# OREGON DEPARTMENT OF FISH AND WILDLIFE REPORT ON THE OREGON BLACK ROCKFISH STOCK ASSESSMENT

## Introduction

Black rockfish are one of the most important species to Oregon's coastal marine recreational fisheries and are the mainstay of Oregon's vibrant charter fishing industry. Opportunities for salmon and tuna fluctuate widely from year to year, halibut seasons are very limited in both time and space, and shelf groundfish are inaccessible most of the year due to Rockfish Conservation Areas. The stability, availability, and accessibility of black rockfish fishing opportunities has made this stock a backstop against variability in other opportunities, insulating coastal small businesses and economies to some degree from the uncertainty surrounding other fishing opportunities. The importance of the black rockfish and other nearshore rockfish stocks is clearly demonstrated in the distribution of the charter industry in Oregon: ports with nearshore reefs and associated fisheries sustain these operations, whereas ports without shallow reefs do not (e.g., Florence and Winchester Bay). Black rockfish are also important to Oregon's commercial nearshore fishery, particularly in some remote communities with undiversified economies, such as Port Orford.

The Oregon Department of Fish and Wildlife (ODFW) participated fully in the 2015 stock assessment process for black rockfish, and emerged with reservations regarding the reliability of this assessment for management, as currently specified. As is the case with many assessments, modest changes to key parameters which are difficult to estimate drastically alter outputs such as depletion and yield. In contrast to the volatility exhibited by model outputs in response to varying parameters, directly measured quantities for black rockfish such as total catch and effort, size distribution, age distribution, catch per unit effort (CPUE), and geographic area of fishing have been relatively unchanging over several decades, and paint a picture of a fishery that has been productive and stable over that timeframe. We are concerned about potentially curtailing a stable, successful fishery which has shown little sign of change under the current management regime based on a stock assessment that is extremely sensitive to assumptions and constraints and is described in the mop-up panel report as 'data rich but information poor' (Agenda Item I.3, Attachment 3).

## A Historical Perspective

Examining the history of the fishery provides one line of evidence for the sustainability of current harvest levels and practices. While total black rockfish removals do fluctuate from year to year, they have largely ranged between 350 and 450 metric tons per year for nearly 35 years without a discernable trend over the long term (Agenda Item I.3, Attachment 1, Figure ES-2). In addition, as acknowledged by reviewers and the Stock Assessment Team (STAT) throughout the review process, there has been little change in the size or age distribution, or the various indices of abundance used in the assessment. We believe that the lack of contrast in these direct metrics provides strong evidence that current management practices and harvest levels are sustainable over the long term.

## Recent Management

The state of Oregon has taken a proactive and precautionary approach to managing nearshore groundfish fisheries. When catches ramped up in the late 1990's due to development of the artisanal commercial fishery targeting black rockfish, within a few years ODFW implemented a management regime that set sector-specific hard limits on annual catches which were substantially lower than allowed under federal regulations at the time. Oregon has continued to set conservative catch limits and regulations for black rockfish through the present day, including lower recreational bag limits and lower commercial trip limits than allowed federally. Given the importance of the black rockfish stock to Oregon's coastal communities,

this risk-averse approach is well founded and has been supported by many Oregonians involved in fisheries. Perhaps the most telling example of Oregon's precautionary approach is the reaction to a substantial increase in the Acceptable Biological Catch (ABC) resulting from the 2007 South of Falcon black rockfish assessment (Sampson 2007). While the stock assessment results indicated that a substantial increase in harvest (up to 1,469 mt; PFMC and NMFS, 2009) off Oregon and California could be realized, through the Council process ODFW supported a lower, constant catch limit of 1,000 mt for the area. ODFW's management response was to increase the recreational marine fish bag limit (which includes black rockfish) from 6 fish to 7 fish per person, a level lower than both the former state bag limit (10 marine fish) or the federally allowed bag limit (15 fish). On the commercial side, two month period limits for black rockfish and blue rockfish combined were increased by 200 pounds for the 120 state permit holders who can participate in that fishery. This can certainly be characterized as a precautionary harvest policy given the scientific advice at the time, and the same basic policy and management measures, which prioritize stability over maximized harvest, remain in place to this day.

