

7.0 THE PUBLIC SECTOR AND FISHERIES MANAGEMENT REGIME

The public sector includes those entities directly affected by changes to the current management regime, but does not include participants in the fishery or the fishing communities of the West Coast (see Chapter 8 for a description of the socioeconomic environment). Therefore, the public sector, as defined in this EIS, represents the policy, science, and management entities that comprise the current management regime. The management regime is an important issue because it generates direct and indirect impacts. The regime is also itself affected by changes in law and policy, which can cumulatively affect the environment. This section discusses stock assessments; catch accounting; observer programs and research fisheries; all crucial components in the process of determining sustainable fishery yields; uncertainty, which underlies the range of alternatives evaluated in this EIS; and enforcement, which affects the efficacy of prescribed management measures. For additional information on the management cycle and legal authorities and jurisdictions, which also directly affect the management regime, see Appendix A, Chapter 1.

7.1 Affected Environment

7.1.1 Managing with Risk and Uncertainty

Uncertainty in fishery management exists for many reasons including imperfect sources of data from the past, inaccurate or inadequate monitoring of current fisheries, and unknown future environmental conditions. All of these factors contribute to the risks associated with the assessment of stock status, the estimation of impacts to fish stocks due to fishery management measures, and the projections of future stock health under varying long-term management alternatives. A detailed discussion of short-term costs versus long-term risk can be found in Appendix A, Section 1.2.1. For more information on the assessment of risk in long-term stock population projections see Appendix A, Section 1.1.1.2.

7.1.2 License Limitation, Capacity Reduction, and Fleet Rationalization

Declining fishing opportunity and increased importance in stock rebuilding and sustainable fisheries since the late-1990s have created the need for smaller, more efficient fishing fleets and more responsive management tools and monitoring programs. A full discussion of these long-term management strategies is presented in Appendix A, Section 1.2.4.

7.1.3 Management Data Systems

7.1.3.1 Catch Monitoring and Accounting

Various state/federal catch monitoring systems are used in West Coast groundfish management. These are coordinated through the Pacific States Marine Fisheries Commission (PSMFC). PacFIN (Pacific Fisheries Information Network) is the commercial catch monitoring database and RecFIN is the database for recreational fishery catch monitoring. There are two components to total catch, (1) catch landed in port, and (2) catch discarded at sea. Discards occur for regulatory reasons (i.e., catch in excess of trip and/or landing limits) and market reasons (i.e., catch of unmarketable species or size). A description of the relevant data systems used to monitor total catch and discards in commercial, recreational, and research fisheries follows.

Monitoring Commercial Landings

Sorting requirements are now in place for all overfished rockfish species. This requires accounting for the weight of landed, overfished rockfish when catches are hauled at sea or landed. Limited entry groundfish trawl fishermen are also required to maintain logbooks that record the start location, time, and duration of

trawl tows, as well as the total catch by species market category (i.e., those species and complexes with sorting requirements). Landings are recorded on state fish receiving tickets. Fishtickets are designed by the individual states, but there is an effort to coordinate record-keeping requirements with state and federal managers. Poundage by sorted species category, area of catch, vessel identification number, and other data elements are required on fishtickets. Landings are also sampled in port by state personnel to collect species composition data, otoliths for ageing, lengths, and other biological data. Sample rates vary between fishery and state, but there is an effort to sample about 20% of the landed catch. A suspension of at-sea sorting requirements and full retention of catch is allowed in the whiting fishery (by FMP Amendment 10 and an annual Exempted Fishing Permit [EFP] in the Shoreside Whiting sector). The at-sea whiting fishery has 100% on-board observer coverage, while the shoreside whiting sector brings 100% of their catch to port for sampling. Landings, logbook data, and state port sampling data are reported inseason to the PacFIN database managed by the PSMFC www.psmfc.org/pacfin/index.html. The GMT and PSMFC manage the quota species monitoring (QSM) dataset reported in PacFIN. All landings of groundfish stocks of concern (overfished stocks and stocks below B_{MSY}) and target stocks and stock complexes in West Coast fisheries are tracked in QSM reports of landed catch. The GMT recommends prescribed landing limits and other inseason management measures to the Council to attain, but not exceed, total catch OYs of QSM species. Stock and complex landing limits are modified inseason to control total fishing-related mortality; QSM reports and landed catch forecasts are used to control the landed catch component.

Monitoring Recreational Catch

Recreational catch is monitored by the states as it is landed in port. These data are compiled by the PSMFC in the RecFIN database. The types of data compiled in RecFIN include sampled biological data, estimates of landed catch plus discards, and economic data. These data are readily available to managers, assessment scientists, and the general public in prepared reports that can be accessed on the Internet at <http://www.psmfc.org/recfin/index.html>.

The MRFSS is an integral part of the RecFIN program. Traditionally, there are two primary components of the survey; field intercept surveys (administered under supervision of PSMFC) and a random phone survey of coastal populations (administered by a third party contracted by NMFS). The field intercept surveys were used to estimate catch, and the phone survey was used to estimate effort. The results of these two efforts are combined in the RecFIN data system maintained by PSMFC, and estimates of total effort and fishing mortality are produced along with other data potentially useful for management and stock assessments. However, MRFSS was not designed to estimate catch and effort at the level of precision needed for management or assessment; it was designed to provide a broad picture look of national fisheries. Comparison with independent and more precise estimation procedures has shown wide variance in catch estimates. Inseason management of recreational fisheries using MRFSS has been compromised by huge inseason variance of catch estimates. In recent years, efforts have been made to improve MRFSS. For instance, in 2001 PSMFC, with support from NMFS, began a new survey to estimate party/charter boat (CPFV) fishing effort in California. This survey differed from the traditional MRFSS telephone survey of anglers to determine CPFV trips by two-month period. The survey sampled 10% of the active CPFV fleet each week to determine the number of trips taken and the anglers carried on each trip. This 10% sample is then expanded to make estimates of total angler trips for Southern California and Northern California. However, the requisite precision for managing for the low OYs of overfished species, like canary rockfish and bocaccio, was still lacking.

Washington and Oregon have used the MRFSS system as a supplement to their port sampling programs from which most of their recreational catch estimates are derived. California has had a greater dependence on MRFSS to estimate their recreational catch. One outcome of this dependence are highly uncertain catch estimates of California recreational catch. This has likely compromised efforts to control total mortality of recreational groundfish species in California, such as bocaccio and canary rockfish. Another outcome is an

observed lack of credibility in the MRFSS program on the West Coast; policy representatives from the West Coast recommended the development of a new program. In response, staff from the California Department of Fish and Game (CDFG) and the PSMFC designed a new program for sampling California's recreational fisheries, incorporating both the comprehensive coverage of the MRFSS program and the high quality sampling (for the private vessel mode) of the Ocean Salmon Project. This new program, the CRFS, specifically includes the following:

- Integration of California's current marine recreational sampling programs into one program.
- Reporting of catch and effort at a finer geographical resolution.
- Estimation of private/rental (PR) vessel effort using an on-site approach.
- Estimation of beach/bank and private access angler effort using an angler license database with the frame built from one out of every 20 licenses.
- Continuation of the CPFV phone survey with effort.
- Augmentation of CPFV phone surveys with effort data collected directly from the landings and CPFV logbooks.
- Increased creel sampling for PR and CPFV vessels.
- Estimation of effort and catch on man-made structures using instantaneous angler counts, roving effort (pressure) surveys, and creel surveys.
- Reporting of effort and catch estimates for all modes at monthly intervals.
- Sufficient sampling of PRs to meet ocean salmon management data requirements, including the collection of coded-wire tags.

