OREGON'S GROUNDFISH FISHERIES AND INVESTIGATIONS IN 2011

OREGON DEPARTMENT OF FISH AND WILDLIFE

2012 AGENCY REPORT
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OREGON DEPARTMENT OF FISH AND WILDLIFE

A. AGENCY OVERVIEW – MARINE RESOURCES PROGRAM

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The Marine Resources Program (MRP) is within the Oregon Department of Fish and Wildlife (ODFW) and has the jurisdiction over marine fish, wildlife, and habitat issues coastwide. MRP is headquartered at Newport in the Hatfield Marine Science Center, with field stations at the coastal cities of Astoria, Tillamook, Charleston, Gold Beach, Brookings, and Corvallis. MRP is tasked with the responsibility for assessment, management, and sustainability of Oregon's marine habitat, biological resources and fisheries. In addition to direct responsibilities in state waters (from shore to three miles seaward), MRP provides technical support and policy recommendations to state, federal, regional, and international decision-makers who develop management strategies that affect Oregon fish and shellfish stocks, fisheries, and coastal communities. Staffing consists of approximately 60 permanent and more than 70 seasonal or temporary positions. The current annual program budget is approximately $8 million, with about 70% coming from state funds including sport license fees, commercial fish license and landing fees, and a small amount of state general fund. Grants from federal agencies and non-profit organizations account for the remaining 30%.

B. MULTISPECIES STUDIES

1. Sport Fisheries Project

Sampling of the ocean boat sport fishery by MRP's Ocean Recreational Boat Survey (ORBS) continued in 2011. Starting in November 2005, major ports were sampled year-round. We continue to estimate catch during unsampled periods in minor ports based on the relationship of effort and catch in minor ports relative to major ports observed during summer-fall periods when all ports are sampled. Samplers were stationed in all ports during the winter of 2011-2012, to attempt to ground truth estimates for unsampled periods. This was the result of a review of the ORBS program by and funded through the National Marine Recreational Information Program (MRIP). Black rockfish (*Sebastes melanops*) remains the dominant species caught in the ocean boat fishery. Lingcod (*Ophiodon elongatus)*, several other rockfish species, cabezon (*Scorpaenichthys marmoratus)* and kelp greenling (*Hexagrammos decagrammus)* are also commonly landed. Oregon's fishery for Pacific halibut (*Hippoglossus stenolepis)* continues to be a popular, high profile fishery requiring International Pacific Halibut Commission (IPHC), federal, and state technical and management considerations.

The ORBS program continued species composition, length and weight sampling of groundfish species at Oregon coastal ports during 2011. Since 2003, as part of a related marine fish ageing research project, lingcod fin rays and otoliths from several species of nearshore groundfish including rockfish species, kelp greenling and cabezon were gathered. Starting in 2001, from April through October, a portion of sport charter vessels were sampled at sea for species composition, discard rates and sizes, location, depth and catch per angler (CPUE) using ride-along samplers.

Starting in 2003, the recreational harvest of several groundfish species is monitored in-season for catch limit tracking purposes. In-season action was taken in 2011 to prohibit retention of cabezon by anglers fishing from boats. The shore fishery remained open. As in recent years, the retention of canary rockfish (*S. pinniger)* and yelloweye rockfish (*S. ruberrimus)* was prohibited year round. In order to remain within the yelloweye rockfish impact cap (via discard mortality), the recreational bottomfish fishery was restricted to inside of 20 fathoms from July 21 to September 30. Landings in the sport Pacific halibut fisheries were monitored weekly for tracking the status of catch limits. The majority of halibut continue to be landed in the central coast sub-area, with the greatest landings in Newport. Other ODFW management activities included participation in the U.S. West Coast Recreational Fish International Network (RecFIN) process, data analysis, and public hearings to discuss changes to the management of Pacific halibut and groundfish fisheries for 2012.

Starting in July 2005, sampling of the shore and estuary fishery was discontinued due to a lack of funding. Black rockfish make up the largest component of the estuary boat groundfish taken and surfperch made up the majority of shore-based catch by weight. Salmon dominate estuary boat landings by weight. Pacific herring historically have comprised the majority of both shore- and estuary-based boat landings by number of fish, but have not dominated catch in recent years. ODFW continues to pursue funding opportunities to reinstate the shore and estuary sampling program.

