Agenda Item F.4.a
Supplemental Attachment 2
June 2008

This preliminary draft of Chapter 4 of the 2009-10 Groundfish Harvest Specifications and Management Measures Environmental Impact Statement appends to Agenda Item F.4.a, Attachment 1, which is comprised of draft Chapter 2 and the first section of draft Chapter 4.

4.3.1.2 *Impacts of Rebuilding Alternatives*

The analysis of rebuilding alternatives (Table 2-4) is designed by the GMT to show the trade-offs associated with the mix of depleted species' OYs under consideration for 2009-10 fisheries. Since the available yield of each depleted species will differentially constrain groundfish fishing sectors due to catchability of the gears used by each sector, comparing the management measures by sector across these rebuilding alternatives reveals the trade-offs in deciding 2009-10 OYs and potentially revised rebuilding plans for depleted species. The following section describes the implications of 2009-10 rebuilding alternatives for each non-tribal groundfish sector.

Most 2009-10 West Coast groundfish fisheries will likely be constrained by the low yelloweye OYs considered, including the OYs under the status quo ramp-down strategy. All commercial and recreational hook and line fisheries will be constrained by yelloweye. Even the limited entry non-whiting trawl fishery is likely to be constrained by yelloweye, although canary is still a constraining species under the lower OYs analyzed. Only the limited entry whiting trawl fishery is not likely to be constrained by yelloweye. There is very little yelloweye bycatch in whiting-directed fisheries. However, the widow OYs will likely to be a constraining species for 2009-10 whiting fisheries and canary rockfish, under the lower OYs analyzed, may also constrain whiting fishing opportunities.

As stated in section 2.1.1.8, Rebuilding Alternative 1 is designed to allow more fishing opportunities on the continental shelf north and south of 40°10' N latitude by specifying relatively higher OYs for bocaccio, canary rockfish, cowcod, widow rockfish and yelloweye rockfish, while allowing fewer fishing opportunities on the slope by specifying relatively lower OYs for darkblotched rockfish and POP. Rebuilding Alternative 2 is conversely designed to allow fewer fishing opportunities on the shelf north and south of 40°10' N latitude by specifying relatively lower OYs for the shelf species (bocaccio, canary, cowcod, widow, and yelloweye), and higher fishing opportunities on the slope by specifying relatively higher OYs for the slope species (darkblotched and POP). Rebuilding Alternative 3 is the most restrictive coastwide since it is constructed with relatively low OYs for all the depleted species. Rebuilding Alternative 4 is the most liberal coastwide since it is constructed with relatively high OYs for all the depleted species. Rebuilding Alternatives 5a and 5b allow mixed fishing opportunities by sector north and south of 40°10' N latitude and in shallow and deeper waters and are designed to show further trade-offs between rebuilding OYs that may not be captured by rebuilding alternatives 1 through 4. Finally, the preferred depleted species OYs in 2009 and 2010 are analyzed as the preferred rebuilding alternative.

Limited Entry Non-Whiting Trawl

Tables 4-11 and 4-23 provide example 2009-10 limited entry trawl trip limits and RCA configurations under the constraints imposed by each Rebuilding Alternative. The predicted total catch of target and depleted species under each trawl scenario are provided in Tables 4-12 to 4-24. (Trip limit and impact tables follow each other under each rebuilding alternative).

Table 4-11. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize fishing opportunities under Rebuilding Alternative 1.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish b/
		Shoreward a/	Seaward								
North Large Footrope	1	75	250 c/	15,000	8,000	8,000	50,000	90,000	50,000	90,000	2,000
	2	75	250	15,000	8,000	8,000	50,000	90,000	30,000	90,000	2,000
	3	75	250	15,000	8,000	8,000	50,000	90,000	30,000	90,000	2,000
	4	75	250	15,000	8,000	8,000	50,000	90,000	30,000	90,000	2,000
	5	75	250	15,000	8,000	8,000	50,000	90,000	30,000	90,000	2,000
	6	75	250 c/	15,000	8,000	8,000	50,000	90,000	50,000	90,000	2,000
North SFFT	1	75	250 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
	2	75	250	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	3	75	250	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	4	75	250	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	5	75	250	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	6	75	250 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
38°-40°10' N lat. d/	1	100	200 c/	15,000	8,000	8,000	50,000	90,000	50,000	10,000	15,000
	2	100	200	15,000	8,000	8,000	50,000	90,000	30,000	10,000	15,000
	3	100	200	15,000	8,000	8,000	50,000	90,000	30,000	10,000	15,000
	4	100	200	15,000	8,000	8,000	50,000	90,000	30,000	10,000	10,000
	5	100	200	15,000	8,000	8,000	50,000	90,000	30,000	10,000	10,000
	6	100	200 c/	15,000	8,000	8,000	50,000	90,000	50,000	10,000	15,000
S 38° N lat. d/	1	100	150	15,000	8,000	8,000	50,000	90,000	50,000	10,000	40,000
	2	100	150	15,000	8,000	8,000	50,000	90,000	30,000	10,000	40,000
	3	100	150	15,000	8,000	8,000	50,000	90,000	30,000	10,000	40,000
	4	100	150	15,000	8,000	8,000	50,000	90,000	30,000	10,000	40,000
	5	100	150	15,000	8,000	8,000	50,000	90,000	30,000	10,000	40,000
	6	100	150	15,000	8,000	8,000	50,000	90,000	50,000	10,000	40,000

a/ Areas shoreward of the RCA north of Cape Alava are closed.

b/ Splitnose rockfish limits equal to slope rockfish limits.

c/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

d/ Chilipepper rockfish limits using small footropes are 5,000 lbs/2 months in the south.

Table 4-12. The predicted total catch (mt) of target and depleted species in the 2009-10 limited entry trawl fishery north and south of 40°10' N latitude under Rebuilding Alternative 1.

Species	Total Catch (mt) by Area		
	North	South	Total
Canary	11.1	2.6	13.7
POP	35.8	0.0	35.8
Darkblotched	100.4	17.4	117.8
Widow	1.2	3.8	5.0
Bocaccio	-	9.7	9.7
Yelloweye	0.6	0.0	0.6
Cowcod	-	1.1	1.1
Sablefish	1,742.8	452.8	2,195.6
Longspine	252.0	189.9	441.9
Shortspine	450.0	161.2	611.3
Dover	4,923.0	1,355.6	6,278.5
Arrowtooth	1,697.0	86.0	1,782.9
Petrale	2,068.8	318.7	2,387.5
Other Flatfish	1,307.9	446.3	1,754.2
Slope Rockfish	56.3	146.0	202.2

Table 4-13. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize fishing opportunities under Rebuilding Alternative 2.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish a/
		Shoreward	Seaward								
North Large Footrope	1	0	200 b/	20,000	22,000	14,000	90,000	110,000	115,000	150,000	2,000
	2	0	200	20,000	22,000	14,000	90,000	110,000	50,000	150,000	2,000
	3	0	150	20,000	22,000	14,000	90,000	110,000	30,000	150,000	2,000
	4	75	WA/ 200 OR	20,000	22,000	14,000	90,000	110,000	30,000	150,000	2,000
	5	0	200	20,000	22,000	14,000	90,000	110,000	50,000	150,000	2,000
	6	0	200 b/	20,000	22,000	14,000	90,000	110,000	115,000	150,000	2,000
North SFFT c/	1	0	200 b/	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	2	0	200								
	3	0	150								
	4	75	WA/ 200 OR								
	5	0	200								
	6	0	200 b/								
38°-40°10' N lat.	1	75	150	20,000	22,000	14,000	90,000	110,000	115,000	10,000	15,000
	2	75	150	20,000	22,000	14,000	90,000	110,000	50,000	10,000	15,000
	3	100	150	20,000	22,000	14,000	90,000	110,000	30,000	10,000	15,000
	4	100	150	20,000	22,000	14,000	90,000	110,000	30,000	10,000	10,000
	5	100	150	20,000	22,000	14,000	90,000	110,000	50,000	10,000	10,000
	6	75	150	20,000	22,000	14,000	90,000	110,000	115,000	10,000	15,000
S 38° N lat.	1	75	150	20,000	22,000	14,000	90,000	110,000	115,000	10,000	40,000
	2	75	150	20,000	22,000	14,000	90,000	110,000	50,000	10,000	40,000
	3	100	150	20,000	22,000	14,000	90,000	110,000	30,000	10,000	40,000
	4	100	150	20,000	22,000	14,000	90,000	110,000	30,000	10,000	40,000
	5	75	150	20,000	22,000	14,000	90,000	110,000	50,000	10,000	40,000
	6	75	150	20,000	22,000	14,000	90,000	110,000	115,000	10,000	40,000

a/ Splitnose rockfish limits equal to slope rockfish limits.

b/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

c/ Vessels using selective flatfish gear in the north in periods 1, 2, 3, 5, and 6 are not held to a lower limit

Table 4-14. The predicted total catch (mt) of target and depleted species in the 2009-10 limited entry trawl fishery north and south of 40°10' N latitude under Rebuilding Alternative 2.

Species	**Total Catch (mt) by Area**		
	North	**South**	**Total**
Canary	1.7	2.6	4.3
POP	92.6	0.0	92.6
Darkblotched	207.8	32.8	240.5
Widow	1.8	5.5	7.3
Bocaccio	-	11.1	11.1
Yelloweye	0.1	0.0	0.1
Cowcod	-	1.0	1.0
Sablefish	2,386.8	610.8	2,997.7
Longspine	448.3	338.7	787.0
Shortspine	880.8	284.0	1,164.8
Dover	8,192.7	2,334.7	10,527.5
Arrowtooth	1,276.6	49.4	1,326.0
Petrale	1,945.2	362.0	2,307.2
Other Flatfish	970.8	556.2	1,527.0
Slope Rockfish	91.8	185.4	277.2

Table 4-15. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize fishing opportunities under Rebuilding Alternative 3.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish a/
		Shoreward	Seaward								
North Large Footrope	1	0	250 b/	11,000	6,000	5,000	30,000	110,000	50,000	50,000	2,000
	2	0	250	11,000	6,000	5,000	30,000	110,000	30,000	50,000	2,000
	3	0	250	11,000	6,000	5,000	30,000	110,000	30,000	50,000	2,000
	4	75	250	11,000	6,000	5,000	30,000	110,000	30,000	50,000	2,000
	5	0	250	11,000	6,000	5,000	30,000	110,000	30,000	50,000	2,000
	6	0	250 b/	11,000	6,000	5,000	30,000	110,000	50,000	50,000	2,000
North SFFT c/	1	0	250 b/								
	2	0	250								
	3	0	250								
	4	75	250	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	5	0	250								
	6	0	250 b/								
38°-40°10' N lat.	1	75	200 b/	30,000	30,000	30,000	100,000	110,000	70,000	10,000	15,000
	2	100	200	30,000	30,000	30,000	100,000	110,000	30,000	10,000	15,000
	3	100	200	30,000	30,000	30,000	100,000	110,000	30,000	10,000	15,000
	4	100	200	30,000	30,000	30,000	100,000	110,000	30,000	10,000	10,000
	5	75	200	30,000	30,000	30,000	100,000	110,000	30,000	10,000	10,000
	6	75	200 b/	30,000	30,000	30,000	100,000	110,000	70,000	10,000	15,000
S 38° N lat.	1	75	150	30,000	30,000	30,000	100,000	110,000	70,000	10,000	40,000
	2	100	150	30,000	30,000	30,000	100,000	110,000	30,000	10,000	40,000
	3	100	150	30,000	30,000	30,000	100,000	110,000	30,000	10,000	40,000
	4	100	150	30,000	30,000	30,000	100,000	110,000	30,000	10,000	40,000
	5	75	150	30,000	30,000	30,000	100,000	110,000	30,000	10,000	40,000
	6	75	150	30,000	30,000	30,000	100,000	110,000	70,000	10,000	40,000

a/ Splitnose rockfish limits equal to slope rockfish limits.

b/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

c/ Vessels using selective flatfish gear in the north in periods 1, 2, 3, 5, and 6 are not held to a lower limit

Table 4-16. The predicted total catch (mt) of target and depleted species in the 2009-10 limited entry trawl fishery north and south of 40°10' N latitude under Rebuilding Alternative 3.

Species	**Total Catch (mt) by Area**		
	North	**South**	**Total**
Canary	1.3	2.8	4.1
POP	31.6	0.0	31.6
Darkblotched	91.5	38.2	129.6
Widow	1.0	6.9	7.9
Bocaccio	-	10.1	10.1
Yelloweye	0.1	0.0	0.1
Cowcod	-	1.0	1.0
Sablefish	1,248.0	909.9	2,157.9
Longspine	238.7	461.8	700.5
Shortspine	284.7	607.6	892.4
Dover	2,926.9	2,614.1	5,540.9
Arrowtooth	1,028.0	49.7	1,077.7
Petrale	1,548.4	329.7	1,878.1
Other Flatfish	984.8	541.8	1,526.6
Slope Rockfish	56.3	165.0	221.3

Table 4-17. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize fishing opportunities under Rebuilding Alternative 4.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish b/
		Shoreward a/	Seaward								
North Large Footrope	1	75	200 c/	18,000	22,000	14,000	110,000	110,000	40,000	150,000	2,000
	2	75	200	20,000	22,000	14,000	110,000	110,000	30,000	150,000	2,000
	3	75	150 WA/ 200 OR	20,000	22,000	14,000	110,000	110,000	30,000	150,000	2,000
	4	75		20,000	22,000	14,000	110,000	110,000	30,000	150,000	2,000
	5	75	200	20,000	22,000	14,000	110,000	110,000	30,000	150,000	2,000
	6	75	200 c/	18,000	22,000	14,000	110,000	110,000	40,000	150,000	2,000
North SFFT	1	75	200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
	2	75	200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	3	75	150 WA/ 200 OR	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	4	75		8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	5	75	200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	6	75	200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
38°- 40°10' N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
S 38° N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000

a/ Areas shoreward of the RCA north of Cape Alava are closed.

b/ Splitnose rockfish limits equal to slope rockfish limits.

c/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

d/ Chilipepper rockfish limits using small footropes are 5,000 lbs/2 months in the south.

Table 4-18. The predicted total catch (mt) of target and depleted species in the 2009-10 limited entry trawl fishery north and south of 40°10' N latitude under Rebuilding Alternative 4.

Species	Total Catch (mt) by Area		
	North	South	Total
Canary	12.8	2.8	15.5
POP	86.1	0.0	86.1
Darkblotched	195.5	35.7	231.3
Widow	1.8	6.2	8.0
Bocaccio	-	12.3	12.3
Yelloweye	0.7	0.0	0.7
Cowcod	-	1.3	1.3
Sablefish	2,380.1	596.5	2,976.6
Longspine	445.9	338.7	784.6
Shortspine	859.8	284.2	1,144.0
Dover	10,692.6	3,012.3	13,704.9
Arrowtooth	1,836.4	64.0	1,900.4
Petrale	1,951.5	342.6	2,294.1
Other Flatfish	1,571.4	558.5	2,129.9
Slope Rockfish	91.8	185.4	277.2

Table 4-19. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize fishing opportunities under Rebuilding Alternatives 5a and 5b.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish b/
		Shoreward a/	Seaward								
North Large Footrope	1	75	200 c/	20,000	22,000	14,000	100,000	110,000	50,000	150,000	2,000
	2		200	20,000	22,000	14,000	100,000	110,000	30,000	150,000	2,000
	3		150 WA/ 200 OR	20,000	22,000	14,000	100,000	110,000	30,000	150,000	2,000
	4			20,000	22,000	14,000	100,000	110,000	30,000	150,000	2,000
	5		200	20,000	22,000	14,000	100,000	110,000	30,000	150,000	2,000
	6		200 c/	20,000	22,000	14,000	100,000	110,000	50,000	150,000	2,000
North SFFT	1	75	200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
	2		200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	3		150 WA/ 200 OR	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	4			8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	5		200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	6		200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
38°-40°10' N lat. d/	1	75	150	20,000	22,000	14,000	100,000	110,000	50,000	10,000	15,000
	2	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	15,000
	3	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	15,000
	4	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	10,000
	5	75	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	10,000
	6	75	150	20,000	22,000	14,000	100,000	110,000	50,000	10,000	15,000
S 38° N lat. d/	1	75	150	20,000	22,000	14,000	100,000	110,000	50,000	10,000	40,000
	2	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	40,000
	3	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	40,000
	4	100	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	40,000
	5	75	150	20,000	22,000	14,000	100,000	110,000	30,000	10,000	40,000
	6	75	150	20,000	22,000	14,000	100,000	110,000	50,000	10,000	40,000

a/ Areas shoreward of the RCA north of Cape Alava are closed.

b/ Splitnose rockfish limits equal to slope rockfish limits.

c/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

d/ Chilipepper rockfish limits using small footropes are 5,000 lbs/2 months in the south.

Table 4-20. The predicted total catch (mt) of target and depleted species in the 2009-10 limited entry trawl fishery north and south of 40°10' N latitude under Rebuilding Alternatives 5a and 5b.

Species	**Total Catch (mt) by Area**		
	North	**South**	**Total**
Canary	12.6	2.7	15.3
POP	83.2	0.0	83.3
Darkblotched	189.8	34.2	224.0
Widow	1.8	5.8	7.6
Bocaccio	-	10.3	10.3
Yelloweye	0.6	0.0	0.7
Cowcod	-	1.0	1.0
Sablefish	2,460.6	614.3	3,074.9
Longspine	445.9	338.7	784.6
Shortspine	859.8	284.0	1,143.8
Dover	9,859.9	2,636.7	12,496.7
Arrowtooth	1,836.4	50.4	1,886.8
Petrale	2,088.0	336.3	2,424.3
Other Flatfish	1,568.2	553.7	2,121.9
Slope Rockfish	91.8	185.4	277.2

Table 4-21. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize 2009 fishing opportunities under the Preferred Rebuilding Alternative.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish b/
		Shoreward a/	Seaward								
North Large Footrope	1	75	200 c/	15,000	22,000	14,000	80,000	110,000	50,000	150,000	2,000
	2	75	200	15,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	3	75	150	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	4	75	WA/ 200 OR	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	5	75	200	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	6	75	200 c/	15,000	22,000	14,000	80,000	110,000	50,000	150,000	2,000
North SFFT	1	75	200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
	2	75	200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	3	75	150	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	4	75	WA/ 200 OR	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	5	75	200	8,000	3,000	3,000	40,000	90,000	25,000	90,000	2,000
	6	75	200 c/	5,000	3,000	3,000	40,000	90,000	16,000	90,000	2,000
38°- 40°10' N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
S 38° N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000

a/ Areas shoreward of the RCA north of Cape Alava are closed.

b/ Splitnose rockfish limits equal to slope rockfish limits.

c/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

d/ Chilipepper rockfish limits using small footropes are 5,000 lbs/2 months in the south.

Table 4-22. The predicted total catch (mt) of target and depleted species in the 2009 limited entry trawl fishery north and south of 40°10' N latitude under the Council's preferred OYs for depleted species.

Species	**Total Catch (mt) by Area**		
	North	**South**	**Total**
Canary	12.1	2.8	14.9
POP	72.3	0.0	72.3
Darkblotched	165.2	35.7	200.9
Widow	1.6	6.2	7.7
Bocaccio	-	12.3	12.3
Yelloweye	0.6	0.0	0.6
Cowcod	-	1.3	1.3
Sablefish	2,060.1	596.5	2,656.6
Longspine	445.9	338.7	784.6
Shortspine	859.8	284.2	1,144.0
Dover	8,147.0	3,012.3	11,159.2
Arrowtooth	1,836.4	64.0	1,900.4
Petrale	2,088.0	342.6	2,430.6
Other Flatfish	1,568.2	558.5	2,126.7
Slope Rockfish	85.5	185.4	270.9

Table 4-23. Limited entry trawl trip limits and seasonal RCA configurations designed to optimize 2010 fishing opportunities under the Preferred Rebuilding Alternative.

Subarea	Period	RCA Boundaries (fm)		Sablefish	Longspine	Shortspine	Dover Sole	Other Flatfish	Petrale Sole	Arrowtooth Flounder	Slope Rockfish b/
		Shoreward a/	Seaward								
North Large Footrope	1	75	200 c/	15,000	22,000	14,000	80,000	110,000	50,000	150,000	2,000
	2	75	200	15,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	3	60	150	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	4	60	WA/ 200 OR	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	5	75	200	18,000	22,000	14,000	80,000	110,000	30,000	150,000	2,000
	6	75	200 c/	15,000	22,000	14,000	80,000	110,000	50,000	150,000	2,000
North SFFT	1	75	200 c/	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	2	75	200	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	3	60	150	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	4	60	WA/ 200 OR	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	5	75	200	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
	6	75	200 c/	5,000	3,000	3,000	25,000	50,000	16,000	50,000	2,000
38°- 40°10' N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	15,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	10,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	15,000
S 38° N lat. d/	1	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000
	2	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	3	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	4	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	5	100	150	20,000	22,000	14,000	110,000	110,000	30,000	10,000	40,000
	6	100	150	18,000	22,000	14,000	110,000	110,000	40,000	10,000	40,000

a/ Areas shoreward of the RCA north of Cape Alava are closed.

b/ Splitnose rockfish limits equal to slope rockfish limits.

c/ The seaward RCA boundary is modified to include specified petrale sole fishing areas.

d/ Chilipepper rockfish limits using small footropes are 5,000 lbs/2 months in the south.

Table 4-24. The predicted total catch (mt) of target and depleted species in the 2010 limited entry trawl fishery north and south of 40°10' N latitude under the Council's preferred OYs for depleted species.

Species	**Total Catch (mt) by Area**		
	North	**South**	**Total**
Canary	6.6	2.8	9.3
POP	73.6	0.0	73.6
Darkblotched	166.7	35.7	202.4
Widow	1.6	6.2	7.7
Bocaccio	-	12.3	12.3
Yelloweye	0.3	0.0	0.3
Cowcod	-	1.3	1.3
Sablefish	1,978.2	596.5	2,574.7
Longspine	446.3	338.7	785.1
Shortspine	867.4	284.2	1,151.6
Dover	7,487.4	3,012.3	10,499.7
Arrowtooth	1,411.8	64.0	1,475.8
Petrale	1,976.3	342.6	2,318.9
Other Flatfish	1,496.1	558.5	2,054.6
Slope Rockfish	91.8	185.4	277.2

Limited Entry Whiting Trawl

The Pacific whiting fishery is limited by widow rockfish in all rebuilding species options. This is based on an extension of the linear trend analysis for predicting widow bycatch that the GMT has been using since the start of 2007. Data used to inform this analysis is through 2007, and therefore, the trend is predicting bycatch two years into the future. This creates some substantial uncertainty, so the estimates are best treated as order of magnitude estimates. The implications of this approach means that a widow rockfish OY of 371 mt may limit the whiting fishery to a U.S. OY of slightly under 200,000 mt, while a widow rockfish OY of 522 mt may limit the whiting fishery to a U.S. OY of slightly under 300,000 mt (Table 4-25).

Table 4-25. Predicted impacts of depleted species across a range of whiting OYs.

U.S. OY (mt)	Sector	Sector Allocation	Canary	Darkblotched	POP	Widow	Yelloweye
280,770	Tribal	35,000	1.1	0.0	0.5	2.7	-
	Mothership	58,505	2.2	6.6	1.2	128.7	0.0
	C-P	82,882	0.3	6.5	1.2	157.5	0.0
	Shoreside	102,384	1.7	3.1	0.4	163.8	0.0
	Total	278,770	5.3	16.2	3.3	452.7	0.0
192,014	Tribal	27,500	0.8	0.0	0.4	2.1	-
	Mothership	39,003	1.5	4.4	0.8	85.8	0.0
	C-P	55,255	0.2	4.3	0.8	105.0	0.0
	Shoreside	68,256	1.1	2.0	0.2	109.2	0.0
	Total	190,014	3.6	10.7	2.2	302.1	0.0

Commercial and Recreational Hook-and-Line Fisheries

All the 2009 commercial hook-and-line fisheries (limited entry fixed gear and directed open access), as well as the Washington, Oregon, and California recreational fisheries will be limited by the available yield of yelloweye rockfish and decisions on how to share that available yield. Section 4.5.2 describes the 2009-10 management measure alternatives for each of these sectors in greater detail, as well as the species impacts under each alternative. Table 4-26 provides those sector alternatives that can be accommodated under each rebuilding alternative by catch scenarios based on the 2005 and 2007 bycatch scorecards. *Note: the results under this section are not significantly different than those presented by the GMT in April 2008 under Agenda Item H.7. This section will be completed after the June 2008 Council meeting.*

4.3.2 Precautionary Zone Groundfish Species

4.3.2.1 *Blue Rockfish (in Waters off California)*

The first blue rockfish assessment on the West Coast was conducted in 2007 for the portion of the stock occurring in waters off California north of Pt. Conception {Key, *et al.* 2008}. The base model in the assessment estimated spawning stock biomass at 29.7% of initial, unfished biomass in 2007; therefore, the stock is considered in the precautionary zone. There are two 2009-10 OY alternatives that contemplate managing blue rockfish off California with species-specific harvest specifications (OY alternatives 3 and 4) and two OY alternatives that contemplate continuing to manage blue rockfish in the minor nearshore rockfish complexes north and south of 40°10' N latitude (OY alternatives 1 and 2; see section 2.1.4 for a description of these two OY alternatives). All four OY alternatives are based on results from the new assessment.

OY Alternative 3 (207 mt in 2009 and 2010) would apply to the portion of the stock occurring off California and is based on the 40-10 adjusted harvestable yield from the assessment base model using an F50% harvest rate for the assessed portion of the California stock north of Pt. Conception at 34°27' N latitude plus 9 mt for the contribution to the OY south of Pt. Conception. The south of Pt. Conception portion of the OY (9 mt) is a 50% adjustment of the original ABC contribution of blue rockfish to the southern minor nearshore rockfish complex (18 mt), which represents the average 1994-99 harvest of blue rockfish in those waters.

OY Alternative 4 (230 mt in 2009 and 2010) would apply to the portion of the stock occurring off California and is based on setting the north of Pt. Conception OY equal to the ABC using the high productivity model (high natural mortality) from the new assessment as constrained by the base model ABC plus 9 mt for the contribution to the OY south of Pt. Conception. The south of Pt. Conception portion of the OY (9 mt) is a 50% adjustment of the original ABC contribution of blue rockfish to the southern minor nearshore rockfish complex (18 mt), which represents the average 1994-99 harvest of blue rockfish in those waters.

4.3.2.2 *Cabezon (in Waters off California)*

All cabezon (*Scorpaenichthys marmoratus*) OY alternatives are based on the most recent cabezon assessment, which was done for the portion of the stock occurring in waters off California in 2005 (Cope and Punt 2006). The assessment stratified analyses for two substocks, north and south of Pt. Conception at 34°27' N latitude, with an estimated spawning output for the northern California substock of $B_{40.1\%}$ and $B_{28.3\%}$ for the southern California substock. Since the two substocks collectively have an estimated spawning output less than $B_{40\%}$, cabezon in waters off California are considered a precautionary zone stock.

OY Alternative 1 (69 mt in 2009 and 2010) is the status quo OY and is based on the average of the 2007 and 2008 OYs projected in the 2005 assessment using an F50% harvest rate with a 60-20 adjustment. The 60-20 adjustment is analogous to the Council's default 40-10 rule, where, in this case, the OY equals the ABC at spawning biomasses ≥60% of initial biomass and sequentially reduced from the ABC until, at 20% of initial biomass, the OY is set to zero.

OY Alternative 2 (74 mt in 2009 and 2010) is based on the average of the 2009 and 2010 OYs projected in the 2005 assessment using an F50% harvest rate with the 60-20 adjustment.

The preliminary preferred OY Alternative is OY Alternative 3 (69 mt in 2009 and 79 mt in 2010), which are the year-specific 2009 and 2010 OYs projected in the 2005 assessment using an F50% harvest rate with the 60-20 adjustment.