The primary goal of the program will be to produce in a timely manner marine recreational, fishery-based data needed to sustainably manage California's marine recreational fishery resources. The changes proposed in this plan should increase the timeliness and accuracy of recreational fisheries data, so they can be more effectively used for inseason monitoring, estimating take for species of concern, developing harvest guidelines, producing stock assessments, and providing other information critical to management decisions. The initial focus of the program will be to produce timely catch estimates with reasonable confidence limits for those groundfish stocks declared overfished by NMFS and for those stocks with a directed harvest. The PSMFC and CDFG will fully implement the CRFS plan beginning in January 2004.

Total Catch Accounting

Implementation of the SFA and decreasing OYs have compelled fishery managers and scientists to improve estimates of total fishery-related impacts, particularly impacts to overfished species. Traditionally, total landed catch was considered and adequate accounting of the success of fishery management measures in limiting catch and, thereby, limiting impacts to the fish resources being accessed. Recent improvements in total catch accounting, that is, landings plus estimated mortality associated with discards have utilized new information from observer programs and fishery sampling (see Section 7.1.3.2).

In estimating total catch, the general methodology is to estimate fishery-related sources of mortality including landings and discards attributed to commercial, recreational, and scientific/research activity. This is

accomplished by using data from the PacFIN and RecFIN databases, scientific/research data from various agencies participating in those activities, and discard estimates from the 2002 and 2003 Groundfish Annual Specifications (Table 5-4 and Table 5-5).

The PacFIN database records landed catch (as opposed to total catch), and thus, an estimate of discards and discard-induced mortality associated with recorded landings were needed to generate estimates of total mortality. At the time of the analysis, one year of trawl observer data was being used for management, but no useable estimate of discards was available for other fisheries such as fixed gear and open access. Using observer data from one gear type presented challenges in estimating discards for the fishery as a whole. Although it was feasible to estimate the appropriate weighting for those discard estimates (i.e., establish the proportion of landed catch those discards should be attributed to), there remained the question of what the appropriate level of discard was for remaining fisheries. Based on this notion, it was deemed most appropriate to use discard assumptions described in the 2002 and 2003 Groundfish Annual Specifications, and apply those estimates to total commercial landed catch to get a preliminary estimate of total catch in all commercial fisheries. Future methodology will be focused on augmenting landed catch estimates with a rigorous estimate of discards in each sector.

Recreational mortality was estimated using weight of "A + B1" catch (landed catch examined by samplers [A] + catch reported by the angler as released dead or filleted at sea [B1]) reported in the RecFIN database. This estimate is best described as the weight of fish that are kept or are known to be dead when discarded. At this time, there still lacks an agreed upon discard mortality rate that should be applied to "B2" catch (catch reported by the angler as fish that were discarded alive), however future analysis plans on applying a discard mortality rate to B2 catch when those rates are developed.

Finally, scientific catch data reported from various agencies often do not have reported weights, and instead report the number of fish that were caught. This problem has been identified by the NMFS Northwest Region and the GMT, but there still lacks an appropriate weighting scheme to apply to the number of fish reported without weights. Therefore, reported scientific/research catch data are incomplete and preliminary at this time.

Table 5-5 shows the overall results of using the described methodology in estimating total catch for 2003. Of note is the fact that additional methodology was used to parse the "unspecified thornyheads" category into shortspine and longspine thornyheads. The "unspecified thornyheads" category comes from California landed catch records and from at-sea records. Those unspecified thornyheads recorded in the state of California were parsed according to the ratio of shortspine and longspine landings recorded in the state of California. At-sea unspecified thornyheads were parsed according to the ABC of northern longspine and shortspine. This was done because no catch records exist in the at-sea data for shortspine and longspine, and the relative ABC's are the best estimate of actual species abundance. An underlying assumption of using the relative ABC's is that the catchability of each species is the same in the at-sea sector, and the ABC of each species represents the ratio of what was caught.

7.1.3.2 Observer Programs

West Coast Groundfish Observer Program

Limiting discards (defined as bycatch in the MSA), to the extent practicable, is an MSA mandate. Effective bycatch accounting and control mechanisms are also critical for staying within target total catch OYs. The first element in limiting bycatch is accurately measuring bycatch rates by time, area, depth, gear type, and fishing strategy. The WCGOP includes the Observer Team and collaborators from PSMFC that direct the program, train new observers, and manage and analyze the bycatch data. On May 24, 2001, NOAA Fisheries (NMFS) established the WCGOP to implement the Pacific Coast Groundfish FMP (50 CFR Part 660). This regulation requires all vessels that participate in the groundfish fishery to carry an observer when notified to

do so by NMFS or its designated agent. These observers monitor and record catch data, including species composition of retained and discarded catch. Observers also collect critical biological data such as fish length, sex, and weight. The program currently deploys observers coast wide on the permitted trawl and fixed-gear groundfish fleet, as well as on some vessels that are part of the open-access groundfish fleet. Observers improve our understanding of fishing activities and help provide accurate accounts of total catch, bycatch, and discard associated with different fisheries and fish stocks.

The WCGOP is designed to provide estimates of fleet-wide discards in commercial fisheries; fishtickets are the mandated landings accounting mechanism. Logbook data needs to be available to fully utilize observer data because observers initially record haul weights and logbook data for retained catch, and these values need to be adjusted by fishticket information to achieve total catch estimates. One difficulty is the need for a statistically significant number of observations of discard across all strata to determine representative bycatch rates for these strata. Implementation of depth-based management further exacerbated the data-sparseness of observations, since areas where many observations occurred in the first year of the Observer Program are now closed to fishing.

NMFS first implemented the WCGOP in August 2001 to make direct observations of commercial groundfish discards. Observer coverage initially extended to about 10% of the West Coast limited entry fleet effort, but increased to about 20% by the summer of 2002 (Elizabeth Clarke, NMFS NWFSC, pers. comm.). Given the skewed distribution of bycatch in West Coast groundfish fisheries, many observations in each sampling strata (i.e., target effort by gear type by area) are needed to estimate representative bycatch rates of overfished groundfish species. The seasonality of bycatch is an important management consideration. Target opportunities for healthy flatfish and DTS species vary seasonally and geographically. It is reasonable to expect bycatch rates of overfished groundfish species to vary in accordance with the concurrence of target species and overfished species. In November 2001, the Council adopted the trawl bycatch model to use for bycatch accounting and control starting in 2002. In 2002, the bycatch rates used in the trawl bycatch model were restratified by depth (using tow start locations in 1999 trawl logbooks) in anticipation of the new depth-based management regime. Depth-based bycatch rates from the trawl bycatch model are applied to landed weight of the target species in the target fisheries to estimate seasonal bycatch of the overfished groundfish species subject to rebuilding plans evaluated in this EIS.

The Council decided in April 2003 to modify the trawl bycatch model by using bycatch rates derived from direct observations of trawl efforts in the WCGOP for 2003 inseason management decision-making. These data were filtered using starting and ending tow locations to emulate, to the extent possible, observations from areas that are outside currently closed trawl RCAs. The data limitations required aggregation of observations to strata north and south of Cape Mendocino and deeper and shallower than the trawl RCA. Therefore, the seasonal and target strategy strata are collapsed in the trawl bycatch model, and only the trawl fishery is modeled for bycatch accountability.

In September 2003, the trawl bycatch model was expanded to include observed discard rates for target species to complement the bycatch rates for overfished species already in the model. This new model configuration was used to evaluate the limited entry trawl management measure alternatives for 2004.

