Report on the Nearshore Stock Assessments Workshop

Pacific Fishery Management Council
Sheraton Portland Airport Hotel
Cascade A/B Room
8235 NE Airport Way
Portland, Oregon 97220

March 31-April 2, 2015

The Pacific Fishery Management Council (PFMC) sponsored a public workshop to evaluate catch data, catch-per-unit-effort (CPUE) indices, and other data sources proposed for use in the 2015 West Coast groundfish stock assessments for black rockfish, China rockfish, and kelp greenling. Attending the workshop were members from the Stock Assessment Teams (STATs), members of the Scientific and Statistical Committee (SSC) who will chair the stock assessment review (STAR) panels, and representatives from the three state fishery agencies: the Washington Department of Fish and Wildlife (WDFW), the Oregon Department of Fish and Wildlife (ODFW), and the California Department of Fish and Wildlife (CDFW). Also attending were members of the Groundfish Advisory Panel and members of the public. A list of attendees is included in Appendix 1.

Day 1 - 03/31/2015.

The workshop began at 1pm. After a round of introductions, review of the proposed agenda, and discussion of anticipated outcomes from the workshop, representatives from each STAT gave brief presentations of proposed data and methods that would likely be used to develop the stock assessments.

China rockfish. Dr. E.J. Dick from the Southwest Fisheries Science Center (SWFSC) briefly reviewed the 2013 assessments for China rockfish (north and south of 40º10'), which had been conducted using XDB-SRA, and provided overviews of the data assembled for each state. He noted some revisions in the California commercial catch history, and showed evidence of possible geographic trends in the length distributions of sport- and commercially caught China rockfish in California. Data on age and associated length are limited but available from all three states. The modeling platform for the new assessment (XDB-SRA versus Stock Synthesis) had not yet been decided. It is likely that a coastwide and several regional configurations will be explored.

Black rockfish. Dr. Jason Cope from the Northwest Fisheries Science Center (NWFSC) described several meetings that had already occurred between members of the STAT and representatives from the states and briefly reviewed past assessments of black rockfish. The new assessment will be conducted with Stock Synthesis (version 3) but details regarding possible spatial structure have not yet been resolved. Also, there are some unresolved issues with the historical catch reconstructions. Jason discussed possible ways to structure the assessment spatially and briefly reviewed the available data that might provide a basis for spatial structure (e.g., results from genetics studies, tag-recaptures show occasional long-distance movements,

states have had different management and exploitation histories). He also described various state and federal recreational fishery surveys that might be used to develop abundance indices and challenges associated with those data. Available fishery-independent data sources are very limited in spatial and temporal coverage.

Kelp greenling. Dr. Aaron Berger (NWFSC) described past attempts to assess kelp greenling (e.g., the 2005 assessment for Oregon and California) and the limited information available for assessing the stock. The new assessment will only be for Oregon. Commercial catches of kelp greenling are taken primarily using hook and line gear and occur primarily in the live-fish fishery along Oregon's southern coastline. Recreational catches tend to occur farther north. Also, there are substantial recreational catches taken by shore-based anglers (e.g., from piers and jetties) but information for this fishing mode does not extend past 2005. Data available for the assessment include substantial observations of lengths and weights but few age-readings. Catch and effort series are available from recreational fishery surveys and a commercial fishery logbook program administered by ODFW. Aaron discussed possible ways he would structure a Stock Synthesis assessment given the available data and some of the difficulties he anticipates.

Day 2 – 04/01/2015.

Onboard observer recreational indices. Dr. Melissa Monk (SWFSC) described methods that have been developed for analyzing data collected by observers on commercial passenger fishing vessels (CPFVs or California charter vessels) and on Oregon charter boats. There are several such data sources for California and Oregon but none for Washington. Compared to most other sources of recreational fishing data, the onboard observer programs collect information at very fine temporal and spatial scales (e.g., by drift at specific locations), which makes it possible to analyze catch rates (CPUE) for a consistent set of fishing locations that are known to provide habitat suitable for the target fish species. Classifying CPUE data based on habitat suitability allows the exclusion of zero catch rates that occur when fishing on unsuitable habitats. These structural zeroes provide no information on changes in fish abundance. Having maps of the suitable habitat areas also provides a basis for weighting the CPUE observations by the relative area of the habitat.

