

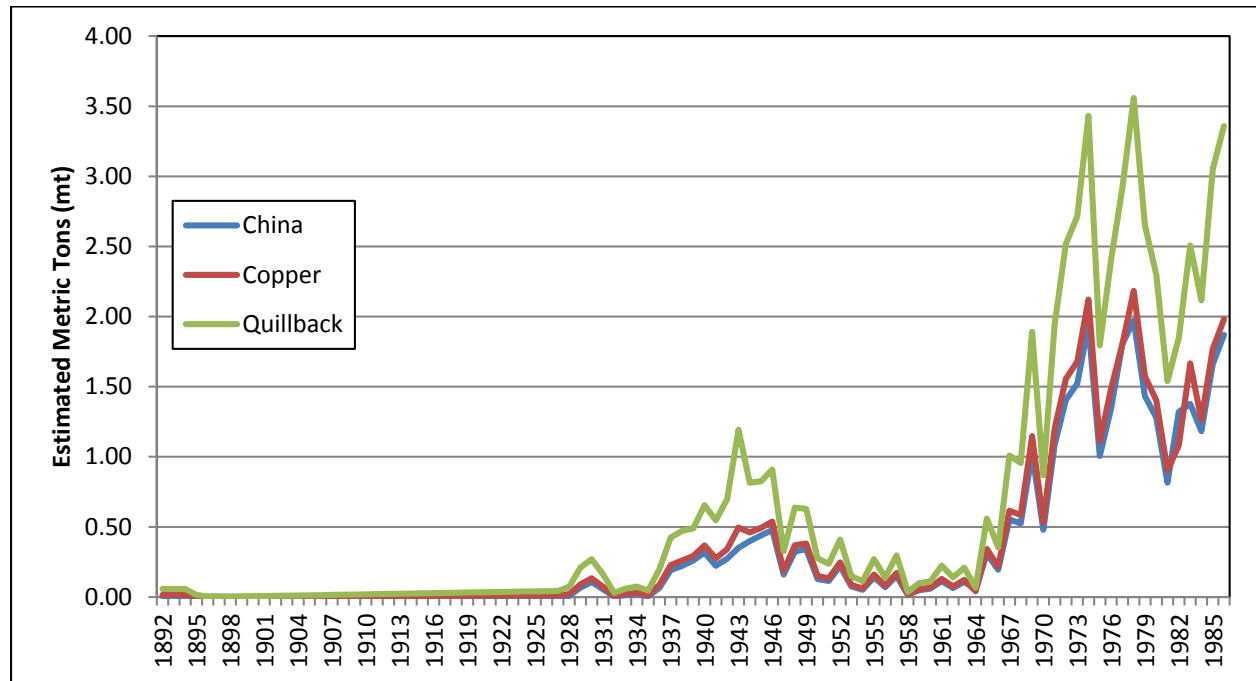
STOCK ASSESSMENT DATA AVAILABLE FOR KELP GREENLING, AND CHINA, COPPER AND QUILLBACK  
 ROCKFISHES FOR THE 2015-16 STOCK ASSESSMENT CYCLE

This report details the Oregon Department of Fish and Wildlife (ODFW) data and information available for kelp greenling (*Hexagrammos decagrammus*), and china (*Sebastes nebulosus*), copper (*S. caurinus*) and quillback rockfishes (*S. malinger*). These data will help to inform decision makers as priorities are set for species assessments for the upcoming 2015-16 stock assessment cycle.

**Commercial Data**

*Commercial catch:* Most commercial catch of these species off Oregon is taken using hook and line gear types such as bottom longline, pole and line, or vertical longline. A relatively small amount is taken by trawl gear. Historical estimates of commercial catch are available for china, copper and quillback rockfishes in Oregon’s commercial historical reconstruction (1892-1986; Karnowski et al. 2014; Figure 1). These estimates are based on several historical sources of data of large market categories to which species compositions are applied. These data are freely available from ODFW, in addition to an ODFW informational report (Karnowski et al. 2014) detailing the methodology that is available online<sup>1</sup>. There are no historical catch data available for kelp greenling in this reconstruction.

Figure 1: Oregon historical commercial catch reconstruction time series for china, copper and quillback rockfishes (1892 – 1986; Karnowski et al. 2014).



Contemporary commercial catches directly from ODFW are available via our fish ticket database (i.e. landing receipts), which feed directly into the Pacific Fisheries Information Network (PacFIN). These

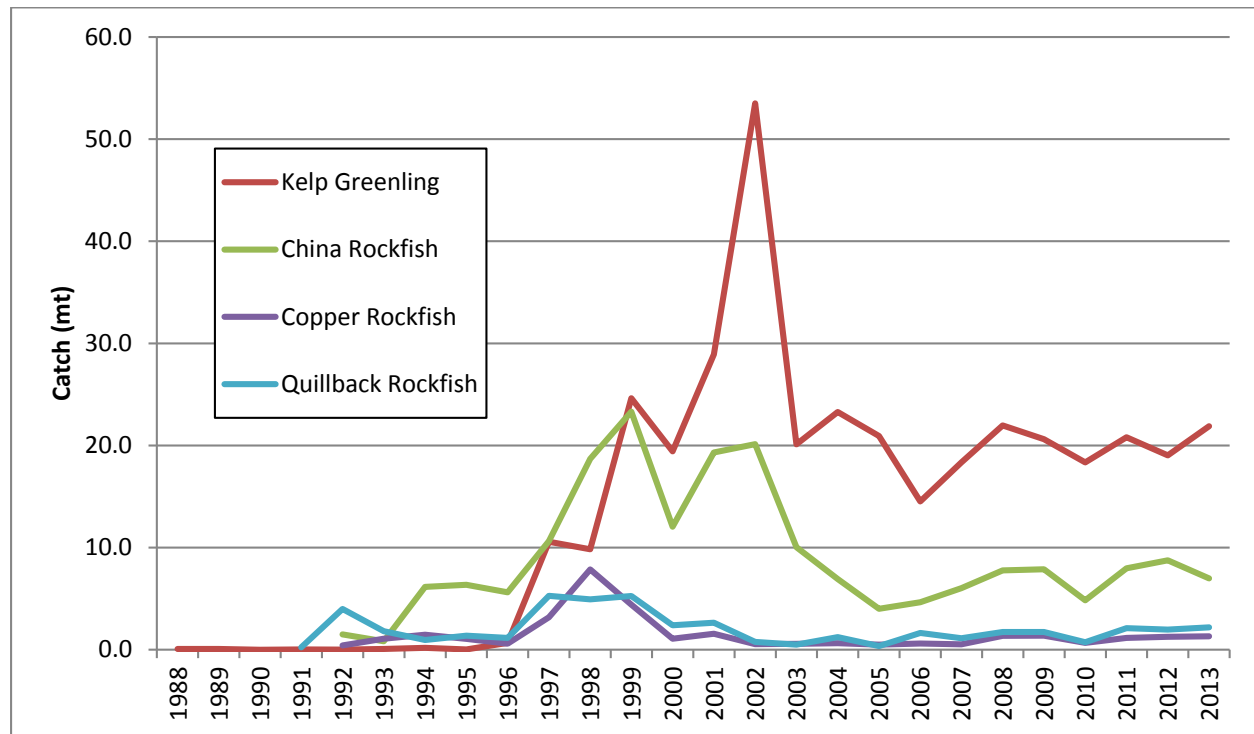
<sup>1</sup> [http://www.dfw.state.or.us/MRP/publications/docs/ODFW\\_Info\\_Rpt%202014-02\\_Historic\\_Reconstruction\\_Oregon\\_Commercial\\_Fish\\_Landings.pdf](http://www.dfw.state.or.us/MRP/publications/docs/ODFW_Info_Rpt%202014-02_Historic_Reconstruction_Oregon_Commercial_Fish_Landings.pdf)