4.3.2.3 *Petrale Sole*

The most recent petrale sole (*Eopsetta jordani*) assessment was done in 2005 (Lai, *et al.* 2006). The portion of the stock in the northern assessment area (Columbia and U.S.-Vancouver INPFC areas) had an estimated spawning stock biomass of $B_{34\%}$ in 2005 and the portion of the stock in the southern assessment area (Conception, Monterey, and Eureka INPFC areas) had an estimated spawning stock biomass of $B_{29\%}$ in 2005. Since the stock's spawning biomass is less than $B_{40\%}$, this is considered a precautionary zone stock.

Only one alternative OY alternative was considered for petrale sole for 2009-10. The OY was projected from the 2005 assessment using the same methodology as used for the final preferred OY alternative in 2007-08. The 2009-10 OY (2,433 mt in 2009 and 2,393 mt in 2010) is based on the sum of the 40-10 adjusted northern OY and 75% of the 40-10 adjusted southern OY. The southern OY has a 75% precautionary adjustment due to greater assessment uncertainty.

4.3.2.4 *Sablefish*

All 2009-10 sablefish OY alternatives are based on a new assessment of the coastwide stock conducted in 2007 {Schirripa 2008}. While the new assessment indicates stock status has improved since the last assessment in 2005, stock depletion was estimated to be at 38.3% of initial, unfished biomass and still in the precautionary zone. As has been standard practice, all alternatives apportion the coastwide OY north and south of 36° N latitude since all commercial allocations are currently based on the proportion of the harvestable surplus of sablefish north of 36° N latitude.

OY Alternative 1 (9,795 mt coastwide, 9,452 mt north of 36° N latitude, and 343 mt south of 36° N latitude in 2009; and 8,988 mt coastwide, 8,673 mt north of 36° N latitude, and 315 mt south of 36° N latitude in 2010) is based on the 40-10 adjusted yield projected from the base model in the new assessment. The coastwide OY was apportioned north and south of 36° N latitude using the status quo method of applying the average proportion of 2000-01 landings of sablefish north of 36° N latitude (96.5%) and south of 36° N latitude (3.5%).

The preliminary preferred sablefish OY is OY Alternative 2 (8,423 mt coastwide, 7,052 mt north of 36° N latitude, and 1,371 mt south of 36° N latitude in 2009; and 7,729 mt coastwide, 6,471 mt north of 36° N latitude, and 1,258 mt south of 36° N latitude in 2010). OY Alternative 2 is developed starting with the 40-10 adjusted coastwide yield projected from the base model of the new assessment. The coastwide yield is then apportioned north and south of 36° N latitude using the average 2003-06 proportions of the swept-area biomass estimates of sablefish from the NWFSC shelf-slope trawl survey (Table 4-27). The average proportions of sablefish biomass distribution are 72% north of 36° N latitude and 28% in the Conception area south of 36° N latitude. The Conception area OY is then adjusted by 50% to account for greater assessment and survey uncertainty south of 36° N latitude. The northern and southern OYs are then summed to derive the coastwide OY.

Table 4-27. Swept-area sablefish biomass estimates from the NWFSC Shelf-Slope Trawl Survey, 2003-2006.

Year	Sum of Biomass (kg)						
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide	Conception %
2003	20,447,961	56,588,162	20,056,170	19,142,018	21,023,894	137,258,205	15%
2004	11,464,607	29,129,020	28,194,388	35,702,436	35,283,014	139,773,464	25%
2005	5,336,756	26,710,615	18,055,534	19,895,829	38,972,171	108,970,905	36%
2006	4,666,495	27,065,009	16,177,190	18,221,394	34,173,714	100,303,804	34%
						2002-06 Average	28%

OY Alternative 3 (6,250 mt coastwide, 5,233 mt north of 36° N latitude, and 1,018 mt south of 36° N latitude in 2009; and 5,777 mt coastwide, 4,837 mt north of 36° N latitude, and 941 mt south of 36° N latitude in 2010) is based on the more conservative low abundance model in the new sablefish assessment with a 40-10 adjustment and the same area apportionment methodology used to derive OY Alternative 2 specifications.

The GMT recommended consideration for the apportionment of the coastwide sablefish biomass north and south of 36° N latitude using the swept-area biomass estimates from the NWFSC trawl survey (Table 4-27) due to concerns that the old apportionment methodology was not based on information related to the biomass distribution. The particularly high northern apportionment under OY Alternative 1 could lead to depletion in the north where the larger fleets targeting sablefish operate. This could lead to a decline in abundance in the north and future hardship for fisheries dependent on this valuable stock. OY alternatives 2 and 3 address the GMT's concern for the northern substock. However, despite a 50% precautionary reduction of the southern OY, the much higher Conception area OY may be a concern since the assessment does not well inform the abundance of the southern substock. The GAP also raised concerns regarding a potentially large effort shift of northern fleets to the Conception area if sablefish trip limits in the south are proportionally increased relative to the change in the OY. The Council want to consider this potential effect in setting the Conception area OY. Concerns of greater fishing pressure in the Conception area can also be addressed in the 2009-10 management measures decision.

4.3.3 Healthy Groundfish Species

4.3.3.1 *Arrowtooth Flounder*

All arrowtooth flounder OY alternatives are based on a new arrowtooth flounder assessment conducted in 2007 {Kaplan and Helser 2008}. The new assessment concluded the West Coast arrowtooth flounder stock was healthy with a spawning biomass estimated at 79% of its initial, unfished biomass in 2007.

OY Alternative 1 (5,245 mt in 2009 and in 2010) for arrowtooth flounder is based on the estimated equilibrium MSY under the proxy SPR harvest rate of F40%.

The preliminary preferred OY Alternative is OY Alternative 2 (11,267 in 2009 and 10,112 mt in 2010), which is based on the estimated ABC for the stock. An OY equal to the ABC is allowed under the FMP for healthy stocks, such as arrowtooth flounder when the spawning biomass is equal to or greater than 40% of its initial, unfished level. The new assessment estimated that the spawning biomass of arrowtooth flounder at the beginning of 2007 was 79% of its initial, unfished level.

These alternative OYs compare to the status quo 2007-08 ABC/OY of 5,800 mt.

4.3.3.2 *Black Rockfish (in Waters off Oregon and California)*

All 2009-10 black rockfish (*Sebastes melanops*) harvest specifications are derived using new 2007 assessments. Assessments for the southern portion of the West Coast black rockfish stock south of Cape Falcon, Oregon {Sampson 2008} and the northern portion of the West Coast black rockfish stock north of Cape Falcon, Oregon {Wallace, *et al.* 2008} were used to derive southern harvest specifications for fisheries off Oregon and California and northern harvest specifications for fisheries off Washington. Both assessments indicate a healthy West Coast black rockfish resource with the portion of the stock south of Cape Falcon estimated to be at 70% of its initial, unfished biomass and the portion of the stock north of Cape Falcon estimated to be at 53.4% of its initial, unfished biomass. This section describes the OY alternatives for the portion of the stock occurring in waters off Oregon and California.

OY Alternative 1 (920 mt in 2009 and 831 mt in 2010) is based on results under the low productivity model in the southern assessment for the portion of the stock south of Cape Falcon. An additional yield for the portion of the stock occurring in Oregon waters north of Cape Falcon is added to the OY using 3% of the northern black rockfish OY from the base model of the northern assessment. The 3% apportionment is based on the estimated proportion of catch from waters off Oregon north of Cape Falcon relative to the entire area between Cape Falcon and the U.S.-Canada border.

The preliminary preferred OY alternative is OY Alternative 2 (1,000 mt in 2009 and 2010). Alternative projections using constant catch scenarios of 800 mt; 1,000 mt; and 1,200 mt were requested by the GMT to better inform a low OY alternative. Of these, the GMT recommended analysis of the 1,000 mt constant catch scenario since projected stock depletion under that scenario was intermediate to the low and base case OY alternatives in the assessment's decision table.

OY Alternative 3 (1,469 mt in 2009 and 1,317 mt in 2010) is based on the medium productivity base case model in the southern assessment with the same apportionment methodology to account for the portion of the stock in Oregon waters north of Cape Falcon as described under OY Alternative 1.

4.3.3.3 *Black Rockfish (in Waters off Washington)*

All 2009-10 black rockfish (*Sebastes melanops*) harvest specifications are derived using new 2007 assessments. Assessments for the southern portion of the West Coast black rockfish stock south of Cape Falcon, Oregon {Sampson 2008} and the northern portion of the West Coast black rockfish stock north of Cape Falcon, Oregon {Wallace, *et al.* 2008} were used to derive southern harvest specifications for fisheries off Oregon and California and northern harvest specifications for fisheries off Washington. Both assessments indicate a healthy West Coast black rockfish resource with the portion of the stock south of Cape Falcon estimated to be at 70% of its initial, unfished biomass and the portion of the stock north of Cape Falcon, Oregon estimated to be at 53.4% of its initial, unfished biomass. This section describes the OY alternatives for the portion of the stock occurring in waters off Washington.

Only one OY alternative is considered for the black rockfish stock occurring in waters off Washington; therefore, OY Alternative 1 (490 mt in 2009 and 464 mt in 2010) is the Council's preliminary preferred OY alternative. This OY is based on the base model from the northern assessment, which assumes medium productivity (natural mortality (M) for males = 0.16 and M for females = 0.24). The OY is reduced by 3% to account for the portion of the assessed northern stock occurring in waters of Oregon north of Cape Falcon.

Only the Washington recreational fishery targets northern black rockfish. It is unlikely the fishery will be constrained by this OY or attain a total catch close to the OY given constraints imposed by canary and yelloweye rockfish. There is little risk of overfishing this stock.

4.3.3.4 *California Scorpionfish*

All 2009-10 California scorpionfish (*Scorpaena guttata*) harvest specifications are based on the only assessment done for this stock in 2005 (Maunder, *et al.* 2006). This assessment indicated the California scorpionfish stock was healthy with an estimated spawning stock biomass of 79.8% of its initial, unfished biomass in 2005.

The California scorpionfish assessment used a recreational catch data stream based upon Commercial Passenger Fishing Vessel (CPFV) logbook data expanded to total recreational catch using a proportion of CPFV to total recreational catch (based upon MRFSS catch history). The SSC approved this assessment with the caveat that the ABC/OY from this assessment could only be related to recreational catch calculated in the same manner as this catch stream. CPFV logbook data, while valuable for stock assessment analyses, are not collected in as timely a manner as needed for inseason monitoring. Consequently, a method was derived with the assistance of the primary stock assessment author to modify the ABC/OY from the assessment so that it could be tracked using CRFS catch estimates. This method takes the recreational portion of the stock assessment ABC/OY, multiplies it by the CPFV proportion calculated from the MRFSS data (53 percent), and then divides it using the proportion of CPFV catch observed in the 2004 CRFS data (88 percent). The stock was pulled from the southern minor nearshore rockfish complex and managed with its own ABC/OY beginning in 2007. Two 2009-10 OY alternatives using projections from the 2005 assessment for California scorpionfish were considered for analysis.

OY Alternative 1 (111 mt in 2009 and 99 mt in 2010) is based on projecting the results of the 2005 assessment modified to incorporate CRFS monitoring data for the CPFV component as described above.

The preliminary preferred OY alternative for California scorpionfish is OY Alternative 2 (175 mt in 2009 and 155 mt in 2010). This OY alternative is the status quo OY and is based on a yield between 137 mt (2007-08 OY as modified by the CPFV modification described above) and 219 mt (2007-08 OY from the base model without the CPFV modification). The 2009 OY under this alternative also equals the projected ABC from the base model in the 2005 assessment. The 2010 OY is limited to the projected 2010 ABC from the base model in the 2005 assessment.

4.3.3.5 *Chilipepper Rockfish*

All 2009-2010 chilipepper rockfish (*Sebastes goodei*) OY alternatives are derived from a new assessment conducted in 2007 {Field 2008}. The 2007 assessment indicated the stock was healthy with a spawning stock biomass estimated to be at 70% of its initial, unfished biomass in 2006.

OY Alternative 1 (2,000 mt in 2009 and 2010) is the status quo 2007-08 OY and was specifically set lower than the estimated ABC, even though the stock was considered healthy, as a precautionary mechanism to be reduce the bycatch of co-occurring bocaccio.

OY Alternative 2 (2,099 mt in 2009 and 2010) is based on the estimated long term equilibrium MSY at an F50% SPR harvest rate from the 2007 assessment.

OY Alternative 3 (3,037 mt in 2009 and 2,576 mt in 2010) is based on the ABC/OY projections from the base model in the 2007 assessment.

The preliminary preferred OY Alternative (2,885 mt in 2009 and 2,447 mt in 2010) is based on the ABC/OY projections from the base model in the 2007 assessment with a 5% reduction to buffer the ABC and thereby reduce potential risk of overfishing.

4.3.3.6 *Dover Sole*

All 2009-10 Dover sole (*Microstomus pacificus*) harvest specifications are derived using projections from the most recent assessment conducted in 2005 (Sampson 2006). The 2005 assessment results indicated the coastwide Dover sole stock was healthy with an estimated spawning stock biomass at 63% of its initial, unfished biomass in 2005.

Only one OY alternative is considered for Dover sole; therefore, OY Alternative 1 (16,500 mt in 2009 and 2010) is the Council's preliminary preferred OY alternative. This OY is the status quo OY and is based on the estimated long term equilibrium MSY at an SPR harvest rate of F40% from the 2005 assessment.

4.3.3.7 *English Sole*

All 2009-10 English sole (*Parophrys vetulus*) harvest specifications are based on a new assessment in 2007 {Stewart 2008c}, which was an update of the last full assessment in 2005 (Stewart 2006). The updated assessment results indicated the stock is healthy with an estimated spawning stock biomass estimated to be at 116% of its initial, unfished biomass in 2007.

Only one OY alternative is considered for English sole; therefore, OY Alternative 1 (14,326 mt in 2009 and 9,745 mt in 2010) is the Council's preliminary preferred OY alternative. This OY is based on the ABC/OY projected from the base model in the 2007 updated assessment.

4.3.3.8 *Lingcod*

All 2009-10 lingcod (*Ophiodon elongatus*) OY alternatives are derived from projections in the most recent assessment done in 2005 (Jagielo and Wallace 2006). The 2005 assessment results indicated the stock was healthy with an estimated coastwide spawning stock biomass estimated to be at 60% of its initial, unfished biomass in 2005.

OY Alternative 1 (5,205 mt in 2009 and 4,785 mt in 2010) is based on sum of the projected ABC/OY from the 2005 assessment for the northern substock (north of 43° N latitude; Columbia and U.S.-Vancouver INPFC areas) and the status quo OY for the southern substock (south of 43° N latitude; Conception, Monterey, and Eureka INPFC areas). The coastwide OY is apportioned north and south of the Oregon-California border at 42° N latitude (4,593 mt in 2009 and 4,173 mt in 2010 for north of 42° N latitude; and 612 mt in 2009 and 2010 for south of 42° N latitude) to derive recreational harvest guidelines in California where relatively lower spawning stock abundance is still a concern (estimated spawning biomass for the southern substock was 24% of its initial, unfished biomass in 2005). The apportionment was done using status quo methodology as follows: the percentage of the 2005-06 OY estimated for the area between 42° and 43° N latitude was derived using the proportional lingcod landings in this area relative to landings further south (107 mt/719 mt) and applied this proportion to the estimated OY south of 43° N latitude to determine an estimated OY for the area between 42° and 43° N latitude. This was added to the projected OY for north of 43° N latitude to determine an appropriate OY for north of 42° N latitude.

The preliminary preferred OY is OY Alternative 2 (5,278 mt in 2009 and 4,829 mt in 2010). This OY alternative is based on the sum of the projected ABC/OY for the northern substock and the projected 40-10 adjusted OY for the southern substock. The 2009-10 coastwide OYs were apportioned north and south of the Oregon-California border using the same methodology described under OY Alternative 1 to derive northern and southern OY components (4,593 mt in 2009 and 4,173 mt in 2010 for north of 42° N latitude; and 685 mt in 2009 and 656 mt in 2010 for south of 42° N latitude).

4.3.3.9 *Longnose Skate*

All 2009-10 longnose skate (*Raja rhina*) OY alternatives are based on a new assessment conducted in 2007 {Gertseva and Schirripa 2008}. The 2007 assessment, which is the first one done for this species on the West Coast, indicated the stock is healthy with an estimated spawning stock biomass of 66% of its initial, unfished biomass in 2007. The Council will decide in June 2008 whether to use the 2007 assessment results to adjust the 2009-10 harvest specifications for the Other Fish complex, which longnose skate was one of the component species, or to establish separate species-specific specifications for longnose skate and adjust the Other Fish specifications accordingly.

OY Alternative 1 (901 mt in 2009 and 902 mt in 2010) is based on the projected OYs from the 2007 assessment using the current estimated exploitation rate.

The preliminary preferred OY alternative for longnose skate is OY Alternative 2 (1,349 mt in 2009 and 2010); although, as stated above, the Council has not decided whether to continue to manage longnose skate separately from the Other Fish complex. This OY alternative is based on a 50% increase in the average landings and discard mortality relative to the base model in the 2007 assessment.

OY Alternative 3 (3,428 mt in 2009 and 3,269 mt in 2010) is based on the ABC/OY projected from the 2007 assessment using the base model and the proxy SPR harvest rate of F45%.

4.3.3.10 *Longspine Thornyhead*

All 2009-10 longspine thornyhead (*Sebastolobus altivelis*) harvest specifications were derived from the most recent assessment done in 2005 (Fay 2006). The results of the 2005 coastwide assessment indicated the longspine thornyhead stock was healthy with an estimated spawning stock biomass at 71% of its initial, unfished biomass in 2005. The Council has managed longspine thornyhead with separate OYs north and south of Pt. Conception at 34°27' N latitude since 2007. The status quo 2007-08 specifications for longspine were an OY of 2,220 mt for north of Pt. Conception and an OY of 476 mt for south of Pt. Conception.

Only one OY alternative is considered for longspine thornyhead; therefore, OY Alternative 1 (north of Pt. Conception: 2,231 mt in 2009 and 2,175 mt in 2010; south of Pt. Conception: 395 mt in 2009 and 385 mt in 2010) is the Council's preliminary preferred OY alternative. This OY alternative is based on projected harvestable yields from the 2005 assessment using status quo methodology for apportioning the coastwide harvestable surplus north and south of Pt. Conception to specify area-specific OYs. The apportionment methodology assumed constant density throughout the Conception area and estimated 79% of the assessed coastwide biomass occurs north of Pt. Conception. The northern OY was then reduced by 25% to account for relatively high assessment uncertainty. The southern OY was reduced by 50% to account for relatively high assessment uncertainty and a paucity of survey data for the Conception area.

4.3.3.11 *Pacific Whiting*

Pacific whiting (*Merluccius productus*) are managed based on an annual assessment prepared jointly by U.S. and Canadian scientists. The most recent assessment, conducted in 2008 {Helser, *et al.* 2008}, estimated the stock's spawning biomass at 42.9% of its unfished spawning biomass at the beginning of 2008 and therefore healthy. Pacific whiting harvest specifications are based on these annual assessments and are only analyzed in this EIS to understand the potential bycatch implications of future whiting fisheries. The 2009 ABC and OY will presumably be considered and adopted by a new international Pacific whiting commission in accordance with the recently ratified Pacific Whiting treaty between the U.S. and Canada. The Council is still anticipated to set annual management measures for Pacific whiting fisheries. The analysis and discussion of the bycatch implications of future whiting fisheries in this EIS will serve to better understand effective management strategies to consider for future whiting fisheries (see section 2.2.3.2 for a description of whiting fishery management measure alternatives). These analyses will also aid the Council in deciding the yields of the most constraining species in whiting-directed fisheries to set-aside when deciding 2009-10 management measures for non-whiting fisheries, which collectively with 2009-10 whiting fisheries, must stay under the OY for these constraining species.

As placeholders, the Council specified a range of U.S. OY alternatives for analysis as follows: OY Alternative 1 (134,773 mt) is an OY half that specified in 2008, OY Alternative 2 (269,545 mt) is the status quo 2008 OY, and OY Alternative 3 (404,318 mt) is 150% of the status quo OY.

4.3.3.12 *Shortbelly Rockfish*

A new shortbelly rockfish (*Sebastes jordani*) was done as an academic exercise in 2007 to understand the potential environmental determinants of fluctuations in the recruitment and abundance of an unexploited rockfish population in the California Current ecosystem {Field, *et al.* 2008}. While the 2007 assessment did not go through the Council's STAR process, it was peer reviewed in a similar process and reviewed by the SSC in 2007 at the request of the SWFSC. The SSC noted the assessment did not fully satisfy the Council terms of reference for groundfish stock assessments. However, they concluded the assessment represents improved knowledge about shortbelly rockfish and might be suitable for management purposes in place of inferences from the hydroacoustic surveys conducted during 1977 and 1980, which formed the basis of the status quo ABC/OY of 13,900 mt. Based on this advice, the Council decided to use the assessment to consider alternative 2009-10 harvest specifications for shortbelly rockfish. The 2007 assessment results indicated the shortbelly stock was healthy with an estimated spawning stock biomass at 67% of its initial, unfished biomass in 2005.

OY Alternative 1 (3,475 mt in 2009 and 2010) is 25% of the status quo ABC/OY. The assessment author advised the Council that the stock would be expected to increase in abundance under this harvest rate.

The preliminary preferred OY alternative is OY Alternative 2 (6,950 mt in 2009 and 2010), which is 50% of the status quo ABC/OY. The assessment author advised the Council that the stock would be expected to remain in its current equilibrium under this harvest rate.

4.3.3.13 *Shortspine Thornyhead*

All 2009-10 shortspine thornyhead (*Sebastolobus alascanus*) harvest specifications were derived from the most recent assessment done in 2005 (Hamel 2006). The results of the 2005 coastwide assessment indicated the shortspine thornyhead stock was healthy with an estimated spawning stock biomass at

62.9% of its initial, unfished biomass in 2005. The Council has managed shortspine thornyhead with separate OYs north and south of Pt. Conception at 34°27' N latitude since 2007. The status quo 2007-08 specifications for shortspine were an OY of 1,634 mt for north of Pt. Conception and an OY of 421 mt for south of Pt. Conception.

Only one OY alternative is considered for shortspine thornyhead; therefore, OY Alternative 1 (north of Pt. Conception: 1,608 mt in 2009 and 1,591 mt in 2010; south of Pt. Conception: 414 mt in 2009 and 410 mt in 2010) is the Council's preliminary preferred OY alternative. This OY alternative is based on projected harvestable yields from the 2005 assessment using status quo methodology for apportioning the coastwide harvestable surplus north and south of Pt. Conception to specify area-specific OYs. The apportionment methodology assumed constant density throughout the Conception area and estimated 66% of the assessed coastwide biomass occurs north of Pt. Conception. The southern OY was reduced by 50% to account for relatively high assessment uncertainty due to a paucity of survey data for the Conception area.

4.3.3.14 *Splitnose Rockfish*

A 1994 splitnose rockfish (*Sebastes diploproa*) assessment (Rogers 1994) forms the basis for status quo and proposed 2009-10 harvest specifications for this stock. As in 2007-08, the ABC of 615 mt is reduced to an OY of 461 mt based on the Council's policy of making a 25% precautionary OY adjustment for species with less rigorous stock assessments. These harvest specifications are for south of 40°10' N latitude since splitnose rockfish are managed as part of the northern Minor Slope Rockfish complex north of 40°10' N latitude.

The Council chose the status quo harvest specifications of 615 mt and 461 mt as the preliminary preferred 2009-10 ABC and OY, respectively for chilipepper rockfish south of 40°10' N latitude.

4.3.3.15 *Starry Flounder*

All 2009-10 starry flounder (*Platichthys stellatus*) harvest specifications were derived from the most recent assessment done in 2005 (Ralston 2006). The results of the 2005 coastwide assessment indicated the starry flounder stock was healthy with an estimated spawning stock biomass at 44% and 62% of its initial, unfished biomass in Washington-Oregon and California, respectively in 2005. The Council started managing starry flounder with its own ABC/OY separate from the Other Flatfish complex since 2007. The status quo 2007-08 OY for starry flounder was 890 mt.

Only one OY alternative is considered for starry flounder; therefore, OY Alternative 1 (1,004 mt in 2009 and 1,077 mt in 2010) is the Council's preliminary preferred OY alternative. These OYs were projected from the base model in the 2005 assessment with a 25% precautionary reduction since this was considered a data-poor assessment.

4.3.3.16 *Yellowtail Rockfish*

All 2009-10 yellowtail rockfish (*Sebastes flavidus*) harvest specifications were derived from the most recent updated assessment done in 2005 (Wallace and Lai 2006). The last full assessment of the northern stock areas was conducted in 2000 (Tagart, *et al.* 2000), and it was then updated in 2003 (Lai, *et al.* 2003). The results of the 2005 updated assessment indicated the yellowtail rockfish stock was healthy with an estimated spawning stock biomass at 55% of its initial, unfished biomass in 2005. The status quo 2007-08 ABC/OY for yellowtail rockfish was 4,548 mt.

Only one OY alternative is considered for yellowtail rockfish; therefore, OY Alternative 1 (4,562 mt in 2009 and 2010) is the Council's preliminary preferred OY alternative. This is the projected ABC/OY from the base model in the 2005 updated assessment.

4.3.4 Unassessed Groundfish Species and Those Managed as Part of a Stock Complex

4.3.4.1 *Minor Rockfish South*

All changes to the Minor Rockfish South complex are driven by decisions on how to manage blue rockfish given the new assessment results. Potential changes to complex specifications are described in Chapter 2 and in the section that follows.

Southern Minor Nearshore Rockfish Species

Changes to the southern minor nearshore rockfish OY that are considered in this EIS relate to changes to the blue rockfish contribution to the complex.

OY Alternative 1 (630 mt in 2009 and 2010) contemplates continuing to manage blue rockfish stock within the complex. The OY under this alternative is determined by first subtracting the status quo OY contribution of blue rockfish (116 mt) from the status quo OY of 564 mt. Then the OY contribution of blue rockfish from the new assessment (182 mt for the portion of the assessed stock south of 40°10' N latitude) is added back to derive the 630 mt OY. The blue rockfish OY contribution from the 2007 assessment is based on the OY projected using the base case, medium productivity model.

The preliminary preferred OY alternative for the southern minor nearshore rockfish complex is OY Alternative 2 (650 mt in 2009 and 2010), which contemplates continuing to manage blue rockfish within the complex. The OY adjustment for the complex is the same as described under OY Alternative 1, except the new blue rockfish OY contribution is 202 mt and is based on the projected OY from the high productivity model in the 2007 assessment as capped by the base model ABC.

OY Alternative 3 (448 mt in 2009 and 2010) contemplates removing blue rockfish from the southern minor nearshore rockfish complex and managing blue rockfish under their own harvest specifications. The OY under this alternative is derived by removing the old blue rockfish OY contribution of 116 mt from the status quo OY of 564 mt.

The SSC recommended that species like blue rockfish should be managed "at a level concordant with stock assessments, not based on an assemblage aggregate". OY Alternative 3 would be consistent with that recommendation.

Southern Minor Shelf Rockfish Species

Access to southern shelf species has been substantially limited since the implementation of RCAs in 2003 under permanent regulations to reduce catch of depleted species, particularly bocaccio and canary rockfish. As a result, catch of species in the southern minor shelf rockfish complex has been minimal. The Council identified the status quo OY of 714 mt as the only alternative to be analyzed for this complex during the 2009-10 management cycle and selected this as the final Council-preferred alternative.

Southern Minor Slope Rockfish Species

Access to southern slope rockfish will be partially limited in 2009-10 between 38° and 40°10' N latitude by constraints imposed to quickly rebuild darkblotched rockfish. Since there is no new information available to inform new specifications for the southern minor slope rockfish complex, the Council is recommending the status quo OY of 626 mt for 2009-10.

4.3.4.2 *Minor Rockfish North*

All changes to the Minor Rockfish North complex are driven by decisions on how to manage blue rockfish given the new assessment results. Potential changes to complex specifications are described in Chapter 2 and in the section that follows.