Data from the onboard observer programs were used in 2013 to develop abundance indices for several data-moderate stock assessments. The 2013 analysis developed maps of suitable habitat by placing spatial buffers around locations that produced catches of the target species. The approach that will be used in 2015 will incorporate information on bathymetry and substrate type, which will result in more refined boundaries for suitable habitat. Reef polygons have been constructed based on bathymetry roughness and substrate maps and then assembled into reef systems. Comparisons of the 2013 versus 2015 habitat boundaries show overlap and some large differences.

Modeling of the CPUE data had not begun but several types of analyses were being contemplated (e.g., delta-GLMs as in 2013, models with reef as a random effect and/or grouping reefs based on sample sizes). Melissa discussed various changes in fishing regulations that the analysis will need to consider, including bag limits and depth closures. There have been substantial changes over the years in the depths that have been fished. With regard to developing indices at different spatial scales, Melissa indicated that it would be relatively easy to develop state-specific indices but more difficult to develop coastwide indices or ones that break at lines other than state boundaries.

Oregon commercial and recreational data. Mr. Patrick Mirick from ODFW presented proposed reconstructions of Oregon recreational catches of China rockfish, black rockfish, and kelp greenling and described the methods used to develop the reconstructions. The commercial fishery removals for 1892 to 1986 were based on landings data assembled by Gertseva, Karnowski, and Stephens and described in the report, "Historical reconstruction of Oregon's commercial fisheries landings". Landings data since 1986 were from PacFIN. Because rockfish species were often landed in mixed-species "market" categories, estimating landings by species requires data on species compositions for each market category. Regular sampling for rockfish species compositions did not begin until the 1980s. Patrick noted that the proposed reconstruction for China rockfish included troll-caught fish but these probably were an artifact of applying species compositions based on data from recreational fisheries. The catch reconstruction for black rockfish differed substantially from the reconstruction used in the 2007 assessment and the ratio of the two series was variable (i.e., not just due to use of a different fixed value for black rockfish as a fraction of total rockfish landings).

Recreational fishery catches were based on information collected by the Oregon Recreational Boat Survey (ORBS). Catch estimates from the Marine Recreational Fishery Statistics Survey (MRFSS), based on angler interviews and telephone surveys, are considered to be unreliable. The ORBS program estimates catches by combining dockside interview data with angler counts from logbooks for charter vessels and visual counts of recreational fishing boats exiting and returning to port. There has been very comprehensive sampling by the ORBS program since 2000. Catch reconstructions for prior to 2000 used ratio estimators to fill in gaps due to time periods that were not sampled (e.g., the winter months) and small ports that were not sampled.

The ORBS program does not account for recreational fishing that occurs in estuaries or that is shore-based. However, information on these modes of fishing was collected by the MRFSS and for two years by an ODFW Shore and Estuary Boat Survey (SEBS). Data from the MRFSS and the SEBS were extrapolated and interpolated to provide catch estimates for black rockfish and kelp greenling for years with missing observations (1991, 1992, 2005 to 2014). The MRFSS and the SEBS indicated that no China rockfish were caught from shore or by boats fishing in estuaries. Estuary and shore-based fishing accounted for a significant portion of the catch of kelp greenling prior to the late 1990s and relatively high catches for 1980, the first year of the MRFSS series. Patrick proposed reconstructing catches of kelp greenling prior to 1980 by scaling to the human population in Oregon.

There was discussion of how to construct a plausible ramp for the recreational catches prior to 1980. One suggestion was to start the ramp based on the California catch reconstruction, which considered anecdotal information as well as license sales from the mid-1930s through recent years. Other potential starting years would be somewhere between the 1920s and the post WWII period. The catch for the end of the ramp was also discussed because there was large variability in the catches during the 1980s. The stock assessment should explore sensitivity to both the starting and ending points of the historical ramp given that this may be an important component of uncertainty in the assessment.

Methods for Expanding Commercial Compositional Data. Dr. Andi Stephens (NWFSC) described various steps involved in processing sample data for age- or length-composition. She has developed a software package for processing data downloaded from the PacFIN Biological Data System (BDS). The first step is trip-level expansion based on the ratio of the total weight of the landed catch over the weight of the sampled landings. There are several options for

estimating the weight of the sampled landings if direct observations are not available. There are also several options available to make stratum-level expansions that combine the individual trip-level expansions.