data are freely available to stock assessors, but ODFW staff can also assist assessors with obtaining PacFIN downloads or raw fish ticket information.

There are commercial landings available for kelp greenling from 1988 to present (Figure 2). In Oregon, kelp greenling are landed as part of a greenling market category that can include extremely minor amounts of rock greenling (*Hexagrammos lagocephalus*). Species compositions are routinely taken, but the market category is consistently > 99% kelp greenling. PacFIN does not allow for non-rockfish species compositions, but they are available directly from ODFW. Oregon greenling landings in PacFIN are also at the market category level (Greenlings; alpha code: KGL1).

There are PacFIN estimates of commercial landings for china and copper rockfish from 1992 to present and for quillback rockfish from 1991 to present (Figure 2). Prior to 1999, these three rockfishes were landed as part of the Other Rockfish market category (PacFIN alpha code: URCK; ODFW species code: 410) and from 2000 – 2007, they were landed as part of the Nearshore Rockfish market category (401). In 2008, the Nearshore Rockfish market category was separated into 11 individual nearshore rockfish species, including china, copper and quillback rockfishes, and these species have been recorded individually on fish tickets since that time. When the multi-species market categories were in place, species compositions were routinely collected by ODFW port biologists (Table 1; 1980-2013). In PacFIN, catch data for these three species prior to 2008 applies these species compositions to produce catch estimates by individual species. However, species compositions for fixed gear landings are sparse prior to 1991/1992 (Table 1), and the few that were taken did not contain any of the three species of interest. This leads to PacFIN estimates of zero catch for these species from 1981-1991/1992. On the other hand, the Karnowski et al. (2014) historical reconstruction used aggregated species composition and landing data from 1985-1993 to derive average proportions for each species in each market category, and applied these proportions to historical fixed gear catches to estimate species specific catches, including China, copper, and quillback rockfish. Methods similar to Karnowski et al. (2014) could be used to estimate catches for the time period which is not covered by the historical reconstruction and in which PacFIN estimates zero catch for these species. ODFW staff can assist with developing more exact methods for this application.

Figure 2: PacFIN commercial catch (mt) for china, copper and quillback rockfishes and kelp greenling (1988-2013).



*Commercial discards:* There are two potential sources of information for these four species, including the logbook program from the nearshore commercial groundfish fishery and the federal observer program, which observes this fishery as part of the observed fixed gear fleet. This fishery is a state-managed limited entry fishery that operates in nearshore waters and targets a variety of nearshore groundfish to supply primarily the live fish market. The limited entry permit program began in 2004. Annual logbook compliance in this fishery averages 85% (SD = 9.3%) from 2004 – 2013 and in recent years, has been greater than 95%. Data can be aggregated at the trip- or set-level and consist of pounds discarded (legal or sub-legal sized) by each of these four individual species. Additional work would be needed to evaluate the integrity of this data, as quality can depend on the species in question and a wide range of additional considerations. Though confidential, logbook data is available upon request from ODFW.

Additionally, the West Coast Groundfish Observer Program (WCGOP) observes the nearshore groundfish fishery as part of their non-catch share fishery observer program. From 2004 – 2011 (all years freely available), WCGOP observed an average of 7.6% of landings from the Oregon commercial nearshore fishery<sup>2</sup>. Annual summaries of the observed catch, discarded catch, and percent observed by species are available online<sup>3</sup> (Table 2). Disaggregated data are available to stock assessors directly from WCGOP.

<sup>2</sup> [http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data\\_products/sector\\_products.cfm](http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm)

<sup>3</sup> [http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data\\_products/sector\\_products.cfm#obs](http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs)

*Commercial length/weight composition:* ODFW port biologists routinely collect biological information from commercially landed catches throughout Oregon that include length, weight and age structures. These are commonly referred to as “market samples”. Length samples are available for china rockfish from 1995 – present, for quillback rockfish and kelp greenling for 1998 – present and for copper rockfish from 1999 – present (Table 3). Weights are available for copper and quillback rockfishes and kelp greenling from 2000 – present and for china rockfish in 1995 and 2000- present (Table 4). These data are available on request from ODFW or can be downloaded from PacFIN.

*Commercial Ages:* Table 5 shows the number of age structures collected for all available years for each species from market samples. Additionally, Table 6 shows those that have been aged and the percent of structures aged from the available years and overall. Most of the commercial catch is marketed live, which limits the number of age structures that can be obtained.

No market sample age structures from copper rockfish or kelp greenling have been aged, but most China rockfish and quillback rockfish structures have been aged. Age structures are also collected from the recreational fisheries and through special projects; however, the protocols for collecting samples from these programs differ from those collected as market samples. These samples are documented in later sections in this document.

Market samples also provide additional associated biological information, such as length and weights of landed fish, which would provide information on species- and Oregon- specific growth rates when combined with age structures.

*Commercial CPUE:* There are several sources available for commercial catch-per-unit-effort (CPUE) indices. The first potential source is the commercial nearshore fishery logbook program. As mentioned previously, this fishery is a state-managed fishery that operates in nearshore waters and targets a variety of nearshore groundfish. CPUE indices could be created using numbers of hooks, hours fishing, numbers of people, or combinations of these (e.g. hook-hours). These data could be aggregated at the trip- or set-level and consist of pounds landed by each of these four individual species. Additional work would be needed to evaluate the integrity of this data, as quality can depend on the species in question and a wide range of additional considerations. The second potential source is ODFW fish ticket data. These data would consist of catch per trip or per day. A final source would be the WCGOP, which observes the commercial nearshore groundfish fishery as part of their non-catch share fishery observer program. From 2004 – 2011 (all years freely available), WCGOP observed an average of 7.6% of landings from the Oregon commercial nearshore fishery<sup>4</sup>. Combinations of these data sources could also be a viable option for a CPUE index for any of these four species. For example, catch could be estimated from fish tickets and combined with an effort estimate from the nearshore logbooks.