The second year of the WCGOP began in September 2002 and ended in August 2004. The program continued to sample the trawl fleet at a rate of approximately 20% and continued to expand coverage of the limited entry fixed-gear and open access sectors. Scientist at the NMFS Northwest Fisheries Science Center worked over the winter to analyze the second year of data and to update the trawl bycatch model. Perhaps the most significant result of incorporating the new data into the trawl model will be the development of seasonal bycatch rates. In modeling 2003 fisheries, the combination of limited observer data from the first year of the program and the need to evaluate bycatch on a depth-specific basis resulted in discontinued use of seasonal bycatch rates. Additionally, a new bycatch model for the fixed-gear fishery has been developed

using data collected in the first two years of the WCGOP. Both trawl and the fixed-gear bycatch models were presented to the SSC at the Council meeting in March 2004. These models were approved for use during the April Council meeting for inseason modeling of 2004 fisheries, as well as developing management measures for fisheries in 2005 and 2006.

The first report on the WCGOP was released in January 2003, entitled “Northwest Fisheries Science Center West Coast Groundfish Observer Program Initial Data Report and Summary Analyses.” That report described the analysis of observer data for various species collected during the first year of the program. Preliminary reports and summary analyses of the second year of data were released in early 2004 and include results from both the limited entry trawl fishery as well as for sablefish-endorsed fixed gear permits. These reports and background materials on the WCGOP are available on the Northwest Fisheries Science Center website at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observer/index.cfm>.

At-Sea Pacific Whiting Observer Program

To increase the utilization of bycatch that is otherwise discarded as a result of trip limits, Amendment 13 to the Groundfish FMP implements an increased utilization program on June 1, 2001, which allows catcher/processors and motherships in the whiting fishery to exceed groundfish trip limits without penalty, providing specific conditions are met. These conditions include provisions for 100% observer coverage, non-retention of prohibited species, and donation of retained catch in excess of cumulative trip limits to a bona fide hunger relief agency.

These provisions have not only given fishery managers the tools necessary to allow the At-Sea Pacific Whiting Program to operate efficiently while meeting management goals, but have also provided scientists, through the observer coverage, extensive amount of information on bycatch species. This dataset has not only provided valuable information in the management of Pacific whiting, but has also been used as a data source for the assessment of widow rockfish. Widow rockfish and Pacific whiting are co-occurring species which can result in significant bycatch of widow rockfish in the midwater trawl nets used for Pacific whiting. However, like other fishery-dependent datasets, it is believed that changes to the management measures since 1999 have a greater influence than widow rockfish abundance on the widow rockfish CPUE in the at-sea Pacific whiting fishery (He, *et al.* 2003b).

Shore-based Pacific Whiting Observer Program

The Shoreside Whiting Observation Program was established in 1992 to provide information for evaluating bycatch in the directed Pacific whiting fishery and for evaluating conservation measures adopted to limit the catch of salmon, other groundfish, and prohibited species. Though instituted as an experimental monitoring program, it has been continued annually to account for all catch in targeted whiting trip landings, enumerate potential discards, and accommodate the landing and disposal of non-sorted catch from these trips. In 1995, the Shoreside Whiting Observation Program’s emphasis changed from a high observation rate (50% of landings), to a lower rate (10% of landings) and increased collection of biological information (e.g., otoliths, length, weight, sex, and maturity) from Pacific whiting and selected bycatch species (yellowtail rockfish, widow rockfish, sablefish, chub (Pacific) mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*). The required observation rate was decreased as studies indicated fishtickets were a good representation of what was actually landed. Focus shifted again due to 1997 changes in the allocation of yellowtail rockfish and increases in yellowtail bycatch rates. Since then, yellowtail and widow bycatch in the shoreside whiting fishery has been dramatically reduced because of increased awareness by fishermen of the bycatch and allocation issues involved in the Shoreside Whiting Observation Program.

The Shoreside Whiting Observation Program is a cooperative effort between the fishing industry and state and federal management agencies to observe and collect information on directed Pacific whiting landings at

shoreside processing plants. Participating vessels apply for and carry two EFPs issued by NMFS. Permit terms require vessels to land unsorted catch at designated shoreside processing plants. Permitted vessels are not penalized for landing prohibited species (e.g., Pacific salmon, Pacific halibut, Dungeness crab), nor are they held liable for overages of groundfish trip limits. Participants in the Shoreside Whiting Observation Program are mid-water trawlers carrying EFPs; designated shoreside processing plants in California, Oregon, and Washington; the Council; NMFS; PSMFC; ODFW; CDFG; and WDFW. (Excerpt from latest ODFW report on the shore-based Pacific whiting program review (Wiedoff and Parker 2002), for the complete report go to: <http://hmsc.oregonstate.edu/odfw/reports/hake.html>).

Since 1997, an EFP has been adopted annually that allow suspension of at-sea sorting requirements in the shore-based whiting fishery enabling full retention and subsequent port sampling of the entire catch. However, EFPs are intended to provide for limited testing of a fishing strategy, gear type, or monitoring program that may eventually be implemented on a larger fleet-wide scale and are not a permanent solution to the monitoring needs of the shore-based Pacific whiting fishery. Results of the shore-based Pacific whiting EFPs indicate that it is feasible to retain and appropriately monitor the incidental take of salmon and groundfish other than Pacific whiting in the shore-based Pacific whiting fishery. A permanent monitoring program for the shore-based Pacific whiting fleet is being developed because of the specification in the Pacific Coast salmon and groundfish fishery FMPs and the 1992 Biological Opinion analyzing the effects of the groundfish fishery on salmon stocks listed under the ESA. The issue of salmon retention in the groundfish trawl fisheries was brought before the Council in 1996 in the form of Amendment 10 to the Pacific Coast Groundfish FMP and Amendment 12 to the Pacific Coast Salmon FMP. Based on an EA drafted to analyze these amendments, the Council recommended the EFP process be used temporarily until a permanent monitoring program could be developed and implemented in the shore-based Pacific whiting fishery.

NMFS is developing a preliminary draft EA which includes a range of alternative monitoring systems for the shore-based Pacific whiting fishery. The alternatives currently focus on three major issues, (1) staffing the monitoring program (i.e., federal observers, state monitors, video cameras, or a combination thereof); (2) tracking and disposition of prohibited species and groundfish overages; and (3) funding of the monitoring program. It is anticipated that the permanent monitoring program will be implemented in 2005. NMFS and the GMT have expressed concerns about the current EFP program and its adequacy of ensuring full retention and, therefore, total catch accounting. This is particularly a concern in regard to the rebuilding of widow rockfish. NMFS is currently exploring the testing of onboard video cameras in the summer of 2004 as a means of verifying total retention.

Central California Marine Sport Fish Project

The Central California Marine Sport Fish Project has been collecting angler catch data from the CPFV industry intermittently for several decades in order to assess the status of the nearshore California recreational fishery. The project has focused on rockfish and lingcod angling and has not sampled salmon trips. Reports and analyses from the project document trends by port area in species composition, angler effort, catch, and, for selected species, CPUE, mean length and length frequency. In addition, total catch and effort estimates are made based on adjustments of logbook data by sampling information.

Before 1987, catch information was primarily obtained on a general port basis from dockside sampling of CPFVs, also called party boats. This did not allow documentation of specific areas of importance to recreational anglers and was not sufficient to assess the status of rockfish populations at specific locations.

CPFV operators are required by law to record total catch and location for all fishing trips in logbooks provided by CDFG. However, the required information is too general for use in assessing the status of the multi-species rockfish complex on a reef-by-reef basis. Rockfish catch data are not reported by species, and information on location is only requested by block number (a block is an area of 100 square miles). Many

rockfishes tend to be residential, underscoring the need for site-specific data. Thus, there is a strong need to collect catch information on board CPFVs at sea. However, locations of specific fishing sites are not revealed, since that information is confidential.