Northern Minor Nearshore Rockfish Species

Changes to the northern minor nearshore rockfish OY that are considered in this EIS relate to changes to the blue rockfish contribution to the complex.

OY Alternative 1 (152 mt in 2009 and 2010) contemplates continuing to manage blue rockfish stock within the complex. The OY under this alternative is determined by first subtracting the status quo OY contribution of blue rockfish (15 mt) from the status quo OY of 142 mt. Then the OY contribution of blue rockfish from the new assessment (25 mt for the portion of the assessed stock north of 40°10' N latitude) is added back to derive the 152 mt OY. The blue rockfish OY contribution from the 2007 assessment is based on the OY projected using the base case, medium productivity model.

The preliminary preferred OY alternative for the northern minor nearshore rockfish complex is OY Alternative 2 (155 mt in 2009 and 2010), which contemplates continuing to manage blue rockfish within the complex. The OY adjustment for the complex is the same as described under OY Alternative 1, except the new blue rockfish OY contribution is 28 mt and is based on the projected OY from the high productivity model in the 2007 assessment as capped by the base model ABC.

OY Alternative 3 (127 mt in 2009 and 2010) contemplates removing blue rockfish from the northern minor nearshore rockfish complex and managing blue rockfish under their own harvest specifications. The OY under this alternative is derived by removing the old blue rockfish OY contribution of 15 mt from the status quo OY of 142 mt.

The SSC recommended that species like blue rockfish should be managed "at a level concordant with stock assessments, not based on an assemblage aggregate". OY Alternative 3 would be consistent with that recommendation.

Northern Minor Shelf Rockfish Species

Access to northern shelf species has been substantially limited since the implementation of RCAs in 2003 under permanent regulations largely to reduce mortalities of canary and yelloweye rockfish. As a result, catch of species in the Minor Shelf Rockfish North complex has been minimal. The Council identified the status quo OY of 968 mt as the only alternative to be analyzed for this complex during the 2000-10 management cycle and selected this as the final Council-preferred alternative.

Northern Minor Slope Rockfish Species

Impacts of species comprising the northern minor slope rockfish complex are managed through commercial RCAs and trip limits, most notably those management measures specified for the trawl sector where most of the northern slope rockfish species are caught. Trawl trip limits and RCA configurations are based on constraints imposed by the depleted slope species, darkblotched rockfish and Pacific ocean perch. No change from status quo is identified by the Council for analysis; therefore, the status quo alternative for the Minor Slope Rockfish North complex, 1,160 mt, is recommended under the final Council-preferred alternative for 2009-10 (Tables 2-1a and 2-1b).

4.3.4.3 *Pacific Cod*

Pacific cod is a transboundary stock with most of the biomass distributed north of the U.S.-Canada border. They are harvested primarily in the limited entry trawl fishery north of 40°10' N latitude. Pacific cod have never been formally assessed on the U.S. West Coast. The status quo ABC and OY for Pacific cod is recommended for 2007–08 fisheries. The ABC of 3,200 mt is based on historical landings and the OY of 1,600 mt is based on the 50 percent precautionary reduction for unassessed stocks as recommended by Restrepo *et al.* (1998). Prior to 2006, allowable landings of Pacific cod were not limited. Harvests in recent years were under the status quo (and proposed) OY of 1,600 mt, but in 2004, total catch approached this harvest level. Therefore, limited entry trawl and limited entry and open access fixed gear trip limits were specified beginning in period 2 of the 2006 fishery to alleviate potential overfishing concerns. These same harvest specifications and trip limits are recommended for the 2009-10 management period, which should maintain total catches well below the Council-preferred OY.

4.3.4.4 *Other Fish*

Development of Harvest Specifications for the Other Fish Complex

The Other Fish stock complex currently contains all the unassessed Groundfish FMP species that are neither rockfish (family *Scorpaenidae*) nor flatfish. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), longnose skate (*Raja rhina*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling or Pacific flatnose (*Antimora microlepis*), Pacific rattail or Pacific grenadier (*Coryphaenoides acrolepis*), ratfish (*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (north of the California/Oregon border at 42° N latitude), and kelp greenling (*Hexagrammos decagrammus*).

When the Groundfish FMP was first implemented in September 1982, the Other Fish complex also contained arrowtooth flounder (*Atheresthes stomias*), but did not include cabezon or kelp greenling. The species comprising the complex were considered under-harvested or not utilized by the commercial or recreational fishery and were characterized as having "low or no economic value". The 1982 FMP explicitly stated that the decision for annual harvest limits must take into account MSY, the current status of stocks, and environmental conditions. It was also stated in the initial FMP that data were lacking to determine an accurate estimate of MSY for the species in the Other Fish complex. Therefore, the ABC for the Other Fish complex was set at a level that would "minimize disruption of existing fisheries." The original ABC for the complex was 16,000 mt apportioned by INPFC area as follows: 3,000 mt for the U.S-Vancouver area; 7,000 mt for the Columbia area; 2,000 mt for the Eureka area; 2,000 for the Monterey area; and 2,000 mt for the Conception area. The Other Fish OY was non-

numerical[2] and defined as "all that are landed under regulations adopted by the Council". Within this management framework, a "point of concern" mechanism was adopted that would require the GMT to evaluate relevant data if an ABC was projected to be exceeded to determine if there are signs of stock "stress". If stock stress was so determined, prescriptive management measures to slow or stop the catch would be recommended. A point of concern mechanism was never triggered for the Other Fish complex because landings never exceeded specified ABCs.

In 1984, the Other Fish ABC was reduced from 16,000 mt to 14,700 mt. The area-specific ABCs were changed from 3,000 mt to 2,500 mt in the U.S.-Vancouver area and from 2,000 mt to 1,200 mt in the Eureka area. Cabezon and kelp greenling were added to the FMP under the Other Fish complex with the implementation of Amendment 1 to the Groundfish FMP in July 1984. The Other Fish ABC of 14,700 mt was not modified as a result of adding these two species. Arrowtooth flounder was removed from the Other Fish complex in 1991 and managed under the Other Flatfish complex specifications. Pacific cod caught south of 43° N latitude were also included in the Other Fish complex for convenience, although only trace amounts of Pacific cod have been caught this far south.

The 14,700 mt ABC for the Other Fish complex was re-specified annually from 1984 through 2004. A new cabezon assessment for the portion of the coastwide population occurring in California waters was conducted in 2004. An ABC of 103 mt was specified for California cabezon in 2005 and 100 mt was accordingly deducted from the Other Fish ABC. An OY of 7,300 mt for the Other Fish complex or half the 14,600 mt ABC was specified in 2005 on a GMT recommendation to take a precautionary approach for this assemblage of unassessed stocks. The 14,600 mt ABC and 7,300 mt OY have been re-specified every year since then.

Considerations for Deciding 2009-10 Harvest Specifications for the Other Fish Complex

A new assessment for longnose skate was conducted in 2007 and recommended by a STAR panel and the Council's SSC for management use. The assessment indicated the stock was at healthy abundance, although it was acknowledged as a data-poor assessment with the major uncertainties being the catch history, since most skates are discarded in trawl fisheries, and the NMFS NWFSC trawl survey catchability coefficient (q). The GMT recommended in November 2007 that longnose skate continue to be managed within the Other Fish complex due to relatively high assessment uncertainty. They recommended the alternative OYs derived from the assessment be used to establish a point of concern for longnose skate. In April 2008, the Council was advised by NOAA General Counsel to establish a harvest guideline if the stock is managed within a complex rather than use the point of concern mechanism, since a point of concern has not been used in groundfish management for many years. The Council decided to adopt a 1,349 mt OY for longnose skate in 2009 and 2010 but deferred a decision on whether to manage this species with its own harvest specifications or within the Other Fish complex until June 2008.

The SSC recommended in April 2008 "that the Council manage fisheries based on stock targets and thresholds that are defined at a level concordant with stock assessments, not based on an assemblage aggregate[3]." Given that harvest specifications for the Other Fish complex were developed by setting ABCs well above the historical catch of all the species in the complex, there is no quantitative basis for the ABC, nor is there a breakdown of ABCs for the species comprising the complex. Furthermore,

[2] Numerical OYs were specified as landed catch quotas that required automatic actions to prohibit landings if attained inseason. The only numerical OYs specified in 1982 were those for Pacific whiting, sablefish, widow rockfish, shortbelly rockfish, and Pacific ocean perch.

[3] They made this recommendation generally, but specifically recommended species-specific harvest specifications be decided for blue rockfish and longnose skate.

harvest specifications for the complex have not been changed even when significant changes were made to the complex, such as removing arrowtooth flounder.

The alternatives at this point are to recommend the longnose skate ABC and OY and make a reasonable adjustment to the Other Fish specifications or to manage longnose skate within the complex and specify a harvest guideline of 1,349 mt for this species. If the Council were to choose to remove longnose skate from the Other Fish complex, it may make sense to recommend 3,400 mt be removed from the Other Fish ABC to account for the "contribution" of longnose skate to derive a value of 11,200 mt. For consistency, an OY of 5,600 mt might be recommended for the Other Fish complex since the same 50% precautionary reduction to the ABC is recommended for unassessed stocks. This is particularly prudent given that the Other Fish harvest specifications are not based on historical catches, but have been well above historical catches given the original FMP objective to set the ABC at a level to "minimize disruption of existing fisheries."

It should also be noted that catches of species in the Other Fish complex have been well below 5,600 mt and rarely greater than 4,000 mt. However, in 2003, the total catch of Other Fish species was 6,557.9 mt. From the longnose skate assessment, the total catch of longnose skate in 2003 was 1,323 mt. Therefore, in this peak year of catch for species in the Other Fish complex, the catch of species other than longnose skate totaled just over 5,200 mt. In other years, the longnose skate catch has exceeded 2,000 mt.

The decision on how to manage longnose skate should therefore consider prudent measures for longnose skate, as well as the other species comprising the Other Fish complex. Longnose skate management would certainly benefit from a species-specific ABC and OY, since harvests for the species would then be tracked inseason against a biologically based OY. This could also be accomplished with a mandatory sorting requirement for skate species and the addition of these species in the QSM tracking system, even if longnose skate are managed within the Other Fish complex. If the species is managed with its own OY, then this is a quota which would require specific action to stay within the OY. If the species is managed within the Other Fish complex, there needs to be specific actions recommended for premature attainment of the longnose skate harvest guideline. Protection of the species would therefore depend on the effectiveness of the automatic actions, so this detail needs to be deliberated.

The other elasmobranchs in the Other Fish complex (big skate, California skate, spiny dogfish, leopard shark, and soupfin shark) are generally a concern for management given their relatively late maturation and low fecundity. Concerns for species in the Other Fish complex will unlikely be addressed in the short term by any measures considered for the 2009-10 management cycle. The SSC remarked in April 2008 that specifications for the Other Fish complex should be re-evaluated in the next management cycle (for management decision-making in 2011-12) since the current specifications are archaic. While the SSC will generally explore assessment options for groundfish complexes, the GMT should consider alternative catch-based specifications for the Other Fish complex if assessment-based specifications are not developed. There should also be consideration for a 2009 assessment of spiny dogfish, which is a candidate stock for a full assessment. This decision will also be made in June 2008.

4.3.4.5 *Other Flatfish*

For sanddabs and rex sole, the available trawl survey data, along with the sizes of selectivity and maturity leads to the recommendation to continue with a data-moderate OY reduction of 25 percent for calculating the contribution of these species to the Other Flatfish OY. The Council believes that it is reasonable to assume that the stocks are above B_{MSY} based on the survey and fisheries information available for these stocks. This recommendation is consistent with Restrepo *et al.* (1998) recommendations for stocks in a data-poor situation that are not depleted, yet below B_{MSY}. The Council

does not have information to conclude that these stocks are below B_{MSY}, but takes this precautionary approach in order to acknowledge a lack of data. The remaining species in the group are also likely to begin reproduction prior to retention by trawl gear, and two of the three states restrict access of trawlers to the primary depth distribution of sand sole, the remaining stock in the complex (other than the starry flounder stock that is recommended for removal from the complex) that contributes the bulk of landings among the remaining species. However, environmental factors, such as estuarine and nearshore water quality, may also play an important role in the current status of sand sole. The GMT believes it prudent to use a 50 percent precautionary reduction when calculating the OY component for these species. Survey and fisheries information on these species is less abundant than on rex sole and sanddabs. Thus, the Council recommendation is to continue to specify a 50 percent OY reduction for these species.

Since there is no new information available to inform new specifications for the Other Flatfish complex, the Council is recommending the status quo specifications for 2009-10.

4.3.5 Non-Groundfish Species

4.3.5.1 *Salmon*

See chapter 5 for a description and analysis of salmon bycatch in groundfish fisheries.

4.3.5.2 *Pacific Halibut*

The Pacific halibut fishery is affected by RCA depth restrictions because commercial halibut fishing is prohibited within the non-trawl RCA. Additionally, the alternative YRCAs under the action alternatives will restrict impacts since yelloweye and Pacific halibut tend to co-occur. Action Alternative 1 would have the least commercial impact on Pacific halibut because the seaward boundary is specified at 150 fm north of 40°10' N latitude; Action Alternative 2 would be intermediate with a seaward boundary at 125 fm in the north; and the greatest impact under Action Alternative 3 and the No Action Alternative with a seaward boundary at 100 fm in the north. The alternative YRCA closures north of 40°10' N latitude will also limit recreational Pacific halibut catch. Under the final Council-preferred alternative, Pacific halibut catch is somewhat greater than under the other action alternatives since the non-trawl RCA is not as extensive and fewer YRCAs are recommended for implementation in 2009-10.

4.3.5.3 *Coastal Pelagic Species*

CPS are taken incidentally in the groundfish fishery. Incidental take is well documented in the at-sea and shorebased whiting fishery. Preliminary data for 2001 indicates approximately 80 mt of squid was incidentally taken in the at-sea whiting fishery through October. There is little information on the incidental take of CPS by the other segments of the fishery; however, given that CPS are not associated with the ocean bottom, the interaction is expected to be minimal.

4.3.5.4 *Highly Migratory Species*

HMS, such as tunas and billfish, are largely pelagic, open ocean species infrequently caught in groundfish directed fisheries. None of the alternatives analyzed should affect HMS species.

4.3.5.5 *Dungeness Crab*

Dungeness crab, which are typically harvested using traps (crab pots), ring nets, by hand (scuba divers), or dip nets, are incidentally taken or harmed unintentionally by groundfish gears. Very little bycatch of

rockfish has been noted in pot and trap fisheries, including those targeting Dungeness crab. It is not anticipated this fishery would need to be constrained or modified to rebuild any of the depleted West Coast groundfish species of concern.

One potential consideration in adjusting the trawl RCA to depths shallower than 75 fm during the summer months is that smaller vessels would be forced to fish shoreward of the RCA. Concentrating vessel effort in shallow water affects Dungeness crab in the north because they are less likely to survive discard during their summer molting season.

There may be a need for a section 7 ESA consultation to prosecute 2009-10 Dungeness crab fisheries in waters off California and Oregon due to recent "takes" of humpback whales by float lines in crab and sablefish pot/trap fisheries. See Chapter 5 for more details.

4.3.5.6 *Greenlings (Other than Kelp Greenling), Ocean Whitefish, and California Sheephead*

Greenlings of the genus *Hexagrammos* (except kelp greenling), ocean whitefish, and California sheephead are managed by the state of California. Due to their co-occurrence with groundfish and their popularity as recreational target species, California often takes state regulatory action for these species when recreational fisheries for federal groundfish fisheries are closed or limited. Therefore, any of the groundfish actions anticipated for constraining groundfish species are likely to constrain impacts for these species as well.

4.3.5.7 *Pink Shrimp*

The pink shrimp fishery is managed by the states of Washington, Oregon, and California. The season runs from April 1 through October 31, and pink shrimp may be taken for commercial purposes only by trawl nets or pots. Most of the pink shrimp catch is taken with trawl gear with a minimum mesh size of one inch to three eighths inch between the knots. In some years, prior to finfish excluder requirements, the pink shrimp trawl fishery has accounted for a significant share of canary rockfish incidental catch. Beginning in 2002, finfish excluders in the pink shrimp fisheries were mandatory in California, Oregon, and Washington.

The pink shrimp trawl fishery is exempted from RCA boundaries because of state required bycatch excluders that effectively reduce rockfish bycatch. Other regulatory provisions including groundfish landing restrictions do not differ between the action alternatives, the final Council-preferred alternative, or the No Action alternative.

4.3.5.8 *California Halibut*

California halibut are primarily caught in open access exempt trawl fisheries south of Pt. Arena, California and by the California recreational fishery. Since the advent of depth based management of West Coast groundfish fisheries in late 2002, exempt trawl fisheries have been subject to the depth/area restrictions imposed with the establishment of the trawl RCA. Therefore, in addition to reduced incidental groundfish landing allowances, limited access to traditional commercial fishing areas for California halibut under changing trawl RCA configurations may be a significant impact.

There has been a significant amount of mixed target fishing for groundfish species and California halibut in some exempt trawl trips as evidenced by fish ticket landing receipts. The new mandate requiring VMS on open access vessels intending to land groundfish may reduce the groundfish impacts

in the commercial California halibut fishery and, at the very least, will enforce the integrity of the trawl RCA restriction on this fleet.

A significant increase in California halibut impacts is not anticipated under any of the action alternatives analyzed in this EIS.

4.3.5.9 *Ridgeback and Spot Prawns*

The ridgeback prawn fishery is managed by the state of California and is prosecuted using exempted trawl gear under the federal open access regulations. Continuing the exemption to RCA restrictions south of 34°27' N latitude is proposed under the final Council-preferred alternative to allow the ridgeback prawn trawl fishery to operate within the trawl RCA to 100 fm when the shoreward boundary of the trawl RCA is at 75 fm. The ridgeback prawn fishery operates primarily between 35 fm and 90 fm, with an average fishing depth of 75 fm. Trawl log data show that 99 percent of ridgeback prawns are caught in depths of 101 fm or less. Therefore, when the shoreward boundary of the trawl RCA is at 100 fm, the fishery will be able to continue operating over traditional fishing grounds. However, the fishery may be significantly impacted when the shoreward boundary of the trawl RCA is at 75 fm. Trawl data evaluated from 2001 showed that 40 percent of the annual catch occurred in depths of 75 fm to 100 fm. An exemption to the RCA closure between 75 fm and 100 fm will allow the fishery to continue fishing operations in traditional fishing grounds in sandy habitats without impact to the depleted rockfish stocks the RCA is intended to protect.

The spot prawn fishery is managed by the states and, since 2003, only fixed gears (pots and traps) are allowed in the fishery. Prior to 2003, exempt trawls were allowed for targeting spot prawns, but the fishery occurred primarily over rocky substrates and the rockfish bycatch was at times excessive. Therefore, spot prawn trawling was prohibited under state and federal regulations beginning in 2003. None of the actions alternatives analyzed in this EIS are anticipated to significantly impact spot prawns.

4.3.5.10 *Sea Cucumbers*

The sea cucumber fishery is managed by the state of California and is prosecuted using exempted trawl gear under the federal open access regulations. Since the advent of depth based management of West Coast groundfish fisheries in late 2002, exempt trawl fisheries have been subject to the depth/area restrictions imposed with the establishment of the trawl RCA. Therefore, in addition to reduced incidental groundfish landing allowances, limited access to traditional commercial fishing areas for sea cucumbers under changing trawl RCA configurations may be a significant impact.

A significant increase in sea cucumber impacts is not anticipated under any of the action alternatives analyzed in this EIS.

4.4 Discussion of Cumulative Impacts

This section to be completed after the June 2008 Council meeting.

4.4.1 Internal Factors

4.4.2 External Factors

4.5 Summary of Impacts

4.5.1 Documentation of Impact Analysis Modeling

4.5.1.1 *Limited Entry Non-Whiting Trawl*

This section to be completed after the June 2008 Council meeting.

4.5.1.2 *Limited Entry Whiting Trawl*

This section to be completed after the June 2008 Council meeting.

4.5.1.3 *Limited Entry Fixed Gear*

Two major strategies for the limited entry fixed gear fleet are targeting of nearshore groundfish species and targeting sablefish in both the primary fishery and the daily-trip-limit (DTL) fishery. Nearshore impact modeling methodology is described in Section 4.5.1.4. Impacts in the sablefish targeting strategies are modeled as follows.

The sablefish OY north of 36° N latitude is apportioned according to the formal intersector allocations shown in Figure 4-12. It is assumed in the analysis that the annual sablefish allocation will be attained by the fixed gear fleets. Fleetwide discard estimates associated with fixed gear sablefish fishing are derived from WCGOP observer data and fish ticket data obtained from PacFIN. WCGOP observation of fixed-gear vessels targeting sablefish began in 2002 and has focused on those participating in the limited-entry primary fishery. However, data from those observations in the open access daily-trip-limit sablefish fishery also inform the impact model.

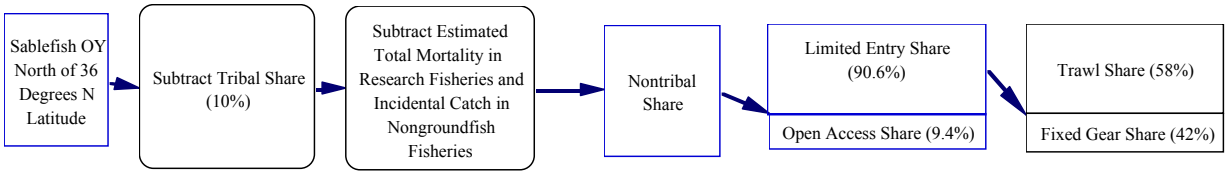

Figure 4-12. The formal intersector allocations of sablefish north of 36° N latitude.

Observations from the fixed gear sablefish fishery north and south of 40°10' N latitude were pooled for all years of data (2002-2006), with no differential weighting applied to catch from different years. This level of data aggregation enables reporting of retained and discarded catch of groundfish species by gear type at a finer latitudinal and depth scale than has been done in previous specifications and management measure analyses. Data summarizing observed retained and discarded catch from fishing efforts north of 40°10' N latitude were stratified by gear type (longline and pot/trap) and three alternative depth ranges that are used to evaluate different seaward boundaries of the non-trawl RCA. Although the range of depths recorded for an individual fixed gear set by observers is commonly much smaller than for observed trawl tows, it may not be possible to accurately assign the catch and discard of many sets to a specific 25 fm interval. For this exercise, the average of the beginning and ending depths of each set was used to represent the depth at which all fish on the set were caught.

The distribution of observed bycatch of canary and yelloweye were evaluated to determine the potential latitudinal boundaries for subareas north of 40°10' N latitude that could be used to segregate areas of higher bycatch of these species and allow for specification of differential seaward RCA boundaries that would promote bycatch reduction with the least disruption of overall fleet fishing practices. This review led to the definition of four subareas for which sablefish catch and discard of other species are summarized. These subareas are bounded by: Cape Mendocino at 40°10' N latitude, the boundary of the Columbia and Eureka INPFC areas (43°10' N latitude), Cascade Head (45.064°10' N latitude), Point Chehalis (46.888°10' N latitude), and the U.S.-Canada border. Several alternative boundaries were evaluated, but those listed above provided the greatest contrast between areas of high and low yelloweye bycatch. In particular, splitting the northernmost subarea, using one of the available management lines, simply created two areas with relatively high yelloweye bycatch from the existing one. Since rockfish bycatch in the pot gear fleet is very small and there are very limited numbers of pot gear observations in some areas, results for this group are summarized with respect to depth only (without subareas).

Tables 4-28, 4-29, and 4-30 report catch and discard data collected from depths greater than 100 fm, 125 fm, and 150 fm, respectively. Discard rates for each subarea and depth are calculated by dividing each discard weight by the weight of retained sablefish, and are provided in Tables 4-31 to 4-33. Since the seaward boundary of the non-trawl RCA south of 40°10' N latitude has always been 150 fm, no data were collected in the sablefish fishery shallower than 150 fm, and hence all of the new columns for each gear type in the southern area contain the same values as reported in the greater than 150 fm depth category.

The highest amounts and rates of yelloweye bycatch in this fishery have been observed north of Point Chehalis. Table 4-34 provides additional information intended to aid the use of these discard rates to project overall northern area impacts associated with implementing differing seaward RCA boundaries across subareas. The upper two panels in Table 4-34 report the distribution of 2002-2006 observed sablefish landings among the four catch subareas and four port groups. The bottom two panels of Table 4-34 report the annual distributions of total fixed-gear sablefish landings (based on fish tickets) among the four port groups. The middle panel of Table 4-34 reports estimates of the distribution of fleet-wide, northern-area landings among catch areas, which area based on the other data presented in Table 4-34. Although the annual results presented in the middle panel are all based on the average port group catch area distributions for the 2002-2006 period, they do illustrate the variability in the proportions of sablefish attributed to each catch area as a result of annual changes in the port groups where sablefish are landed.

In evaluating the overall effect of alternative RCA specifications, a column from Table 4-31, 4-32, or 4-33 may be selected to represent each of the four areas. The discard rates associated with the depth range selected for each area can then be multiplied by the row from the middle panel of Table 4-34 which is judged to be most representative (Tables 4-35 to 4-37). Summing these results across the entire area north of 40°10' N latitude yields weighted-average discard rates that can be used directly in the existing spreadsheet model used to evaluate impacts in this fishery.

In this analysis, observations from the primary fishery are assumed to be representative of bycatch and discard occurrences associated with all fixed gear sablefish fishing north of 36° N latitude. Since only a fraction of discards die, an assumed mortality percentage is applied. In accordance with the rate of survival assumed by the GMT, 20% of the discarded poundage of sablefish is assumed to represent mortality. For rebuilding species, observed discard ratios relative to retained sablefish, are then used to calculate estimated amounts of mortality for each.

Table 4-28. Amounts of species discard observed on fixed-gear sablefish sets deeper than 100 fm, stratified north and south of 40°10' N latitude, including four subareas for longline catch north of 40°10' N latitude.

	All observations recorded as being deeper than 100 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Observed sablefish pounds								
retained	141,939	2,643,162	379,834	584,656	411,205	1,267,467	207,178	1,548,261
discarded	64,449	357,465	54,360	137,272	79,756	86,078	96,335	319,949
Number of observed sets								
total	138	1,902	222	353	235	1,092	94	1,445
with yelloweye	0	127	7	23	4	93	0	2
% of total	0%	7%	3%	7%	2%	9%	0%	0%
with canary	0	113	5	17	18	73	0	0
% of total	0%	6%	2%	5%	8%	7%	0%	0%
Discarded pounds of species								
Canary rockfish	**0**	**1,166**	**36**	**172**	**120**	**838**	**0**	**0**
Widow rockfish	0	10	0	0	10	0	0	5
Yelloweye rockfish	**0**	**1,741**	**194**	**403**	**68**	**1,075**	**0**	**7**
Bocaccio rockfish	0	0	0	0	0	0	0	0
Cowcod rockfish	0	0	0	0	0	0	0	0
Pacific ocean perch	0	243	14	0	16	213	2	3
Darkblotched rockfish	53	466	211	55	16	183	32	114
Pacific whiting/hake	52	593	118	200	153	122	0	54
Shortspine thornyhead	437	1,752	177	66	312	1,198	1	77
Longspine thornyhead	120	10	0	2	3	5	0	11
Dover sole	519	4,778	125	221	2,507	1,925	63	1,087
Arrowtooth flounder	6	97,097	134	2,745	4,728	89,490	23	2,775
Petrale sole	1	84	0	10	8	66	7	0
English sole	0	0	0	0	0	0	0	0
Other flatfish	0	674	0	597	51	26	0	5
Yellowtail rockfish	0	675	0	0	14	661	0	0
Chilipepper rockfish	0	0	0	0	0	0	0	0
Other shelf rockfish	65	13,237	1,329	931	1,108	9,869	24	103
Blackgill rockfish	569	0	0	0	0	0	69	0
Splitnose rockfish	45	0	0	0	0	0	19	0
Other slope rockfish	2,691	14,920	1,803	794	2,324	9,999	6	137
Lingcod	20	19,276	582	2,709	1,123	14,863	2,736	6,365
Pacific cod	0	3,038	0	22	54	2,962	0	6
Spiny dogfish	6,375	368,177	12,512	6,511	54,529	294,625	6	661
Longnose skate	6,038	87,767	8,478	13,301	12,120	53,867	0	0
Big skate	31	27,649	1,475	579	189	25,406	0	0
Unspecified skate	1,839	41,664	2,550	8,289	6,052	24,775	0	0
Other groundfish	3,536	6,244	2,279	1,155	351	2,460	11	3,761
Pacific Halibut	13	637,029	6,247	69,377	21,263	540,142	0	27,208
Other non-groundfish	7,600	88,593	5,917	19,223	17,013	46,440	32	8,290

Table 4-29. Amounts of species discard observed on fixed-gear sablefish sets deeper than 125 fm, stratified north and south of 40°10' N latitude, including four subareas for longline catch north of 40°10' N latitude.