## **Recreational Data**

*Recreational catch:* Recreational catch estimates have been derived from at least three distinct sampling programs, which have varied in occurrence, sampling protocols, and estimation methods over time. The basis for catch estimates available from the Recreational Fishery Information Network (RecFIN) also vary over time (Table 7). The Oregon Recreational Boat Sampling (ORBS) has been collecting data on sport catch and effort since the late 1970s. These data are available from 1979 – present for all four species in various forms and represent ocean boat catches only. From 1979 to 1989, there are ORBS data available in numbers of fish by individual species (Figure 3). Since monitoring sport salmon catches is the primary focus of ORBS, data on other species during this early time period were aggregated to a set of five categories. All rockfish species were part of a generic “rockfish” category and kelp greenling were part

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<sup>4</sup> [http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data\\_products/sector\\_products.cfm](http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm)

of a “miscellaneous” category. Data from these categories were separated by species using species composition data taken during the same time period, though potentially, these compositions were not taken methodically. The level at which species compositions were collected in ORBS has changed over the years. Figure 4 documents how trip type classifications and protocols for collecting species compositions have changed over time in ORBS. These data would need to be expanded to account for unsampled ports and time periods, but similar expansions have been developed for other species, including yelloweye rockfish (2009) and cabezon (2009) for other assessments. These data are only available by request from ODFW and are not available on RecFIN.

Figure 3: Numbers of fish (unexpanded) for kelp greenling, and china, copper and quillback rockfishes in legacy ORBS data.

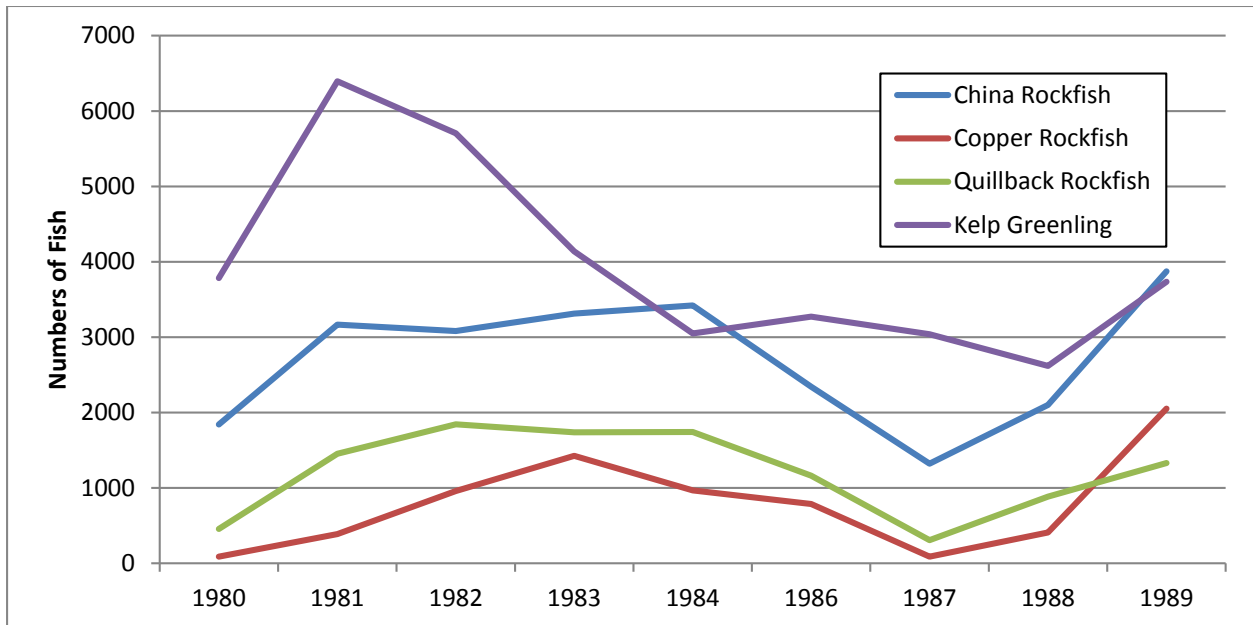
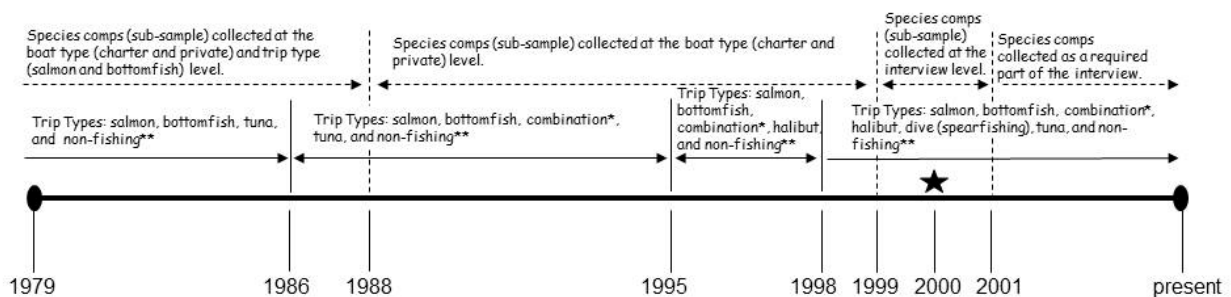


Figure 4: Timeline of bottomfish species composition collection and sampling, 1979 – present.



\* From 1986-1994, the “combination” trip type was assigned only to charter trips that targeted both salmon and bottomfish. From 1995-1997, the “combination” trip type was assigned to both charter and private trips that targeted salmon and bottomfish. In 1998, the definition of “combination” was expanded to include any trip that targeted salmon and another species/species group (e.g. salmon/halibut, salmon/bottomfish, etc.)