There was discussion of a problem identified by Dr. Theresa Tsou (WDFW) that arises with Washington data if a fishing trip delivers fish to more than one fish dealer. Deliveries that are split between Oregon and Washington ports also have this problem. The expansion process should aggregate samples from "split deliveries" and expand to the total landed weight reported across all fish tickets for that trip. Oregon data include trip-level landings for any split-deliveries if all the fish are landed in Oregon.

Trip-based recreational CPUE indices. Dr. E.J. Dick (SWFSC) discussed issues with using recreational catch and effort data series that are based on dockside sampling (as opposed to the at-sea observer program data series described earlier). There are three sources of such data: the MRFSS Type-3 records from interviews with anglers in California and Oregon; the ORBS program in Oregon; and the Ocean Sampling Program (OSP) in Washington. From these data sources it would be possible to develop five potential CPUE indices for China and black rockfish and two potential indices for kelp greenling. The method requires that the catch and effort data be identifiable at the level of a trip. An algorithm was developed in 2013 for processing the MRFSS Type-3 data. The trip-level data would then be filtered to remove structural zeroes based on species compositions using the method of Stephens and MacCall (2004). E.J. noted a problem in the California data because the onboard samplers sometimes reported Type-3 data following an observed trip, thus resulting in double use of data from some trips. The problem may also occur in the Oregon data but is less likely because the onboard sampling was done independently of the MRFSS interviews. There was discussion but no resolution of the best way to handle the problem.

Data availability and issues associated with developing Washington CPUE indices. Dr. Theresa Tsou (WDFW) presented information related to Washington's OSP. Theresa noted that the recent Marine Recreational Information Program review of the OSP had been favorable. Washington groundfish catch estimation for recreational fisheries relies on two main components: a) a complete count of the vessels leaving or returning to a port and b) dockside composition sampling to estimate catch and effort. Unlike California and Oregon, there is no onboard observer sampling in Washington. Sampling and effort counts occur during the primary fishing season from spring to fall. Winter months are not sampled and are considered to have negligible landings. Although major jetties are sampled, other types of shore-based fishing are not sampled and are also considered negligible.

Other information collected during dockside sampling includes the primary target species, number of anglers, management area fished, number of released fish by species, and fishing depth. The retained catch is divided into species and enumerated, though flatfish are not resolved to species. Landed numbers are converted to landed weights using tabled values of average weights.

It was noted that Oregon and Washington have a "reciprocity" agreement for recreational fisheries from Cape Falcon off Oregon to Leadbetter Point off Washington. Some portion of the Washington catch coming into Columbia River ports is from fishing areas off Oregon. Similarly some portion of Oregon landings come from Washington waters, though the lack of suitable habitat for nearshore species north of the Columbia River mouth makes this of less concern. The

magnitude of this problem should be evaluated if possible. A modest amount of ambiguity concerning geographic boundaries of the assessment is unlikely to have a large impact on assessment results. The reciprocity agreement does not apply to commercial fisheries.

The group also discussed the interviews of charter boat captains summarized in documents provided by Mr. Mark Cedergreen and Mr. Tom Burlingame. This information should be taken into consideration when developing stock assessments for black and China rockfish. Of particular interest are summaries of fishing strategies and gear, as well as the population trends that are perceived by fishermen.

Washington's black rockfish tagging program. Theresa also described the Washington black rockfish tagging program, which is a long-term study with shifting objectives over time. Changes in spatial coverage and other aspects of survey design make it difficult to render the data in a form suitable for use in assessment models. The tagging program extends from 1981-2013 (33 years). The entire coast was sampled in only a few years (1986-1990). In recent years (1998-2013) tagging has focused on the central Washington coast. Use of recent data in a stock assessment for the State of Washington will require making the assumption that the trend in the area covered by the tagging program is representative of the entire state.

The tagging study was used in the previous stock assessment by obtaining Petersen estimates of population abundance for the period 2000-2006. Due to the limited sampling area, the assessment model estimated a catchability coefficient (q) to represent the proportionality between the tagging study estimate of abundance and the population abundance. The tagging study also provided a CPUE series from the tag-release trips.

