



Theme 4: Organization and priorities

Summary

The Alaska Fisheries Science Center has been a leader in identifying methods to address which crab and groundfish stocks should be assessed. A detailed description of the types of models used and ecosystem considerations addressed by the stock assessment groups at AFSC is provided in Hollowed et al. (2011). A description of the key laws and policies governing federal fisheries management in the GOA and BSAI is provided by Livingston et al. (2011). The NPFMC designs its management strategy to achieve the following core goals:

- (i) Prevent overfishing
- (ii) Promote sustainable fisheries and communities
- (iii) Preserve food web structure
- (iv) Manage incidental catch and reduce bycatch and waste
- (v) Avoid impacts to seabirds and marine mammals
- (vi) Reduce and avoid impacts to habitat
- (vii) Promote equitable and efficient use of fishery resources
- (viii) Increase Alaska native consultation
- (ix) Improve data quality, monitoring and enforcement

These core goals dictate the need, frequency and appropriate level of assessments conducted by scientists at AFSC. AFSC's approach recognizes that required assessments are not limited to target species; some non-target stock assessments are needed to conform to these policies. Further, harvest recommendations and/or management strategy evaluations may consider the interplay between the various regulations governing fisheries in Alaska including prohibited species caps. The NPFMC recognizes four categories of managed species in the GOA and BSAI: a) target species within the fishery, b) non-target stocks managed within the fishery, c) prohibited species, and d) ecosystem component species (DiCosimo et al. 2010).

A productivity–susceptibility analysis (PSA) was applied to determine which stocks would be managed “in the fishery” (Omseth and Spencer, 2011). The productivity – susceptibility analysis (PSA) is used to evaluate the relative risk of overfishing for a variety of species and species groups in Alaska. Based on the outcome of the PSA, the SSC and Council identified the suite of species and species groups that were in the fishery. Stocks managed “in the fishery” are assessed on an annual or biennial time step (see table of current assessments).

The AFSC also conducts biennial assessments of selected ecosystem species groups due to their importance in the GOA and BSAI ecosystems. For example, forage fish assessments are provided to document time trends in distribution, abundance and catch of these key prey species. These assessments are reviewed by the Plan Teams and SSC to ensure that maximum retention allowances continue to be effective deterrents to the development of directed fisheries and will continue to sustain the resource into the future. Likewise, at its February meeting in 2014, the NPFMC amended its FMP to include grenadiers (primarily giant grenadier) in the ecosystem component. Due to the abundance and the high level of incidental catch of this species group, grenadiers will also likely be assessed on a biennial time step.

The frequency of updated, full, and benchmark assessments is based on legal mandates as well as an evaluation of: a) the availability of updated abundance indices, b) attributes of the stock including recruitment variability and productivity, c) uncertainty in abundance indices or model parameters, d) a realized need for model changes, e) current trends in exploitation and f) the economic value of the stock. These core attributes align closely with proposed national guidelines for stock assessment prioritization. Full assessments are prepared annually for key prey of the endangered Steller sea lion (Atka mackerel, walleye pollock, and Pacific cod) as dictated by the Steller sea lion Recovery Plan and Biological Opinion. All three of these species exhibit high interannual variability in recruitment, and in most regions they support large and valuable target fisheries. Full assessments are prepared annually for sablefish, and all of the Bering Sea crab stocks that are managed “in the fishery” because of their importance as a target species, availability of annually updated abundance information, and, in the case of crab stocks the high interannual variability in the recruitment. Full assessments are also prepared annually for BSAI

yellowfin sole and BSAI rock sole due to their commercial importance, and the availability of updates from the EBS trawl survey. Skates, sharks, squid, sculpin, octopus, rockfish, and minor flatfish stocks are assessed biennially in conjunction with the time step for updated trawl survey data (odd years in GOA, and even years in AI). For stocks assessed on a biennial time step, the projections are updated in the “off-year” with observed catch.

The AFSC strives to base harvest advice on the best available information. The AFSC strives to gather sufficient information to ensure that stocks are not overfished and overfishing is not occurring. The standard for stocks that are “in the fishery” is to strive to manage stocks based on Tier 3 type assessments. In some cases, information is insufficient to manage the stocks at this level. In these cases, AFSC conducts research to identify methods to improve data collection to improve the assessments in the future. For example the Center has supported a cooperative research project to develop and test the capture efficiency of octopus pots (http://www.nmfs.noaa.gov/stories/2012/08/08_17_2012_octopus_video.html).

For stocks managed as ecosystem component species, stock assessments typically evaluate time trends in catch and biomass as well as size distribution when data are available. Because of their importance in the ecosystem, AFSC conducts research to improve assessment methods for selected ecosystem component species (especially forage fish and grenadiers). For example, as part of the NPRB Bering Sea Project, Ressler et al. (2012) developed acoustic methods to estimate euphausiid abundance as part of AFSC’s acoustic trawl surveys in the GOA and EBS.