In May 1987 the Central California Marine Sport Fish Project began on-board sampling of the CPFV fleet. Data collection continued until June 1990, when state budgetary constraints temporarily precluded further sampling, resumed in August 1991, and continued through 1994. The program depends on the voluntary cooperation of CPFV owners and operators. Angler catches on board central and northern California CPFVs were sampled from fourteen ports, ranging from Crescent City in the north to Port San Luis (Avila Beach) in the south. For additional information on this program, see the PSMFC website at: www.psmfc.org/recfin/ccmsp.htm.

Oregon Marine Recreational Observers Program

In response to overfished species declarations and increasing concerns about fishery interactions with these species, ODFW started this program to improve understanding of recreational impacts. There were three objectives to this project; (1) document the magnitude of canary rockfish discard in the Oregon recreational fishery; (2) improve the biological database for several rockfish and groundfish species; and (3) gather reef location information for future habitat mapping. Discussion A seasonal observer was stationed in each of the ports of Garibaldi, Newport, and Charleston to ride recreational groundfish charter vessels coastwide in Oregon from July through September 2001. The Garibaldi observer covered boats out of Garibaldi, the Newport observer covered both Newport and Depoe Bay, and the Charleston observer covered Charleston, Bandon, and Brookings charter vessels. During a typical day the observer would ride a five to eight hour recreational groundfish charter trip and spend the remainder of the day gathering biological and genetic data dockside from several rockfish and groundfish species, for which little is known, mostly due to their infrequency in the catch. When allowed by the captain, the observer also obtained GPS locations of fishing sites for future use by the Habitat Mapping Project of ODFW Marine Resources Program. Results from this program have been incorporated into recreational fishery modeling by ODFW. For more information on this program, as well as other fishery research and survey programs, see the ODFW Marine Program website at: <http://hmsc.oregonstate.edu/odfw/reports/finfish.html>.

WDFW Groundfish At-Sea Data Collection Program

The WDFW At-Sea Data Collection Program was initiated in 2001 to allow fishers access to healthier groundfish stocks, while meeting the rebuilding targets of overfished stocks, and to collect bycatch data through an at-sea observer program. The data collected in these programs could assist with future fishery management by producing valuable and accurate data on the amount, location, and species composition of the bycatch of rockfish associated with these fisheries, rather than using calculated bycatch assumptions. These data could also allow the Pacific Council to establish trip limits in the future that maximize fishing opportunities on healthy stocks while meeting conservation goals for depleted stocks.

Over the past four years, WDFW has implemented its At-Sea Data Collection Program through the use of federal EFPs. In 2001, 2002, 2003, and 2004 WDFW sponsored and administered a trawl EFP for arrowtooth flounder and petrale sole, and in 2002 WDFW also sponsored a midwater trawl EFP for yellowtail rockfish. The primary objective for these experimental fisheries was to measure bycatch rates for overfished rockfish species associated with these trawl fisheries. Participating fishers were provided access to healthier groundfish stocks and were constrained by individual vessel bycatch caps. Observers were used to collect data on the amount of rockfish bycatch caught on a per tow basis and to ensure the vessel complied with the bycatch cap; therefore, vessels participating in the EFP were required to have 100% observer coverage.

The costs associated with these observer programs were covered with federal Disaster Relief funds. The majority of those funds have been spent; however, WDFW has continued its At-Sea Data Collection Program in 2003 and 2004 with having the participating fishers share the costs of the observer program. The average costs associated with providing observer coverage (including salaries, safety equipment, sampling supplies) is approximately \$4,000 to \$4,500 per month observed. However, there are additional costs incurred by WDFW in providing staff time to administer, monitor, and oversee the observer program, as well as analyze the data that are collected.

Monitors were hired as temporary employees of the WDFW and were assigned to a duty station based on the vessel's home port. WDFW monitors completed a two-week training course, consistent with the NMFS' Observer Training Manual. Training exercises include U.S. Coast Guard safety training—including survival suit immersion test and vessel safety, and WDFW training on fish identification, random sampling theory, data collection methods, current groundfish management issues, and additional safety measures.

WDFW fishery managers and biologists were involved in hiring and training the observers as well as administering and monitoring the program. WDFW scientific technicians sampled the catch dockside, collected biological data, and entered the data into an electronic database. Research scientists have analyzed the preliminary data from the 2001, 2002, and 2003 EFPs, and have finalized summary reports.

WDFW Ocean Sampling Program

In addition to the At-Sea Data Collection Program, WDFW collects at-sea data through the Ocean Sampling Program. The at-sea portion is not intended to be an observer program for the purposes of enumerating the bycatch alone, but is coupled with shore-based sampling of anglers to calculate an estimated discard weight. At-sea observers record biological information from discarded species. Shore-based creel surveys of anglers provide the estimate of total number of discards. Combining these two data sources yields estimates of the weight of total fishery discard by species.

Tribal Observer Program

Tribal directed groundfish fisheries are subject to full rockfish retention. For some rockfish species where the tribes do not have formal allocations, trip limits proposed by the tribes are adopted by the Council to accommodate incidental catch in directed fisheries (i.e., Pacific halibut, sablefish, and yellowtail rockfish). These trip limits are intended to constrain direct catches while allowing for small incidental catches. Incidental catch and discard of overfished species is minimized through the use of full rockfish retention, shore based sampling, observer coverage, and shared information throughout the fleets regarding areas of know interactions with species of concern. Makah trawl vessels often participate in paired tows in close proximity where one vessel has observer coverage. If landings on the observed vessel indicate higher than anticipated catches of overfished species, the vessels relocate and inform the rest of the fleet of the results (Steve Joner, Makah Fisheries Management, pers. comm., February, 2004). Fleet communication, in order to avoid overfished species, is practiced by all tribal fleets.

7.1.3.3 Research Fisheries

The reduction in directed fisheries and overall landings has resulted in less information available to fishery managers compromising efforts to assess stock abundance and recovery. There is an increasing reliance on fishery-independent sources of information such as research fisheries and surveys. This is particularly true for overfished species such as widow rockfish, cowcod, bocaccio, and canary rockfish as fisheries are designed to avoid areas inhabited by these species. There is a relatively sparse amount of data available for widow rockfish, as directed fisheries have been essentially eliminated, and the Pacific whiting sectors have modified their behavior to avoid encounters with widow rockfish. The latest widow assessment (He, *et al.*

2003b) highlighted the need for long-term datasets for this species and questioned the reliance on bottom trawl logbook data that has diminished with decreased fishing opportunities since 1999 and an index of juvenile rockfish abundance that surveys a small proportion of widow rockfish range. Additionally, future widow rockfish assessments may look to expand use of existing fishery-dependent data such as the observer data in the Pacific whiting fisheries (see Section 7.1.3.2). Assessment scientists will continue to rely on research fisheries as landings, age composition, and logbook catch rate data from many fishery sources decreases. A summary of long-term research fisheries and resource surveys can be found in Appendix A, Section 1.1.1.3.

7.1.3.4 The Stock Assessment Process

Rebuilding plans and stock assessments for overfished species are subject to review every two years. NMFS is currently planning the next round of stock assessments for 2005 for use in developing management measures and harvest specifications for the 2005-2006 biennial management cycle. The list of species planned for updated assessments contains over 20 species including bocaccio, cowcod, widow rockfish, and yelloweye rockfish. NMFS will also hold a series of workshops in 2004 focusing on data needs and available data sources for the ambitious list of stock assessments being considered for 2005. Additionally, the SSC is currently working on standards for the required review of rebuilding analyses. These reviews are required every two years for species under rebuilding plans. More information on the stock assessment process can be found in Appendix A, Section 1.1.1.1.