The group discussed various ways that black rockfish tagging data could potentially be incorporated in the stock assessment:

1. Fully incorporating the tag recovery data into the stock assessment. Stock Synthesis includes a fairly rudimentary capacity for including tagging data. Tagged fish would need to be grouped into age groups for each release year, so that these cohorts could be tracked over time. Generally this option would require making relatively strong assumptions regarding how cohorts of tagged fish behave relative to untagged fish.
2. Incorporate tagging data in the assessment as an abundance index based on analysis of tagging data using conventional mark-recapture methods such as Petersen estimates, or perhaps Jolly-Seber models. This approach was used in previous black rockfish assessments for both Oregon and Washington. It represents a compromise between rigor and practicality, but still relies on certain assumptions that may be difficult to support.
3. Develop a CPUE index based simply on a standardized catch rate during tagging operations. These data are likely to be more reliable than fishery-dependent CPUE data, but still could be criticized because of uneven spatial coverage.
4. Exclude the tagging data entirely from the assessment.

There was considerable discussion regarding these various approaches. Generally it was concluded that the integrated approach to using tagging data (Option 1) should not be used in the upcoming black rockfish assessment due to the strong assumptions that are required. The group recommends that the approach used in the previous assessment (Option 2) be evaluated at least as a bridge model between the previous assessment and the current assessment. The STAT is considering the CPUE approach (Option 3) as a way to incorporate the data from the tagging

program in the assessment in some fashion, while avoiding the necessity of making strong assumptions required for use of the tagging data.

Data availability and issues associated with developing Oregon CPUE indices. Mr. Patrick Mirick (ODFW) presented information related to developing indices from Oregon's recreational fishery for nearshore species. Indices can potentially be developed from both dockside intercept surveys and onboard observer data. There are two sampling programs based on dockside intercept surveys: the MRFSS data set extending from 1980 to 2003, and the ORBS data set extending from 2001 to 2014. Aggregated data for ORBS extends back to 1980, but the raw data are no longer available.

There are a number of possible options for developing a CPUE time series from the available data. Since similar information is collected for both sampling programs, the group discussed whether or not it would be possible to combine the MRFSS and the ORBS data into a single CPUE time series. Different sampling programs use different measures of effort which may limit the possibilities for combining these time series. The MRFSS program records time spent fishing whereas the ORBS program records the duration of the fishing trip, including travel time. A potential issue with how the data are entered in data loggers was mentioned. The time when data are entered into the logger establishes the trip ending time, but apparently some port samplers write the information down on paper and enter it into the data logger at some later time. It is unclear how widespread this practice is.

It was noted that the use of aggregated ORBS data would make it possible develop a CPUE time series over the entire time period 1980-2014, but extending the CPUE time series would come at the cost of losing spatial resolution with respect to fishing area and depth. It may be possible to evaluate the impact of lower spatial resolution by comparing the aggregated ORBS trend with the trend from the onboard observer CPUE, which has high spatial resolution.

Another issue that was discussed was whether it was appropriate to use both onboard observer data and ORBS data when the same trip was sampled by both sampling programs. This same issue was raised by Dr. E.J. Dick in relation to the CPUE data from California. Clearly the onboard observer data has precedence since it is has higher spatial resolution and is less affected by fishing regulations. If both sampling programs operate independently, exclusion of trips simply because they were sampled by another program may increase the variance of CPUE estimates, which is not a desirable outcome.

Regulations that could potentially influence CPUE indices were discussed. A multispecies bag limit is used in Oregon for "marine fish," which includes rockfish, kelp greenling, and cabezon. Sub-limits for selected species such as cabezon are also used. The bag limit has been gradually reduced over time from 15 fish to 7 fish. Summer depth restrictions at 30 and 40 fathoms have also been used to reduce bycatch of rebuilding species such as canary rockfish. Limiting CPUE data to less than 30 fathoms would be one way to account for changes in depth restrictions, though it may also be possible to account for depth restrictions in the GLM model for CPUE.

The group also discussed the impact of the mixed bag limit on CPUE trends for different species. The primary concern was whether changes in the abundance of black rockfish would impact CPUE indices of other species included in the mixed bag, such as kelp greenling and China rockfish. A scenario was discussed where the high abundance of black rockfish in mid-water aggregations would prevent the hooks from ever getting to the bottom where China

rockfish and kelp greenling are found. High abundance of black rockfish could lead to increased fishing in areas where black rockfish are located, and reduced effort in high relief habitats preferred by China rockfish AND kelp greenling. The CPUE time series for different species may show an inverse correlation if these interactions are important.