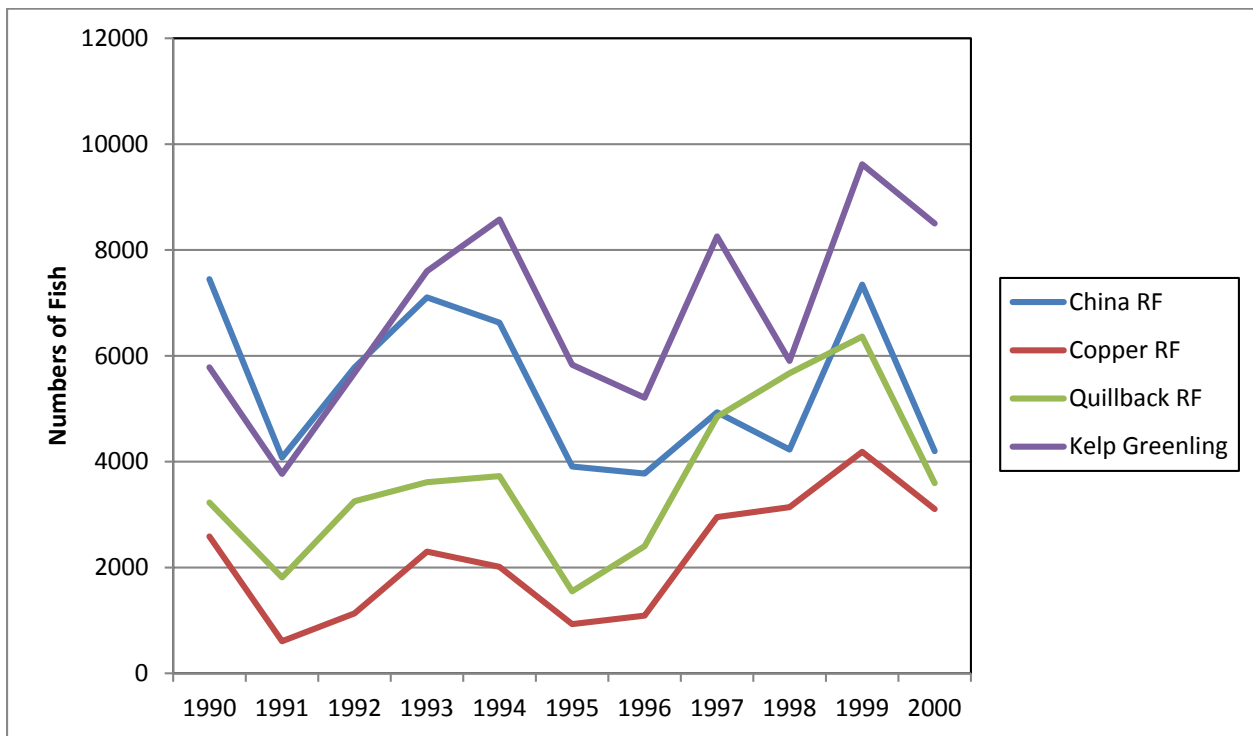
\*\* From 1979-1998, dive trips on which anglers spearfished were included in the “non-fishing” trip type category.

★ From 1979-1999, information was collected on bottomfish catch only; no information was collected on released bottomfish. In 2000, samplers collected data on released lingcod and halibut. From 2001-present, samplers collect information on releases of all bottomfish.

There are also ORBS data from 1990 – 2000 with applied species compositions that are expanded for unsampled ports and times (Figure 5). These data constitute the ocean boat catches in RecFIN from 1993 to 2000 and consist of numbers of fish. It is unclear at this time why data from 1990-1992 were not included in the RecFIN database, but it is available directly from ODFW. From 1993 to present, all ocean boat mode data on RecFIN are from ORBS, and are available directly from RecFIN or from ODFW.

To convert numbers of fish to biomass, measurements of fish weights are needed. These sources are discussed in another section below. For the yelloweye rockfish and cabezon assessments, average weights from RecFIN were used, in addition to internal ODFW sources, such as ORBS or from specific special projects.

Figure 5: Numbers of fish (expanded for unsampled ports and times) for kelp greenling, and china, copper and quillback rockfishes in legacy ORBS data. Data shown from 1993-2000 are available on RecFIN.



ORBS data represent ocean boat data (charter and private) only. There are data on other fishing modes from the Marine Recreational Fisheries Statistics Survey (MRFSS), available on RecFIN from 1980 – 2003. These modes include several shore based categories, including “man-made” and “beach/bank”, or a combined “shore modes”. From 1980 to 1989, recreational ocean boat catches are also from MRFSS. There are no data on RecFIN from 1990-1992. Annual catch estimates for MRFSS shore modes are sporadic for both china and quillback rockfish (non-zero catch estimates in five years and six years between 1980 and 2003, respectively), but are more consistent for copper rockfish (non-zero catch estimates in 19 years between 1980 and 2003). There are non-zero kelp greenling catch estimates for MRFSS shore modes for all years between 1980 and 2003. However, ODFW cautions that the kelp greenling estimates may be inflated and are working to find alternative data sources to document shore-side catches.

There are also shore-based catch data available from the Shore and Estuary Boat Survey (SEBS) from mid-2003 to mid-2005. This survey was an extension of the MRFSS protocols with a few minor changes.

Catch estimates are available on RecFIN. There are no recent estimates of shore-based catches after SEBS was terminated in 2005. There are no catch estimates for china rockfish in SEBS, but the other three species are available.

*Recreational discard:* There are MRFSS estimates for discarded catch available on RecFIN from 1980 – 2000. For selected fishing modes, china rockfish discards are available from 1980 – 1989, quillback rockfish discards are available in 1982 and 1984 and copper rockfish for 1980-1982, 1987 and 2002. Kelp greenling discards are available from 1980 – 2003.

ORBS has also been collecting information on discarded fish since 2001 (Table 8). These data consist of numbers of fish discarded and are collected when anglers are interviewed dockside. These data are also expanded for unsampled days using boat counts in each sampled port. The expanded data are available on RecFIN from 2001 to present.

An additional source of recreational discards includes the State Sport Observer (SSO) program, which the ODFW maintains as a state program to observe on-board activity of the charter boat (CPFV) fleet. The SSO program was initiated as a pilot program in 2001, and became a permanent program in 2003. Recently, staff from ODFW and the Southwest Fishery Science Center developed a relational database with the data collected in this program (Monk et al. 2013). These data are confidential but available by request through the ODFW. Data are aggregated at the drift- or trip-level and consist of numbers of discarded fish by individual species (Table 9).

*Recreational length/weight composition:* MRFSS has annual average lengths and weights for all four species on RecFIN from 1980 – 1989, though not for each mode for all those years.

ORBS subsamples recreational catch to obtain biological data, such as length, weight, sex (when applicable) and scans for various types of tags. Average lengths and weights from 1993 to present in RecFIN are based on ORBS data. The number of length and associated weight samples for each of the four species from ORBS is available in Table 10 (2001-2014). ODFW notes that the average lengths and weights available on RecFIN are different than those based on the raw data because of the post-processing protocols that RecFIN applies to those data.