	All observations recorded as being deeper than 125 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Observed sablefish pounds								
retained	141,939	2,011,574	334,560	442,757	232,204	1,002,053	207,178	1,437,897
discarded	64,449	267,854	50,829	107,519	44,074	65,431	96,335	303,092
Number of observed sets								
total	138	1,423	199	262	161	801	94	1,373
with yelloweye	0	60	5	6	3	46	0	0
% of total	0%	4%	3%	2%	2%	6%	0%	0%
with canary	0	39	2	4	4	29	0	0
% of total	0%	3%	1%	2%	2%	4%	0%	0%
Discarded pounds of species								
Canary rockfish	**0**	**516**	**10**	**99**	**8**	**398**	**0**	**0**
Widow rockfish	0	0	0	0	0	0	0	5
Yelloweye rockfish	**0**	**859**	**178**	**37**	**63**	**583**	**0**	**0**
Bocaccio rockfish	0	0	0	0	0	0	0	0
Cowcod rockfish	0	0	0	0	0	0	0	0
Pacific ocean perch	0	160	0	0	16	144	2	3
Darkblotched rockfish	53	417	184	54	16	163	32	114
Pacific whiting/hake	52	507	118	157	147	85	0	54
Shortspine thornyhead	437	1,643	177	60	288	1,118	1	77
Longspine thornyhead	120	7	0	2	1	3	0	11
Dover sole	519	1,985	113	155	150	1,567	63	1,078
Arrowtooth flounder	6	75,876	79	2,224	4,115	69,458	23	2,714
Petrale sole	1	18	0	3	0	15	7	0
English sole	0	0	0	0	0	0	0	0
Other flatfish	0	542	0	525	0	17	0	5
Yellowtail rockfish	0	430	0	0	0	430	0	0
Chilipepper rockfish	0	0	0	0	0	0	0	0
Other shelf rockfish	65	9,229	1,084	523	497	7,124	24	91
Blackgill rockfish	569	0	0	0	0	0	69	0
Splitnose rockfish	45	0	0	0	0	0	19	0
Other slope rockfish	2,691	14,407	1,792	483	2,258	9,875	6	137
Lingcod	20	11,000	390	2,358	103	8,148	2,736	5,347
Pacific cod	0	1,225	0	0	43	1,182	0	6
Spiny dogfish	6,375	275,549	11,291	3,849	36,518	223,890	6	346
Longnose skate	6,038	64,142	8,107	11,671	5,061	39,302	0	0
Big skate	31	15,814	647	324	89	14,754	0	0
Unspecified skate	1,839	26,404	2,061	5,279	2,601	16,463	0	0
Other groundfish	3,536	5,236	2,167	896	186	1,987	11	3,726
Pacific Halibut	13	385,424	3,653	55,551	14,171	312,049	0	24,242
Other non-groundfish	7,600	61,233	5,618	15,261	6,863	33,491	32	8,063

Table 4-30. Amounts of species discard observed on fixed-gear sablefish sets deeper than 150 fm, stratified north and south of 40°10' N latitude, including four subareas for longline catch north of 40°10' N latitude.

	All observations recorded as being deeper than 150 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Observed sablefish pounds								
retained	141,939	1,400,373	259,771	253,782	153,026	733,794	207,178	1,381,297
discarded	64,449	177,749	44,890	62,210	26,600	44,050	96,335	296,434
Number of observed sets								
total	138	1,026	160	164	117	585	94	1,313
with yelloweye	0	22	1	2	3	16	0	0
% of total	0%	2%	1%	1%	3%	3%	0%	0%
with canary	0	13	0	2	1	10	0	0
% of total	0%	1%	0%	1%	1%	2%	0%	0%
Discarded pounds of species								
Canary rockfish	**0**	**102**	**0**	**49**	**0**	**53**	**0**	**0**
Widow rockfish	0	0	0	0	0	0	0	5
Yelloweye rockfish	**0**	**359**	**8**	**28**	**63**	**261**	**0**	**0**
Bocaccio rockfish	0	0	0	0	0	0	0	0
Cowcod rockfish	0	0	0	0	0	0	0	0
Pacific ocean perch	0	75	0	0	16	59	2	2
Darkblotched rockfish	53	273	94	40	15	124	32	114
Pacific whiting/hake	52	288	42	116	55	74	0	54
Shortspine thornyhead	437	1,396	163	50	209	974	1	77
Longspine thornyhead	120	7	0	2	1	3	0	11
Dover sole	519	1,198	100	99	123	875	63	1,060
Arrowtooth flounder	6	47,968	28	1,150	3,325	43,466	23	2,449
Petrale sole	1	3	0	0	0	3	7	0
English sole	0	0	0	0	0	0	0	0
Other flatfish	0	93	0	76	0	17	0	5
Yellowtail rockfish	0	228	0	0	0	228	0	0
Chilipepper rockfish	0	0	0	0	0	0	0	0
Other shelf rockfish	65	3,537	193	388	263	2,693	24	85
Blackgill rockfish	569	0	0	0	0	0	69	0
Splitnose rockfish	45	0	0	0	0	0	19	0
Other slope rockfish	2,691	13,163	863	477	2,117	9,706	6	132
Lingcod	20	3,869	214	815	68	2,773	2,736	3,762
Pacific cod	0	568	0	0	33	535	0	6
Spiny dogfish	6,375	208,686	9,381	1,971	22,653	174,681	6	311
Longnose skate	6,038	38,710	7,050	4,303	4,058	23,299	0	0
Big skate	31	5,724	10	93	89	5,532	0	0
Unspecified skate	1,839	16,330	1,470	3,851	1,635	9,374	0	0
Other groundfish	3,536	3,985	2,047	439	94	1,405	11	3,694
Pacific Halibut	13	165,671	2,512	11,521	12,098	139,541	0	21,204
Other non-groundfish	7,600	47,383	5,132	9,487	5,673	27,091	32	8,005

Table 4-31. Rates of species discard, relative to retained sablefish, observed on fixed gear sablefish sets deeper than 100 fm, stratified by area.

Species	All observations recorded as being deeper than 100 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	13.5%	14.3%	23.5%	19.4%	6.8%	46.5%	20.7%
Canary rockfish	**0.000%**	**0.044%**	**0.010%**	**0.029%**	**0.029%**	**0.066%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.002%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.066%**	**0.051%**	**0.069%**	**0.017%**	**0.085%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.009%	0.004%	0.000%	0.004%	0.017%	0.001%	0.000%
Darkblotched rockfish	0.038%	0.018%	0.056%	0.009%	0.004%	0.014%	0.016%	0.007%
Pacific whiting/hake	0.036%	0.022%	0.031%	0.034%	0.037%	0.010%	0.000%	0.003%
Shortspine thornyhead	0.308%	0.066%	0.047%	0.011%	0.076%	0.095%	0.000%	0.005%
Longspine thornyhead	0.085%	0.000%	0.000%	0.000%	0.001%	0.000%	0.000%	0.001%
Dover sole	0.365%	0.181%	0.033%	0.038%	0.610%	0.152%	0.030%	0.070%
Arrowtooth flounder	0.004%	3.674%	0.035%	0.470%	1.150%	7.061%	0.011%	0.179%
Petrale sole	0.001%	0.003%	0.000%	0.002%	0.002%	0.005%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.025%	0.000%	0.102%	0.012%	0.002%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.026%	0.000%	0.000%	0.003%	0.052%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.046%	0.501%	0.350%	0.159%	0.269%	0.779%	0.012%	0.007%
Blackgill rockfish	0.401%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.032%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	1.896%	0.564%	0.475%	0.136%	0.565%	0.789%	0.003%	0.009%
Lingcod	0.014%	0.729%	0.153%	0.463%	0.273%	1.173%	1.321%	0.411%
Pacific cod	0.000%	0.115%	0.000%	0.004%	0.013%	0.234%	0.000%	0.000%
Spiny dogfish	4.491%	13.929%	3.294%	1.114%	13.261%	23.245%	0.003%	0.043%
Longnose skate	4.254%	3.321%	2.232%	2.275%	2.948%	4.250%	0.000%	0.000%
Big skate	0.022%	1.046%	0.388%	0.099%	0.046%	2.004%	0.000%	0.000%
Unspecified skate	1.296%	1.576%	0.671%	1.418%	1.472%	1.955%	0.000%	0.000%
Other groundfish	2.491%	0.236%	0.600%	0.198%	0.085%	0.194%	0.005%	0.243%
Pacific Halibut	0.009%	24.101%	1.645%	11.866%	5.171%	42.616%	0.000%	1.757%
Other non-groundfish	5.354%	3.352%	1.558%	3.288%	4.137%	3.664%	0.016%	0.535%

Table 4-32. Rates of species discard, relative to retained sablefish, observed on fixed gear sablefish sets deeper than 125 fm, stratified by area.

Species	All observations recorded as being deeper than 125 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	13.3%	15.2%	24.3%	19.0%	6.5%	46.5%	21.1%
Canary rockfish	**0.000%**	**0.026%**	**0.003%**	**0.022%**	**0.004%**	**0.040%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.043%**	**0.053%**	**0.008%**	**0.027%**	**0.058%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.008%	0.000%	0.000%	0.007%	0.014%	0.001%	0.000%
Darkblotched rockfish	0.038%	0.021%	0.055%	0.012%	0.007%	0.016%	0.016%	0.008%
Pacific whiting/hake	0.036%	0.025%	0.035%	0.035%	0.063%	0.008%	0.000%	0.004%
Shortspine thornyhead	0.308%	0.082%	0.053%	0.014%	0.124%	0.112%	0.000%	0.005%
Longspine thornyhead	0.085%	0.000%	0.000%	0.000%	0.001%	0.000%	0.000%	0.001%
Dover sole	0.365%	0.099%	0.034%	0.035%	0.064%	0.156%	0.030%	0.075%
Arrowtooth flounder	0.004%	3.772%	0.024%	0.502%	1.772%	6.932%	0.011%	0.189%
Petrale sole	0.001%	0.001%	0.000%	0.001%	0.000%	0.001%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.027%	0.000%	0.119%	0.000%	0.002%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.021%	0.000%	0.000%	0.000%	0.043%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.046%	0.459%	0.324%	0.118%	0.214%	0.711%	0.012%	0.006%
Blackgill rockfish	0.401%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.032%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	1.896%	0.716%	0.536%	0.109%	0.972%	0.985%	0.003%	0.010%
Lingcod	0.014%	0.547%	0.117%	0.533%	0.044%	0.813%	1.321%	0.372%
Pacific cod	0.000%	0.061%	0.000%	0.000%	0.019%	0.118%	0.000%	0.000%
Spiny dogfish	4.491%	13.698%	3.375%	0.869%	15.727%	22.343%	0.003%	0.024%
Longnose skate	4.254%	3.189%	2.423%	2.636%	2.180%	3.922%	0.000%	0.000%
Big skate	0.022%	0.786%	0.193%	0.073%	0.038%	1.472%	0.000%	0.000%
Unspecified skate	1.296%	1.313%	0.616%	1.192%	1.120%	1.643%	0.000%	0.000%
Other groundfish	2.491%	0.260%	0.648%	0.202%	0.080%	0.198%	0.005%	0.259%
Pacific Halibut	0.009%	19.160%	1.092%	12.547%	6.103%	31.141%	0.000%	1.686%
Other non-groundfish	5.354%	3.044%	1.679%	3.447%	2.955%	3.342%	0.016%	0.561%

Table 4-33. Rates of species discard, relative to retained sablefish, observed on fixed gear sablefish sets deeper than 150 fm, stratified by area.

Species	All observations recorded as being deeper than 150 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	12.7%	17.3%	24.5%	17.4%	6.0%	46.5%	21.5%
Canary rockfish	**0.000%**	**0.007%**	**0.000%**	**0.019%**	**0.000%**	**0.007%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.026%**	**0.003%**	**0.011%**	**0.041%**	**0.036%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.005%	0.000%	0.000%	0.010%	0.008%	0.001%	0.000%
Darkblotched rockfish	0.038%	0.020%	0.036%	0.016%	0.010%	0.017%	0.016%	0.008%
Pacific whiting/hake	0.036%	0.021%	0.016%	0.046%	0.036%	0.010%	0.000%	0.004%
Shortspine thornyhead	0.308%	0.100%	0.063%	0.020%	0.137%	0.133%	0.000%	0.006%
Longspine thornyhead	0.085%	0.000%	0.000%	0.001%	0.001%	0.000%	0.000%	0.001%
Dover sole	0.365%	0.086%	0.038%	0.039%	0.081%	0.119%	0.030%	0.077%
Arrowtooth flounder	0.004%	3.425%	0.011%	0.453%	2.173%	5.923%	0.011%	0.177%
Petrale sole	0.001%	0.000%	0.000%	0.000%	0.000%	0.000%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.007%	0.000%	0.030%	0.000%	0.002%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.016%	0.000%	0.000%	0.000%	0.031%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.046%	0.253%	0.074%	0.153%	0.172%	0.367%	0.012%	0.006%
Blackgill rockfish	0.401%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.032%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	1.896%	0.940%	0.332%	0.188%	1.384%	1.323%	0.003%	0.010%
Lingcod	0.014%	0.276%	0.082%	0.321%	0.044%	0.378%	1.321%	0.272%
Pacific cod	0.000%	0.041%	0.000%	0.000%	0.021%	0.073%	0.000%	0.000%
Spiny dogfish	4.491%	14.902%	3.611%	0.777%	14.804%	23.805%	0.003%	0.023%
Longnose skate	4.254%	2.764%	2.714%	1.696%	2.652%	3.175%	0.000%	0.000%
Big skate	0.022%	0.409%	0.004%	0.037%	0.058%	0.754%	0.000%	0.000%
Unspecified skate	1.296%	1.166%	0.566%	1.518%	1.068%	1.277%	0.000%	0.000%
Other groundfish	2.491%	0.285%	0.788%	0.173%	0.061%	0.191%	0.005%	0.267%
Pacific Halibut	0.009%	11.831%	0.967%	4.540%	7.906%	19.016%	0.000%	1.535%
Other non-groundfish	5.354%	3.384%	1.976%	3.738%	3.707%	3.692%	0.016%	0.580%

Table 4-34. Apportionment of observed and fleet longline landings of sablefish among port groups and catch areas.

Port group	Longline				
	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	North of 40°10' N lat
Observed sablefish poundage, by area of catch and port group of landing, 2002-2006					
Westport and north	0	22,994	69,517	1,248,592	1,341,104
Astoria and SW Wash.	0	106,394	293,232	18,875	418,500
Coos Bay to Tillamook	23,287	417,946	48,456	0	489,689
Eureka to Bandon	270,610	35,544	0	0	306,155
Percentage of observed port-group sablefish landings attributable to each catch area, 2002-2006					
Westport and north	0.0%	1.7%	5.2%	93.1%	100.0%
Astoria and SW Wash.	0.0%	25.4%	70.1%	4.5%	100.0%
Coos Bay to Tillamook	4.8%	85.3%	9.9%	0.0%	100.0%
Eureka to Bandon	88.4%	11.6%	0.0%	0.0%	100.0%
Estimated distribution of fleet-wide northern longline landings among catch areas, by year (for use in weighting Table 4-31, 4-32, or 4-33 discard rates to obtain northern area weighted averages)					
2002	18%	21%	12%	49%	100%
2003	21%	24%	10%	45%	100%
2004	14%	22%	13%	51%	100%
2005	22%	23%	13%	41%	100%
2006	22%	23%	13%	42%	100%
2002-2006	20%	23%	12%	45%	100%
Distribution of longline fleet landings of sablefish among port groups by year, 2002-2006					
	2002	2003	2004	2005	2006
Metric tons					
Westport and north	484	616	792	780	747
Astoria and SW Wash.	102	97	172	224	220
Coos Bay to Tillamook	161	273	280	348	309
Eureka to Bandon	185	287	214	422	395
North of 40°10'	932	1,274	1,457	1,774	1,671
Port group percentage					
Westport and north	52%	48%	54%	44%	45%
Astoria and SW Wash.	11%	8%	12%	13%	13%
Coos Bay to Tillamook	17%	21%	19%	20%	18%
Eureka to Bandon	20%	23%	15%	24%	24%

Table 4-35. Rates of species discard, relative to retained sablefish, weighted by the 2002-06 average estimated distribution of fleetwide northern longline landings among catch areas north of 40°10' N latitude, observed on fixed-gear sablefish sets deeper than 100 fm, stratified by area. Discard rates north of 40°10' N latitude are the sum of the northern subareas. Discard rates south of 40°10' N latitude are the same as in Table 4-31.

Species	All observations recorded as being deeper than 100 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	13.6%	2.8%	5.3%	2.4%	3.1%	46.5%	20.7%
Canary rockfish	**0.000%**	**0.042%**	**0.002%**	**0.007%**	**0.004%**	**0.030%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.066%**	**0.010%**	**0.016%**	**0.002%**	**0.038%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.009%	0.001%	0.000%	0.000%	0.008%	0.001%	0.000%
Darkblotched rockfish	0.038%	0.020%	0.011%	0.002%	0.000%	0.007%	0.016%	0.007%
Pacific whiting/hake	0.036%	0.023%	0.006%	0.008%	0.005%	0.004%	0.000%	0.003%
Shortspine thornyhead	0.308%	0.064%	0.009%	0.003%	0.009%	0.043%	0.000%	0.005%
Longspine thornyhead	0.085%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.001%
Dover sole	0.365%	0.160%	0.006%	0.009%	0.076%	0.069%	0.030%	0.070%
Arrowtooth flounder	0.004%	3.454%	0.007%	0.106%	0.143%	3.198%	0.011%	0.179%
Petrale sole	0.001%	0.003%	0.000%	0.000%	0.000%	0.002%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.026%	0.000%	0.023%	0.002%	0.001%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.024%	0.000%	0.000%	0.000%	0.024%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.046%	0.491%	0.069%	0.036%	0.034%	0.353%	0.012%	0.007%
Blackgill rockfish	0.401%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.032%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	1.896%	0.551%	0.093%	0.031%	0.070%	0.357%	0.003%	0.009%
Lingcod	0.014%	0.700%	0.030%	0.105%	0.034%	0.531%	1.321%	0.411%
Pacific cod	0.000%	0.108%	0.000%	0.001%	0.002%	0.106%	0.000%	0.000%
Spiny dogfish	4.491%	13.076%	0.646%	0.252%	1.649%	10.529%	0.003%	0.043%
Longnose skate	4.254%	3.245%	0.437%	0.516%	0.367%	1.925%	0.000%	0.000%
Big skate	0.022%	1.012%	0.076%	0.022%	0.006%	0.908%	0.000%	0.000%
Unspecified skate	1.296%	1.521%	0.132%	0.321%	0.183%	0.885%	0.000%	0.000%
Other groundfish	2.491%	0.261%	0.118%	0.045%	0.011%	0.088%	0.005%	0.243%
Pacific Halibut	0.009%	22.959%	0.322%	2.690%	0.643%	19.303%	0.000%	1.757%
Other non-groundfish	5.354%	3.225%	0.305%	0.745%	0.515%	1.660%	0.016%	0.535%

Table 4-36. Rates of species discard, relative to retained sablefish, weighted by the 2002-06 average estimated distribution of fleetwide northern longline landings among catch areas north of 40°10' N latitude, observed on fixed-gear sablefish sets deeper than 125 fm, stratified by area. Discard rates north of 40°10' N latitude are the sum of the northern subareas. Discard rates south of 40°10' N latitude are the same as in Table 4-32.

Species	All observations recorded as being deeper than 125 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	13.8%	3.0%	5.5%	2.4%	3.0%	46.5%	21.1%
Canary rockfish	**0.000%**	**0.024%**	**0.001%**	**0.005%**	**0.000%**	**0.018%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.042%**	**0.010%**	**0.002%**	**0.003%**	**0.026%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.007%	0.000%	0.000%	0.001%	0.007%	0.001%	0.000%
Darkblotched rockfish	0.038%	0.022%	0.011%	0.003%	0.001%	0.007%	0.016%	0.008%
Pacific whiting/hake	0.036%	0.027%	0.007%	0.008%	0.008%	0.004%	0.000%	0.004%
Shortspine thornyhead	0.308%	0.079%	0.010%	0.003%	0.015%	0.051%	0.000%	0.005%
Longspine thornyhead	0.085%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.001%
Dover sole	0.365%	0.093%	0.007%	0.008%	0.008%	0.071%	0.030%	0.075%
Arrowtooth flounder	0.004%	3.479%	0.005%	0.114%	0.220%	3.140%	0.011%	0.189%
Petrale sole	0.001%	0.001%	0.000%	0.000%	0.000%	0.001%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.028%	0.000%	0.027%	0.000%	0.001%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.019%	0.000%	0.000%	0.000%	0.019%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.046%	0.439%	0.064%	0.027%	0.027%	0.322%	0.012%	0.006%
Blackgill rockfish	0.401%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.032%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	1.896%	0.697%	0.105%	0.025%	0.121%	0.446%	0.003%	0.010%
Lingcod	0.014%	0.517%	0.023%	0.121%	0.006%	0.368%	1.321%	0.372%
Pacific cod	0.000%	0.056%	0.000%	0.000%	0.002%	0.053%	0.000%	0.000%
Spiny dogfish	4.491%	12.935%	0.661%	0.197%	1.956%	10.120%	0.003%	0.024%
Longnose skate	4.254%	3.120%	0.475%	0.598%	0.271%	1.777%	0.000%	0.000%
Big skate	0.022%	0.726%	0.038%	0.017%	0.005%	0.667%	0.000%	0.000%
Unspecified skate	1.296%	1.275%	0.121%	0.270%	0.139%	0.744%	0.000%	0.000%
Other groundfish	2.491%	0.273%	0.127%	0.046%	0.010%	0.090%	0.005%	0.259%
Pacific Halibut	0.009%	17.923%	0.214%	2.844%	0.759%	14.105%	0.000%	1.686%
Other non-groundfish	5.354%	2.992%	0.329%	0.781%	0.368%	1.514%	0.016%	0.561%

Table 4-37. Rates of species discard, relative to retained sablefish, weighted by the 2002-06 average estimated distribution of fleetwide northern longline landings among catch areas north of 40°10' N latitude, observed on fixed-gear sablefish sets deeper than 150 fm, stratified by area. Discard rates north of 40°10' N latitude are the sum of the northern subareas. Discard rates south of 40°10' N latitude are the same as in Table 4-33.

Species	All observations recorded as being deeper than 150 fm							
	Longline						Pot	
	36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat
Discarded ratios for species, relative to retained sablefish								
Sablefish	45.4%	12.7%	3.4%	5.6%	2.2%	2.7%	46.5%	21.5%
Canary rockfish	**0.000%**	**0.007%**	**0.000%**	**0.004%**	**0.000%**	**0.003%**	**0.000%**	**0.000%**
Widow rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Yelloweye rockfish	**0.000%**	**0.026%**	**0.001%**	**0.003%**	**0.005%**	**0.016%**	**0.000%**	**0.000%**
Bocaccio rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Cowcod rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Pacific ocean perch	0.000%	0.005%	0.000%	0.000%	0.001%	0.004%	0.001%	0.000%
Darkblotched rockfish	0.000%	0.020%	0.007%	0.004%	0.001%	0.008%	0.016%	0.008%
Pacific whiting/hake	0.000%	0.021%	0.003%	0.010%	0.004%	0.005%	0.000%	0.004%
Shortspine thornyhead	0.000%	0.100%	0.012%	0.004%	0.017%	0.060%	0.000%	0.006%
Longspine thornyhead	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.001%
Dover sole	0.000%	0.086%	0.008%	0.009%	0.010%	0.054%	0.030%	0.077%
Arrowtooth flounder	0.000%	3.425%	0.002%	0.103%	0.270%	2.683%	0.011%	0.177%
Petrale sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.003%	0.000%
English sole	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other flatfish	0.000%	0.007%	0.000%	0.007%	0.000%	0.001%	0.000%	0.000%
Yellowtail rockfish	0.000%	0.016%	0.000%	0.000%	0.000%	0.014%	0.000%	0.000%
Chilipepper rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Other shelf rockfish	0.000%	0.253%	0.015%	0.035%	0.021%	0.166%	0.012%	0.006%
Blackgill rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.033%	0.000%
Splitnose rockfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.009%	0.000%
Other slope rockfish	0.000%	0.940%	0.065%	0.043%	0.172%	0.599%	0.003%	0.010%
Lingcod	0.000%	0.276%	0.016%	0.073%	0.006%	0.171%	1.321%	0.272%
Pacific cod	0.000%	0.041%	0.000%	0.000%	0.003%	0.033%	0.000%	0.000%
Spiny dogfish	0.000%	14.902%	0.708%	0.176%	1.841%	10.783%	0.003%	0.023%
Longnose skate	0.000%	2.764%	0.532%	0.384%	0.330%	1.438%	0.000%	0.000%
Big skate	0.000%	0.409%	0.001%	0.008%	0.007%	0.341%	0.000%	0.000%
Unspecified skate	0.000%	1.166%	0.111%	0.344%	0.133%	0.579%	0.000%	0.000%
Other groundfish	0.000%	0.285%	0.154%	0.039%	0.008%	0.087%	0.005%	0.267%
Pacific Halibut	0.000%	11.831%	0.189%	1.029%	0.983%	8.614%	0.000%	1.535%
Other non-groundfish	0.000%	3.384%	0.387%	0.847%	0.461%	1.672%	0.016%	0.580%

4.5.1.4 *Directed Open Access*

Impacts associated with the directed open access daily-trip-limit fishery targeting sablefish are modeled using the primary sablefish model described above. Nearshore commercial fisheries in waters off Oregon and California are modeled separately from offshore efforts targeting sablefish.

Bycatch impacts in the open access daily-trip-limit (DTL) sablefish fishery are modeled using the limited entry fixed gear impact model. It is assumed that the directed open access sector will take their entire allocation of sablefish (Figure 4-12). The discard rates used to model bycatch impacts in the primary limited entry fixed sablefish gear fishery are also assumed in the analysis of impacts in the open access DTL fishery. The data informing the fixed gear sablefish bycatch impact model are aggregated across the limited entry and open access fixed gear fleets

Catch and discard data collected between January 1, 2003 through December 31, 2006 from fixed gear fishing conducted in depths less than 50 fm were aggregated by area (north or south of 40°10' N latitude), depth interval, and species or species group, with no inter-annual weighting. Amounts of catch and discard are reported for each of the three depth intervals (0-10 fm, 11-20 fm, and 21-50 fm) used to model impacts in nearshore commercial fisheries and are included in Table 4-38, along with the percentage of each species' (or group's) catch that was discarded. Additionally, a rate of discard relative to the amount of retained nearshore target species in the stratum is reported for species modeled by the GMT as bycatch species: bocaccio, canary rockfish, widow rockfish, yelloweye rockfish, yellowtail rockfish, minor shelf rockfish. For this summary, blue rockfish and black rockfish are not grouped with the target category for deeper nearshore rockfish species in the area south of 40°10' N latitude. The average of gear set and retrieval depths recorded by observers is used to assign each record (gear set) to a depth category. Because many of these observations reflect the practice of drifting while pole gear is deployed, and the fact that the depth intervals are relatively small, the average depth may not always reflect the depth interval in which all or any fish were caught.