Data availability and issues associated with developing an Oregon commercial nearshore logbook CPUE index. Mr. Brett Rodomsky presented information related to developing indices from logbooks collected from Oregon's commercial nearshore fishery. The nearshore fishery in its present form dates from 2003 with establishment of a permit system for black and blue rockfish, and a nearshore endorsement for other species. Permits for black and blue rockfish only are distributed throughout Oregon coastal regions, while vessels with a nearshore endorsement are concentrated in southern Oregon ports such as Port Orford and Gold Beach.

Many of the logbooks are incomplete or have reliability concerns, so a filter was applied to exclude logbooks with unreliable data. More than 50% of the logbooks were excluded based on these considerations, though comparison of trends between the full logbook data and the "reliable" subset did not show large differences. Presently, the logbooks and fish tickets are not linked. Although linking these two sets of data is unlikely to be accomplished during the current assessment cycle, this should be viewed as a priority task.

Factors that could potentially influence CPUE indices were discussed. There are strong spatial patterns in harvest of different nearshore species, with kelp greenling and China rockfish taken primarily from the southern areas, while black rockfish harvests are more evenly distributed. The nearshore commercial fishery is subject to landing caps, period trip limits, and daily limits that constrain catches, and each of these limits have varied over time.

Data availability and issues associated with developing California CPUE indices. No presentations were given under this agenda item. The topic had already been covered in the earlier presentation by Dr. Melissa Monk.

Joint meeting of the Stock Assessment Teams. The plenary workshop ended mid-afternoon to provide time for the STATs to clarify that all relevant data sources had been addressed and to discuss cross-cutting issues, workloads, and timelines for completing the stock assessments.

Day 3 – 04/01/2015.

Washington nearshore management history. Ms. Heather Reed (WDFW) presented information on the history of regulations influencing nearshore recreational and commercial fisheries in Washington. The recreational fisheries are regulated using depth restrictions and closed areas, with the aim of lessening catches of canary and yelloweye rockfish, which are currently managed under rebuilding plans. Other recreational regulations include seasonal closures, daily bag limits, and non-retention rules. In addition to regional differences in some management measures, there have been changes to the regulations through the years (e.g., the daily groundfish bag limit dropped from 15 to 12 fish in 1992 and from 12 to 10 fish in 1995). Commercial fishing operations off Washington have been affected by trip limits and spatial closures. For example, state waters (0-3 miles) were closed to hook and line operations in 1995 and to trawling in 1999.

Oregon nearshore management history. Ms. Lynn Mattes (ODFW) described the history of regulations influencing nearshore commercial and recreational fisheries in Oregon. Many of the regulations and important changes in regulations had been discussed during previous

presentations. State caps on landings of nearshore species began in 2002. Tools for regulating the recreational fishery have included bag limits, seasonal depth restrictions, non-retention of certain species, closed areas, and minimum size limits (e.g., 10 inch limit for greenling). Tools for regulating the commercial nearshore fishery have included trip limits, adjustments to the shoreward boundary of the Rockfish Conservation Area, and minimum size limits (e.g., 12 inch limit for greenling). In addition to annual adjustments, regulations are sometimes adjusted in season. ODFW provided a report with details of the annual regulations and in-season adjustments for both the recreational and commercial fisheries in Oregon.

California nearshore management history. Mr. John Budrick (CDFW) described the history of regulations for California's nearshore recreational and commercial fisheries. The recreational fishery has been regulated using bag limits, depth restrictions, time-area closures, length and gear restrictions, and season lengths. Some of the notable restrictions on the recreational fishery have included a two-fish bag limit for nearshore rockfish (including China rockfish) in 2003 and 2004, depth restrictions that have varied by management area, and the system of marine protected areas in state waters that has been gradually implemented during recent years. Restrictions on the commercial fishery, which have varied over the years and regionally in some cases, include gear restrictions, limited entry permits, trip limits, depth restrictions, length restrictions, and time-area closures.