7.1.4 Enforcement

Enforcement of fishery regulations has become increasingly complex with the addition of large closed areas, smaller cumulative trip limits and bag limits, and depth-based closures for commercial and recreational fisheries. At the same time, decreased OYs, and the need to rebuild overfished stocks, has placed additional importance on controlling and monitoring fishery-related mortality. Enforcement agencies continue to utilize traditional methods to ensure compliance with groundfish fishery regulations including, dockside sampling, at-sea patrols, and air surveillance. Recent declines in enforcement agency budgets, combined with increased regulatory complexity, have stressed the ability to adequately monitor fisheries for regulatory compliance. In response, NMFS implemented a VMS, which includes satellite tracking of vessel positions and a declaration system for those vessels legally fishing within an RCA. VMS was implemented beginning on January 1, 2004 and is required on all vessels with a limited entry permit. Expansion of the program to other sectors is currently being considered. VMS dramatically enhances, rather than replaces, traditional enforcement techniques. A more detailed description of fishery monitoring and enforcement is included in Appendix A, Section 1.1.5.

7.2 Criteria Used to Evaluate Impacts

Effects on the public sector correlate with changes in the level of regulatory complexity. Regulatory complexity affects the public costs of implementing a management regime by increasing the burden of monitoring, enforcing, and adjusting fisheries to meet but not exceed intended impact levels. Thus, costs to governmental entities associated with increased regulatory complexity could be one way to evaluate the relative effects of the alternatives on the public sector. Intrinsic to the costs to the public sector is the assessment of risk to the resource. Management alternatives with a high degree of regulatory complexity or a substantial reliance on accurate and timely inseason fishery data not only increase the expense of enforcement and monitoring, they also increase the risk of non-compliance and overfishing and could compromise species rebuilding. Managing fisheries in a cost-effective manner while balancing risks to the resource with socioeconomic benefits is often the objective of public agencies charged with fishery management and enforcement. Therefore, costs, enforcement feasibility, risk to the resource, and reliance on fishery data are the criteria used in the following qualitative evaluation of the impacts to the public sector.

Successful stock rebuilding depends on the ability of management/rebuilding measures to effectively control all sources of fishing-related mortality, including landed catch and bycatch. All rebuilding alternatives analyzed in this EIS have a calculated total catch OY to accommodate landings of unavoidable incidental catch of the four species subject to rebuilding plans analyzed herein. The effectiveness of all rebuilding strategies (given the probabilistic trajectories of future increases in biomass relative to B_{MSY}) depends on managing fishing-related mortality within prescribed total catch OYs. Landed catch allowances for all overfished species are designed to minimize target opportunities on these species while allowing landings of unavoidable bycatch that would otherwise be discarded dead at sea. Management measures consistent with rebuilding should have harvest control rules that are enforceable and effectively stay within total catch targets.

7.3 Discussion of Direct and Indirect Impacts

7.3.1 Catch Monitoring and Accounting

The availability of data is critical to the effective management of fishery resources. Fishery impact modeling, stock assessments, and socioeconomic analyses are not directly affected by the management alternatives, but rely on long-term data sources. Longstanding, fishery-dependent data sources are compromised under rebuilding strategies with reduced OYs or zero impacts as directed groundfish fishing opportunities diminish. Loss of fishery-dependent data is a cost to fishery management agencies through increased uncertainty in resource analyses, such as stock assessments, and the added expense of developing new data collection methods and analytical tools.

7.3.2 Constraining OYs and Bycatch Accounting

Alternatives such as the No Action Alternative and Action Alternative 4 include restrictive OYs for overfished species that have wide ranging constraining effects along the entire coast and across many fisheries. State, federal, and tribal agencies charged with monitoring fishery-related impacts have increased responsibilities in terms of inseason catch accounting, bycatch projection, and timely reporting. This is particularly true when the amount of available OY is low and is attributable to bycatch rather than landed catch. Bycatch accounting often requires costly and time-consuming at-sea observation, shore-based sampling, and logbook programs. The WCGOP has completed two years of at-sea observation of the limited entry trawl and fixed gear fisheries, and trawl logbooks have been in place for several years. Although valuable to resource management, these data require extensive analysis and are not designed for real-time, inseason tracking of impacts. The effects of the alternatives to the public sector are evident in the expense of inseason fishery monitoring, as well as the risks associated with uncertainty. If management measures designed to meet rebuilding strategies with low OYs are projected to meet the available OY for constraining species, such as bocaccio or canary rockfish, the required careful monitoring and frequent inseason management actions could have relatively high costs and risk when compared to alternatives with projected impacts below the OY. Rebuilding alternatives with less constraining OYs would allow more flexible management strategies that are not expected to meet the OYs for constraining species. The remaining OY could be utilized as a “buffer” against the cost of intensive inseason management and the risk of exceeding the OY.

Bycatch accounting and control has been one of the weaker elements in groundfish management. However, bycatch accounting in the commercial sectors is improving rapidly. With the advent of data from the NMFS WCGOP, it is anticipated that more accurate bycatch accounting from the limited entry trawl, limited entry fixed gear, and directed open access sectors will soon be available for management. These data will allow much more accurate bycatch estimation and will be progressively integrated into the models currently used to project total catch under alternative management measures

Rebuilding strategies should always use the best available estimates of bycatch, and managers should always seek to improve bycatch accounting and control mechanisms. Data and resulting analyses from the WCGOP have already demonstrated an ability to provide valuable knowledge where limited information and difficult assumptions have existed in the past. Improved understanding of bycatch rates and total mortality will improve fishery modeling by replacing assumptions and surrogate values with fishery-related mortality estimates from direct observation. Additionally, historic catch data could be adjusted to incorporate new methods of estimating bycatch. Stock assessments and rebuilding analyses will benefit from more accurate sources of data on total fishery removals over time. Reducing the uncertainty in stock status and rebuilding projections will more effectively support sound harvest policy and sustainable fishery resource management.

Rebuilding strategies are sensitive to the actual bycatch rate, since successful rebuilding requires accurate accounting of total catch. If bycatch rates are overestimated in the bycatch models, then there will be negative socioeconomic consequences of lower trip limits and/or early fishery closures. If they are underestimated, rebuilding progress will be compromised. With the low OYs specified under rebuilding, improving bycatch accounting and control is critical. With the advent of data from the NMFS WCGOP, it is anticipated that more accurate bycatch accounting data from the limited entry trawl, limited entry fixed gear, and directed open access sectors will be available for management. Rebuilding strategies should always use the best available estimates of bycatch, and managers should always seek to improve bycatch accounting and control mechanisms.

Such measures as full retention of bycatch and/or bycatch caps could significantly reduce fishing-related mortality of overfished groundfish species. A program of mandatory full retention of rockfish (or other overfished species that would otherwise be discarded dead at sea) during commercial fishing activities to increase accuracy in estimating total catch. If compliance can be verified through camera surveillance, observer coverage, or other means, a full retention program could ensure total catch OYs are not exceeded while attempting to access harvestable groundfish species. Mandatory rockfish retention and observer coverage might allow greater flexibility for managers to consider fishing opportunities that might otherwise be considered risky. As long as total catch controls are reliable and responsive to rapid changes in the fishery, such explorations may be acceptably risk-averse. Full rockfish retention would incur a cost to the processing sector since unmarketable rockfish, due to size or condition, would need to be handled and disposed. Bycatch accounting of retained species that would otherwise be discarded at sea may be considered an additional marginal cost, since dockside sampling of landed catch occurs anyway. Sampling the fully retained catch would add to the time and effort involved in dockside sampling, but would not require the implementation of a new sampling system.

