - Priority: Critical Ongoing Monitoring, Crab PT - Priority: Critical Ongoing Monitoring	Partially underway	2012	In light of budgets this should be important, not urgent. There is Arctic IERP starting this year so could be considered underway or partially underway as I don't know if subsistence is the main focus?
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	Important	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Important	Partially underway	2012	
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	Critical Ongoing Monitoring	Joint Groundfish PT - Priority: Urgent, Crab PT - Priority: Strategic	Partially underway	2012	
187	Continue to develop and improve the use of indicator-based ecosystem assessments throughout the range of the Council's managed resources	Maintain indicator-based ecosystem assessment for EBS.	Critical Ongoing Monitoring	Critical Ongoing Monitoring	Crab PT - Priority: Critical Ongoing Monitoring, Joint Groundfish PT - Priority: Critical Ongoing Monitoring	Underway	2012	
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	Important	Joint Groundfish PT - Priority: Urgent	Partially underway	2012	
189	Develop stock-specific ecosystem indicators and incorporate into stock assessments	Develop stock-specific ecosystem indicators and incorporate into stock assessments. (in progress)	Urgent	Urgent	Joint Groundfish PT - Priority: Urgent, Crab PT - Priority: Urgent	Partially underway	2012	2018 - Top Ten
190	Collect and maintain time series of ocean pH	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	Critical Ongoing Monitoring	Joint Groundfish PT - Priority: Urgent, Crab PT - Priority: Critical Ongoing Monitoring	Partially underway	2012	CPT 2017-05: Some moorings removed; less data on carbonate parameters; capacity reduced based on funding availability

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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	Strategic	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Important	Partially underway	2012	likely to fall outside of a 5 year time frame for incorporation into assessment and management
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	Critical Ongoing Monitoring	Crab PT - Priority: Critical Ongoing Monitoring, Joint Groundfish PT - Priority: Important	Underway	2012	
194	Identification and integration of archived data	Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys, and fishery data) 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	Strategic	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Strategic	Partially underway	2012	Not sure if the important legacy data has been completed or if there is still outstanding data sets to archive?
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.	Urgent	Urgent	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Strategic	Partially underway	2012	
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	Strategic	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Strategic	No action	2012	
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	Strategic	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Strategic	No action	2012	Dropped by CPT May 2015
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 direct impacts on Bristol Bay red king crab. Indirect impacts are important to the foraging ecology of walrus (candidate species for listing under ESA), bearded seals, and gray whales.	Urgent	Urgent	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Important	Underway	2012	
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	Strategic	Joint Groundfish PT - Priority: Strategic	Partially underway	2012	
223	Develop and evaluate global climate change models (GCM) or down-scaled climate variability scenarios to assess impacts to recruitment, growth, spatial distributions, and benthic productivity.	Quantify the effects of historical climate variability and climate change on recruitment, growth, spatial distribution, and benthic productivity. Develop standard environmental scenarios (e.g., from GCMs) for present and future variability based on observed patterns. This is important for fisheries that target benthic species such as crab for which management may be structured on an assumption of stable stock distribution.	Strategic	Strategic	Scallop PT - Priority: Important, Crab PT - Priority: Important, Joint Groundfish PT - Priority: Strategic	Partially underway	2012	2020-01 CPT: Combine with 671?

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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	Strategic	Scallop PT - Priority: Strategic, Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Strategic	Partially underway	2012	Delete - duplicate with 223
225	Develop projection models to evaluate management strategies under varying climate, ecological, and economic conditions and evaluate impacts to managed resources and coastal communities.	There is a need to develop projection models that evaluate the robustness and resilience of different management strategies under varying climate, ecological, and economic conditions. Projection models should forecast seasonal and climate related shifts in the spatial distribution and abundance of commercial fish and shellfish, and impacts to communities.	Strategic	Strategic	Joint Groundfish PT - Priority: Important, Crab PT - Priority: Urgent	Partially underway	2012	CPT 2017-05: how is this different from 158? Consider merging
240	Develop a multivariate index of the climate forcing of the Bering Sea shelf	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	Important	Crab PT - Priority: Important, Joint Groundfish PT - Priority: Important	Partially underway	2012	
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	Important	Crab PT - Priority: Critical Ongoing Monitoring, Joint Groundfish PT - Priority: Important	Partially underway	2012	
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	Strategic	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Important	Partially underway	2012	
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	Strategic	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Strategic	Partially underway	2012	Combine with 671?
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	Important	Joint Groundfish PT - Priority: Strategic	No action	2012	
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	Important		Partially underway	2012	2018 - Top Ten
248	Measure and monitor large scale fish composition	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	Strategic	Joint Groundfish PT - Priority: Strategic	Underway	2012	
249	Monitor the movement of Steller sea lions and northern fur seals	Monitor the movement of Steller sea lions and northern fur seals in response to environmental variability to understand the spatial changes of predator-prey interactions.	Critical Ongoing Monitoring	Critical Ongoing Monitoring		Partially underway	2012	Dropped by CPT May 2015