Table 4-38. Summary of observed catch and discard of important groundfish species or species groups in nearshore, fixed gear fisheries conducted from January 2003 through December 2006.

Species	0 - 10 fm				11 - 20 fm				21 - 50 fm			
	Observed lbs.		Discard % a/	Discard Rate b/	Observed lbs.		Discard % a/	Discard Rate b/	Observed lbs.		Discard % a/	Discard Rate b/
	Catch	Discard			Catch	Discard			Catch	Discard		
North of 40°10' N lat												
Black rockfish	51,777	1,446	2.79%		47,163	1,640	3.48%		2,555	31	1.20%	
Blue rockfish	6,028	1,151	19.09%		11,219	2,120	18.90%		1,555	161	10.33%	
Other minor nearshore rockfish	3,892	153	3.92%		6,675	201	3.01%		2,053	40	1.97%	
Cabezon	4,787	754	15.75%		11,553	1,237	10.71%		482	50	10.47%	
Kelp greenling	4,377	710	16.21%		5,839	1,144	19.59%		223	57	25.54%	
Lingcod	12,161	5,559	45.71%		19,992	8,224	41.14%		3,246	469	14.44%	
Sum of target species	83,021	9,772	11.77%		102,439	14,565	14.22%		10,115	808	7.99%	
Canary rockfish	301	301	100.00%	0.41%	927	924	99.76%	1.05%	290	290	100.00%	3.12%
Widow rockfish	4	0	0.00%	0.00%	74	22	29.13%	0.02%	17	7	39.09%	0.07%
Yelloweye rockfish	82	82	100.00%	0.11%	451	450	99.60%	0.51%	411	411	100.00%	4.41%
Yellowtail rockfish	230	73	31.52%	0.10%	617	243	39.34%	0.28%	278	49	17.67%	0.53%
Minor Shelf rockfish	812	61	7.49%	0.08%	1,811	70	3.86%	0.08%	490	22	4.47%	0.24%
South of 40°10' N lat												
Shallow nearshore rockfish	6,491	1,388	21.39%		2,053	785	38.25%		370	112	30.34%	
Black rockfish	604	126	20.81%		728	166	22.75%		3	3	100.00%	
Blue rockfish	1,073	368	34.36%		1,096	579	52.83%		386	348	90.14%	
Other deeper nearshore rockfish	3,217	259	8.04%		4,926	351	7.12%		269	56	20.77%	
Cabezon	13,585	4,273	31.46%		568	415	73.18%		165	42	25.34%	
Kelp greenling	1,877	1,156	61.58%		150	139	92.34%		111	111	100.00%	
Lingcod	6,472	2,864	44.25%		4,169	2,017	48.38%		396	164	41.52%	
California sheephead	26,039	9,043	34.73%		0	0			0	0		
Sum of target species	59,357	19,477	32.81%		13,691	4,452	32.52%		1,700	837	49.23%	
Bocaccio					4	3	76.47%	0.04%	77	2	2.91%	0.26%
Canary rockfish	23	23	100.00%	0.06%	413	413	100.00%	4.47%	101	101	100.00%	11.71%
Widow rockfish					2	1	26.09%	0.01%				
Yelloweye rockfish					10	10	100.00%	0.10%	12	12	100.00%	1.36%
Minor Shelf rockfish	615	51	8.29%	0.13%	1,331	39	2.93%	0.42%	1,026	51	4.99%	5.93%

[a/] The discard percentage is calculated as the observed discard pounds divided by the observed total catch for each species or species group.

[b/] The discard rate for bycatch species is calculated as the observed discard pounds for a species/group divided by the observed landed catch of all target species combined.

Description of the Open Access Sablefish Daily Trip Limit Fishery Regression Model Used for Inseason Adjustments of Trip Limits

The open access sablefish daily trip limit (DTL) model can be described as the product of two multivariable linear regressions. These regressions predict number of vessels landing open access sablefish in a two-month period and average catch per vessel in a two-month period. The explanatory variables in each regression are: season; the daily limit; the weekly limit; and the monthly limit.

The seasonality variable is included because it appears that fishing effort and success is determined to a large degree by weather. This variable is constructed by assuming that period 4 is the period of highest effort and catch (all else being equal), and that catch and effort decline in a linear fashion if one goes earlier or later in the year. This approach means (if everything else is equal) that period 3 and 5 would be the second highest period of catch and effort, period 2 and 6 would be the third highest period of catch and effort, and period 1 would be the period of lowest catch and effort. This approach essentially creates a triangular distribution between average vessel catch and season.

The daily, weekly, and bimonthly limits are included in the model because these limits directly affect the opportunities available to harvesters. Changes in fishing opportunities in an open access fishery should be expected to change effort in the fishery. In addition, changes in fishing opportunities should also be expected to change the average catch per vessel.

Season and historic DTL regulations on historic levels of effort and on average vessel catch were regressed to construct this model. Daily, weekly, and bimonthly limits for each two month period from 2003 through 2007 were used in the regression analysis. Figure 4-13 shows the accuracy of using the models to predict average catch and effort relative to what actually occurred.

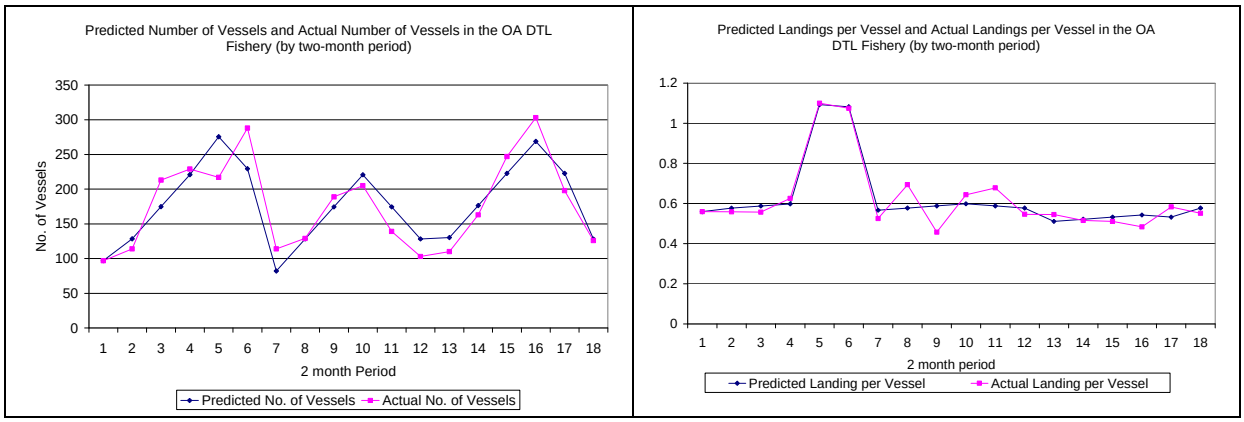

Figure 4-13. Predicted number of vessels versus the actual number of vessels (A) and predicted landings per vessel versus actual landings per vessel (B) in the open access daily-trip-limit fishery by two month period.

By multiplying each of these models by one another we can predict aggregate landings in this fishery for a year or for a given two-month period. Figure 4-14 shows the accuracy of this approach for predicting aggregate landings in this fishery.

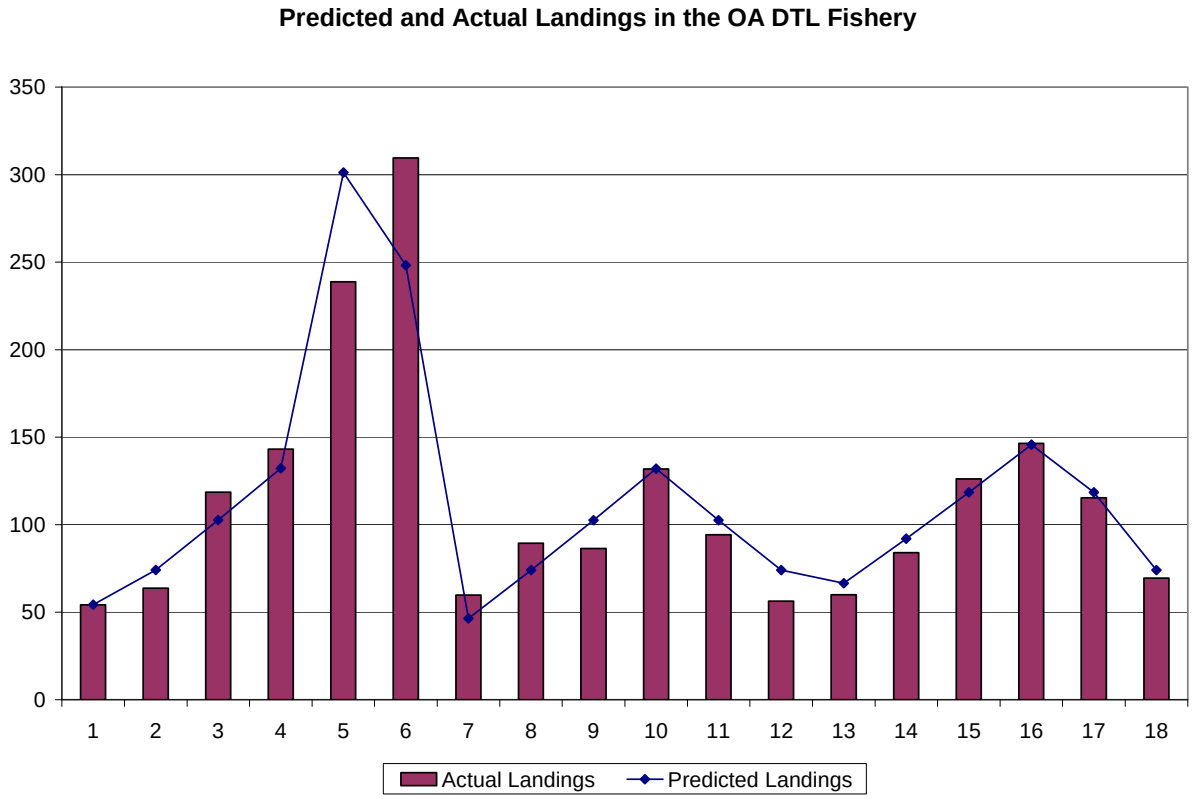

Figure 4-14. Predicted versus actual landings in the open access daily-trip-limit fishery.

Tables 4-39 and 4-40 show the statistical results of each regression. These results show that both models have a high degree of "fit" to the actual data, but some of the parameters are unexpected. In particular, the fact that the weekly limit has a negative coefficient (in the effort model) is unexpected since an increase in fishing opportunity should be expected to result in an increase in effort. A more in-depth look at the information shows that this unexpected sign can be explained because of the high degree of correlation between the weekly limit and the 2-month limit (Pearson correlation = 0.99). In other words, management has historically varied the 2-month limit and the weekly limit in concert, and therefore the regression technique cannot easily untangle the effect of the weekly limit from the 2-month limit on effort. This has implications for possible future management approaches if there is a potential for the weekly and 2-month limit to diverge. If these two limits diverge, the model's capacity to estimate catch levels will almost certainly be diminished.

Table 4-39. Statistical results for the catch per vessel regression analysis.

Regression Statistics	
Multiple R	0.947096565
R Square	0.896991904
Adjusted R Square	0.875531884
Standard Error	0.112296262
Observations	30

ANOVA				
	df	*SS*	*MS*	*F*
Regression	5	2.635475653	0.527095131	41.79828
Residual	24	0.302650813	0.012610451	
Total	29	2.938126466		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.130945908	0.133635926	0.979870548	0.3369
Bad Slmn opp	-0.03110317	0.081522276	-0.38152964	0.7062
minus peak (period)	-0.00198886	0.022626666	-0.08789879	0.9307
day	0.000195027	0.001399768	0.139328226	0.8904
2 month	0.000150027	2.79878E-05	5.36045618	0.0000
week	0.000116645	0.000470168	0.248091019	0.8062

Table 4-40. Statistical results for the number of vessels regression analysis.

Regression Statistics	
Multiple R	0.921265839
R Square	0.848730747
Adjusted R Square	0.824527666
Standard Error	22.0232807
Observations	30

ANOVA				
	df	*SS*	*MS*	*F*
Regression	4	68033.57768	17008	35.06705
Residual	25	12125.62232	485	
Total	29	80159.2		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	19.24193388	25.81139002	0.745	0.4629
Bad Slmn opp	62.35301892	11.48884052	5.427	0.0000
minus peak (period)	34.68262233	4.436273736	7.818	0.0000
day	0.556008406	0.116219706	4.784	0.0001
2 month	-0.00933888	0.004831928	-1.933	0.0647

4.5.1.5 *Tribal*

This section to be completed after the June 2008 Council meeting.

4.5.1.6 *Recreational Discard Mortality*

In June 2007, the Council endorsed the RecFIN Technical Committee's recommendation to apply mortality rates by species and depth to the estimates of total discards in order to estimate total mortalities for discarded fish. This method of accounting for discards is intended to assure that discard mortalities are determined in a consistent manner in all three states. The Council tasked the GMT with developing a matrix describing mortality by species and depth ("discard mortality matrix") in time to be analyzed in this EIS. The methods for estimating discard mortality rates were reviewed by the SSC during the April 2008 Council meeting, and their suggestions were incorporated into the results presented here.

Methods and Results

The GMT's review and discussion of the state of knowledge on discard mortality identified three categories of mortality. First, the team considered "surface" mortality, i.e. mortality that is observable when a fish is brought to the surface, handled on deck, and thrown back. Second, the team considered short-term, below-surface mortality that has been documented in research trials to a limited extent using underwater cameras or divers. Lastly, the team took into consideration longer-term, below-surface mortality that is essentially unobservable in the field and for which there is little, if any, information available in the literature. Documentation of the scientific literature that the team reviewed can be found in Appendix A. *[This documentation will be provided after the June 2008 Council meeting]* During subsequent biennial specification processes, the team will review the latest research and data available and determine whether they can be incorporated into the discard mortality matrix.

Estimates of Surface Mortality

Estimates of surface mortality were created in a two-step analysis. First, the GMT performed a generalized linear model (GLM) analysis of species disposition by depth on a data set created from observations of discarded fish taken onboard recreational charter boats. Second, to account for species for which insufficient observer data were available, the team performed a guild-based GLM analysis that compared mortality rates among groups of species with similar depth distribution and vertical orientation in the water column.

Description of Available Data on Surface Mortality

The GMT analyzed three data sets with information on the disposition of discarded fish (live or dead) by species and capture depth (10-fm increments) from the California Recreational Fishery Survey (CRFS), the California Department of Fish and Game (CDFG) Commercial Passenger Fishing Vessel Onboard Observer Program, and the Oregon Department of Fish and Wildlife (ODFW) Onboard Observation Program.

The first data set combined observations from the CDFG CPFV Onboard Observer Program from Point Conception to Fort Bragg from 1987 to 1998 and the CRFS CPFV Onboard Observer Program/ODFW Onboard Recreational Boat Sampling (ORBS) data from the Oregon/Washington border to Mexico from 2005 to 2007. Observers recorded the disposition of discarded catch for a subset of anglers onboard the boat. Observers either watched a fish as it

was discarded or asked the angler whether the fish was bleeding from the gills or floated away (dead) as opposed to swimming back down (alive). The second data set was constructed from the CRFS/ORBS Onboard Observer Program Sampler Examined Discards collected from Mexico to the Oregon/Washington border between 2003 and 2007 ("Type 3d"). The onboard sampler recorded the condition of the discarded fish after taking length measurements and discarding the fish.

The California data sets are not independent of one another because the Type 3d data are a subset of the tallied fish from the combined CRFS-CPFV data. The team discussed the relative merits of the two data sets and the GMT concluded that the combined CRFS-CPFV data had the advantage of a larger sample size and greater range of encounter depths. However, the team concluded that the Type 3d data set was more reliable because of the direct observation of the discarded fish by the sampler and the greater sample size for overfished species such as yelloweye rockfish. Thus the Type 3d sampler-examined discard was used in the GLM analyses.

Average bottom depth over a drift was used to approximate the depth at the location of capture. Semi-pelagic and pelagic species may have ascended from mid-water when caught and therefore the recorded bottom depth is not necessarily the depth of capture. Recorded depth should be regarded as ascribing mortality to fish caught while fishing in or around a given depth bin.

GLM Model Description and Results

The proportion of fish released dead (the "mortality rate") as recorded in the Type 3d data set, π, was modeled using a quasi-binomial generalized linear model (GLM) with a logit link function (McCullagh and Nelder, 1989).

$$\log\left(\frac{\pi_i}{1-\pi_i}\right) = x_i^T \beta \qquad [1]$$

This model is similar to a binomial GLM in that $E\left[Y_i \middle| X_i\right] = n_i \pi_i$, but it includes an "overdispersion" parameter, ϕ, in the variance function: $V\left[Y_i \middle| X_i\right] = \phi n_i \pi_i (1-\pi_i)$. Overdispersion can be the result of dependence between trials or unexplained heterogeneity within a group. An error in the structural form of the model can also give the appearance of overdispersion. Although overdispersion was detected for these data, the relative contribution of these effects is unknown.

Species and depth (by 10-fm bin) were included in the model as categorical variables. Due to smaller sample sizes, depths greater than 50 fm were excluded. Species with small sample sizes (*S. chrysomelas, S. nebulosus, S. maliger* and *S. rastrelliger*) were excluded to stabilize the parameter estimation procedure. Discard mortality estimates for these four species are based on the by-guild GLM analysis.

The observed and predicted proportions of fish released dead are plotted by species and depth in Figure 4-15. Table 4-41 reports sample sizes by species and depth bin. Observations based on less than 5 fish were excluded from Figure 4-15.

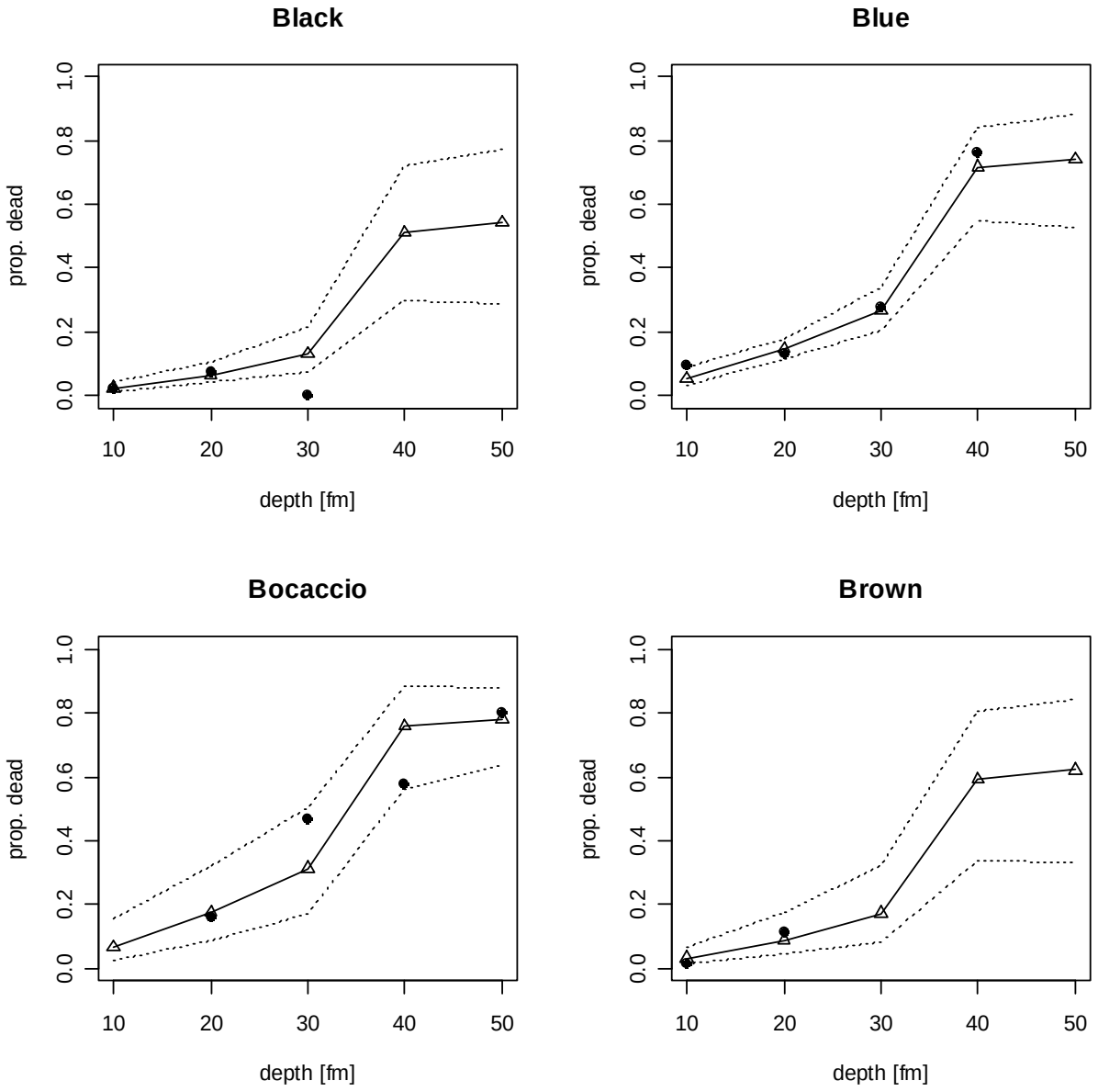

Figure 4-15. Comparison of GLM predictions of the proportion of fish released dead at the surface with observed proportions, by species and 10-fm depth bin. Observations with samples sizes less than 5 were not plotted. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals.

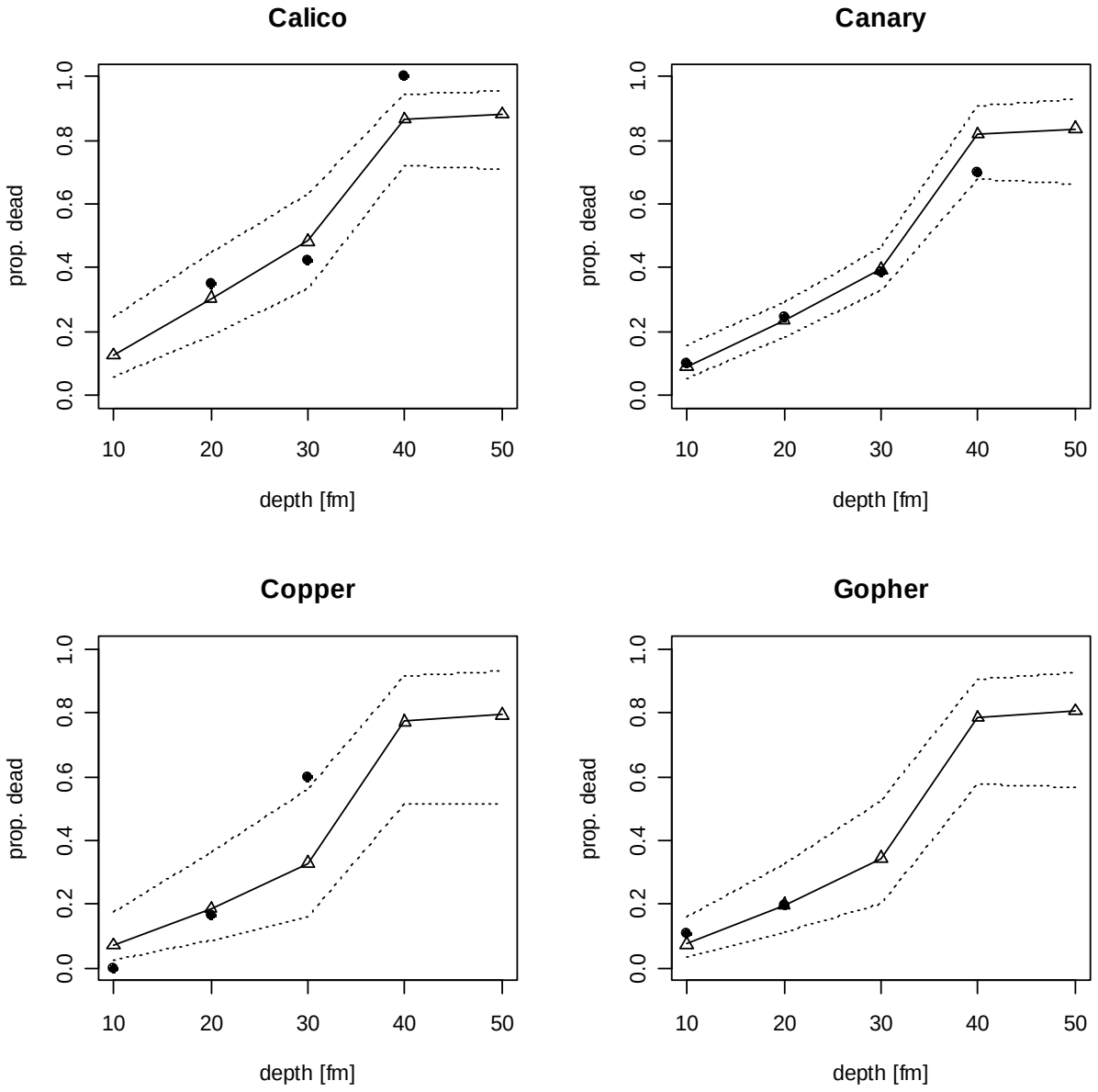

Figure 4-15. Comparison of GLM predictions of the proportion of fish released dead at the surface with observed proportions, by species and 10-fm depth bin. Observations with samples sizes less than 5 were not plotted. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals (continued).

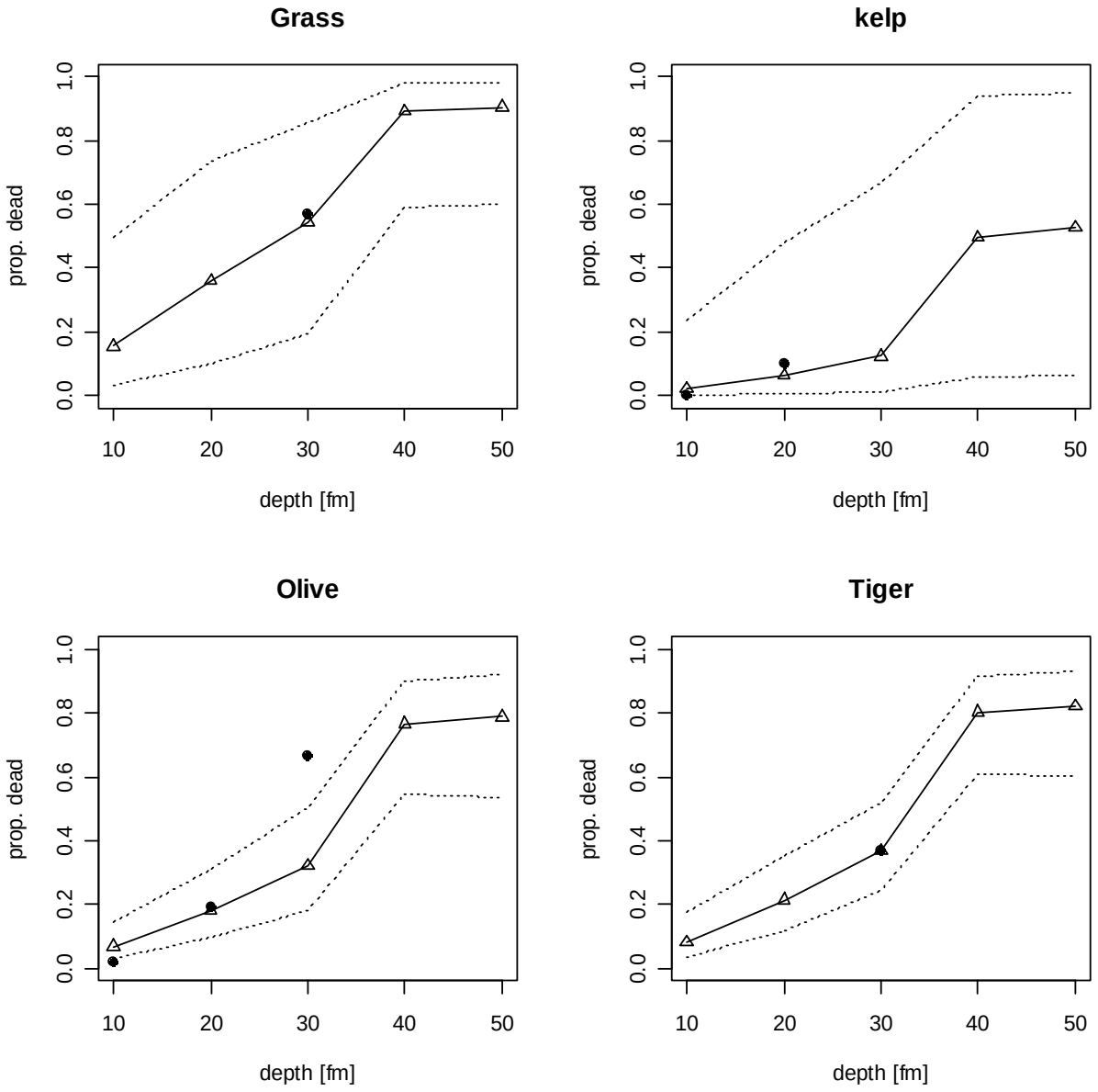

Figure 4-15. Comparison of GLM predictions of the proportion of fish released dead at the surface with observed proportions, by species and 10-fm depth bin. Observations with samples sizes less than 5 were not plotted. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals (continued).