A management strategy of bycatch caps (the fishery is closed once landings plus bycatch reach a critical threshold, notably, the total catch OY) would probably entail the need for a significantly higher observer coverage rate, perhaps 100%, if the caps are imposed at the vessel and not the fleet-wide level^{1/}. This is because the distribution of fishing efforts resulting in significant bycatch is skewed to a few efforts. Given the nature of highly variable bycatch by time, area, gear, and fishing strategy, the allocational aspects of a management system relying on bycatch caps creates potentially serious repercussions. Such a system might promote derby fisheries where fishermen would compete to get their fish first before a cap is attained. This creates safety risks, a poor supply and demand marketing situation, and a contracted stream of fishery-dependent data (landings and bycatch information) that might be difficult to assimilate and react to in a timely fashion. One mitigative measure to consider in rationalizing a management strategy that depends on bycatch caps may be to develop individual trawl quotas (ITQs) for the overfished groundfish species. An ITQ system could be used to buy and sell overfished species' OY, which could leverage more healthy target

1/ The current management regime essentially manages for the total catch OY and includes best estimates of landings and discard. This management strategy may be likened to a bycatch cap on a fleet-wide basis.

species landings while maintaining better accounting and control of overfished species' bycatch. The Congressional ITQ ban was lifted last year enabling the Council and NMFS to pursue such a strategy.

7.3.3 Enforcement

Prior to 2000, groundfish management mainly regulated the amount of landed fish, based on cumulative trip limits. This type of measure has the advantage that monitoring and enforcement can be shore-based because limits are based on landings; but this approach is problematic because discarded bycatch cannot be directly monitored from shore. Depth-based closed areas will likely continue as a way to reduce bycatch by keeping vessels out of areas where overfished groundfish species occur. However, depth-based management introduces a new set of enforcement issues because compliance must occur at sea, requiring additional, more costly at-sea monitoring and enforcement methods. The efficacy of management measures hinges on the degree to which fishers comply with them. Environmental impacts associated with enforcement, therefore, mainly result from the degree to which catch levels are exceeded because of non-compliance. Furthermore, management and rebuilding of overfished groundfish relies on depth-based closures to minimize bycatch of these species. Illegal fishing activity in closed conservation areas could result in increased bycatch. The degree to which these catches in excess of limits or in closed areas remain unmonitored or under-reported is of crucial importance to effective management. While recognizing that most fishers comply with the rules, the overall level of compliance is influenced by the tradeoff between risk and reward. Fisheries enforcement generally seeks to deter fishers from violating the rules through severe penalties because the cost of constant and comprehensive monitoring using conventional means is high. This strategy relies on a sufficient level of monitoring and enforcement, so the tradeoff between the risk of being caught and severely penalized and the benefits from harvesting fish illegally is tipped in favor of compliance for the great majority of fishers.

7.3.3.1 Geographic Extent of Closed Areas

The geographic extent and the number of the GCAs (which includes the RCA, YRCA, and CCA) can have a profound effect on regulatory complexity. Their boundaries are complex, involving hundreds of points of latitude and longitude to delineate nearshore and offshore fathom curves. The areas are vast, extending along the entire West Coast from Canada to Mexico, and weather and sea conditions are frequently harsh. As a result, ensuring the integrity of conservation areas using traditional enforcement methods (such as aerial surveillance, boarding at sea via patrol boats, landing inspections, and documentary investigation) is difficult. However, the extent of the RCAs, the most extensive and complex of the closed areas, varies greatly among the rebuilding alternatives for bocaccio, but are anticipated to be relatively consistent for cowcod and yelloweye rockfish. Both the YRCA and the CCA are relatively easy to enforce, as they are extensive in area and are regularly shaped. Therefore, regulatory complexity and costs to the public sector, due to the size of commercial closed areas and their distance offshore vary the greatest among bocaccio rebuilding alternatives. As new information from the WCGOP becomes available over the years, the size of the non-trawl RCA may be modified to protect yelloweye rockfish, but these adjustments are not anticipated to add significant complexity to the regulations and are not a direct response the rebuilding alternatives. One new aspect of these recreational closures is the establishment of waypoints specified by latitude and longitude which define large closed area boundary lines. Previous depth-based closures in the recreational fisheries have only specified a depth contour as a boundary or had established waypoints for a relatively small geographic area (i.e., the YRCA). Although many recreational vessels carry the necessary electronic equipment to chart their location relative to the closed area, it is uncertain what effect expanding the use of specified boundary lines in recreational fisheries will have on recreational fishery compliance.

Increased reliance on depth-based closed areas in recreational fisheries adds regulatory complexity and costs to the public sector. Development of closed areas requires significant analyses to determine historic fishing patterns and species distributions. Determination of specific latitude and longitude coordinates is often a public process that tries to balance the conservation needs of overfished species while preserving fishing

opportunities for harvestable target stocks. Adoption and publication of hundreds of coordinates is a considerable regulatory task and efficient and accurate publication of coordinates involves the creation of written and electronic listings. Shore-based enforcement techniques are not sufficient and increased at-sea patrols are required to ensure angler compliance with closed areas.

VMS is a tool currently used to monitor vessel activity in relationship to geographical defined management areas where fishing activity is restricted. VMS transceivers installed aboard vessels automatically determine the vessel's location and transmit that position to a processing center via a communication satellite. Issues of regulatory complexity with large closed areas that differ between fishery sectors are substantially addressed but not alleviated with the implementation of VMS. Updating the system to incorporated new management lines and monitoring declarations to fish within closed areas are not without costs.

GCAs prevent vessels from operating in waters where overfished species are commonly found, reducing the overall incidental take of overfished species. If the integrity of the closed areas are not adequately maintained, harvest assumptions could be inaccurate resulting in indirect effects, such as unaccounted for removals. If the integrity of the closed areas cannot be maintained, the risk of exceeding an OY, and thereby missing a rebuilding target, is increased.

7.4 Discussion of Cumulative Impacts

Cumulative impacts to the public sector result from the combination of past, present, and future direct and indirect impacts of management measures combined with the effects of other activities. Ongoing and dramatic changes in the management, enforcement, and monitoring of groundfish fisheries in response to significant reduction in the amount of available resources have combined to force management agencies to consider changes to the management regime.

7.4.1 VMS Expansion

Enforcement methods of patrolling sea areas either by airplane or ship (carried out primarily by the U.S. Coast Guard, although state agencies have some capacity in this regard), and using fishery observers to monitor vessel position, can be used to monitor and enforce closed areas. However, VMS is a superior enforcement technology because the position of vessels with transmitting units can be tracked at all times. NMFS, in consultation with the Council and the Ad Hoc Vessel Monitoring System Committee (VMSC), published a final rule in the *Federal Register* on November 4, 2003 that requires VMS on all limited entry trawl and limited entry fixed gear vessels beginning January 1, 2004. A complete analysis of the alternatives considered for this program can be found in the Environmental Analysis/Regulatory Impact Review/Regulatory Flexibility Analysis for A Program to Monitor Time-Area Closures in the Pacific Coast Groundfish Fishery (available online at: http://www.nwr.noaa.gov/1sustfsh/groundfish/VMS/VMS_EA_Final.pdf) (NMFS 2003b).

The risk of exceeding OYs due to non-compliance would be greater without the VMS monitoring program in place. Enforcement relying on monitoring by airplanes and ships to identify incursions into the closed areas would not be as effective as VMS. A lot of time and considerable cost would have to be spent investigating any vessel appearing on enforcement radar, whether or not they are legitimately fishing in an area or not. This would reduce the ability of enforcement vessels to cover a large proportion of the closed area in a timely manner, reducing total monitoring and deterrence.

The risk of exceeding OYs would be less if VMS were implemented under any of these alternatives. One of the major benefits of VMS is its deterrent effect. If fishers know they are being monitored, and a credible enforcement action will result, they are less likely to fish illegally in closed areas. In addition, the data

collected with a VMS system can be used to better understand the distribution of fishing effort, which is likely to be affected by closed areas.