Limited information is available on discard lengths from the SSO database. Lengths are only collected on discarded fish, but can be compared to retained catch length compositions recorded by the ORBS program. Initially, observers measured as many discarded fish as possible (2003-2009) but more recently, as many as possible were measured but no more than 10 fish per drift (2010 – present). Samples are very limited for all three of the rockfish species ( $n = 41$  for all three), but samples are slightly higher for kelp greenling ( $n = 81$ ). Minimum size limits for kelp greenling have been in place in the recreational fishery since 2004. Fish weights ( $W$ ) are calculated in the database using fork length ( $L$ ; equation:  $W = aL^b$ ), but are not directly measured at sea.

*Recreational Ages:* Age structures are collected from recreational fisheries routinely, but the majority of structures collected from these species have not been aged. There have been recreational structures collected for all four species from 1998 to present (Table 11). There were some kelp greenling samples aged from the majority of those years, but the three rockfishes were only aged in a relatively small number of years (Tables 12 and 13). These recreational samples also provide additional associated biological information, such as length and weights of fish, which would provide information on species- and Oregon- specific growth rates when combined with age structures.

*Recreational CPUE:* There are effort data available from ORBS from 1986 to 2000 in numbers of trips and anglers. These data are also expanded to account for unsampled times in the sampled ports. However,

these data have not yet been disaggregated to the species-level, and are currently only available at the category levels mentioned previously (e.g. rockfish and miscellaneous).

From 2001 to present, ORBS has effort estimates of numbers of boats and anglers. Angler effort is estimated from the interview and boat counts are obtained through a camera network in the major ports. ORBS also collects information on hours fished during interviews; however, this can be a misleading estimate of time actually spent bottomfishing, as trips are often combinations of several types of fishing and crabbing.

Additionally, there are effort data from the MRFSS and SEBS programs available (1980 – 2005, collectively). Interview-level data, which contains estimates of catch per angler, can be requested directly from RecFIN.

The SSO database also contains information on effort of the recreational charter fleet (Monk et al. 2013). These data can be aggregated at the trip- or drift-level, depending on the type of effort measurement, and consist of number of observed anglers, drift hours, and some information on gear at the trip level, including number of hooks. As part of the Council's "data-moderate" assessment process, CPUE indices for copper and china rockfish have been developed from this data.

### **Special Project and Research Biological Data**

Length, weight, age structures and other biological data are often collected by ODFW for "special projects" and research. Special project samples are typically fishery samples collected in a manner similar to commercial market samples or recreational age samples. They may represent targeted sampling for a specific purpose (e.g., estimating maturity curves, see next paragraph), or samples that did not meet standard protocols for any number of reasons. Depending on how they were collected, a number of these samples may be integrated with standard fishery samples, especially where sample size is lacking. These samples are often associated with additional material such as maturity status, gonad samples, or tissue samples. The same types of information are also collected during targeted, fishery independent research projects which often mimic commercial or recreational fishing practices. Tables 14, 15, 16, 17, and 18 tabulate the number of available lengths, weights, age structures, ages, and percent of structures aged respectively by species and source for special project and research samples. Samples designated as from an unknown source are typically fishery samples that lack a record of whether they were collected from a recreational or commercial fishery.

### **Maturity Information**

In 2011, ODFW staff published a report that detailed age- and length-at-maturity data for quillback rockfish and length-at-maturity for china rockfish (Hannah and Blume 2011). Additionally, in 2014, ODFW staff published a report that detailed age- and length-at-maturity for copper rockfish (Hannah 2014). These data are based on histological evaluation of ovaries, generally considered more reliable than macroscopic evaluation. Samples were collected from recreational landings on the central Oregon coast.

ODFW efforts continue to evaluate length- and age-at-maturity for kelp greenling in Oregon waters. A recent review of available maturity samples revealed a critical data gap for kelp greenling less than 25 centimeters. In 2013, efforts to collect fish through fishing, beach seining and trapping have yielded new samples in the appropriate size range that are currently being processed. Additional sampling efforts are anticipated in 2014.



## Regulations

Management and regulation changes over time dramatically impact the context in which fishery-dependent data is viewed. ODFW has compiled information on regulation and major management changes over time for both commercial and recreational groundfish fisheries in a database format. The SSO database contains a table with all relevant sport regulations from 2001-2010. These are available to assessors upon request.

## New Black Rockfish Assessment Data

All of the Oregon data sources utilized in the 2007 assessment are available with updated information. This includes additional catch, biological (length, weight and age) and tagging data. Additionally, black rockfish landings are estimated in the commercial historical reconstruction (1892 – 1986). More details on how the historical catch estimates were developed are available in Karnowski et al. 2014.

## References

Hannah, R.W. and M. T. Blume. 2011. Maturity of female quillback (*Sebastes maliger*) and china rockfish (*S. nebulosus*) from Oregon waters based on histological evaluation of ovaries. ODFW Information Report # 2011-01.

<http://www.dfw.state.or.us/MRP/publications/docs/Quillback%20china%20RF%20maturity.pdf>

Hannah, R.W. 2014. Length and age at maturity of female copper rockfish (*Sebastes caurinus*) from Oregon waters based on histological evaluation of ovaries. ODFW Information Report # 2014-04.

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Monk, M., E.J. Dick, T. Buell, L. Zumbrunnen, A. Dauble and D. Pearson. 2013. Documentation of a relational database for the Oregon Sport Groundfish Onboard Sampling program. NOAA Technical Memorandum NMFS-SWFSC-519. <http://swfsc.noaa.gov/publications/TM/SWFSC/NOAA-TM-NMFS-SWFSC-519.pdf>.

## Tables

Table 1: Number of species composition samples taken by market category for longline and hook and line gear types, and number with China, copper and quillback rockfishes from 1980 – 2013.