**Treatment of natural mortality (M) –**

It is difficult to make sense of the contrasting information contained in each state assessment on the estimation of natural mortality (M). This issue was explored exhaustively during the review process, and a detailed review is given in the mop-up panel report (Agenda Item I.3. Attachment 3). Here, we simply emphasize that several lines of evidence support the plausibility of M values higher than the fixed 0.17 used for males and young females in the Oregon model. Using the method of Hewitt et al (2007), direct estimates of M from an ODFW tagging study of black rockfish (described further below) averaged in the range of 0.21 – 0.24 (sexes combined), depending on the structure of the tagging model, and direct estimates described in the 2008 North of Falcon assessment (Wallace et al, 2008; pg. 26) arrived at similar values of 0.22 for males and 0.27 for females. ODFW feels that these direct estimates are superior to indirect estimates based on life history characteristics such as maximum age or growth coefficients, or poorly informed Stock Synthesis estimates. Finally, the Stock Synthesis estimates of female M for the Washington and California models, which formed the basis of the fixed value for Oregon, were either informed by conflicting information (Washington, where age data favored higher M and length data lower M) or were only well informed as to a minimum value for female M (California, with values up to 0.24 being nearly as likely as the estimated value of 0.18; Agenda Item I.3, Attachment 1; figures 71 and 227).

**Mark-Recapture Estimates of Abundance and Exploitation Rate–**

As detailed in Section 2.1.6.5.4 of the draft assessment document (Agenda Item I.3, Attachment 1), ODFW conducted a mark-recapture tagging experiment for black rockfish from 2004-2013. This project was initiated to generate direct estimates of survival, exploitation rate, and population abundance for a portion of the black rockfish stock, with the explicit purpose of 'ground-truthing' assessment models. The abundance estimates from the project were included in the 2007 assessment (Sampson, 2007) as an index of abundance with a freely estimated catchability coefficient, or 'Tag-Q', interpreted as the model's estimate of the proportion of the exploitable population occurring within the tagging project area off of Newport, Oregon. Throughout the review process for that assessment, the model-estimated Tag-Q was compared to an independent estimate based on the relative proportion of black rockfish habitat occurring inside the tagging area, using the information from the tagging project as intended.

For the 2015 black rockfish assessment, six additional years of abundance information from the ODFW tagging study were utilized. The proportion of black rockfish occurring in the tagging area was re-analyzed using the most up-to-date black rockfish habitat maps and CPUE to estimate relative black rockfish density by port (Agenda Item I.3, Attachment 1; Table 39). In addition, the assessment area is much smaller than in 2007 (Oregon only, rather than all areas south of Cape Falcon); therefore the tagging study represents a larger portion of the assessed population. ODFW believes that these factors increase both the reliability of the abundance estimates based on the tagging study and the ability to scale those estimates to the entire

assessed population relative to the 2007 assessment. The current analysis estimates that 12.7 percent of the exploitable Oregon population of black rockfish occurs within the tagging project area. In stark contrast, estimated Tag-Q in the proposed base model for the mop-up panel implied that about 60 percent of the population occurred within the tagging area, which represents less than 10 percent of the available habitat off Oregon. We firmly believe that model results such as this are highly implausible given that the tagging study is the only source of direct information on the scale of the black rockfish population off Oregon, albeit for a limited area.