Depth-based management started in 2002 and became a major tool in the management of overfished groundfish species. Moving fisheries away from areas critical to the health of rebuilding stocks has quickly become a central aspect of West Coast groundfish management. The need to maintain the integrity of groundfish conservation areas through effective monitoring and enforcement is critical if fishery management agencies aim to provide fishing opportunity for healthy stocks while rebuilding overfished species in the future. The cumulative effect of declining fishery resources, increasing reliance on depth-based closed areas, and the long rebuilding time frames for overfished rockfish species have led management agencies to consider expansion of VMS to fishery sectors beyond limited entry fleets. The Council's VMSC met in October 2003 to develop criteria and objectives for identifying key fishery sectors to consider VMS expansion (summary minutes of the VMSC report can be found at the Council web site at: www.pcouncil.org/groundfish/gfvms.html). The VMSC is expected to give the Council a status report on the existing VMS program in 2004. At that time the Council is anticipated to consider the VMSC recommendations for the existing program as well as proposals for its expansion.

7.4.2 Fishery Monitoring and Biennial Management

Fishery management tools recently implemented, such as depth restrictions for recreational fisheries if caps on impacts to overfished species are attained, and tools considered for the future, such as individual quotas or bycatch caps, require timely, inseason catch and bycatch information. A cumulative effect of decreasing fishing opportunity and tightened regulations that rely on inseason tracking of fishery impacts is development of data sources that are timely and accurate. Among the tools being developed or considered are electronic logbooks to improve the speed and ease of incorporating at-sea fishery data into management, redesigning the MRFSS program by putting an emphasis on dock-side sampling for more effective inseason use, and expanding the WCGOP. As these data sources expand, and our knowledge of the stocks and fisheries improve, management agencies will need to consider mechanisms for incorporating this new information into biennial management. The Council has formed the Ad Hoc Groundfish Information Policy Committee to look into the use of these new data during a two-year management cycle. Fishery management agencies strive to use the best available science when establishing fishery resource policy, but frequent adjustments to the harvest specifications or management measures could erode the benefits of biennial management.

7.4.3 Fleet Reduction and Fishery Rationalization

Fleet reduction and fishery rationalization have been considered by state and federal management agencies since the 1980's. Overcapitalization of the fishery and optimistic expectations of groundfish stock productivity led to overfished species and compromised fishing industries and communities. In response, the Council and NMFS have completed a trawl vessel buyback program to reduce the size of the limited entry fleet. Additionally, the Council will begin to explore the potential for individual quotas, in part, as a means of providing regulatory flexibility and economically viable fishing communities. The cumulative effects of past management practices, current fishery crises, and the foreseeable need to rebuild overfished species and strengthen coastal economies have combined to make these dramatic changes to the management regime attractive to the fishery regulatory agencies.

7.4.4 Potential Unintended Consequences

Another way of looking at cumulative impacts is to identify the potential unintended consequences of the proposed action. The proposed action has an express purpose, as discussed in Chapter 1. However, when combined with other actions or external effects, the proposed action may have other effects. By definition, any description of unintended consequences must be speculative because they cannot be fully anticipated;

but this discussion helps inform the public as to the potential range of effects stemming from the proposed action.

Increased monitoring and enforcement of commercial and recreational fisheries as fisheries are constrained under rebuilding plans could have unintended consequences. Potential results could include information about the status of species not previously assessed that could result in the identification of new conservation concerns or an underutilized resource. Increased reliance on research activities such as trawl surveys, submersible surveys, and acoustic surveys as the availability of long-term fishery-dependent data sources could potentially erode resources that have historically been reserved for long-standing monitoring programs and data systems for tracking landed catch. Management measures designed to achieve lower OYs for overfished species could evolve into fishing techniques, gear types, or fishing grounds that are very different from traditional methods. There could be additional costs to the management regime from development of new programs to monitor catch and bycatch, modification and adjustment of historical and new data sets for stock assessment or population trend analysis, and designing new enforcement techniques.

7.5 *Summary of Impacts*

7.5.1 **No Action Alternative**

7.5.1.1 *Bocaccio*

The near-zero short-term OYs associated with this alternative for bocaccio would have substantial impacts to the public sector and fishery management regime in areas south of Cape Mendocino, California. As occurred in 2003, constraining OYs lead to complex regulations that seek to minimize impacts to bocaccio by limiting fishery access to large areas that bocaccio inhabit. These regulations incur costs to the public sector through increased enforcement burdens and a greater likelihood of frequent inseason management adjustments. Additionally, alternatives with low OYs and corresponding fishery restrictions limit the availability of fishery-dependent data. Increased reliance on research fisheries and surveys, and greater uncertainty in the stock assessment results, impacts the public sector through increased costs associated with research activities and increased management risk.

7.5.1.2 *Cowcod*

There is a negligible difference in the harvest levels and subsequent effects of the No Action Alternative and the two action alternatives for rebuilding cowcod. All alternatives are essentially the same, prescribing zero or near-zero harvests and complete avoidance strategies. Realistically, the zero harvest under the No Action Alternative and the most liberal annual harvest level of 4.8 are functionally the same, given our abilities to detect such small impacts in the affected fisheries.

Closing areas of highest density and preferred habitat should be a relatively effective way to protect cowcod given the sedentary lifestyle of adults. The existing CCAs in the Southern California Bight are in areas determined to be preferred cowcod habitats based on records showing these areas to be where the highest catch rates in recreational and fixed gears occurred (Butler, *et al.* 1999). They are relatively easy to enforce since they are extensive and regularly shaped. It is not anticipated that the size or configuration of the CCA will be modified in response to the rebuilding alternative chosen resulting in negligible differences in impacts to the public sector relative to the management regime currently in place for cowcod.

7.5.1.3 *Widow*

The No Action Alternative is not legally viable for rebuilding widow rockfish, since this stock is predicted to take longer to rebuild than the maximum allowable rebuilding time or not rebuild at all.

7.5.1.4 *Yelloweye*

There is little difference in the No Action Alternative and the action alternatives to rebuild the coastwide yelloweye rockfish stock. The 4 mt to 6 mt difference in harvest limits between the most liberal and most conservative alternatives analyzed is arguably not within the current data monitoring systems' capability to precisely differentiate. The No Action Alternative for rebuilding yelloweye rockfish is not legally viable, given the stock does not rebuild in the maximum allowable time (T_{MAX}) according to the National Standards Guidelines. This is due to the escalating harvest rate as biomass increases under the 40-10 rule.

Area closures and marine reserves for yelloweye rockfish, similar to the YRCA in northern Washington waters, may be an effective complement to a yelloweye rebuilding strategy given the sedentary nature of adults. It is not anticipated that the size or configuration of the YRCA will be modified in response to Council's identification of a preferred rebuilding alternative resulting in negligible differences in impacts to the public sector relative to the management regime currently in place for yelloweye rockfish. A more regional rather than coastwide management approach where the coastwide OY could be further defined as area specific harvest guidelines or quotas may also be advised to avoid further serial depletion of localized yelloweye rockfish populations.