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2. Yellowtail Rockfish Exempted Fishing Permit

In 2009 and 2010, the Oregon Chapter of the Recreational Fishing Alliance (RFA-OR) in conjunction with ODFW received an exempted fishing permit (EFP) from the National Marine Fisheries Service (NMFS) to test experimental recreational fishing gear to target under-utilized yellowtail rockfish (*S. flavidus)* while avoiding the overfished yelloweye rockfish on select charter fishing trips. The experimental terminal tackle gear has a long leader (30-60 feet) between the weight and hooks, with a float to keep the line vertical in the water column. Ten charter vessels from three sections of the Oregon coast were to conduct three trips each over the course of the fishing season, to distribute trips spatially and temporally. ODFW supplied onboard samplers for each trip to gather information on total catch, gear set up, location, and to collect biological information from retained fish and provided some introductory data analysis.

Due to a delay in issuance of the permit by NMFS, no trips under this EFP were conducted in 2010. NMFS issued the permit for 12 months from the data of issue (late August 2010), rather than 12 calendar months. In 2011, 22 trips occurred out the ports of Garibaldi, Depoe Bay and Newport. The applicant did not apply for an EFP for 2012; therefore no further trips are anticipated. Data analysis will continue into 2012.

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3. Commercial Fisheries Monitoring and Sampling

Data from commercial groundfish landings are collected throughout the year and routinely analyzed by ODFW to provide current information on groundfish fisheries and the status of the stocks. This information is used in management, including inseason adjustments of the commercial nearshore fishery, which is conducted in state waters. Species composition sampling of rockfish continued in 2011

for commercial trawl, fixed gear, and hook and line landings. Biological data including length, age, sex, and maturity status continued to be collected from landings of major commercial groundfish species.

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4. Maturity Studies

We continued research begun several years ago to produce histologically verified female maturity data for a variety of species for which maturity data is unavailable or outdated. A report detailing age and length at maturity data for female quillback and china rockfish (length only) was completed, available at: http://www.dfw.state.or.us/MRP/publications/#Research

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5. Movement of Rockfishes Using Acoustic Telemetry

Analysis of data continued from a 4-month 2010 study of the movements of quillback, copper and brown rockfish at Cape Perpetua, an area of low-relief emergent structure subject to frequent seasonal hypoxia. The data from this study, which utilized Vemco's VPS acoustic telemetry technology, has produced home range estimates for these species as well as very detailed information on movements and movement responses to a moderate hypoxic event.

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6. Development and Testing of a Video Lander for Studying Demersal Fishes on Nearshore Rocky Reefs

We completed several field projects designed to determine the utility of using a video lander to study the abundance and distribution of demersal fish living on high relief rocky reefs. Work in 2011 included a large-scale gridded survey to evaluate the suitability of the western boundary of the Yelloweye Rockfish Conservation Area (YRCA) at Stonewall Bank. The data showed that for the northern portion of the YRCA, the area just to the outside (west) of the closure boundary enclosed similar numbers of yelloweye rockfish and preferred habitat to the area inside the YRCA, suggesting that an expansion of the YRCA to the west would significantly improve the level of protection for yelloweye rockfish provided by this marine protected area. Analysis of relative abundance data for all of the common demersal species observed indicated that a video lander deployed in the manner used in this study could detect statistically significant differences in relative abundance of about ±50%. The write-up of this project continues.

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7. Reducing Eulachon Entrainment at the Footrope of a Shrimp Trawl

We continued field studies in 2011 examining how footrope changes can be used to reduce entrainment and subsequent bycatch of eulachon and other small demersal fish in a shrimp trawl. In 2010, an experimental footrope, modified by removing the central one third of the trawl groundline was shown to reduce eulachon bycatch by 33.9%, ($P < 0.001$). However, it also reduced the catch of ocean shrimp

(weight) by 22.2%. As a follow-up experiment in 2011, we fished the same experimental footrope design against the same control footrope, but reduced fishing line height in the experimental trawl to reduce shrimp loss. Shrimp loss dropped to just 14% with this change, however, eulachon bycatch reduction was also reduced to just 14%, relative to the control net. Our conclusion is that eulachon bycatch can be reduced by eliminating a large section of groundline. However, significant shrimp loss will result, which could result in more hours of towing, possibly negating benefits to eulachon populations.