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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	Important	Crab PT - Priority: Strategic, Joint Groundfish PT - Priority: Pending	Partially underway	2012	
251	Modeling studies of ecosystem productivity in the different FMP areas	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	Important	Scallop PT - Priority: Strategic, Crab PT - Priority: Important, Joint Groundfish PT - Priority: Strategic	Underway	2012	
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	Strategic	Scallop PT - Priority: Urgent	Partially underway	2014	
362	Monitoring potential water quality impacts on scallops	Seasonal water quality monitoring in known scallop areas are needed to determine whether conditions are detrimental to scallop growth and survival.	Important	Important	Scallop PT - Priority: Important	No action	2014	SPT 2020-02: Pending deployment of CTD and other WQ instruments on dredges and moored stations
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.	Urgent	Urgent	Joint Groundfish PT - Priority: Important	Underway	2014	
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	Important	Joint Groundfish PT - Priority: Important	Underway	2014	
454	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 mortality 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	Important	Joint Groundfish PT - Priority: Strategic	No action	2015	
493	Examine the relative importance of historical closed areas in the vicinity of the Pribilof Islands as juvenile halibut nursery habitat relative to other regions coast-wide.	Evaluate the biological effects of establishing spatial protections of juvenile halibut from fishing gear on BSAI halibut stock health.	Urgent	Urgent		No action	2015	
532	Natural mortality estimation for crab stocks	Investigate natural mortality for crab stocks, to include responses to environmental variability and predation. Compare to existing natural mortality parameters used in stock assessment modeling.	Important	Important		No action	2016	Removed from CPT priorities - redundant with other life Hx priorities
536	Evaluate incorporation of climate change impacts into stock assessments	Climate change impacts are becoming an increasingly important consideration for long term planning and should be included in projections of exploitable fish stocks and associated ecosystem components. Incorporation of climate-based parameters into fish stock assessments will allow for exploration of harvest scenarios in the context of evolving climate conditions. Research is needed to explore how these parameters can be integrated into fishery stock assessments.	Strategic	Strategic	Joint Groundfish PT - Priority: Important, Crab PT - Priority: Strategic	Underway	2016	

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556	Re-evaluate the location and temporal structure of Herring Savings Areas	Re-evaluate whether the current locations of the Herring Savings Areas are likely to be effective at protecting herring populations (i.e. overlap with current distribution of herring during the specified dates) and whether seasonally-fixed or moving closures would be the most effective. Re-evaluation is particularly necessary due to recent changes in herring distributions. The research would ensure that groundfish fisheries are not pushed into areas with higher salmon PSC and squid bycatch without meeting the goal of protecting herring.	Urgent	Urgent	Joint Groundfish PT - Priority: Important	No action	2016	
613	Maintain and update coupled biophysical projections for the North Pacific	Coupled model projection systems are needed to support the NPFMC's strategic initiatives related to the Bering Sea Regional Action Plan, the Bering Sea Fisheries Ecosystem Plan and the Alaska Climate Integrated Modeling activity. Research is needed on methods to dynamically downscale physics and bio-geo-chemical information derived from global models and earth systems models to regional ocean models (ROMs) as well as methods for coupling nutrient-phytoplankton-zooplankton (NPZ) into ROMs. Likewise continued research on methods for coupling biological models (including the response of fishers) to projected environmental change will be an ongoing strategic activity. Projected environmental conditions from the ROMs/NPZ model is the foundation for management strategy evaluations needed to provide climate informed harvest strategies for the future. Support for continued update and refinement of the ROM/NPZ coupled models will be an ongoing strategic research need for the NPFMC.	Strategic	Strategic	Joint Groundfish PT - Priority: Strategic, Crab PT - Priority: Important	Partially underway	2017	
615	Evaluate the interactions between fisheries and killer whales and sperm whales	Attempt to quantify killer whale and sperm whale depredation on halibut, sablefish, and turbot in the CV and CP longline and trawl fleets. Study the effects on DMRS, the observer program, stock estimates, wastage, and unobserved mortality. Evaluate methods of avoidance, deterrence, and cost.	Important	Important	Joint Groundfish PT - Priority: Important	Underway	2017	
671	Characterize expected changes in benthic production due to climate change	Investigations are needed to address the impacts of global climate change on spatial patterns of benthic productivity. This is important for fisheries that target benthic species such as crab for which management may be structured on an assumption of stable stock distribution.	Important	Important	Crab PT - Priority: Important	No action	2018	
715	Physiological responses of crab to climate stressors	Investigate how observed environmental changes (temperature, OA, etc.) affect crab physiological condition & survival of multiple life stages and reproductive output. Consider interactions among multiple stressors	Important	Important	Crab PT - Priority: Important	Partially underway	2019	
734	Conduct an assessment of the Councils Bering Sea management with respect to EBFM best practices.	This research priority could be useful to help identify future needs and research.	Strategic	Strategic		No action	2021	BSFEP priority