Stock structure considerations. Dr. Martin Dorn from the Alaska Fisheries Science Center briefly described a framework developed and used in the North Pacific Fishery Management Council for identifying and distinguishing stocks spatially for the purposes of stock assessment and management. Features that could be considered include evidence of genetic isolation, natural tags (e.g., otolith microchemistry or parasites), physical barriers to larval dispersal, spatial differences in population trends, temporally stable differences in growth, or differences in spawning times.

General comments.

The workshop provided a useful forum for exchanging information between the state fishery agencies and the STATs. This was particularly important in the case of the nearshore stocks because most of the available data were collected and processed by staff from the state agencies. Further, the state agency representatives had much closer knowledge of and experience with changes in fishery regulations that may have influenced the nearshore fisheries and associated data streams.

The STATs will not be able to address all of the issues that were raised during this workshop between now and when these assessment are due to be reviewed later in the year. The teams will need to evaluate the workload associated with the various issues, and to prioritize their time on tasks that can be addressed in the time available and contribute most to the assessment. Some issues are better addressed in off cycle years for use in future stock assessments.

Recommendations.

During the final hours of the workshop the group discussed various issues that had been raised. The following recommendations were developed.

Area Stratifications / Regional Assessment Models

- In developing area stratifications for their assessment models the STATs should explore available evidence in terms of genetics, life history patterns, age- or length-compositions, exploitation trends, or state-specific data (e.g., the Oregon nearshore logbook). Management history should be taken in to account in determining area stratifications.
- The STATs should explore state-specific stratifications for the assessment models. If the available data do not compel a state-specific stratification, the final assessment should nonetheless provide estimates of relative biomass by state to inform management decisions.
- The STAT for China rockfish should provide estimates of biomass north and south of the Council's management boundary at 40°10' N latitude.
- The STATs for black rockfish and China rockfish should not conduct coastwide (one-area) assessments because state-to-state differences in exploitation and management almost certainly have created spatial structure in the age-structure and abundance of these stocks.
- The STATs should minimize borrowing data from other areas to inform an assessment, although borrowing life history data may be a reasonable exception.
- The STAT for black rockfish should use port of landing of recreational catches by state for area stratifications. Further exploration of historical trawl catches is needed to apportion landings in Astoria and Ilwaco.

Methodologies

- The new methodology presented by Dr. Melissa Monk (for processing the at-sea observer data from the recreational fisheries in California and Oregon) is a substantial improvement over the methodology that was used in the last assessment cycle to produce CPUE indices for some of the data-moderate assessments. The workshop participants recommend use of this new methodology.
- There are issues that need to be explored and resolved with respect to combining habitat and CPUE data from Oregon and California. The data are not strictly compatible.
- The CPUE analysts should keep management boundaries and depth restrictions in mind when choosing spatial strata for CPUE standardization.
- Most changes in management and regulations have been documented and included in a database so they can be incorporated into CPUE standardizations. Analysts should ensure these databases are complete with respect to all management changes that may have affected recent and historical data.
- Along with gear changes, many other technological changes have occurred over the length of the CPUE time series that may have affected catchability (e.g., the introduction of depth finders and GPS). The STATs should consider the importance of these changes and how to address these potential effects (gradual change, step functions, etc.). The South Atlantic Fishery Management Council has had to deal with potential temporal changes in catchability for many of their fisheries; it might be worth exploring approaches they have developed.