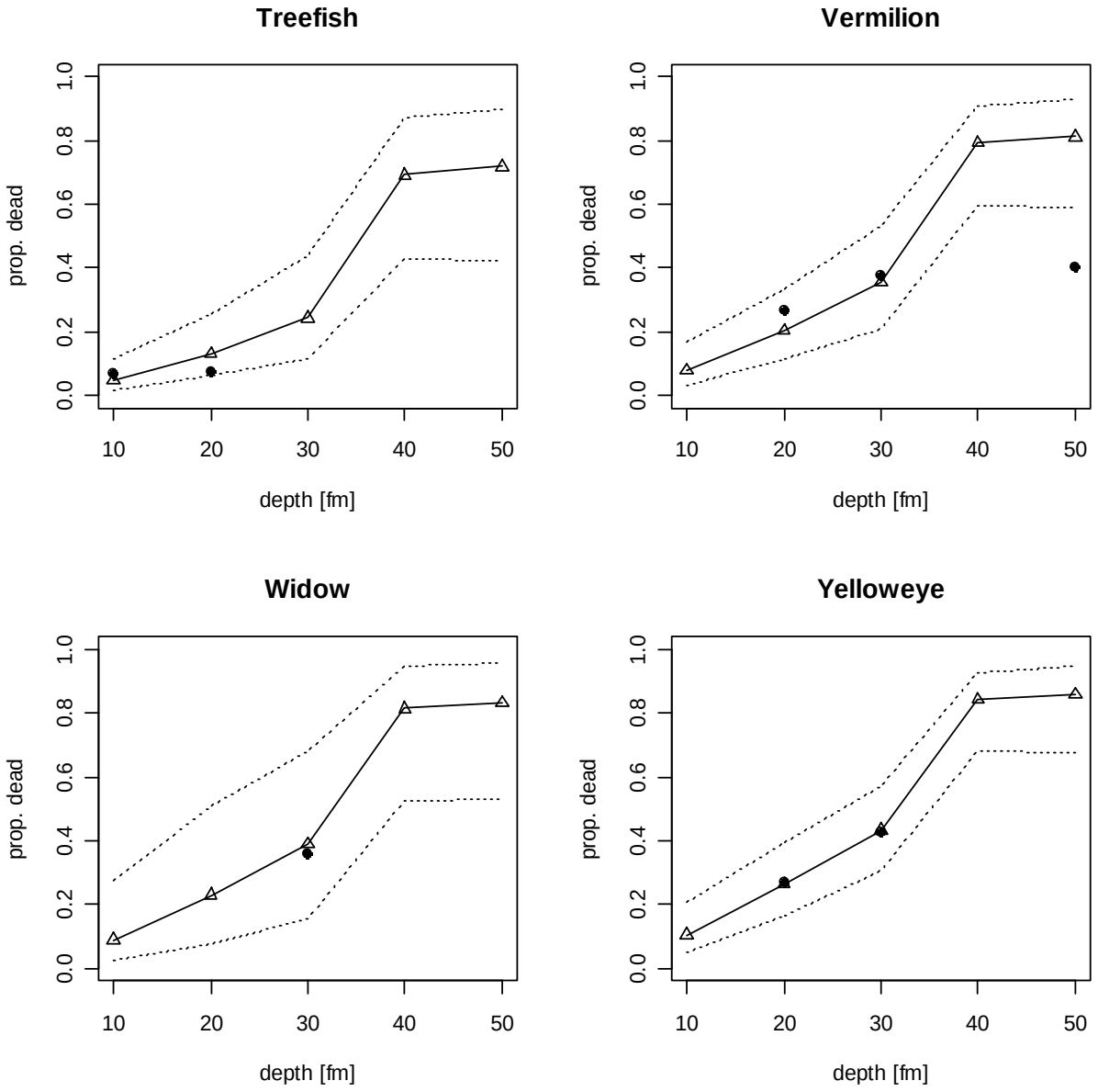

Figure 4-15. Comparison of GLM predictions of the proportion of fish released dead at the surface with observed proportions, by species and 10-fm depth bin. Observations with samples sizes less than 5 were not plotted. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals (continued).

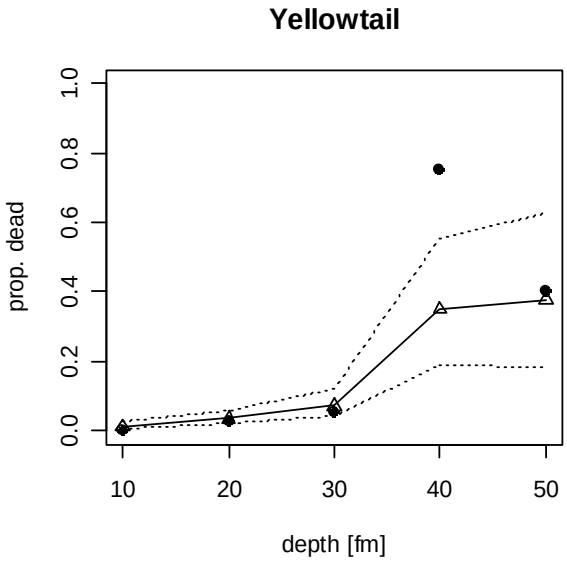

Figure 4-15. Comparison of GLM predictions of the proportion of fish released dead at the surface with observed proportions, by species and 10-fm depth bin. Observations with samples sizes less than 5 were not plotted. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals (continued).

Table 4-41. Sample sizes by species and depth; data used in GLM model for surface mortality.

Species	Depth Bin (fm)				
	10	**20**	**30**	**40**	**50**
Black	254	303	11		
Blue	136	632	108	17	4
Bocaccio		19	15	19	66
Brown	141	89	1	1	
Calico	1	40	38	5	
Canary	10	249	225	10	1
Copper	5	43	5		
Gopher	19	76	3	2	
Grass	3	2	7		
kelp	18	10			
Olive	48	57	6	2	
Tiger			76		
Treefish	29	66	4		
Vermilion	3	67	8	4	5
Widow		2	14	3	2
Yelloweye	2	26	66	4	
Yellowtail	14	210	174	12	5

Although the interaction between species and depth was significant, leaving this term in the model reproduces the observed proportions exactly and provides no method for estimating missing cells. Because predictions from the model without the interaction term were quite good in most cases (Figure 4-15), the simpler model was chosen to estimate surface mortality rates (Table 4-42). Upper 95% confidence limits illustrate the degree of uncertainty associated with the GLM predictions (Figure 4-15, Table 4-43), and were consulted during precautionary adjustments to model predictions. Since upper 95% confidence limits for surface mortality approach 100% at depths greater than 30 fm, mortality beyond this depth was assumed to be 100%. The two exceptions to this approach were yellowtail and black rockfish, given their relatively low mortality rates.

The GLM predicts mortality rates from a combination of species and depth effects, so all cells in Tables 4-42 and 4-43 have predicted mortality rates. Tables 4-44 and 4-45 present GLM predictions and upper 95% confidence limits, respectively, adjusted for short- and long-term, below-surface mortality (described below).

Guild-based GLM Analysis

An analysis was conducted to estimate surface mortality for groups of species (‘guilds’) that have similar distribution in the water column (pelagic vs. demersal) and differences in depth distribution (deep vs. shallow) (Table 4-46). Guilds were based on published information regarding depth distribution and orientation in the water column {Love, *et al.* 2002} and collective experience of team members.

Data (Type 3d) for species within each guild were combined and re-analyzed using a quasi-binomial GLM as described above (Figure 4-16, Tables 4-47 to 4-51). In addition to depth of capture, this approach assumes that discard mortality depends on general patterns of depth distribution and orientation in the water column, characteristics which may not be clearly defined for all species. Therefore, precaution is advised when applying these rates since the model does

not account for uncertainty associated with misclassification. Nonetheless, this method provides a means for assigning depth-specific discard mortality rates to species for which there is little or no data, based on information available from other species with similar characteristics.

Table 4-42. Predicted percentage released dead (surface mortality only) from the GLM.

Species	Depth Bin (fm)				
	10	20	30	40	50
Black	2%	7%	13%	51%	54%
Blue	5%	15%	27%	72%	74%
Bocaccio	6%	17%	31%	76%	78%
Brown	3%	9%	17%	59%	62%
Calico	12%	30%	48%	87%	88%
Canary	9%	23%	39%	82%	84%
Copper	7%	19%	33%	77%	79%
Gopher	7%	20%	34%	79%	81%
Grass	15%	36%	55%	89%	90%
kelp	2%	6%	12%	50%	53%
Olive	7%	18%	32%	77%	79%
Tiger	8%	21%	37%	80%	82%
Treefish	5%	13%	24%	69%	72%
Vermilion	8%	20%	35%	79%	81%
Widow	9%	23%	39%	82%	83%
Yelloweye	10%	26%	43%	84%	86%
Yellowtail	1%	3%	7%	35%	38%

Table 4-43. Upper 95% confidence limits of GLM predictions for surface mortality.

Species	Depth Bin (fm)				
	10	20	30	40	50
Black	4%	11%	22%	72%	77%
Blue	9%	18%	34%	84%	88%
Bocaccio	15%	32%	50%	89%	88%
Brown	7%	17%	32%	81%	85%
Calico	25%	45%	63%	94%	96%
Canary	16%	29%	47%	91%	93%
Copper	18%	36%	56%	92%	93%
Gopher	16%	33%	52%	91%	93%
Grass	49%	74%	86%	98%	98%
kelp	23%	48%	67%	94%	95%
Olive	14%	31%	51%	90%	92%
Tiger	18%	35%	52%	91%	93%
Treefish	11%	26%	44%	87%	90%
Vermilion	17%	34%	53%	91%	93%
Widow	28%	51%	68%	95%	96%
Yelloweye	21%	39%	57%	93%	95%
Yellowtail	3%	6%	12%	55%	63%

Table 4-44. Estimated percentage of fish released dead, based on GLM predictions of surface mortality adjusted by estimates of short- and long-term, below-surface mortality.

Species	Depth Bin (fm)				
	10	20	30	40	50
Black	11%	20%	29%	63%	67%
Blue	18%	30%	43%	79%	82%
Bocaccio	19%	32%	46%	82%	85%
Brown	12%	22%	33%	69%	73%
Calico	24%	43%	60%	90%	92%
Canary	21%	37%	53%	87%	89%
Copper	19%	33%	48%	83%	86%
Gopher	19%	34%	49%	84%	87%
Grass	23%	45%	63%	92%	93%
kelp	11%	19%	29%	61%	66%
Olive	34%	45%	57%	86%	88%
Tiger	20%	35%	51%	86%	88%
Treefish	14%	25%	39%	76%	80%
Vermilion	20%	34%	50%	85%	87%
Widow	21%	36%	52%	86%	89%
Yelloweye	22%	39%	56%	88%	90%
Yellowtail	10%	17%	25%	50%	55%

Table 4-45. Upper 95% confidence limits for percentage of fish released dead, based on GLM predictions of surface mortality adjusted by estimates of short- and long-term, below-surface mortality.

Species	Depth Bin (fm)				
	10	20	30	40	50
Black	13%	23%	36%	79%	84%
Blue	21%	32%	49%	88%	92%
Bocaccio	26%	44%	61%	92%	92%
Brown	15%	29%	45%	85%	89%
Calico	34%	55%	71%	96%	97%
Canary	27%	42%	59%	93%	95%
Copper	28%	48%	66%	94%	95%
Gopher	27%	44%	63%	93%	95%
Grass	54%	77%	88%	98%	99%
kelp	31%	55%	73%	95%	96%
Olive	39%	54%	69%	94%	96%
Tiger	28%	47%	62%	94%	95%
Treefish	20%	36%	54%	90%	93%
Vermilion	28%	45%	64%	93%	95%
Widow	37%	60%	75%	96%	97%
Yelloweye	31%	50%	67%	95%	96%
Yellowtail	12%	19%	29%	66%	73%

Table 4-46. Species composition of guilds based on depth distribution and orientation in the water column.

Guild	Species Included in Guild (RF=Rockfish)
Shallow Pelagic	Black RF, Olive RF, Yellowtail RF
Shallow Demersal	Brown RF, Grass RF, Kelp RF, Treefish.
Deep Pelagic	Bocaccio RF, Widow RF, Canary RF, Blue RF
Deep Demersal	Vermilion RF, Copper RF, Yelloweye RF, Gopher RF

Short-Term Below-Surface Estimates of Mortality

The GMT reviewed additional studies to identify information regarding delayed/long term mortality in addition to the baseline mortality rate provided by the GLM.

Albin and Karpov (1996) provided estimates of additional mortality accrued on recreationally caught rockfishes in 0-180 feet of water from 1-5 days after capture. In order to account for variation in mortality rate with depth, the data for 1-5 day mortality by species was grouped by shallow and deep-dwelling species to estimate delayed/long-term mortality rates based on predominant depth of occurrence. The GMT agreed to adjust the GLM results with additional mortality based on proportions from the Albin and Karpov study to provide an estimate of surface and short-term, below-surface discard mortality. For deep-water species, a short-term below-surface mortality estimate of 8.33% was incorporated into the mortality rate predicted by the GLM. For shallow-water species, a short-term below-surface mortality estimate of 4.55% was added. A separate adjustment (25.6%) was added to the GLM estimate for olive rockfish due to an unrepresentatively high estimate of long-term mortality at depth that dramatically changed the mortality estimate for shallow species.

Long-Term Delayed Estimates of Mortality

The GMT discussed the potential for long-term effects from releasing fish caught at varying depths. Fish that appear to be unharmed after catch and release may have unidentified problems, ranging from swim bladder or internal organ damage to reduced reproductive success or other factors affecting mortality rates. Very little is known about delayed mortality of discards other than there is some likely long-term effect associated with catch and release. In order to account for the uncertainty in delayed mortality, the GMT discussed further adjustment of mortality rates that were based on the GLM estimates and Albin and Karpov data. For species with swim bladders, the GMT considered rates between 2 and 5 percent for fish with swim bladders released between 0 and 10 fm. Due to the lack of available information, the GMT settled on using the higher value of 5 percent as a more conservative rate. Delayed mortality for species subject to barotrauma is expected to increase with greater changes in ambient pressure (i.e. increasing depth of capture). Based on this assumption, the GMT included an additional 5% mortality for each 10 fm of depth of capture. This component of mortality is considered independent of the GLM-estimated surface mortality and short-term below-surface mortality based on the Albin and Karpov data.

Pacific cod is another species with a swim bladder and is therefore subject to barotrauma. There is very little information on discard mortality for Pacific cod so the GMT recommends using a 5% discard rate based on hooking mortality for Pacific cod caught in the 0-10 fm range and

recommends applying the combined average for all rockfish data from the GLM results for the 11-20 and the 21-30 depth bins.

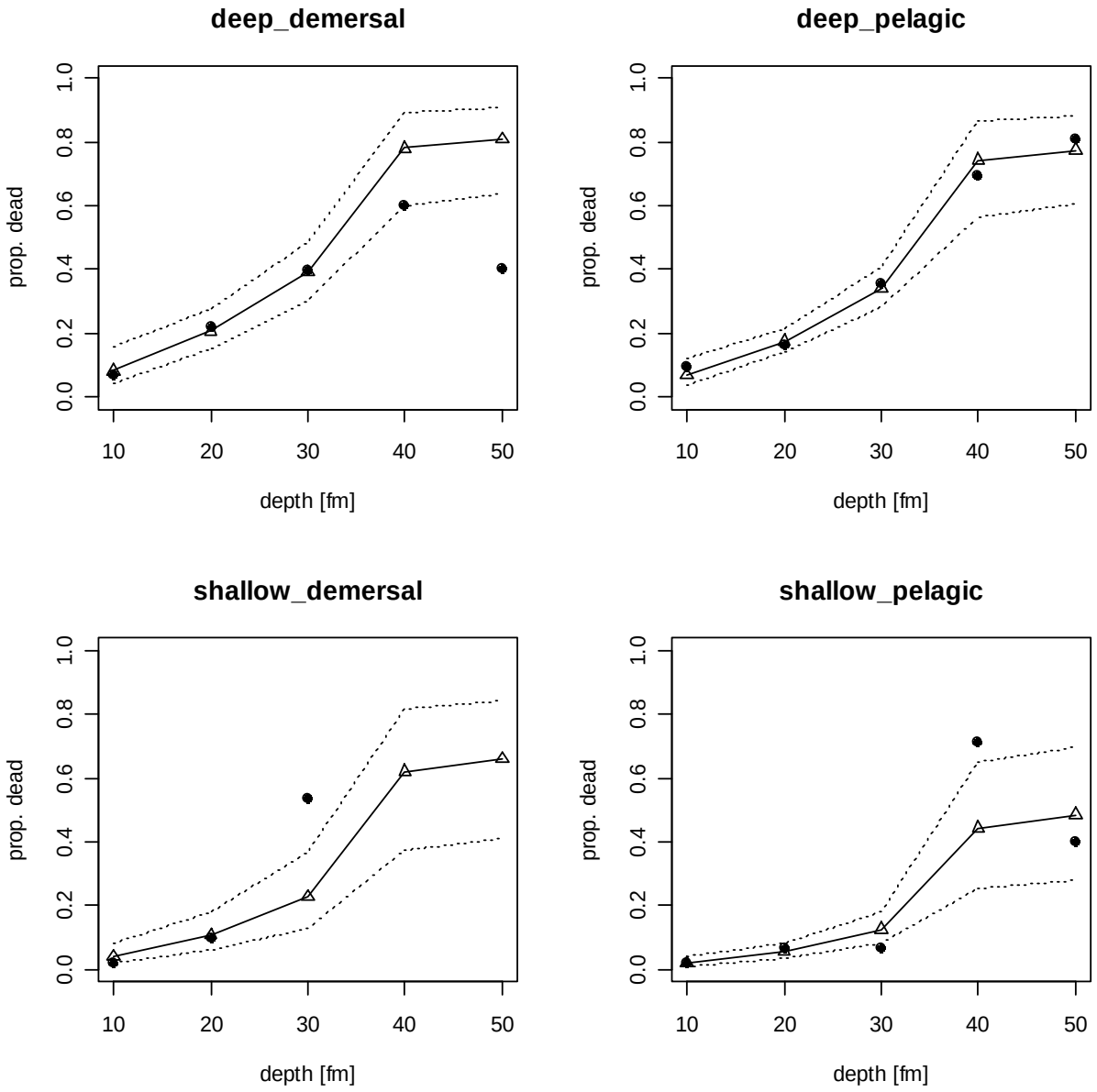

Figure 4-16. Comparison of guild-based GLM predictions of the proportion of fish released dead at the surface with observed proportions, by 10-fm depth bin. Samples sizes less than 5 were excluded. Observed = solid circles, predicted = solid line with triangles, dotted lines represent 95% confidence intervals.

Table 4-47. Sample sizes by species and depth from data used in guild-based GLM analysis.

Guild	Depth Bin (fm)				
	10	20	30	40	50
deep demersal	29	212	158	10	5
deep pelagic	146	902	362	49	73
shallow demersal	195	171	15	1	
shallow pelagic	316	570	191	14	5

Table 4-48. Predicted percentage released dead from guild-based GLM (surface mortality).

Guild	Depth Bin (fm)				
	10	20	30	40	50
deep demersal	9%	21%	38%	81%	84%
deep pelagic	6%	15%	29%	73%	77%
shallow demersal	4%	11%	23%	66%	70%
shallow pelagic	2%	5%	12%	48%	53%

Table 4-49. Upper 95% confidence limits of guild-based GLM predictions (surface mortality).

Guild	Depth Bin (fm)				
	10	20	30	40	50
deep demersal	17%	29%	49%	92%	93%
deep pelagic	11%	19%	38%	87%	88%
shallow demersal	9%	19%	38%	85%	87%
shallow pelagic	4%	8%	18%	70%	74%

Table 4-50. Predicted percentage released dead from guild-based GLM, adjusted for short- and long-term mortality (Albin and Karpov; GMT linear adjustment).

Guild	Depth Bin (fm)				
	10	20	30	40	50
deep demersal	21%	35%	52%	86%	89%
deep pelagic	18%	30%	45%	80%	84%
shallow demersal	13%	24%	37%	74%	79%
shallow pelagic	11%	19%	29%	60%	66%

Table 4-51. Upper 95% confidence limits of guild-based GLM predictions, adjusted for short- and long-term mortality (Albin and Karpov; GMT linear adjustment).

Guild	Depth Bin (fm)				
	10	20	30	40	50
deep demersal	28%	41%	60%	94%	95%
deep pelagic	23%	33%	52%	90%	92%
shallow demersal	17%	31%	50%	89%	91%
shallow pelagic	13%	21%	34%	77%	81%

Multiplicative adjustment for short- and long-term mortality

Surface mortality rates from the GLM were adjusted for below-surface, short- and long-term mortality based on the assumption that each stage of mortality was independent from the previous stages. Survival rates (fraction alive = 1 – [fraction dead]) for the three stages of mortality were multiplied together and the product was subtracted from one to produce an estimate of total mortality.

Major uncertainties and data needs

- Limited data for several species
- Very limited information about post-release mortality rates
- Insufficient data to evaluate differences in depth effects among species (interaction terms in the GLM)
- Lack of depth-specific information in delayed mortality adjustments
- No additional uncertainty associated with delayed mortality adjustment
- The data do not cover the entire coast (i.e., ends at the OR/WA border), and ignore possible regional differences (e.g. temperature effects).

The GMT recommends managing 2009-10 recreational fisheries using the discard mortality rates shown in Table 4-52 for use in estimating discard mortalities. This table should be updated each biennium and incorporate new research findings and data as appropriate.

Table 4-52. Estimated discard mortality rates for recreationally important groundfish species.

Species Group	Species	Depth Bin			
		0-10 fm	11-20 fm	21-30 fm	>30 fm
Rockfish	Black Rockfish	11%	20%	29%	63%
	Black and Yellow Rockfish	13%	24%	37%	100%
	Blue Rockfish	18%	30%	43%	100%
	Bocaccio	19%	32%	46%	100%
	Brown Rockfish	12%	22%	33%	100%
	Calico Rockfish	24%	43%	60%	100%
	Canary Rockfish	21%	37%	53%	100%
	China Rockfish	13%	24%	37%	100%
	Copper Rockfish	19%	33%	48%	100%
	Gopher Rockfish	19%	34%	49%	100%
	Grass Rockfish	23%	45%	63%	100%
	Kelp Rockfish	11%	19%	29%	100%
	Olive Rockfish	34%	45%	57%	100%
	Quillback Rockfish	21%	35%	52%	100%
	Tiger Rockfish	20%	35%	51%	100%
	Treefish	14%	25%	39%	100%
	Vermilion Rockfish	20%	34%	50%	100%
	Widow Rockfish	21%	36%	52%	100%
	Yelloweye Rockfish	22%	39%	56%	100%
	Yellowtail Rockfish	10%	17%	25%	50%
Other Fish	Cabezon	7%	7%	7%	7%
	California scorpionfish	7%	7%	7%	7%
	Kelp Greenling	7%	7%	7%	7%
	Lingcod	7%	7%	7%	7%
	Pacific Cod	5%	32%	53%	97%
General Cat.	Flatfish	7%	7%	7%	7%
	Sharks and Skates	7%	7%	7%	7%
	Dogfish	7%	7%	7%	7%

4.5.1.7 *Washington Recreational*

Washington Recreational Fishery Sampling and Catch Estimates

The Washington Ocean Sampling Program (OSP) generates catch and effort estimates for the recreational boat-based groundfish fishery, which are provided to Pacific States Marine Fisheries Commission (PSMFC) and incorporated directly into . The OSP provides catch in total numbers of fish, and also collects biological information on average fish size, which is provided to RecFIN to enable conversion of numbers of fish to total weight of catch. Boat egress from the Washington coast is essentially limited to four major ports, which enables a sampling approach to strategically address fishing effort from these ports. Effort estimates are generated from exit-entrance counts of boats leaving coastal ports while catch per effort is generated from angler intercepts at the conclusion of their fishing trip. The goal of the program is to provide information

to RecFIN on a monthly basis with a one-month delay to allow for inseason estimates. For example, estimates for the month of May would be provided at the end of June. Some specifics of the program are:

Exit/entrance count: boats are counted either leaving the port (4:30 AM - end of the day) or entering the port (approximately 8:00 AM through end of the day) to give a total count of sport boats for the day.

Interview: boats are encountered systematically as they return to port; anglers are interviewed for target species, number of anglers, area fished, released catch data and depth of fishing (non-fishing trips are recorded as such and included in the effort expansion). The OSP collects information on released catch but does not collect information on the condition of the released fish. Therefore, released catches must be post-stratified as live or dead based upon an assumed discard mortality rated. Onboard observers are deployed on charter vessels throughout the salmon season primarily to observe hatchery salmon mark rates but also to collect rockfish discard information on these trips.

Examination of catch: catch is counted and speciated by the sampler. Salmon are electronically checked for coded wire tags and biodata is collected from other species.

Sampling rates vary by port and boat type. Generally, at boat counts less than 30, the goal is 100% coverage. The sampling rate goal decreases as boat counts increase (e.g., at an exit count of 100, sample rate goal is 30%; over 300, sample rate goal is 20%). Overall sampling rates average approximately 50% coastwide through March-October season.

Sampling schedules are stratified due to differences in effort patterns on weekdays versus weekend days. Usually, both weekend days and a random 3 of 5 weekdays are sampled.

Personnel: OSP sampling staff include two permanent biologists coordinating data collection, approximately twenty-two port samplers, three on-board observers and one data keypuncher.

Volume of data: Between 20,000 and 30,000 boat interviews completed per season coastwide.

Data Expansion:
Algorithm for expanding sampled days:

$$\text{Exit Count} \;/\; \text{Total boats sampled} \;\; * \; P_S \text{ sampled} = P_t$$

where P_S = any parameter (anglers, fish retained, fish released) within a stratum,
and P_t = total of any parameter with stratum for the sample day.

Algorithm for expanding for non-sampled days:

Total Weekday Catch = = $\Sigma(P_t)$ on sampled weekdays / number weekdays sampled * no. of weekdays in stratum;

Total Weekend Catch =$\Sigma(P_t)$ on sampled weekend days / number weekend days sampled * no. weekend days in stratum number;

Total weekend catch + total weekday catch = total catch in stratum.