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8. Evaluation of Eulachon and Other Species Behavior When Exiting a Shrimp Trawl

We conducted a study in 2011 that used high-definition stop-motion video to view the condition of eulachon and other fishes as they exited the escape opening of a bycatch reduction device in a shrimp trawl. Observed behaviors were quantified in relation to a proposed model of an ideal trawl escapement based on an actively swimming fish avoiding contact with the grid. This model of avoidance-based escapement assumed that a roundfish in excellent condition would, 1) maintain distance from the grid, 2) avoid physical contact with the grid, 3) maintain a forward swimming orientation, and 4) maintain an upright vertical orientation. Of the species and size classes of fish encountered, large eulachon (approximately 170-240 mm total length), came closest to the proposed model of avoidance-based escapement, indicating less behavioral impairment than other species. Almost 80% of the large eulachon maintained an upright vertical orientation throughout their escape and exited the trawl in a forward-swimming orientation. Large eulachon maintained distance from the deflecting grid better than the other species encountered ($P < 0.001$) and typically showed no contact or only minimal contact with it (63%). Only about 20-30% of the large eulachon showed behaviors indicating fatigue, such as laying on or sliding along the grid. In contrast, both adult and juvenile Pacific hake (*Merluccius productus*) frequently showed signs of fatigue, including sliding along or laying on the grid, exiting the trawl in physical contact with the grid or failing to maintain an upright vertical orientation throughout their escape. Lingcod (*Ophiodon elongatus*) and juvenile rockfish (*Sebastes* spp.) were intermediate in their escape behavior between Pacific hake and large eulachon.

A manuscript summarizing this work is in review at Fisheries Research.

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9. Marine Reserves in Oregon

Status of sites: Harvest prohibitions took effect on January 1, 2012 for Oregon's first two established marine reserve sites. Three new marine reserve sites have been identified and are to be established, as mandated by Senate Bill 1510 passed by the 2012 Oregon Legislature. Harvest prohibitions are not to take effect until two years of baseline data collection are completed.

Monitoring: For the two established marine reserve sites, ecological and human dimensions (social and economic) baseline data collection was completed in 2011. Data collection was conducted by ODFW staff and external scientific research partners. Local fishing vessels were utilized when and where

feasible. Baseline monitoring reports are to be completed in the spring of 2012. Monitoring will continue at these two sites.

In February 2012, ODFW hosted a marine reserves ecological monitoring workshop with 31 invited west coast scientists. The purpose of the meeting was to seek expert feedback on current and future ecological monitoring activities conducted by ODFW.

ODFW is to begin baseline data collection at two of the three new marine reserve sites in 2012.

Management plans: ODFW staff worked with local community teams, for the two established sites, to develop site management plans. The management plans outline strategies for ecological and human dimensions monitoring, reporting, and evaluation; outreach; compliance and enforcement; and community and public engagement. The plans also highlight priorities and implementation efforts of the local community that complement that of the state. Management plans for the two sites are to be completed in the spring of 2012.

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10. Hypoxia Effects on Seafloor Communities

As part of an Oregon Sea Grant research grant, personnel from ODFW's Marine Habitat Project partnered with the Partnership for Interdisciplinary Study of Coastal Oceans (PISCO) to continue and expand documentation of the ecological effects, including disturbance and recovery, of recently discovered hypoxia events on seafloor communities. We conducted a survey of seafloor biota at three sites offshore of central Oregon (Cape Perpetua, Yaquina Head, and Siletz Reef) with a Remotely Operated Vehicle (ROV) during May, June, August, and December of 2011. In concert with PISCO's efforts to collect oceanographic data (e.g., temperature, salinity, dissolved oxygen content), which documented the spatial extent and degree of hypoxia in the study area over a seasonal time scale, we collected video footage of organisms occurring on the seafloor along a previously-established (i.e. "fixed") transect line. Our objective was to continue the nearly-annual time series of ROV video data along a fixed transect line. We have monitored the Cape Perpetua reef complex regularly since 2000. Hypoxic events occurred on the inner continental shelf during September 2011, but the oceanographic extent and duration of these events were not as extreme as in prior years (e.g., 2002 and 2006). Due to vessel scheduling conflicts, we were not able to document immediate post-hypoxic conditions, but our site visit during December did not yield any significant qualitative differences in fish community structure or abundance. This was the second and final field season for this Sea Grant project, and data analysis and report writing will be performed in 2012.