- Analysts should explore ways to address the potential effects of bag limit changes on CPUE series. High resolution effort data (e.g., fishing hours) may alleviate some of this problem. East Coast fisheries have had to deal with bag limits for many of their recreational fishery CPUE indices. Analysts should explore how other assessment scientists have dealt with this issue.
- Analysts should consider differences in the effort metric between CPUE indices based on ORBS (trip duration) and MRFSS (fishing time) data.
- Changes in depth restrictions and the creation of MPAs will affect the spatial distribution of effort. CPUE indices that are based on data with spatial information may not be as affected because those changes will be tracked directly. However, if these depth and area restrictions moved effort out of hot-spots, analysts must consider how to address the loss of information from these areas.
- In the Oregon historical catch reconstruction for kelp greenling the catches prior to 1980 should ramp up from the WWII era rather than being scaled to the human population size. Also, the catch for 1979 should be based on an average catch during the early years when catch data were available rather than the estimated 1980 catch.
- The Oregon historical catch reconstruction for kelp greenling should explore alternatives to the assumption that the shore and estuary catches of kelp greenling were constant during the last 10 years.
- The STATs for black rockfish and kelp greenling should consider the sensitivity of the assessment results to uncertainty in the historical catch series.
- The STAT for black rockfish should consider using the Washington (and possibly the Oregon) tag release data of black rockfish to develop a CPUE index. A bridge model run using tagging data as an absolute abundance estimation method (e.g., the Peterson approach in the 2007 northern black rockfish assessment) may be an option to explore.
- The STATs for all three stocks should explore developing CPUE indices using the Oregon nearshore commercial fishery logbook data.
- The STATs for China rockfish and kelp greenling should attempt to explore multispecies aspects when interpreting recreational CPUE trends for China rockfish and kelp greenling (for example, comparing the CPUE for black rockfish with an aggregate CPUE for benthic target rockfish species, or comparing CPUE trends from different fishing sectors).
- Changes in market forces will change the targeting behavior of fishermen. This will be particularly evident with the rise of the live-fish fishery where smaller fish are more valuable per pound than larger fish. Such changes in market preference will affect the observed species compositions and should be accounted for in both CPUE indices and selectivity functions.
- Changes in regulations and gear (e.g., use of descending devices) may change discard patterns or discard mortality rates. Analysts should ensure discards are being appropriately accounted for (e.g., catch-per-unit-effort vs. landings- or retained-fish-per-unit-effort, incorporation of discards in historical reconstructions, etc.).

Appendix 1 List of Workshop Participants

Dr. David Sampson, Oregon State University, Scientific and Statistical Committee, Kelp Greenling STAR Chair, Workshop Chair
Dr. Andrew Cooper, Simon Fraser University, Scientific and Statistical Committee, Black Rockfish STAR Chair
Dr. Martin Dorn, NMFS Alaska Fisheries Science Center, Scientific and Statistical Committee, China Rockfish STAR Chair
Dr. E.J. Dick, NMFS Southwest Fisheries Science Center, Lead STAT for China Rockfish
Dr. Jason Cope, NMFS Northwest Fisheries Science Center, Lead STAT for Black Rockfish
Dr. Aaron Berger, NMFS Northwest Fisheries Science Center, Lead STAT for Kelp Greenling
Ms. Meisha Key, California Department of Fish and Wildlife, Scientific and Statistical Committee Chair, Black Rockfish STAT
Dr. Ian Taylor, NMFS Northwest Fisheries Science Center, China Rockfish STAT
Dr. Melissa Monk, NMFS Southwest Fisheries Science Center, China Rockfish STAT
Dr. Andi Stephens, NMFS Northwest Fisheries Science Center, Black Rockfish STAT
Mr. Patrick Mirick, Oregon Department of Fish and Wildlife, Black Rockfish STAT, China Rockfish STAT, Kelp Greenling STAT
Ms. Heather Reed, Washington Department of Fish and Wildlife, Groundfish Management Team Chair
Dr. Theresa Tsou, Washington Department of Fish and Wildlife, Scientific and Statistical Committee
Dr. Jim Hastie, NMFS Northwest Fisheries Science Center
Dr. John Field, NMFS Southwest Fisheries Science Center, Scientific and Statistical Committee
Mr. Troy Buell, Oregon Department of Fish and Wildlife
Mr. Brett Rodomsky, Oregon Department of Fish and Wildlife
Mr. Craig Good, Oregon Department of Fish and Wildlife
Ms. Lynn Mattes, Oregon Department of Fish and Wildlife, Groundfish Management Team
Mr. Corey Niles, Washington Department of Fish and Wildlife
Ms. Jessi Doerpinghaus, Washington Department of Fish and Wildlife, Groundfish Management Team
Ms. Lorna Wargo, Washington Department of Fish and Wildlife
Mr. Phil Weyland, Washington Department of Fish and Wildlife
Mr. Brad Speidel, Washington Department of Fish and Wildlife
Mr. John Budrick, California Department of Fish and Wildlife, Groundfish Management Team
Mr. Ed Hibsch, Pacific States Marine Fisheries Commission
Mr. Gerry Richter, Pt. Conception Groundfishermens Association, Groundfish Advisory Subpanel
Mr. John Holloway, Groundfish Advisory Subpanel
Mr. Mark Cedergreen
Mr. Bill James
Mr. John DeVore, Pacific Fishery Management Council