The primary domestic and international stock assessment needs facing the AFSC include: a) maintaining annual catches within the constraints of established prohibited species catch limits for Pacific salmon, Pacific herring, Pacific halibut and Bering Sea Aleutian Islands crab, b) maintaining baseline monitoring indices and assessments for pollock in the doughnut hole (see the Bogoslof Island pollock assessment), c) maintaining data to track the exchange rates of trans-boundary stocks including US – Russian stocks of pollock, and d) gathering and assessing baseline monitoring for Arctic species. In recent years, a large effort was devoted to evaluating and understanding salmon bycatch in the EBS and GOA pollock fisheries (Stram and Ianelli 2009). Likewise, with the establishment of ACLs for BSAI crab stocks there is increasing review and evaluation of crab bycatch in groundfish fisheries. In the case of the Arctic fisheries, the NPFMC proactively closed the region to directed fishing until sufficient information is available to sustainably manage the resource.

As noted in other sections, members of the stock assessment programs provide technical support on a variety of Council or Regional Office issues (see Committee Listing). These issues include but are not limited to: management strategy evaluations and impacts assessments for NPFMC plan amendments (including Environmental Assessments and Environmental Impacts Statements), impacts analyses for Biological Opinions, and expert reviews of stock assessments through service on PFMC and NPFMC committees including the SSC and Plan Teams. In addition, several program members serve as technical experts or reviewers on national or international science panels (see full listing of committees 2012-present). In addition, AFSC’s stock assessment scientists are well recognized nationally and internationally and are often called upon to serve as independent reviewers of stock assessments. On a national level, members of AFSC’s stock assessment programs serve on numerous committees designed to improve and advance the stock assessment enterprise. These committees include but are not limited to: the FATE steering committee, the Advanced Stock Assessment Modeling workgroup, the Sustaining Marine Ecosystems in a Changing Climate (SMECC) Execution Focus Area, the climate vulnerability assessment workgroup, the stock assessment improvement plan workgroup, the ADMB model developers group. Performing these services is an integral aspect of the stock assessment enterprise. Service on these committees and workgroups ensures that managers base decisions on the best available science and that the AFSC and NMFS continue to conduct cutting edge scientific research.

As noted in earlier sections, the NPFMC has an open approach to assessment reviews. Members of the public often attend the NPFMC Plan Team and SSC meetings and contribute valuable comments and insights into the stock assessment process. AFSC’s scientific investigations focused attention on vulnerable non-target species. This research was well received by several non-governmental entities. Likewise, industry stakeholders appreciate the importance of collecting annual data for stocks that exhibit high levels of interannual variability in the Bering Sea, <http://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/> and they often voice their support for our surveys to decision makers. In some cases, industry will hire stock assessment experts to review and interpret AFSC’s assessments. The NPFMC established protocols to allow these analysts to suggest alternative modeling approaches. For key species such as eastern Bering Sea pollock, AFSC’s analysts provide a public seminar prior to the November Plan Team meeting to explain the updated assessment to stakeholders.

The AFSC assessment enterprise is effective at balancing benchmark, full assessments, and updates for their assessments. In the context of this review, benchmark assessments are defined as assessments that introduce a major re-examination of existing model structure or incorporation of new datasets (see assessment classification table). AFSC and the NPFMC don't dictate a timeline for benchmark assessments. Assessment authors introduce innovations as the necessity arises. As per the NPFMC's timeline and AFSC's stock assessment guidelines, proposed innovations to past assessment model approaches are presented the Plan Teams at least one meeting prior to selection of the baseline model. This approach allows the Plan Teams and SSC to provide comments and suggestions on the proposed innovations. Innovations to modeling approaches are a common part of the Council process. These innovations typically stem from comments and suggestions from CIE reviews, the SSC and Plan Teams as well as new approaches identified by the analyst. This has the desirable result of keeping AFSC's assessment approaches at the forefront of new science.

The AFSC assessment enterprise produces a large number of assessments on a timely basis every year. As described in the AFSC's Science Plan and implemented in the Annual Guidance memo, the AFSC places a high priority on data collection to support annual stock assessments. The AFSC's fishery dependent and fishery independent data collection programs have established excellent data processing protocols that allow rapid analysis and transfer of information to the assessment scientists (see the National Review results). Fish otolith aging is a time consuming activity that still relies on human evaluation. The AFSC has established an age prioritization process wherein assessment analysts annually make requests for age determinations. These requests are prioritized by Center leadership. It should be noted that there are some areas of data collection that are sub-optimal. For example maturity schedules for several stocks are outdated and assumed to be constant. Likewise, additional field research to improve parameterization of key processes and reduce uncertainty in the assessments is needed. In particular, process studies to improve parameterization of species interactions and to understand mechanisms underlying time varying selectivity and natural mortality as well as, recruitment variability are needed.

The NPFMC and stakeholders desire for assessments to be based on the best available information mandates that assessments incorporate new survey data when it is available. This creates a tight timeline for incorporation of in-year data into the assessment. For stocks that are patchily distributed (rockfish) or exhibit high degrees of interannual variability incorporation of new data may necessitate several exploratory model runs to resolve discontinuities in the data.