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C. BY SPECIES

1. Black Rockfish PIT Tagging

Black rockfish comprise approximately 50% of the catch in Oregon's primary recreational groundfish fishery, making this species an important component of managing the fishery. Historically, assessments of black rockfish have relied on CPUE data from recreational fisheries to estimate the trend of relative population abundance. However, these data are not robust to problems of sampling bias, or to changes

in fishing distribution, bag limits, or fishing power. The need to independently estimate exploitation rates and population abundances for black rockfish off Oregon prompted us to investigate the use of passive integrated transponder (PIT) tags for a mark-recapture program. Since PIT tags are invisible to anglers, there is no tag non-reporting problem, and tag detection rates can be estimated directly. Tags are injected in the hypaxial musculature below the gill arches, determined to be the best site by a previous PIT tag retention study. At tagging, categorical barotrauma symptoms were noted and fish with significant barotrauma symptoms were recompressed by immediate submersion in a cage and released at depth. PIT tags (12mm x 2mm) were inserted in 4,188 black rockfish in 2011 during 20 days of fishing near Newport. The total number of black rockfish tagged since the project began in 2002 is now 32,759. Carcasses of black rockfish are counted and electronically scanned for tags year-round upon being landed by recreational and charter fishers. In 2011, 75% of the black rockfish landed in Newport and 37% of those landed in Depoe Bay were scanned for tags. We recovered 309 tags, all in Newport. All ten tag cohort years were recovered. We have had consistent recovery rates each year. Estimates of annual exploitation rate derived from this project vary from 3.2% to 4.9% and are less than expected assessment values of approximately 5%. Survival rate estimates remain imprecise, likely due to problems with non-mixing. As the number of fish tagged has increased, there has been a corresponding decrease in variation of parameter estimates. Black rockfish populations off Oregon and California underwent a full assessment in 2007. Results from this study were included in the 2007 assessment as an index of abundance for the assessed population. Based on the input of the assessment author and reviewers, this index will likely be incorporated in future assessments. Tagging and recovery efforts will continue in 2012.

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2. Photograph-based Length Estimation of Recreational Yelloweye Rockfish Discards

In 2011, we continued a portion of a 2010 pilot project designed to collect data on the length distribution of yelloweye rockfish discarded in the recreational bottomfish and halibut fisheries off Oregon. Due to the prohibition on retention in most U.S. west coast fisheries, data of this type has become extremely limited in recent years. Anglers were asked to photograph any yelloweye encountered with a known-size reference object in the photograph frame. The relationship between the length of the fish and the size of the reference object in the photograph can then be used to estimate the length of fish using computer software. We provided digital cameras to crewmembers of 20 participating charter vessels, and asked that they photograph all yelloweye rockfish they encountered over the course of the season. We suspended work with private vessels in 2011 due to the high effort required and low number of photos obtained until a more efficient method can be developed. Data on the number of useable photographs from 2011 was not available at the time of this report writing but work will continue into 2012.

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3. Morphological differences between “Blotched” and “Solid” Blue Rockfish Morphotypes

Blue rockfish (*S. mystinus*) are a major component of the nearshore fishery landings along the U.S. west coast. Field identification of blue rockfish relies on several characteristics; dark bars across the head, maxilla extends anterior of mid-orbit, blue coloration on the pelvic fins, spots absent on the dorsal membrane. By using these characters, we found two distinctly different fish were being grouped

together that can be distinguished as two morphotypes with careful observation. We have designated the terms 'blotched' and 'solid' to differentiate these two blue rockfish.

Recent genetic studies on blue rockfish have found population differences north and south of Cape Mendocino (Cope 2004). Burford and Bernardi (2008) confirmed the presence of two reproductively isolated sympatric lineages. Peterson (in review) confirmed two unique lineages and have assigned large genetic distances between these morphotypes. Burford (2009) has identified 30 private alleles in solid blue rockfish and 45 private alleles in blotched blue rockfish. These studies confirm major genetic isolation between these two morphotyes although there is confirmed habitat overlap.