Year	n samples taken		n samples with species		
	Other Rockfish (410)	Nearshore Rockfish (401)	China Rockfish	Copper Rockfish	Quillback Rockfish
1980	0	NA	0	0	0
1981	0		0	0	0
1982	0		0	0	0
1983	0		0	0	0
1984	0		0	0	0
1985	0		0	0	0
1986	6		2	1	1
1987	8		0	0	0
1988	26		0	0	0
1989	26		0	0	0
1990	2		0	0	0
1991	17		0	0	2
1992	109		14	6	13
1993	113		13	9	19
1994	99		29	15	20
1995	35		14	3	4
1996	51		18	6	12
1997	65		34	13	28
1998	83		63	29	37
1999	133	101	48	73	
2000	NA	176	152	32	42
2001		238	213	57	71
2002		363	321	32	52
2003		236	220	27	26
2004		207	174	30	49
2005		96	75	9	13
2006		145	112	19	30
2007		142	123	25	34
2008	Nearshore groundfish coded to species on fish tickets; species composition samples used to estimate sorting contamination		44	14	23
2009			103	12	32
2010			151	26	34
2011			40	47	85
2012			0	2	5
2013			2	2	3

Table 2: Aggregated WCGOP data for China, copper, and quillback rockfishes and kelp greenling. Data are from 2004-2012 (all years available). (Data downloaded from: [http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data\\_products/sector\\_products.cfm#obs](http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/sector_products.cfm#obs))

Species Name	Average Annual Observed Catch (mt)	Average Annual Observed Discarded Catch (mt)	Average Annual Percent Discarded
China Rockfish	0.57	0.04	6.8%
Copper Rockfish	0.08	0.00	4.2%
Quillback Rockfish	0.11	0.01	13.1%
Kelp Greenling	1.64	0.27	16.0%

Table 3: Number of length samples from commercial market samples for China, copper and quillback rockfishes, and kelp greenling.

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
	102	0	0	0
1996	118	0	0	0
1998	138	0	4	165
1999	130	10	25	192
2000	1232	85	200	1442
2001	2054	92	214	2898
2002	1592	28	59	3870
2003	994	40	49	1696
2004	701	53	134	2561
2005	217	11	20	1639
2006	438	41	140	1993
2007	724	32	127	2068
2008	376	19	55	1539
2009	430	15	64	1146
2010	529	42	69	1829
2011	997	80	191	2524
2012	603	59	151	1597
2013	688	63	214	2382
<b>Total</b>	<b>12063</b>	<b>670</b>	<b>1716</b>	<b>29541</b>

Table 4: Number of weight samples from commercial market samples for China, copper and quillback rockfishes, and kelp greenling.

<b>Year</b>	<b>China Rockfish</b>	<b>Copper Rockfish</b>	<b>Quillback Rockfish</b>	<b>Kelp Greenling</b>
1995	92	0	0	0
1996	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	1	4	20	6
2001	70	9	8	3
2002	533	21	45	474
2003	369	28	18	247
2004	591	53	65	1152
2005	206	11	20	578
2006	428	38	73	1456
2007	712	31	127	2068
2008	363	19	54	1539
2009	423	12	59	1123
2010	513	34	63	1821
2011	992	80	191	2506
2012	594	45	129	1569
2013	676	61	211	2325
<b>Total</b>	<b>6563</b>	<b>446</b>	<b>1083</b>	<b>16867</b>

Table 5: ODFW market sample age structures for China, copper and quillback rockfishes and kelp greenling (1995-2013).

<b>Year</b>	<b>China Rockfish</b>	<b>Copper Rockfish</b>	<b>Quillback Rockfish</b>	<b>Kelp greenling</b>
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	1	0	0	0
2001	72	0	0	0
2002	125	1	3	0
2003	185	9	9	41
2004	58	27	63	0
2005	16	0	1	0
2006	30	1	63	0
2007	40	2	2	17
2008	34	1	10	19
2009	80	1	17	35
2010	67	6	14	49
2011	309	18	97	90
2012	153	11	102	100
2013	268	31	117	151
<b>Total</b>	<b>1438</b>	<b>108</b>	<b>498</b>	<b>502</b>

Table 6: ODFW number and percent aged from market samples for China and quillback rockfishes (note that other samples for all species have been aged through special projects not included here). No age structures from market samples have been aged for copper rockfish or kelp greenling.

Year	Number Aged		Percent Aged	
	China Rockfish	Quillback Rockfish	China Rockfish	Quillback Rockfish
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	63	0	88	0
2002	121	2	97	67
2003	181	9	98	100
2004	55	63	95	100
2005	14	1	88	100
2006	29	63	97	100
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
<b>Total</b>	<b>463</b>	<b>138</b>	<b>32</b>	<b>28</b>

Table 7: Available sources of recreational catch estimates including basis for RecFIN estimates

Year	Available catch estimates by sampling program		Basis for RecFIN estimates	
	ORBS	MRFSS	Ocean boat fishing modes	Shore and estuary fishing modes
1979	Catch estimates for ocean boat fishing modes , not expanded for unsampled ports and times	None	None	None
1980		Catch estimates for all fishing modes	MRFSS	MRFSS
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990	Catch estimates for ocean boat fishing modes , expanded for unsampled ports and times	Program suspended, no catch estimates	None	None
1991		Catch estimates for all fishing modes	ORBS	MRFSS
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004	Program terminated, no estimates	None	SEBS	
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				

Table 8: Number of interviews (e.g. encounters) with recorded discarded fish for China, copper, and quillback rockfishes and kelp greenling from ORBS (2001-2014)

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
2001	16	7	2	104
2002	7	8	5	75
2003	20	12	8	159
2004	26	18	10	192
2005	92	66	44	484
2006	68	54	42	274
2007	59	46	45	213
2008	94	45	34	319
2009	72	33	18	453
2010	68	40	25	639
2011	101	59	35	552
2012	85	38	61	567
2013	119	59	69	703
<b>Total</b>	<b>832</b>	<b>501</b>	<b>403</b>	<b>4803</b>

Table 9: Observed encounters in the SSO program for China, copper, and quillback rockfishes and kelp greenling (Monk et al. 2013).

Species	Number Retained	Number Discarded	Drifts Encountered	Percent of Drifts Encountered
China Rockfish	325	19	296	2.4
Copper Rockfish	245	15	228	1.9
Quillback Rockfish	394	9	331	2.7
Kelp Greenling	757	73	700	5.8



Table 10: Number of length and weight samples from ORBS for China, copper, and quillback rockfishes and kelp greenling (2001-2014).

Year	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
2001	373	196	321	515
2002	644	641	757	1280
2003	685	518	875	1365
2004	395	325	500	1098
2005	619	696	931	1559
2006	713	758	1033	1353
2007	899	796	1074	1313
2008	907	834	1115	1832
2009	653	569	824	1820
2010	742	790	918	2572
2011	886	864	1044	2490
2012	846	944	1240	2429
2013	792	570	752	2305
<b>Total</b>	<b>9174</b>	<b>8523</b>	<b>11421</b>	<b>22075</b>

Table 11: Collected ODFW recreational age structures for china, copper and quillback rockfishes and kelp greenling (1998-2013). Collections for 2013 are preliminary.