Notes on Data Expansion:
Salmon and halibut catches are stratified by week; all other species are stratified by month. All expansions are stratified by boat type (charter or private), port, area and target species trip type (e.g., salmon, halibut, groundfish, or albacore).

Washington Recreational Fishery Impact Modeling

Pre-Season Catch Projections

Projected impacts for Washington's recreational fishery are essentially based upon the previous season's harvest estimated by the Ocean Sampling Program (OSP) and incorporated in . This is especially true if recreational regulations remain consistent.

In 2005 the Washington Department of Fish and Wildlife implemented a depth restriction of 30 fm for a portion of the Washington coast. Since 2002, the OSP program began collecting fishing depths as well as discard information. This information is keypunched and analyzed on an annual basis with respect to depth of catch for species of concern. Beginning in 2006, and carrying through 2007 and 2008, we have modified our pre-season catch projections, based on the use of depth restrictions, by subarea and fishery. The Washington recreational management measures for 2009-2010 will continue to include prohibiting fishing deeper than 20 or 30 fm (depending upon time and management subarea); therefore, the depth analysis was again used to determine the catch and mortality of discarded fish for 2009-2010 pre-season catch projections relative to these depths as follows:

Canary Rockfish

- Apply 100% mortality rate to canary rockfish caught on all recreational fishing trips targeting Pacific halibut, when there is no depth restriction in place
- Apply 66% mortality rate to canary rockfish on recreational fishing trips targeting species other than Pacific halibut, when there is no depth restriction in place (based upon average depth distribution of catch from intercept surveys).
- When a 20-fm depth restriction is in place, apply a 50% mortality rate to canary rockfish caught on all recreational fishing trips (based on research by Albin and Karpov, 1995).

Yelloweye Rockfish

- Apply 100% mortality rate to yelloweye rockfish caught on all recreational fishing trips, when there is no depth restriction in place
- When a 20-fm depth restriction is in place, apply a 50% mortality rate to yelloweye rockfish caught on all recreational fishing trips (based on research by Albin and Karpov, 1995).
- When a 20-fm depth restriction is in place, apply an encounter rate reduction of 25% (based on 2005 OSP catch-by-depth data) as yelloweye tend to inhabit deeper depths.

Inseason Catch Projections for 2009-2010

Inseason catch projections are based upon the most recent OSP estimates (with a one-month time lag) with subsequent months extrapolated from the pre-season catch projections. In 2009-2010, depth dependant mortalities will be applied uniformly to all discarded fish coast wide through . This will replace the mortality estimates for canary and yelloweye used in 2007-2008. Projected impacts for 2009-2010 were based on 2007-2008 impact estimates and the depth analysis described above. The 2007-2008 impact model was used because post season catch estimates could not be recalculated using the new mortality estimates and at the time, the coastwide depth dependant mortality matrix was still preliminary. It should be noted that the precision of

recreational groundfish catch estimates based upon previous seasons will continue to be influenced by factors such as the length and success of salmon and halibut seasons, weather and unforeseen factors.

4.5.1.8 *Oregon Recreational*

Modeling the Effects of Oregon 2009-10 Recreational Groundfish Management Measures

Data Source for Base Model

Modeling of expected 2009-10 Oregon recreational fishery impacts of selected groundfish species was based on recent year estimates of landings and discards. For the ocean boat fishery, the data source was the Oregon Department of Fish and Wildlife Ocean Recreational Boat Survey (ORBS). For the shore and estuary fishery, the data source was the Marine Recreational Fisheries Statistics Survey (MRFSS). Analyzed species included black, blue, brown, canary, china, copper, grass, quillback, and yelloweye rockfishes; as well as kelp and rock greenling, cabezon and lingcod. Base level landings and discards for the ocean boat fishery (in numbers of fish) were based on normalized 2005, 2006 and 2007 landings and discards because these data reflect fishery years with regulations most similar to those expected in 2009-10 (i.e., bag limits, offshore closures, behavioral activities to avoid overfished species, etc.). Base level landings and discards for the shore and estuary fishery (in weight), largely not affected by management of overfished species, reflect the most recent 5-year average, 1998-2002. Annual weights of greenling and cabezon were adjusted to reflect changes in minimum length.

Normalizing 2005, 2006, and 2007 Ocean Boat Catch and Angler Trip Data

A base year period of 2005-07 was chosen for modeling catch and angler effort. Equal weighting was given to each year as it is not possible to forecast the opportunity for other targeted fisheries (i.e., salmon, halibut, tuna, etc.) in 2009-10. The fisheries in 2005-07 vary in both angler opportunity and success for other target species such as salmon, tuna and halibut. All three base years include groundfish fishery restrictions (e.g., offshore closures and restrictions on groundfish retention in the directed Pacific halibut fishery).

To facilitate providing maximum flexibility in modeling 2009-10 fishery options, landings in 2005, 2006 and 2007 were normalized to a 10-fish marine bag limit and a year round season with no offshore closures (essentially the basic regulations from 2000 through 2003). Starting in 2004 the sport fishery was managed with offshore closures to reduce impacts on overfished species (i.e., lingcod, canary rockfish, and yelloweye rockfish); the marine fish bag limit of 10 was carried over from 2003. In response to an early closure in 2004 due to attainment of the black rockfish harvest guideline, the marine bag limit in 2005 started at 8 fish on January 1 and was reduced to 5 fish on July 16. During 2006-08 the marine fish bag limit imposed under state regulations was 6 fish to provide for a year round nearshore fishery and not exceed the black rockfish harvest guideline. The marine fish bag limit includes rockfish, greenling, cabezon and other species excluding lingcod, flat fish, Pacific halibut, salmon, trout, steelhead, perch, sturgeon, striped bass, offshore pelagic species, and bait fish (herring, smelt anchovies and sardines).

Normalizing to a 10-fish marine bag limit was accomplished through comparing the average catch per angler trip (CPUE) under 8, 6 and 5 fish regulations in 2005-07 with comparable periods in 2003-04 under a 10 fish marine bag limit. The average CPUE change from 10 to 8 fish was a 13.5 percent reduction, which compared to a 34.3 and 37.8 percent reduction when

reducing the bag limit from 10 to 6 and 5 fish, respectfully. The same exercise was also applied to discards per angler as the number discarded for many species for which retention was allowed generally increased as the retention bag limit was reduced. The average duration of groundfish trips did not change, but anglers sorted through more fish. The number of yelloweye rockfish and canary rockfish encountered, both species for which all retention was prohibited in the model base years, was not adjusted due to the reduced marine bag limit as the average duration of groundfish angler trips were nearly the same regardless of the marine bag limit. These adjustments were not made for lingcod, which has a separate bag limit.

Landings and discards were normalized to an all-depth season. In 2004-06, from June through September the groundfish fishery was closed seaward of the 40-fm line; for 2007 the offshore closure seaward of 40-fm occurred from April through September. The expected increase in encounter rates for offshore residing species (i.e., yelloweye rockfish and canary rockfish) in normalizing to an all-depth scenario was based on data from 2001 and 2003-07 at-sea observations on Oregon charter vessels (over 500 trips were observed). The observer study was not conducted in 2002. The following increased encounter rate (numbers of fish) were applied to appropriate months (those that were closed seaward of 40-fm) when normalizing to an all-depth fishery: canary rockfish = 1.20 and yelloweye rockfish = 1.47.

Landings and discards in 2005 were normalized to a year round season as the fishery was closed earlier than scheduled. In both 2004 and 2005 regulations were changed inseason (starting in early September in 2004 and mid-October in 2005). Because of the inseason closures in 2004-05, the 2003 fishery was used as a template for seasonal catch and effort pattern in the groundfish fishery as it was open January through December. Estimating potential catch for October through December in 2005 was based on normalized January through September 2005 estimates and applying the monthly temporal pattern observed in 2003.

The expected weight of landed fish was based on the 2005-07 average by species and month for the ocean boat fishery. The expected average weight of discarded fish in the ocean boat fishery was based on combined at-sea observations in 2003-2007 with attention paid to matching samples with depth closure regulations (releases were not measured on 2001 at-sea trips). Observations indicate that yelloweye rockfish and canary rockfish caught inside of the 40-fm line were considerably smaller compared to the average size of those caught offshore as it appears more juveniles of these species reside nearshore. An exception in the method to estimate the size of discards was made for nearshore rockfish species, other than black rockfish and blue rockfish, due to small sample sizes (most are retained), where a 50 percent reduction in average landed weight was assumed for discards. The fifty percent reduction in average weight was based on the observed average size of discarded black rockfish and blue rockfish which were on the order of a 50 percent reduction from average landed weight. A 50 percent reduction was also used for greenling species since they are also rarely released.

Ocean boat angler trip data from 2005 was also normalized using the 2003 temporal pattern to estimate groundfish effort during October through December when the nearshore fishery was closed.

Angler effort in shore and estuary areas was assumed to be similar to the base period of 1998-2002. Groundfish angler trips in the shore and estuary fishery are not available, only total angler trips of all trips types combined, thus all projections of angler trips by trip type exclude shore and estuary.

Model Inputs

Bag limits, offshore closures, season structure and halibut quotas were the basic input factors applied to the standardized model.

Bag limits were modeled to range from 6 to 10 marine fish and from 2 to 3 lingcod. Fish species included in the marine bag limit were defined earlier in this report. The expected reduction in CPUE from reducing the marine bag limit from 10 fish was based on the same comparison between a 10 and 8, 6 or 5 bag limit discussed earlier in this report. In estimating expected reductions in CPUE for marine bag limits a linear relationship was developed using the observations between 10, 8, 6 and 5 fish bag limits (Figure 4-17). The number of released fish of species for which retention is not prohibited was estimated to increase as the bag limit was reduced (Figure 4-18). As assumed in normalizing the model no effect on CPUE was expected for the non-retention species yelloweye rockfish and canary rockfish for changes in the marine fish bag limit (refer to earlier discussion in this report).

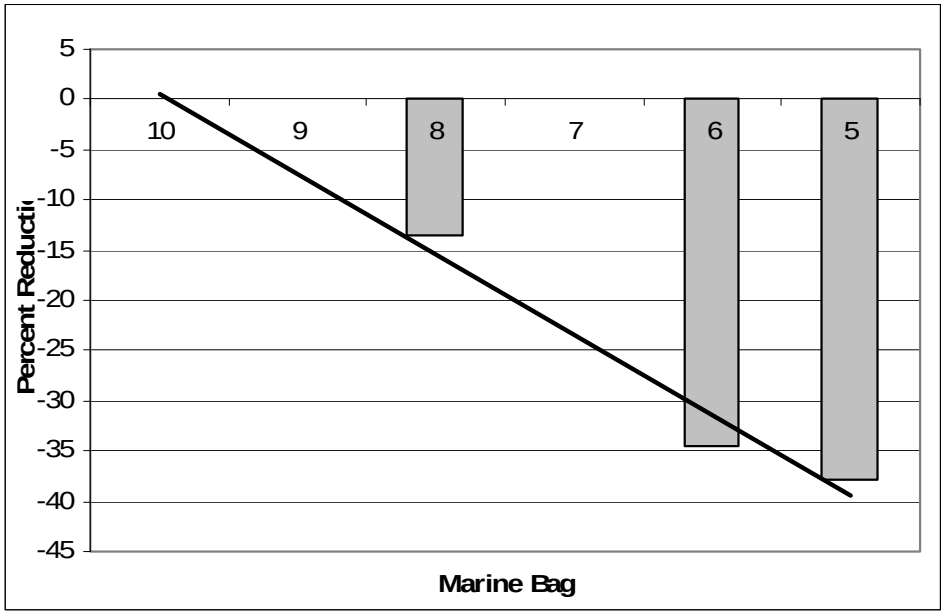

Figure 4-17. Percent reduction of catch per angler under decreasing marine bag limits for nearshore groundfish.

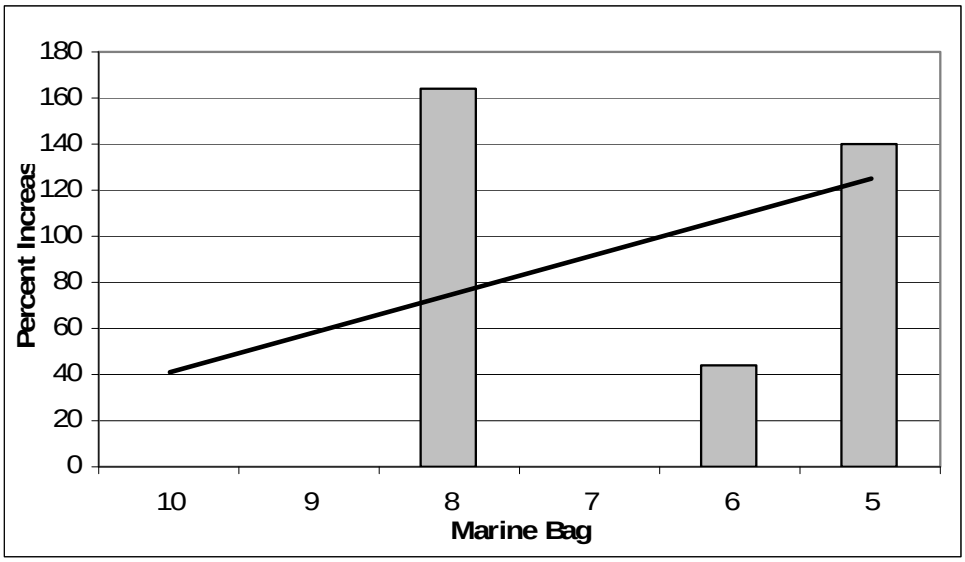

Figure 4-18. Percent increase of release per angler with decreasing marine bag limits for nearshore groundfish.

Estimates were also made for the effect of increasing the lingcod bag limit from 2 to 3 fish on landed fish and were made external to the impact model. In the ocean boat fishery the analysis from the 2007-08 EIS was carried forward; sample data from 2005 was used to determine the percent of anglers that had achieved their 2 fish bag limit in 2005 (6.3%). Assuming each of these anglers would have retained a third fish under a 3 fish bag resulted in a 10 percent increase of total fish landed (applied to the 2005-07 average landings). No adjustments were made for increased targeting due to the increased bag limit. Discussions with anglers and charter operators indicate any likely increase in targeting lingcod would occur in offshore areas, for which opportunity is drastically reduced due to offshore closures during the peak summer fishing periods (if not all year under some options).

Expected encounter rate reductions for yelloweye rockfish and canary rockfish normally encountered in offshore waters were developed for offshore closures outside of 40, 30, 25, and 20 fm (Table 4-53). They were based on the at-sea observations mentioned earlier in the report. Modeling assumptions included a shift in offshore effort (7 percent of total groundfish directed effort) to open areas nearshore during offshore closure periods affecting the catch rates of fish encountered.

Table 4-53. Percent total encounter reductions in yelloweye rockfish and canary rockfish due to depth closures.

2001, 2003-2007 Distribution of encounters by depth bin (fm) from at-sea observations (fishery open all depths)						
Species	<20 fm	21-25 fm	26-30 fm	31-40 fm	>40 fm	(n)
Canary rockfish	59%	15%	5%	7%	16%	518
Yelloweye rockfish	32%	24%	7%	5%	31%	74
Percent reduction in total encounters from open all depths to the following depth closures						
Species	Closed >20 fm	Closed >25 fm	Closed >30 fm	Closed >40 fm		
Canary rockfish	43%	28%	23%	16%		
Yelloweye rockfish	67%	43%	36%	31%		

Monthly groundfish directed angler effort was assumed to remain equal to the 2005-07 normalized average unless the fishery season was reduced to less than a May through September season (the five core months). If the season duration was less than May 1 through September 30 the assumption would be that a third of the normal effort during the closed season would be shifted into the open period (the same assumption used in the 2007-08 EIS). Thus, for the May 1 through September 30 option (option 6) it was assumed that the angler effort from the closed period (January 1 through April 30 and October 1 through December 31) would not transfer to the open period as the five core months would be open.

Angler effort in the directed Pacific halibut fishery was assumed to decrease slightly in 2009-10 due to the slight reduction in halibut allocation. The halibut allocation in 2009-10 was assumed to be equal to the 2008 allocation, which is six percent lower than the allocation in 2007. Because the International Pacific Halibut Commission is considering a substantial reduction in the allocation to Area 2A (Washington, Oregon and California) in 2009, an option (option 2) was modeled. The halibut effort and catch in this option was assumed to be reduced by 50 percent and the groundfish fishery was expanded based on the reduced yelloweye rockfish impacts in the halibut directed fishery (total for all Oregon sport fisheries not to exceed 2.5 mt). The decision on the 2009 halibut catch allocation will occur after the 2009-10 groundfish regulations will be set. One potential inseason regulatory change that could result under a reduced halibut allocation is illustrated by option 2.

Model Description

The model design was similar to that used in setting the 2007-08 regulations. The model is housed as an Excel spreadsheet. The model has both landed and discarded fish sections. Each section has similar components although the discarded section also has components to apply both differential mortality rates and average size changes due to various potential offshore closures (i.e., seaward of 20, 25, 30 or 40 fm). Groundfish impacts on yelloweye rockfish and canary rockfish in the Pacific halibut fishery were modeled as a separate fishery. Lingcod landings under the two bag limit options were addressed external to the model.

The model normalized to a 12 month all-depth fishery was used to address impacts from all ocean boat fishery sources, excluding the targeted Pacific halibut fishery. It includes the following components for each species by month: (1) catch; (2) bag limit affects; (3) offshore fishery effects on encounter rates and average size; (4) a 7 percent effort shift to the nearshore fishery due to offshore closures; (5) average size and (6) mortality rates for discarded fish. For landed and discarded fish the methodology to address the affects of various marine bag limits, and offshore closure effects on (a) encounter rates and (b) effort shifts nearshore, were discussed earlier in the report under the Normalization section. Average weight was based on the 2005-07 average landed weight and at-sea observations since 2001 for discarded fish as discussed earlier in this report also under the Normalization section. Discarded fish mortality rates by rockfish species and depth were developed from at-sea observer data for catch distribution using mortality rates by species and depth adopted by the PFMC (Table 4-54). Discard mortality rates of 5 percent were applied to lingcod, cabezon and greenling as they do no suffer from barotrauma.

Expected impacts on yelloweye rockfish and canary rockfish in the Pacific halibut fishery were addressed separately. The encounter rate per halibut pound landed in 2005, 2006 and 2007, using the 2002-2003 average weight of fish caught outside of 30-fm, was applied to the 2008 Oregon central coast all-depth halibut sport allocation. The estimated impacts were averaged between the

three years to address expected impacts on both species. This assumes similar Pacific halibut allocations in 2009-10 for all but option 2 (see the discussion above under Model Inputs).

Landings and discard impacts for shore and estuary caught species were modeled on a season total basis using the 1998-2002 average metric tons. This fishery will be managed for a year round season as it does not impact yelloweye rockfish and canary rockfish. The metric tons were adjusted for length limits applied to cabezon and greenling since that period (refer to the 2004-05 EIS). Sub-legal cabezon and greenling that were landed in the 1998-2002 period were now considered discards. A mortality rate of 5 percent was applied to all species discarded in the shore and estuary fishery to represent hooking mortality as the waters are not deep enough to cause mortality from barotrauma.

Table 4-54. Discard mortality rate calculations for select rockfish species based on sport observer data from 2001 and 2003-07. Mortality rates are predicted for all-depth fisheries and various depth closure scenarios.

2001, 2003-2007 count of released fish by depth bin (fm)							
Species	≤10 fm	11-20 fm	21-25 fm	26-30 fm	31-40 fm	>40 fm	Total
Black rockfish	506	522	29	2	0	0	1,059
Blue rockfish	308	846	87	7	0	0	1,248
Brown rockfish	0	1	0	0	0	0	1
China rockfish	1	7	3	0	0	0	11
Copper rockfish	0	12	1	1	0	0	14
Quillback rockfish	0	3	1	0	0	0	4
Canary rockfish a/	15	295	78	26	21	83	518
Yelloweye rockfish a/	1	24	18	5	4	23	74
Distribution of released fish by depth bin (fm) when open all depths.							
Species	≤10 fm	11-20 fm	21-25 fm	26-30 fm	31-40 fm	>40 fm	Total
Black rockfish	48%	49%	3%	0%	0%	0%	1,059
Blue rockfish	25%	68%	7%	1%	0%	0%	1,248
Brown rockfish	0%	100%	0%	0%	0%	0%	1
China rockfish	9%	64%	27%	0%	0%	0%	11
Copper rockfish	0%	86%	7%	7%	0%	0%	14
Quillback rockfish	0%	75%	25%	0%	0%	0%	4
Canary rockfish a/	3%	57%	15%	5%	4%	16%	518
Yelloweye rockfish a/	1%	32%	24%	7%	5%	31%	74
Predicted distribution of released fish when closed outside 40 fm							
Species	≤10 fm	11-20 fm	21-25 fm	26-30 fm	31-40 fm	Total	
Black rockfish	48%	49%	3%	0%	0%	1,059	
Blue rockfish	25%	68%	7%	1%	0%	1,248	
Brown rockfish	0%	100%	0%	0%	0%	1	
China rockfish	9%	64%	27%	0%	0%	11	
Copper rockfish	0%	86%	7%	7%	0%	14	
Quillback rockfish	0%	75%	25%	0%	0%	4	
Canary rockfish	3%	68%	18%	6%	5%	435	
Yelloweye rockfish	1%	46%	35%	10%	7%	51	
Predicted distribution of released fish when closed outside 30 fm							
Species	≤10 fm	11-20 fm	21-25 fm	26-30 fm	Total		
Black rockfish	48%	49%	3%	0%	1,059		
Blue rockfish	25%	68%	7%	1%	1,248		
Brown rockfish	0%	100%	0%	0%	1		
China rockfish	9%	64%	27%	0%	11		
Copper rockfish	0%	86%	7%	7%	14		
Quillback rockfish	0%	75%	25%	0%	4		
Canary rockfish	4%	71%	19%	6%	414		
Yelloweye rockfish	2%	50%	37%	11%	47		

Table 4-54. Discard mortality rate calculations for select rockfish species based on sport observer data from 2001 and 2003-07. Mortality rates are predicted for all-depth fisheries and various depth closure scenarios (continued).

Predicted distribution of released fish when closed outside 25 fm						
Species	≤10 fm	11-20 fm	21-25 fm	Total		
Black rockfish	48%	49%	3%	1,057		
Blue rockfish	25%	68%	7%	1,241		
Brown rockfish	0%	100%	0%	1		
China rockfish	9%	64%	27%	11		
Copper rockfish	0%	92%	8%	13		
Quillback rockfish	0%	75%	25%	4		
Canary rockfish	4%	76%	20%	388		
Yelloweye rockfish	2%	56%	42%	42		
Predicted distribution of released fish when closed outside 20 fm						
Species	≤10 fm	11-20 fm	Total			
Black rockfish	49%	51%	1,028			
Blue rockfish	27%	73%	1,154			
Brown rockfish	0%	100%	1			
China rockfish	13%	88%	8			
Copper rockfish	0%	100%	12			
Quillback rockfish	0%	100%	3			
Canary rockfish	5%	95%	310			
Yelloweye rockfish	3%	97%	24			
Mortality rate						
Species	≤10 fm	11-20 fm	21-25 fm	26-30 fm	31-40 fm	> 40 fm
Black RF	11%	20%	29%	29%	63%	63%
Blue RF	18%	30%	43%	43%	100%	100%
Brown rockfish	12%	22%	33%	33%	100%	100%
China rockfish	13%	24%	37%	37%	100%	100%
Copper rockfish	19%	33%	48%	48%	100%	100%
Quillback rockfish	21%	35%	52%	52%	100%	100%
Canary RF	21%	37%	53%	53%	100%	100%
Yelloweye RF	22%	39%	56%	56%	100%	100%
Total mortality rate for discarded fish by proposed depth closure						
Species	≤10 fm	≤ 20 fm	≤25 fm	≤30 fm	≤40 fm	All depth
Black rockfish	11%	16%	16%	16%	16%	16%
Blue rockfish	18%	27%	28%	28%	28%	28%
Brown rockfish	12%	22%	22%	22%	22%	22%
China rockfish	13%	23%	27%	27%	27%	27%
Copper rockfish	19%	33%	34%	35%	35%	35%
Quillback rockfish	21%	35%	39%	39%	39%	39%
Canary rockfish	21%	36%	40%	40%	43%	52%
Yelloweye rockfish	22%	38%	46%	47%	51%	66%

a/ Observed retained fish in 2001 and 2003 were included in the analysis.

4.5.1.9 *California Recreational*

The CDFG revised their impact projection model ("RecFish") that was reviewed by the GMT at their January 2008 meeting and at the April 2008 PFMC meeting. The GMT recommends this updated model for use in projecting impacts of groundfish species in 2009–10 California recreational fisheries. This model is described below and is used in impact analyses in this EIS.

Recreational fisheries management for multispecies assemblages in California presents many challenges. In recent years, declining stocks of several rockfish species have dictated recreational groundfish management seasons and depths in California. Increasingly complex restrictions have been necessary to keep total catch of depleted species within the reduced limits that are necessary to rebuild the stocks while providing fishing opportunity.

Prior to 2000, the recreational daily bag limit for rockfish was 15 fish per angler with no closed months or depths. Beginning in 2000, the daily bag limit was reduced to 10 fish. Regulations have changed each year since 2000, making analyses of the effects of particular regulations difficult. In addition, regulations have become more region-specific, adding to the difficulty of modeling projected catches.

Methodology Used to Project Recreational Catches for 2009–10

The recreational catch model incorporates a number of parameters and assumptions, all of which are either risk-neutral or risk-adverse. The basic analytical approach is the same as that used for 2007–08, with revision to the proportion of catch by depth for yelloweye rockfish, percent of catch by month for yelloweye and canary rockfish, division of the North-Central management area into two areas, and use of depth-dependent mortality rates for rockfish of the genus *Sebastes*. The 2005-2007 data from the California Recreational Fishery Survey (CRFS) program serves as a baseline. The model output predicts expected catch under any combination of season and depth fishing restrictions for each of the regions described below:

- Northern Groundfish Management Area: North of 40°10' N latitude to CA/OR border
- North-Central North of Pt. Arena Groundfish Management Area: South of 40°10' N latitude to 38°57' N. latitude (Pt. Arena)
- North-Central South of Pt. Arena Groundfish Management Area: South of Pt. Arena to 37°11' N latitude (Pigeon Pt.)
- South-Central Monterey Groundfish Management Area: South of Pigeon Pt. to 36° N latitude (Lopez Pt.)
- South-Central Morro Bay Groundfish Management Area: South of Lopez Pt. to 34°27' N latitude (Pt. Conception)
- South Groundfish Management Area: South of Pt. Conception to CA/Mexico Border

CDFG/California Recreational Groundfish (RecFish) Model Assumptions

Effort Shift Inshore: The model includes a 27.6 percent increase in expected landings when fishing is restricted to less than 30 fm and a 39.3 percent increase in expected landings when fishing is restricted to less than 20 fm. The increase, or effort shift, is to account for increased effort in a smaller fishing area.

Discard Mortality: The GMT developed depth-dependent mortality rates for discarded rockfish of the genus *Sebastes* in 10-fm increments, the derivation of which is described in section 4.1.5.6. The species-specific depth-dependent mortality rates agreed upon by the GMT and approved by

the PFMC in 2008 are applied to the discarded fish in the CRFS base data from 2005-07 used in the RecFish model. When projecting the 2009-2010 season catch, discard catch estimates are multiplied by the proportion of catch in a given 10-fm depth increment times the depth-dependent mortality rate for the corresponding depth for each species.

Inputs and Key Parameters for the Model

Weighting of Base Years: Base year data 2005-2007 were given nearly equal weighting by applying a 0.99 decay function. The previous biennial cycle made use of a 0.67 decay function to weight 2005 more heavily than 2004. With the exclusion of the 2004 data in the current model due to issues with the comparability of trip types between years, there are three years of data available for the model and these are weighted nearly equally (2007 = 33.7%, 2006 = 33.3%, 2005 = 33.0%) to represent the base catch in the model.