We conducted a pilot study investigating morphological difference between the two blue rockfish morphotypes. Our research found three gross anatomical characters to distinguish between these morphotypes. Body shape and color and patterning were different between morphs. The blotched morph has a deeper body and head and green background coloration with small distinct dark patches of black color along the sides. The solid morph is more streamlined and has a uniform dark brown coloration with a speckled appearance. The second feature is the extension of the lower jaw. Solid blue rockfish morphs have an approximately 0.5 cm "overhang" of the lower maxillary while the blotched morph has little if no overhang. Ovary coloration is also different between morphs. Blotched morphs have a yellow/orange colored ovary while the solid morph has a slightly pink or cream colored ovary. Five morphometric characters also distinguish between these different blue rockfish morphotypes. Head depth at the posterior end of the maxilla, distance between the dorsal fin origin to the anal fin origin, distance between the dorsal fin insertion to the anal fin insertion, distance from the first dorsal spine to the anal fin origin and the depth of the caudal peduncle were all found to be significantly different between morphotypes. In 2012, we will examine specimens from the original description of *S. mystinus* to determine the morphotype of blue rockfish. These characteristics will be used to identify landed blue rockfish more accurately and enable fisheries managers to better set harvest levels at sustainable levels in the future.

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D. PUBLICATIONS

Dauble, A.D., S.A. Heppell, and M.L. Johansson. 2012. Settlement patterns of young-of-the-year rockfish among six Oregon estuaries experiencing different levels of human development. Marine Ecology Progress Series 448: 143-154.

Hannah, R. W., P. S. Rankin and M. T. O. Blume. 2012. Use of a novel cage system to measure post-recompression survival of Northeast Pacific rockfish. Marine and Coastal Fisheries: Dynamics, Management and Ecosystem Science 4:46-56.

Hannah, R. W., S. A. Jones, M. J. M. Lomelli and W. W. Wakefield. 2011. Trawl net modifications to reduce the bycatch of eulachon (*Thaleichthys pacificus*) in the ocean shrimp (*Pandalus jordani*) fishery. Fisheries Research 110:277-282.

Hannah, R. W. and P. S. Rankin. 2011. Site fidelity and movement of eight species of Pacific rockfish at a high-relief rocky reef on the Oregon coast. N. Amer. J. of Fish. Mgt. 31:483-494.

Hannah, R. W. 2011 Variation in the distribution of ocean shrimp (*Pandalus jordani*) recruits: links with coastal upwelling and climate change. Fisheries Oceanography 20(4):305-313.

Hannah, R. W. 2011. Maturity of female quillback (*Sebastes maliger*) and china rockfish (*S. nebulosus*) from Oregon waters based on histological evaluation of ovaries. Oregon Dept. Fish Wildl., Information Rept. Ser., Fish. No. 2011-01. 27 p.

E. PROJECTS PLANNED FOR YEAR 2012

1. Maturity studies

Work will continue to summarize maturity data for copper rockfish.

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2. Rockfish Movement

A study using VPS acoustic telemetry technology aimed at evaluating movement tendencies of yelloweye rockfish at Stonewall Bank is planned in 2012.

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3. Testing a Video Lander for Surveying Rocky Reefs

Work planned for 2012 includes evaluating a high definition and possibly a stereo-video version of our video lander.

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4. Reducing eulachon entrainment at the footrope of a shrimp trawl

We plan to conduct a follow-up experiment to our 2011 footrope work to determine if using a five to six foot ”window” (a gap) in the groundline (with normal fishing line height) can reduce eulachon entrainment with acceptable shrimp loss. In theory, some eulachon should herd to the very center of the groundline and utilize this gap to escape under the trawl, while shrimp should be stimulated off bottom across most of the groundline length. A second experiment examining the effect of disk-protected groundlines under the wings of shrimp trawls is also anticipated.

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5. Discard Mortality of Rockfishes

In 2012, we anticipate extending 2010 studies on yelloweye and canary rockfish post-recompression survival into deeper waters, more representative of capture depths for rockfish bycatch in the Pacific halibut fishery.

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6. Baseline Data Collection for future Marine Protected Areas

In 2012, the Marine Habitat Project will work with the Marine Reserves Program to gather baseline ecological data for the future marine protected areas designated at Cape Perpetua and Cascade Head, as well as their respective comparison areas. Marine Habitat personnel will use a ROV to survey the habitat and biota occurring on deep (>-20 m) rocky reefs in these areas.

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7. Developing an improved rockfish species composition expansion model

Work was initiated in 2010 to develop a better model to apply species composition data collected by port samplers to fisheries catch data. The original framework relies on a series of borrowing rules based on temporal and spatial factors. Documentation on the original borrowing rules and rationale are no longer available. However, researchers at Oregon State University recently developed a model to estimate the existing borrowing rules. While many different fish families are affected by these rules, rockfish, due to the species diversity and nominal category designation are most in need of a better expansion model. Work will continue into 2012.

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