Species	China Rockfish	Copper Rockfish	Quillback Rockfish	Kelp Greenling
1998	1	13	23	6
1999	12	5	13	43
2000	6	4	2	20
2001	101	37	107	79
2005	56	56	91	179
2006	192	194	340	387
2007	264	264	311	335
2008	269	270	365	471
2009	183	183	245	519
2010	175	175	374	547
2011	237	237	337	696
2012	208	208	475	671
2013	146	187	279	555
<b>Total</b>	<b>1850</b>	<b>1833</b>	<b>2962</b>	<b>4508</b>

Table 12: ODFW Aged samples from recreational fishery for china, copper and quillback rockfishes and kelp greenling (1998-2012).

<b>Species</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>
China Rockfish	1	12	6	1	55	188	0	0	0	0	0	0	<b>263</b>
Copper Rockfish	0	0	0	0	55	188	0	0	0	0	0	0	<b>243</b>
Quillback Rockfish	0	0	0	0	91	340	0	356	0	0	0	0	<b>787</b>
Kelp Greenling	2	7	0	6	147	382	335	470	260	274	348	335	<b>2566</b>

Table 13: Percent of collected recreational samples that have been aged for china, copper and quillback rockfishes and kelp greenling (1998-2012; excludes preliminary collections in 2013).

<b>Species</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>
China Rockfish	100	100	100	1.0	98.2	97.9	0.0	0.0	0.0	0.0	0.0	0.0	<b>15.4</b>
Copper Rockfish	0.0	0.0	0.0	0.0	98.2	96.9	0.0	0.0	0.0	0.0	0.0	0.0	<b>14.8</b>
Quillback Rockfish	0.0	0.0	0.0	0.0	100	100	0.0	97.5	0.0	0.0	0.0	0.0	<b>29.3</b>
Kelp Greenling	33.3	16.3	0.0	7.6	82.1	98.7	100	99.8	50.1	50.1	50.0	49.9	<b>64.9</b>

Table 14: ODFW special project and research length samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	43	0	12	0
	2000	84	0	6	0
	2001	52	0	101	0
	2002	90	187	0	0
	2003	254	187	0	45
	2004	289	117	0	6
	2005	149	71	0	1
	2006	131	24	0	0
	2007	1	220	0	7
	2008	203	170	0	0
	2009	5	92	0	0
	2010	20	96	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	<b>Total</b>	<b>1408</b>	<b>1164</b>	<b>120</b>	<b>59</b>
Copper Rockfish	1998	0	0	13	0
	1999	0	0	5	0
	2000	1	3	4	0
	2001	8	1	37	0
	2002	0	222	2	4
	2003	14	170	3	35
	2004	11	193	28	8
	2005	23	170	0	1
	2006	4	319	0	0
	2007	0	272	0	0
	2008	43	192	0	0
	2009	1	137	0	0
	2010	0	75	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	0	0
	<b>Total</b>	<b>109</b>	<b>1754</b>	<b>92</b>	<b>48</b>

Table 14 Continued: ODFW special project and research length samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	23	0
	1999	6	0	13	0
	2000	15	25	2	0
	2001	2	24	107	3
	2002	0	167	0	5
	2003	9	219	4	61
	2004	21	149	0	8
	2005	67	155	0	2
	2006	34	187	0	0
	2007	961	122	0	15
	2008	62	97	0	0
	2009	0	109	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	2	0
	2013	0	0	0	0
		<b>Total</b>	<b>1181</b>	<b>1254</b>	<b>151</b>
Kelp Greenling	1998	0	0	5	0
	1999	14	0	43	0
	2000	15	0	20	0
	2001	31	0	79	0
	2002	8	0	30	0
	2003	142	170	6	25
	2004	567	167	0	44
	2005	248	218	0	6
	2006	279	182	4	0
	2007	112	227	2	26
	2008	1146	182	0	0
	2009	255	95	0	0
	2010	910	168	0	0
	2011	552	0	0	0
	2012	1198	0	0	0
	2013	345	0	0	0
		<b>Total</b>	<b>5822</b>	<b>1409</b>	<b>189</b>

Table 15: ODFW special project and research weight samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	0	0
	1999	1	0	0	0
	2000	82	0	0	0
	2001	45	0	0	0
	2002	90	0	0	0
	2003	250	0	0	0
	2004	289	0	0	1
	2005	149	0	0	0
	2006	127	0	0	0
	2007	1	0	0	0
	2008	1	0	0	0
	2009	5	0	0	0
	2010	20	0	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	<b>Total</b>	<b>1147</b>	<b>0</b>	<b>0</b>	<b>1</b>
Copper Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	1	0	0	0
	2001	8	0	0	0
	2002	0	0	0	0
	2003	14	0	0	0
	2004	11	0	0	1
	2005	23	0	0	0
	2006	4	0	0	0
	2007	0	0	0	0
	2008	1	0	0	0
	2009	1	0	0	0
	2010	0	0	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	0	0
	<b>Total</b>	<b>67</b>	<b>0</b>	<b>0</b>	<b>1</b>

Table 15 Continued: ODFW special project and research weight samples by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	14	0	0	0
	2001	2	0	0	0
	2002	0	0	0	0
	2003	9	0	0	0
	2004	40	0	0	0
	2005	67	0	0	0
	2006	15	0	0	0
	2007	0	0	0	0
	2008	6	0	0	0
	2009	0	0	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	0	0
	2013	0	0	0	0
		<b>Total</b>	<b>157</b>	<b>0</b>	<b>0</b>
Kelp Greenling	1998	0	0	0	0
	1999	5	0	0	0
	2000	15	0	0	0
	2001	21	0	0	0
	2002	16	0	0	0
	2003	53	0	0	0
	2004	1111	0	0	21
	2005	248	0	0	0
	2006	263	0	0	0
	2007	112	0	0	0
	2008	947	0	0	0
	2009	161	0	0	0
	2010	910	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
		<b>Total</b>	<b>3862</b>	<b>0</b>	<b>0</b>

Table 16: ODFW special project and research age structure samples (aged and un-aged) by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	0	0	12	0
	2000	81	0	6	0
	2001	43	0	101	0
	2002	90	187	0	0
	2003	246	187	0	47
	2004	287	118	0	6
	2005	149	95	0	1
	2006	131	111	0	0
	2007	1	220	0	7
	2008	203	170	0	0
	2009	5	92	0	0
	2010	20	96	0	0
	2011	47	0	0	0
	2012	30	0	0	0
	2013	10	0	0	0
	<b>Total</b>	<b>1343</b>	<b>1276</b>	<b>120</b>	<b>61</b>
Copper Rockfish	1998	0	0	13	0
	1999	0	0	5	0
	2000	1	0	4	0
	2001	8	1	37	0
	2002	0	222	0	4
	2003	14	170	2	35
	2004	11	194	0	8
	2005	23	171	0	1
	2006	4	320	2	0
	2007	0	272	0	0
	2008	43	165	1	0
	2009	1	137	0	0
	2010	0	75	0	0
	2011	3	0	0	0
	2012	1	0	0	0
	2013	0	0	28	0
	<b>Total</b>	<b>109</b>	<b>1727</b>	<b>92</b>	<b>48</b>