Finally, the direct estimates of annual exploitation rates from the tagging study are low relative to estimates generated by many of the model configurations explored, currently ranging from 3 percent to 5 percent per year. It is important to note that the tagging study was conducted in the area off Newport in part because it is one of the most heavily exploited areas on the coast of Oregon. Newport has the highest level of marine recreational effort and catch of any Oregon port, largely due to its proximity to Willamette Valley population centers, robust charter boat fleet, and a bar that is relatively easy to navigate. From 2010 through 2014, an average of 23.8 percent of Oregon's coastwide recreational catch of black rockfish (and 24.7 percent of bottomfish trips) came from Newport. Newport's proportion of coastwide catch is substantially higher than the estimated proportion of habitat occurring in the area. Therefore, coastwide exploitation rates are likely to be lower than those estimated from the tagging study area, and lower than the rates generated by many model configurations.

**Response to Research Recommendations**

A number of excellent recommendations for further research were generated as a result of the stock assessment review process. There are several that may be addressed by ODFW within a relatively short time frame (i.e., one or two biennial assessment cycles). Examples include re-aging of some age structures read in earlier years using reliable and known age readers, addressing potential issues with the selectivity of the tagging study through further analysis based on suggestions of the reviewers, and resolving differences in mean lengths from different creel surveys (i.e., MRFSS vs. ORBS). In addition, ODFW is conducting extensive fishery-independent research to evaluate the effects of Oregon's marine reserves, which will provide information on relative size and age structure of black rockfish populations in fished versus unfished areas. Given the small home ranges estimated for black rockfish, this could, for example, help shed light on questions of natural mortality rates and the lack of older females in the catch data. We are also exploring a combination of acoustic and visual tools to estimate semi-pelagic rockfish population sizes (e.g., black rockfish and blue rockfish) and while this is likely a longer-term proposition, we are hopeful that these tools will eventually provide information on absolute abundance across a larger area and for more species than the black rockfish tagging study. It is of course unknown if any of these recommendations will result in a clearer picture of black rockfish population dynamics, but we feel that this stock should be a high priority for reassessment in the near future if substantial data improvements can be made that have a high probability of producing a more robust assessment.

**Conclusions**

All three state-specific black rockfish assessments conducted in 2015 were exceptionally challenging given the lack of fishery-independent data. This appeared to be especially true for the Oregon assessment where fishery-dependent data seemed to be largely uninformative as well. We appreciate the time, effort, and work of everyone involved to come to some resolution, but at the same time feel that there are fundamental aspects of black rockfish population dynamics simply are not well understood and are not captured in the current model specification. For example, alternative stock structure assumptions, stock recruitment relationships, or values of steepness were not explored at all during this process. We believe the ODFW tagging study offers the only direct evidence for the scale of the population, exploitation rate, and natural mortality rate, and these estimates should be strongly considered when evaluating plausibility of stock assessment results, especially in cases such as this where the results are highly sensitive to choices driven

by professional opinion and judgment on key parameters for which data are either nonexistent or uninformative. The apparent long-term stability of the population and the fishery, as indicated by a lack of change in fishery age structure, length structure, CPUE, and harvest levels, also provides strong evidence that current management is sustainable for this extremely valuable stock. Despite our reservations regarding aspects of this assessment, if it is endorsed as the best available science for setting black rockfish harvest levels off Oregon by the Council's Scientific and Statistical Committee, we feel it is acceptable for use in management until such time as new research or substantial data improvements are available.

**References**

Hewitt DA, Lambert DM, Hoenig JM, Lipcius RN, Bunnell DB, and TJ Miller. 2007. Direct and indirect estimates of natural mortality for Chesapeake Bay blue crab. Transactions of the American Fisheries Society 136: 1030-1040.

PFMC (Pacific Fishery Management Council) and NMFS (National Marine Fisheries Service). 2009. Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2009-2010 Pacific Coast Groundfish Fishery Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Pacific Fishery Management Council, Portland, OR. January 2009.

Sampson, David B. 2007. The Status of Black Rockfish off Oregon and California in 2007. Pacific Fishery Management Council, Portland, OR.

Wallace FR, Cheng YW, and TS Tsou. 2008. Status of the Black Rockfish Resource North of Cape Falcon, Oregon to the U.S.-Canada Border in 2006. Pacific Fishery Management Council, Portland, Oregon. December 2008.