7.5.2 **Action Alternative 1**

Action Alternative 1 generally prescribes the highest harvests considered by the Council for rebuilding bocaccio, cowcod, widow rockfish, and yelloweye rockfish. It is unlikely this level of harvest will be attained for bocaccio, cowcod, and yelloweye rockfish under the current management regime because of the constraints imposed by the need to rebuild canary rockfish (Table 5-12). Active management of the midwater trawl fisheries targeting Pacific whiting (see Section 5.3.3) may be all that is required to restrict widow rockfish bycatch under Action Alternative 1. This alternative assumes the lower impacts to the public sector and fisheries management regimes than the No Action Alternative since it prescribes the higher OYs that may result in the least extensive RCA designations. Additionally, higher OYs provide greater management flexibility allowing fishery managers to consider attributing a portion of the available OY as a buffer against exceeding OYs and potentially compromising rebuilding objectives. This risk averse strategy could also result in a decreased need for inseason management including fishery closures. Impacts to the public sector related to enforcement under Action Alternative 1 are potentially mixed. Regulatory complexity could be reduced relative to the other alternatives with less extensive RCAs, fewer closed periods, and less frequent inseason adjustment creating a more enforceable set of management measures. However, this could be offset to some degree as additional fishing opportunity increases fishing effort and the need for more enforcement patrols.

7.5.3 **Action Alternative 2**

Action Alternative 2 is more constraining to shelf fisheries than Action Alternative 1, but may have similar effects as Action Alternative 1 for non-whiting shelf fisheries due to canary rockfish rebuilding constraints. The whiting fishery would be more dramatically constrained under Action Alternative 2, since there is very little available widow rockfish OY if non-whiting fisheries continue to be held harmless. Impacts to the public sector and the fisheries management regime would likely be similar to those under Action Alternative 1. More stringent management of the whiting-directed fishery would require closer monitoring

and inseason tracking of catch and bycatch incurring more costs to the public sector than under Action Alternative 1.

7.5.4 Action Alternative 3

Action Alternative 3 is more constraining than Action Alternatives 1 and 2. It is likely the available widow rockfish OY under this alternative will not accommodate current non-whiting shelf fishing opportunities, since widow bycatch probably cannot be managed solely within the whiting fishing sectors under this alternative. Therefore, the expected impacts to the public sector and the fisheries management regimes are likely to be more significant as RCAs are extended and regulatory complexity increases. Potential management measures under this alternative are less likely to afford buffers as the lower widow rockfish OY becomes constraining to more fishing sectors. Restricted shelf opportunity could lead to management measures with increased regulatory complexity as specific time and area restrictions proliferate in an attempt to find ways to harvest under utilized species while avoiding overfished species. Enforcement burdens under this alternative would likely be great as large areas are restricted or closed to fishing and fishery seasons become shorter and perhaps more sporadic. Action Alternative 3 would likely incur considerable costs to catch and bycatch monitoring systems, as lower OYs create increased management reliance on catch and bycatch accounting.

7.5.5 Action Alternative 4

Action Alternative 4 specifies the lowest OYs considered by the Council for bocaccio, cowcod, widow rockfish, and yelloweye rockfish. However, this is the same cowcod OY specified under Action Alternatives 2 and 3. The bocaccio OY under Action Alternative 4, assuming the STATc base model, becomes much more constraining to shelf fisheries south of Cape Mendocino. Current fishing opportunities in these waters would not likely be fully accommodated under this level of harvest (Tables 2-1 and 5-12). Therefore, impacts to the public sector and the management regime would be similar to but greater than those under Action Alternative 3. The widow rockfish OY under Action Alternative 4 is near-zero and would result in very stringent management measures on the shelf coastwide. The whiting fishery could not be accommodated at all under this alternative, and any non-whiting shelf fishery with an estimated bycatch of widow (Table 5-12) would have to be dramatically displaced or eliminated altogether. Therefore, under this alternative, widow rockfish becomes the most constraining stock for most shelf fisheries on the U.S. West Coast. Constraining OYs for widow rockfish could lead to complex regulations that seek to minimize impacts to widow rockfish by limiting fishery access to large areas that widow rockfish inhabit. These regulations incur costs to the public sector through increased enforcement burdens and a greater likelihood of frequent inseason management adjustments.

7.5.6 Action Alternative 5 (Council-Preferred)

7.5.6.1 *Bocaccio*

The Council-preferred Alternative for bocaccio (Action Alternative 2) specifies a rebuilding strategy estimated to have a 70% probability of rebuilding by T_{MAX} . The Council also chose the base model STATc as the most plausible for rebuilding bocaccio given its endorsement by the stock assessment author. It is not anticipated rebuilding alternative chosen by the Council be a constraining factor for shelf fisheries due to canary rockfish rebuilding constraints resulting in minimal impacts to the public sector and fishery management regime.

7.5.6.2 Cowcod

The Council-preferred Alternative for cowcod (Action Alternatives 2, 3, and 4) specifies a rebuilding strategy estimated to have a 60% probability of rebuilding by T_{MAX} . Achieving this strategy will require a very low, constant harvest rate of 4.2 mt. Given our abilities to detect such small impacts in the affected fisheries, this will result in a management strategies of non-retention and avoidance to achieve minimal impacts to cowcod while providing opportunity for harvestable target stocks.

The Council also recommended the continued implementation of the existing CCAs in the Southern California Bight. Restricting fishing access in areas determined to be preferred cowcod habitats is considered a necessary action to avoiding fishery-related impacts. The CCAs are relatively easy to enforce, since they are extensive and regularly shaped. It is not anticipated the size or configuration of the CCA will be modified in response to the Council's identification of this preferred alternative resulting in negligible differences in impacts to the public sector relative to the management regime currently in place for cowcod.

7.5.6.3 Widow

The Council-preferred Alternative for widow rockfish (Action Alternative 1) specifies a rebuilding strategy estimated to have a 60% probability of rebuilding by T_{MAX} . The Council also chose the base Model 8 as the most plausible for rebuilding widow rockfish given its endorsement by the stock assessment team. Total catch OYs for widow rockfish under this rebuilding strategy are likely to preclude or limit midwater trawl opportunity including fisheries targeting widow rockfish, yellowtail rockfish, and Pacific whiting (Table 5-8b).

Management measures for other midwater trawl fisheries are likely to increase regulatory and monitoring complexities and, thereby, increase impacts to the public sector. Observers are already an important mechanism for monitoring bycatch in current midwater trawl fisheries such as the Pacific whiting fisheries and the tribal yellowtail rockfish fisheries. The GMT has recommended additional management strategies for addressing widow rockfish bycatch in the Pacific whiting fisheries (see Section 5.3.3). Concepts such as hard widow rockfish bycatch caps, avoidance strategies through timely reporting of widow rockfish bycatch data, "penalty box" strategies for vessels with high bycatch, and closure of areas of high widow rockfish bycatch would all require additional and potentially intensive inseason fishery monitoring. Identification of closed areas increases the management burdens by requiring additional regulatory language specifying the size and provisions of the closed area and increases the enforcement burden by adding complexity to the task of ensuring the integrity of new closed areas.

7.5.6.4 Yelloweye

The Council-preferred Alternative for yelloweye rockfish (Action Alternative 3) specifies a rebuilding strategy estimated to have an 80% probability of rebuilding by T_{MAX} . The Council recommended the continued implementation of the YRCA in northern Washington waters as a means of reducing fishery interactions with yelloweye rockfish given the sedentary nature of adults. The YRCA is only one management tool utilized in achieving rebuilding OYs for yelloweye rockfish. Recreational and commercial fisheries are tracked inseason and closed or limited where necessary. In Washington and Oregon, 2004 recreational fisheries will be restricted to areas shallower than 30 fm in areas of high bycatch if inseason tracking suggests yelloweye rockfish harvest guidelines are projected to be attained early. Therefore, it is not anticipated the size or configuration of the YRCA will be modified in response to the rebuilding alternative chosen resulting in negligible differences in impacts to the public sector relative to the management regime currently in place for yelloweye rockfish. A more regional rather than coastwide management approach may also be advised to avoid further serial depletion of localized yelloweye rockfish

populations. The Council is considering regional management alternatives for yelloweye rockfish for 2005-2006.