Table 16 Continued: ODFW special project and research age structure samples (aged and un-aged) by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	23	0
	1999	0	0	13	0
	2000	9	25	2	0
	2001	2	24	107	3
	2002	0	167	0	5
	2003	7	219	4	61
	2004	21	149	0	8
	2005	67	155	0	2
	2006	15	187	0	0
	2007	0	122	0	15
	2008	62	97	0	0
	2009	0	109	0	0
	2010	2	0	0	0
	2011	0	0	0	0
	2012	2	0	0	0
	2013	0	0	2	0
	<b>Total</b>	<b>187</b>	<b>1254</b>	<b>151</b>	<b>94</b>
Kelp Greenling	1998	0	0	5	0
	1999	0	0	43	0
	2000	15	0	20	0
	2001	20	0	79	0
	2002	8	0	0	0
	2003	35	170	1	25
	2004	565	167	0	44
	2005	248	218	30	6
	2006	279	184	9	0
	2007	112	227	2	26
	2008	1146	184	0	0
	2009	254	95	0	0
	2010	910	168	0	0
	2011	552	0	0	0
	2012	1178	0	0	0
	2013	345	0	0	0
	<b>Total</b>	<b>5667</b>	<b>1413</b>	<b>189</b>	<b>101</b>



Table 17: ODFW special project and research aged structures by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	1	0
	1999	0	0	12	0
	2000	81	0	6	0
	2001	39	0	1	0
	2002	89	184	0	0
	2003	167	186	0	47
	2004	276	115	0	2
	2005	0	71	0	1
	2006	0	111	0	0
	2007	0	220	0	7
	2008	0	0	0	0
	2009	0	0	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
		<b>Total</b>	<b>652</b>	<b>887</b>	<b>20</b>
Copper Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	0	3	0	0
	2001	0	1	0	0
	2002	0	222	0	4
	2003	0	170	2	35
	2004	0	194	0	8
	2005	0	170	0	1
	2006	0	318	0	0
	2007	0	273	0	0
	2008	0	25	0	0
	2009	0	26	0	0
	2010	0	21	0	0
	2011	0	0	0	0
	2012	0	0	0	0
2013	0	0	0	0	
	<b>Total</b>	<b>0</b>	<b>1423</b>	<b>2</b>	<b>48</b>

Table 17 Continued: ODFW special project and research aged structures by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Quillback Rockfish	1998	0	0	0	0
	1999	0	0	0	0
	2000	9	25	0	0
	2001	2	24	0	3
	2002	0	167	0	5
	2003	0	217	4	61
	2004	19	149	0	8
	2005	0	155	0	2
	2006	0	187	0	0
	2007	0	122	0	15
	2008	0	96	0	0
	2009	0	53	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	<b>Total</b>	<b>30</b>	<b>1195</b>	<b>4</b>	<b>94</b>
Kelp Greenling	1998	0	0	2	0
	1999	0	0	7	0
	2000	14	0	0	0
	2001	20	0	6	0
	2002	2	0	0	0
	2003	33	94	1	19
	2004	261	65	0	0
	2005	0	96	0	6
	2006	274	100	0	0
	2007	25	227	2	0
	2008	0	131	0	0
	2009	52	0	0	0
	2010	0	0	0	0
	2011	0	0	0	0
	2012	0	0	0	0
	2013	0	0	0	0
	<b>Total</b>	<b>681</b>	<b>713</b>	<b>18</b>	<b>25</b>

Table 18: ODFW special project and research percent of structures aged by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
China Rockfish	1998	0	0	100	0
	1999	0	0	100	0
	2000	100	0	100	0
	2001	91	0	<0.5	0
	2002	99	98	0	0
	2003	68	99	0	100
	2004	96	97	0	33
	2005	<0.5	75	0	100
	2006	<0.5	100	0	0
	2007	<0.5	100	0	100
	2008	<0.5	<0.5	0	0
	2009	<0.5	<0.5	0	0
	2010	<0.5	<0.5	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	<0.5	0	0	0
	<b>Total</b>	<b>49</b>	<b>70</b>	<b>17</b>	<b>93</b>
Copper Rockfish	1998	0	0	<0.5	0
	1999	0	0	<0.5	0
	2000	<0.5	0	<0.5	0
	2001	<0.5	100	<0.5	0
	2002	0	100	0	100
	2003	<0.5	100	100	100
	2004	<0.5	100	0	100
	2005	<0.5	99	0	100
	2006	<0.5	99	<0.5	0
	2007	0	100	0	0
	2008	<0.5	15	<0.5	0
	2009	<0.5	19	0	0
	2010	0	28	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	0	0	<0.5	0
	<b>Total</b>	<b>&lt;0.5</b>	<b>82</b>	<b>&lt;0.5</b>	<b>100</b>

Table 18 Continued: ODFW special project and research percent of structures aged by type and year for China, copper, and quillback rockfishes and kelp greenling.

Species	Year	Commercial	Recreational	Research	Unknown
Kelp Greenling	1998	0	0	40	0
	1999	0	0	16	0
	2000	93	0	<0.5	0
	2001	100	0	8	0
	2002	25	0	0	0
	2003	94	55	100	76
	2004	46	39	0	<0.5
	2005	<0.5	44	<0.5	100
	2006	98	54	<0.5	0
	2007	22	100	100	<0.5
	2008	<0.5	71	0	0
	2009	20	<0.5	0	0
	2010	<0.5	<0.5	0	0
	2011	<0.5	0	0	0
	2012	<0.5	0	0	0
	2013	<0.5	0	0	0
	<b>Total</b>	<b>12</b>	<b>50</b>	<b>10</b>	<b>25</b>
Quillback Rockfish	1998	0	0	<0.5	0
	1999	0	0	<0.5	0
	2000	100	100	<0.5	0
	2001	100	100	<0.5	100
	2002	0	100	0	100
	2003	<0.5	99	100	100
	2004	90	100	0	100
	2005	<0.5	100	0	100
	2006	<0.5	100	0	0
	2007	0	100	0	100
	2008	<0.5	99	0	0
	2009	0	49	0	0
	2010	<0.5	0	0	0
	2011	0	0	0	0
	2012	<0.5	0	0	0
	2013	0	0	<0.5	0
	<b>Total</b>	<b>16</b>	<b>95</b>	<b>&lt;0.5</b>	<b>100</b>