Base Year Catch: Initially, CRFS catch estimates in weight of fish were summed for caught and retained (CRFS "A" catch), filleted/caught otherwise unavailable ("B1" catch), and for species of concern, a proportion of CRFS reported discarded fish derived using depth-based mortality estimates. Base year catch estimates are assumed to be for an unrestricted fishing year with no months closed and no depths closed. Therefore, for each year, a back calculation method was used to obtain an estimate for what the catch would have been if all months and all depths had been open. This back calculation uses month and depth catch proportions derived from historical catch estimates from seasons unregulated by month and depth.

Historical Catch By Month: Estimates of historical percent catch by two-month period were calculated for each region based on Marine Recreational Fisheries Statistics Survey (MRFSS) data (weight of A+B1) from 1993-99, which was a time period when seasons and depths were unconstrained. Proxies were considered on a species by species basis for regions where there was a lack of catch data for that area. Monthly estimates of percent catch then were divided equally (50:50) for each pair of months. This percentage was adjusted for yelloweye and canary rockfish in order to reflect the apparent opener effect in recent years, which resulted in increased catch in the months following the season opening and reduced effort later in the year as compared to the historical data. For these two species, the average proportion of catch by month for 2005 and 2006 were used to perform a post-model adjustment to apportion the projected catch for the year to the given months of the season.

Historical Catch by Depth: Estimates of percent catch by depth were calculated for each region based on MRFSS depth sample data (numbers caught A+B1 for CPFV and A+B1+B2 for PR) from 1999-2000, which was a time period when depths were unconstrained. Proxies were considered on a species by species basis for regions where there was a lack of catch data for that area.

To improve the accuracy of catch estimates for yelloweye rockfish, two methods were employed when modeling the effect of depth restrictions on the catch of this species:

1) For expanding baseline input catch data from regulated seasons to all depths, unregulated depth distribution of catch data from other areas can be used to supplement the existing historical data; these data must be from unregulated years to be able to expand to all depths. In the North, data from 1999-2003 were used (years unregulated by depth in the North), recent unregulated Oregon catch by depth (1999-2003), and 1999-2000 data from the North-Central area that is north of Point Arena (for bathymetric and fishing effort similarities to the North). For the North-Central area, additional data from dockside party charter catch by depth data from 1999-2000 were used.

2) More recent catch data from CRFS were used to produce region–specific proportions of catch by depth with a higher sample size than historical data to provide improved projections that represent the current depth distribution of catch. Although this data is from regulated years, recent years have seen a consistent regulatory scheme by depth that would allow for use in apportioning catch by depth within the open depth strata. For example, for the North, the years 2004-2007 saw a consistent 0-30 fm depth restriction in place. The catch by depth for those years was used to project the depth distribution within the upper 30 fm for upcoming years (assuming catch will be restricted to within this zone), providing a more current framework than using the historical 1999-2000 data. Similarly, this applies to 2006-2007 catch by depth data for the North-Central Regions (same 0-30 fm depth restrictions). These depth distributions are applied as a post-model run adjustment, reapportioning the projections with the new depth distributions.

Determining the Proportion of Angler Reported Unavailable Dead Catch for Yelloweye and Canary Rockfish that was Composed of Discarded Dead Fish:

The California Recreational Fisheries Survey program (CRFS) uses several different catch types in generating catch estimates: sampler examined catch ("A"), angler reported unavailable catch including discarded dead ("B1"), and angler reported discarded live catch ("B2"). The B1 category includes disposition such as retained (filleted fish, fish given away, used for bait or otherwise unavailable) and fish discarded dead. Unfortunately, since CRFS began in 2004, no disposition of the B1 catch has been recorded for the majority of private and rental trips which are sampled in the PR1 mode. Therefore, it is not possible to separate the discarded dead fish from the retained unavailable fish in the B1 catch type without use of a proxy for the proportion of fish discarded dead. Attempts have been made to use sparse available data and apply these to the B1 catch data, but little data exists for overfished non-retention species, such as yelloweye and canary rockfish.

To estimate the proportion of B1 catch of yelloweye and canary rockfish that is discarded dead, a "compliance factor" (CF) was determined from recent (2005-2007) CRFS data. The CF is calculated by dividing the B2 catch by the total catch (A+B1+B2); this represents the proportion of fish reported discarded live by anglers (reported live only) while complying with regulations. It is conservative, as a portion of the B1 catch (the discarded dead) in the denominator should be in the numerator. The CF is used as a proxy for the proportion of B1 that is discarded dead, and so it is multiplied by the B1 catch to estimate the total fish discarded dead. This amount is added to the known B2 catch to arrive at total discards. This value is then multiplied by discard mortality factors by depth to obtain the discard mortality. Total mortality is then the retained catch (A+B1, less the proportion of B1 designated discarded dead) + discard mortality. Because the CFs are conservative, the proportions of B1 that are considered otherwise unavailable dead (filleted, used for bait, given away) will be biased high, thereby leading to an estimate of total mortality that is biased high. CFs were determined for each management area for both yelloweye and canary rockfish and applied to the B1 (aggregate unavailable dead catch) catch for these species to provide a conservative proxy estimate of fish discarded dead to which depth dependent mortality rates would be applied in estimating total mortality.

Methodology Used to Calculate Annual Unrestricted Catch

1. Pull (A+B1+B2+B3) Catch for each year from the RecFIN CRFS data web site:
http://www.psmfc.org/recfin/forms/est2004.html.
Specify species, and select the parameters: month and district under Define Table Layout.

2. Pull historical catch by depth (1999-2000, most recent years unregulated by depth) from the RecFIN boatdepth2 site:
http://www.psmfc.org/recfin/forms/boatdepth2.html

Add PC and PR fish caught together for each separate region and species, maintaining combined depth totals for each depth strata. Calculate average percentage of total fish caught within each 10 fm depth stratum (= "Depth Profile") by dividing 10 fm depth strata totals by combined total sum of all strata for the region. Assign proxies as needed for data-poor areas, using adjacent regions, similar species, etc.

3. Pull historical catch through time (1993-1999, the most recent years unregulated by monthly closure) from RecFIN web site:
http://www.psmfc.org/recfin/forms/est.html
Calculate average wave percents over combined years 1993-1999 by dividing individual wave totals by sum of all waves for each region. Assign proxies as needed for data-poor areas using the other region (North or South) as the proxy.

4. For each management region and species, calculate total regulated catch based on months each set of regulations was in effect. For example, if fishing was only open from 0-60 fm for March-December, sum total catch for those months only. Each management region should now have catch data for all species grouped by the different sets of management regulations (MR sets) in effect for the year so that the identical calculations can easily be performed on identically restricted species.

5. Expanding to All Depths. For each MR set: If there was no depth restriction, use the unmodified total regulated catch as the expected catch for all depths for that period of the year. If a depth restriction was in place, use total regulated catch to expand out each species in each MR set to all depths: from the Depth Profile, divide total regulated catch by sum of proportion of catch represented by the depths where fishing was open. This is the total expected catch for all depths. For example, if fishing for a MR set was open < 20 fm, divide the total catch by the percentage of the catch < 20 fm using the appropriate Depth Profile (historical unregulated catch data) for each species and region.

6. Effort Shift. If the depth restriction is confined to a 20 or 30 fm band, we assume increased effort occurred for these months. To remove this effect, apply an Effort Shift factor to remove the increased fishing (and increased catch) for the constrained depth zone. For example, if a 0-20 fm restriction was in effect, divide the total expected catch for all depths by 1.393 to get final total expected catch for those months. Similarly, use a factor of 1.276 if fishing was restricted within a 30 fm range. No Effort Shift is applied for depth restrictions > 30 fm.

7. Accounting for Closed Months. After expanding to all depths and removing Effort Shift (if needed), sum all the final expected catch values across all the MR sets for the year for each management region and species. Divide this sum by the percent catch for the year that these regulated months represent (from the wave percents for the year). In other words, divide the calculated catch for all open months by the percentage of the catch for the year these months historically represent. This results in the expected annual unregulated catch, expanded out from the regulated catch, for each region and species.

8. Input expected annual unregulated catch for each region-species into the Catch by Year Table in the RecFish Model database. The weighting of the different years' data to be used by the model in projecting catch can be selected at the model-user interface.

Projecting Catch from Model Runs

The RecFish model output consists of a matrix for each species or species group and management area. Within each matrix, catch tonnages are generated for each month and 10-fm depth stratum. Following a model run for all months and depths open (with a 0.99 decay value selected), the resulting catch projection values matrix is adjusted by separating out the retained (A+B1) and discarded (B2+B3) catch. The discard tonnages are obtained using 05-07 average discard proportions for each species and multiplying these by the total tonnages obtained from the model. These discard tonnages are multiplied by mortality factors condensed from: 1) GMT-determined

mortality rates by depth, and 2) CRFS depth distributions from seasons with identical depth restrictions to expected future seasons. The resulting discard mortality is then recombined with retained catch to obtain total projected mortality. This final matrix is used as a base to project catch by summing catch from selected months and depths open, while also factoring any effort shift effects. In addition, for yelloweye and canary rockfish there are other post-model adjustments for catch by time and depth (see "Inputs and Key Parameters for Model" above).

Subdivision of the North-Central Management Area

Ports south of Point Arena contributed only 2% of the statewide catch of yelloweye rockfish in 2007. In order to prevent the area south of Point Arena from being unnecessarily closed inseason, the North-Central Management Area will be divided into two management areas, the North-Central North of Point Arena Management Area and North-Central South of Point Arena Management Area. Adoption of this line will divide the current North-Central Management Area into two smaller areas.

Depth Restriction Changes

The 20-fm depth restriction will continue in the Northern and North-Central North of Point Arena Management Areas to reduce impacts on yelloweye rockfish. The shallower depth restriction is projected to result in a 33.8% reduction in yelloweye rockfish catch in the North-Central North of Point Arena and a 26.8% reduction in the North Central South of Point Arena. To reduce impacts on Minor Nearshore Rockfish in the North-Central South of Point Arena Management Area, the depth restriction may be increased to 30 fm.

California Recreational Yelloweye Rockfish Conservation Area Analysis

CDFG used 1999-2007 MRFSS/CRFS effort data and CRFS 2006 and 2007 yelloweye catch data (both sampler examined and reported) with latitude and longitude of catch data to identify one square nautical mile blocks with high yelloweye rockfish catch per unit effort from northern California (Pt. Conception to the OR/CA border) using Arc View 9.1. We ascribed the sampled catch of yelloweye rockfish and effort of anglers with rockfish in their catch to the centroid of a given block to determine the catch per unit effort in each 1nm square block. The 2006 CPUE and a conglomerate data set of 1999-2007 CPUE were plotted to identify other potential yelloweye rockfish hotspots that we may have missed using only 2007 data.

We identified many areas in the North and North-Central Management Area North of Point Arena that have high yelloweye catch. Three criteria were used in identifying areas for further analysis of potential catch savings from YRCAs:

- High yelloweye catch per unit effort within a given 1 nm square block.
- Clustering of high catch per unit effort blocks in the same area.
- Repeated presence of high catch per unit effort among years.

The following sections discuss the catch savings estimation methods and areas identified as prospective YRCAs for in-state waters alone and for areas in both state and federal waters.

Yelloweye Rockfish Conservation Areas Previously Proposed in State Waters for 2008

The YRCAs developed for use during the 2008 season could only be implemented in state waters since analysis of these areas was not included in the 2007-08 EIS. This precluded the inclusion of high yelloweye catch per unit effort areas in federal waters. To compensate for the inability to close areas where high numbers of yelloweye rockfish are known to occur, larger areas within

state waters were identified (see the California Recreational portion of section 2.2.4.2). These areas included large enough portions of the fishable grounds in the vicinity of a given port that the assumption could be made that the effort inside the YRCA would not be redistributed, but instead would be lost from a given port. Thus the catch savings from these areas were calculated as:

Catch Savings = yelloweye catch for the port * (proportion of the catch occurring within the YRCA).

Yelloweye Rockfish Conservation Areas in State and Federal Waters Proposed for 2009-2010

The 2009-2010 EIS development provided the opportunity to identify areas with high catch per unit effort in federal as well as state waters since the analysis could be included in the FEIS and be available for use in the 2009-2010 seasons. This allowed smaller areas with higher catch per unit effort in federal and state waters to be placed in YRCAs. These areas are sufficiently small that it is likely that anglers would redistribute their fishing effort to areas outside the YRCA in the vicinity of the port. Thus the catch savings resulting from the YRCAs in state and federal waters were calculated as:

> Percent Catch Reduction from YRCA Implementation = ((sampled yelloweye catch for the remaining ports in the management area +((sampled yelloweye catch for the port * (1-the proportion of sampled yelloweye catch within the YRCA) * (1+ the proportion of effort with rockfish in the catch within the YRCA))) / sampled yelloweye catch for the management area.)*100.

The catch reductions were calculated using yelloweye catch data from the 2007 CRFS database. The catch outside the YRCA under analysis but within 20 fm was increased by 9% prior to calculation of catch reductions to account for the reduction in the depth restriction from 30 fm in 2007 to 20 fm in the 2008 season. Accounting for this effort shift reduced the amount of catch reduction from implementation of the YRCAs, making the estimate more conservative. The sum of the YRCAs independently implemented for a given port result in less savings than if both are implemented since effort from the YRCA that is implemented could be shifted to the other area of high catch that is in the unimplemented YRCA area. For example, there is a 17% catch reduction for the Northern Management Area from implementing both the Point Saint George and South Reef YRCA off of Crescent City, but only an 8% and 6% catch reduction from closing only Point Saint George or only South Reef because effort from one area of high catch can be shifted onto another area of high catch if both are not closed. The estimated percent reduction in yelloweye rockfish catch from the implementation of each YRCA and combined use of YRCAs by management area are provided in Table 4-55.

Table 4-55. Estimated percent yelloweye catch reduction from the implementation of YRCAs and combinations of YRCAs.

Yelloweye Rockfish Conservation Area	Management Area	Port of Origin	Percent Reduction in Management Area Yelloweye Catch
Point Saint George	Northern	Crescent City	8%
South Reef	Northern	Crescent City	6%
Redding Rock	Northern	Trinidad	30%
Point Delgada North	North-Central North of Pt. Arena	Shelter Cove	6%
Point Delgada South	North-Central North of Pt. Arena	Shelter Cove	32%
Point Saint George and South Reef	North-Central North of Pt. Arena	Crescent City	17%
Point Delgada North and South	North-Central North of Pt. Arena	Shelter Cove	49%
All Northern Management Area YRCAs	Northern	Crescent City / Trinidad	47%
All North-Central North of Pt. Arena Management Area YRCAs	North-Central North of Pt. Arena	Shelter Cove	49%

The latitudes and longitudes that delineate the proposed YRCAs for possible use in the 2009-10 seasons are provided in the California Recreational portion of section 2.2.4.2.

Analyzing the Effectiveness of the Sanddabs and Other Flatfish Gear Restriction Regulation

Sanddabs and Other Flatfish are allowed to be taken in the California recreational fishery when fishing for rockfish, lingcod and associated species (referred to as the RCG complex below for simplicity) are closed. Starting in 2004 the following regulations were placed on sanddabs and Other Flatfish fishery to reduce bycatch of "overfished" species:

> *The use of weight no more than 2 pounds and no more than 12 hooks size 2 or less while fishing for sanddabs and Other Flatfish during the months in which the RCG complex is closed.*

There is concern that this is the standard gear used for targeting sanddabs regardless of whether rockfish is open or closed and that the restrictions do not offer additional protection to rockfish. Additionally, both CRFS samplers and party boat operators indicate that the by-catch of rockfish while fishing for sanddabs and Other Flatfish is minimal.

The objective of this analysis is to compare the bycatch of rockfish (the primary species of concern associated with fisherman who are targeting sanddabs and Other Flatfish) when there were no gear restrictions to years when the restrictions were put in place, focusing on four rockfish species of concern: bocaccio, canary rockfish, cowcod, and yelloweye rockfish. The goal is to determine if the gear restrictions reduce the bycatch of rockfish in the recreational

fishery for sanddabs and Other Flatfish. If not, the gear restrictions may be unnecessary and could potentially be eliminated, simplifying the ocean sport fish regulations.

Using the CRFS database for 2004-07 and the MRFSS database for 2001-03, relevant data were extracted pertaining to all catch events in which sanddab species group was targeted. The data were compiled in Microsoft Access. All species that were caught in association with sanddab as a targeted species group during the months in which the Rockfish, Cabezon and Greenling (RCG) complex was closed were queried for 2004 through 2007. Data were stratified into the northern California (Oregon/California border to Point Conception) and southern California (Point Conception to the U.S.-Mexico border) areas. Data were further stratified by party/charter boats (PC) and private/rental boats (PR). The same data extraction and query was made using the MRFSS data base for 2001 through 2003. A comparison of the by-catch was made between the seasons with no gear restrictions (2001-03) and the seasons when the restrictions were in place (2004-07). It was assumed that anglers were using the required gear when fishing for sanddabs.

Table 4-56 shows that before the sanddab gear restrictions were in place, there was little to no catch association of species of concern when sanddabs were the targeted species. While there were some catch events for bocaccio south of Point Conception and yelloweye rockfish north of Point Conception these encounters were infrequent while fishing for sanddabs. The results for the bycatch of species of concern during the time when the gear restrictions were in place showed little to no catch of those species. The results indicate that sanddabs and Other Flatfish fishery gear restrictions have not shown to be effective in restricting the bycatch of the rockfish species of concern.

Table 4-56. Numbers of fish and ratios of rockfish species of concern to sanddabs before and after gear restriction regulations.

Prior to Gear Restrictions									
Year	Numbers of Fish Sampled					Bycatch Ratio to Sampled Sanddabs			
	Sanddabs	Bocaccio	Canary	Cowcod	Yelloweye	Bocaccio	Canary	Cowcod	Yelloweye
Northern California PC Boats									
2001	No data	NA	NA	NA	NA	NA	NA	NA	NA
2002	1,657	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2003	2,984	0	0	0	0	0.0000	0.0000	0.0000	0.0000
Northern California PR Boats									
2001	210	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2002	324	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2003	220	0	0	0	0	0.0000	0.0000	0.0000	0.0000
Southern California PC Boats									
2001	309	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2002	2,528	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2003	1,743	0	0	0	0	0.0000	0.0000	0.0000	0.0000
Southern California PR Boats									
2001	42	1	0	0	0	0.0238	0.0000	0.0000	0.0000
2002	494	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2003	740	0	0	0	0	0.0000	0.0000	0.0000	0.0000
After Gear Restriction Regulations									
Year	Numbers of Fish Sampled					Bycatch Ratio to Sampled Sanddabs			
	Sanddabs	Bocaccio	Canary	Cowcod	Yelloweye	Bocaccio	Canary	Cowcod	Yelloweye
Northern California PC Boats									
2004	4,183	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2005	967	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2006	1,383	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2007	575	0	1	0	0	0.0000	0.0017	0.0000	0.0000
Northern California PR Boats									
2004	2,837	0	0	0	2	0.0000	0.0000	0.0000	0.0007
2005	952	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2006	963	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2007	1,037	0	3	0	0	0.0000	0.0029	0.0000	0.0000
Southern California PC Boats									
2004	2,522	5	0	0	0	0.0020	0.0000	0.0000	0.0000
2005	3,175	1	0	0	0	0.0003	0.0000	0.0000	0.0000
2006	900	0	0	0	0	0.0000	0.0000	0.0000	0.0000
2007	3,439	2	0	0	0	0.0006	0.0000	0.0000	0.0000
Southern California PR Boats									
2004	598	1	0	0	0	0.0017	0.0000	0.0000	0.0000
2005	676	2	0	0	0	0.0030	0.0000	0.0000	0.0000
2006	1,351	1	0	0	0	0.0007	0.0000	0.0000	0.0000
2007	1,158	2	0	0	0	0.0017	0.0000	0.0000	0.0000

Bag Limit Analyses

Rockfish Cabezon and Greenling (RCG) Bag Limit

A six fish bag limit is being considered for Northern and North-Central North of Point Arena Management Area to reduce impacts on yelloweye rockfish. The RCG Bag Limit Reduction analysis was done using the Bag Frequency Analysis tool available on the RecFIN web site available at http://www.psmfc.org/recfin/forms/bfreq.html. The parameters selected in the analysis were based on past analysis of bag limit reduction by species. The species chosen were all rockfish, kelp greenling, cabezon with a 10 fish bag limit. The marine area selected was all areas shoreward of 3 nm. Three modes were analyzed separately: Party and Charter mode, Private and Rental mode, and Shore mode. In the Data type parameters, "split shared angler bags" was selected and the catch type was A+B1+B2: total catch. Counties selected were based on the counties within their respective Management Areas. The analysis looked at two areas, the Northern and North-Central Management Area North of Pt. Arena. The range of Hypothetical Bag Limits analyzed was 10 to 3 fish for RCG. The years used in the analysis were 2005-07.

Once the parameters were set, the analysis was conducted and the results were used to calculate total % catch reduction for a reduced bag limit. The total catch for each bag limit from 10 fish down to 3 fish were subtracted by the total catch of the current 10 fish bag limit regulation. The result was divided by the current 10 fish bag limit total catch number and multiplied by 100 to provide a percent reduction in catch resulting from a given bag limit. The resulting catch reductions for the private rental and party charter modes can be seen in Table 4-57.

A six fish bag limit is estimated to result in a 20% reduction in the RCG catch for the private rental mode and a 26% catch reduction in the party charter mode in the Northern Management Area. The majority of the rockfish catch in California originates from the PR and the 20% catch reduction is used as the proxy for catch reduction for all modes in calculating the catch resulting from a 6 fish bag limit in the Northern Management Area and the North-Central Management Area North of Pt. Arena. This analysis accounts for only the catch reduction due to the reduction in retained fish by a given angler, it does not account for reductions in effort due to the reduced opportunity represented by the lower bag limit which could further reduce catch. This analysis does not account for the possibility of increased discarding with lowered bag limits as anglers become more selective with regard to the fish they retain.

Table 4-57. Percent reductions in the RCG catch resulting from reductions in the bag limit from the current 10 fish bag limit for the Private Rental and Party Charter Modes in the Northern and North-Central Management Areas.

Bag Limit	Private and Rental Percent RCG Catch Reduction	Party Charter Percent RCG Catch Reduction
9	3%	5%
8	8%	11%
7	14%	18%
6	20%	26%
5	28%	35%
4	38%	45%
3	48%	56%

Bocaccio, Greenling, and Cabezon Bag Limit Analyses

Alternative 2009-10 bag limits include an increase in the greenling and cabezon bag limits from one to two fish. CDFG used the RECFIN methodology for Hypothetical Bag Limit Analyses to determine increased impacts on greenlings and cabezon resulting from this change. We used the A+B1+B2 fish from 2004 for estimating the increased impact based on all fish encountered. The A fish are sampled dead fish. CDFG assumes for greenlings and cabezon that B1 includes filets and there were no fish thrown back dead as kelp greenlings and cabezon usually survive release. B2 includes live fish over the bag limit or under the size limit of 12". Since there is no way to estimate the proportion of fish that were undersized, this analysis also assumes there were no fish thrown back as sublegal and assumes that all B2 fish would be available if the bag limit were increased as the most conservative estimate. All bags over the hypothetical limit are then set to the hypothetical limit to calculate increased take. Results show a consistent increase in expected catch for the private/rental mode for both species, as well as increases in catch for cabezon shore modes (Table 4-58).

An alternative 2009-10 bocaccio bag limit includes a reduction in the bocaccio bag limit from Cape Mendocino to the Oregon border from 2 to 1 fish to protect bocaccio under the lower OY. The estimated saving in bocaccio as a result of this change is not possible to determine because the data cannot be summarized for only this region. Bocaccio is at the northern end of its distribution in this part of the state and the fishing effort is low relative to other regions. The estimated take of bocaccio in 2005 was minimal in this region; therefore, some small but undetermined amount of savings would be expected.

Conversely, an alternative bocaccio bag limit includes an increase in the bocaccio bag limit from one to two fish for the area south of Cape Mendocino so that the statewide bag limit would be two fish. CDFG used the RECFIN methodology for Hypothetical Bag Limit Analyses to determine increased impacts on bocaccio resulting from this change. The program uses the A+B1+B2 fish from 2005-07 for estimating the increased impact. The A fish are sampled dead fish. CDFG assumes for bocaccio that B1 includes filets and fish thrown back dead (over the bag limit) as bocaccio do not usually survive release. B2 fish were included as CDFG assumed most of the B2 fish were regulatory discards after the angler had already caught one bocaccio. All bags over the hypothetical limit are then set to the hypothetical limit to calculate increased take. The increased estimated impacts on bocaccio are strongly pronounced in the private/rental mode south of Pigeon Pt., especially in the Southern Management Area, and in the party/charter mode in the Southern Management Area (Table 4-58)

There have been anecdotal suggestions that there has been good bocaccio recruitment in southern California during 2003 and/or 2004. Those fish would be expected to recruit first to the recreational fishery in 2006 or 2007, so that additional unknown and unquantified impacts from new recruits could also occur, however, CDFG reviewed the 2005 and 2006 CRFS sample data to look for a spike in small fish with no success.

Table 4-58. Results of analyses of bag limit changes for bocaccio, greenlings, and cabezon.

Expected % increase in catch from 1 to 2-fish bag limit by fishing mode and management area

	Bocaccio		Greenlings		Cabezon			
	Fishing Mode							
Management Area	PC	PR	PC	PR	PC	PR	MM	BB
North	-	-	33	34	0	44	5	75
North-Central N of Pt Arena	0	0	0	47	0	20	14	0
North-Central S of Pt Arena	8	0	0	21	8	24	23	17
South-Central - Monterey	3	33	0	38	0	21	13	0
South-Central - Morro Bay	7	25	0	40	8	37	0	0
South	29	63	0	0	3	24	20	20

(PC = Party/Charter, PR = Private/Rental, MM = man-made structures, BB = beach/bank)

2009/2010 Ocean Whitefish Analysis

The objective o the ocean whitefish analysis is to determine rockfish bycatch rates associated with fisherman who are targeting ocean whitefish in southern California in the months of January and February (when rockfish is closed in southern California). Bocaccio is one species of concern that was looked at closely in this analysis. Due to a decline in bocaccio over the last 20 years, mostly because of commercial and recreational bycatch, regulations have become tighter over the years to protect them.

The methodology for this analysis is as follows:

1) A query was run to obtain the catch per angler for anglers whose primary target was Ocean White Fish for Private/Rental and Party/Charter modes for all months of 2005-2007, using the summarized RecFIN Survey Sample data site, version 3 (http://www.recfin.org/forms/samp3.html).

2) The average weight of discards over the entire period for A (sampler examined) fish were obtained. Since there are no weights available for B1 (angler reported retained) or B2 (angler reported discarded dead) fish, we will make an assumption that the average weight of A fish was the same for B1 and B2 fish. The average weight of A fish was obtained (in kg) for the time of 2005-07 using the summarized RecFIN Survey Sample data Version 3. The weight in kilograms was converted to metric tons.

3) The average effort for bottomfish trip type for December and March for 2005-07 was queried using the Summarized Marine Recreational Estimates tool on the RecFIN website (http://www.recfin.org/forms/est2004.html). The months of December and March were selected to represent January and February as a proxy estimate of effort.

Thus, we can multiply the A weight by the number of fish per angler and then multiply this by the average effort for the bottomfish trip type for Dec and March for 2005-07 to obtain a proxy estimate of the total catch. This will most likely be an overestimate because of the assumption that the average effort for bottomfish trip type will be representative of the effort for Ocean Whitefish. It will also be biased high because the average weight of A fish will probably be higher than those that were thrown back.

The analysis shows a high level of rockfish caught in association with ocean whitefish as a target trip type. In both boat fishing modes (Party/Charter and Private/Rental) the percentage of rockfish to the total catch was extremely high. For example, the Party and Charter mode rockfish catch made up 40% of the total catch (Figure 4-19), and the Private and Rental mode rockfish catch was 38% of the total catch Figure 4-20).

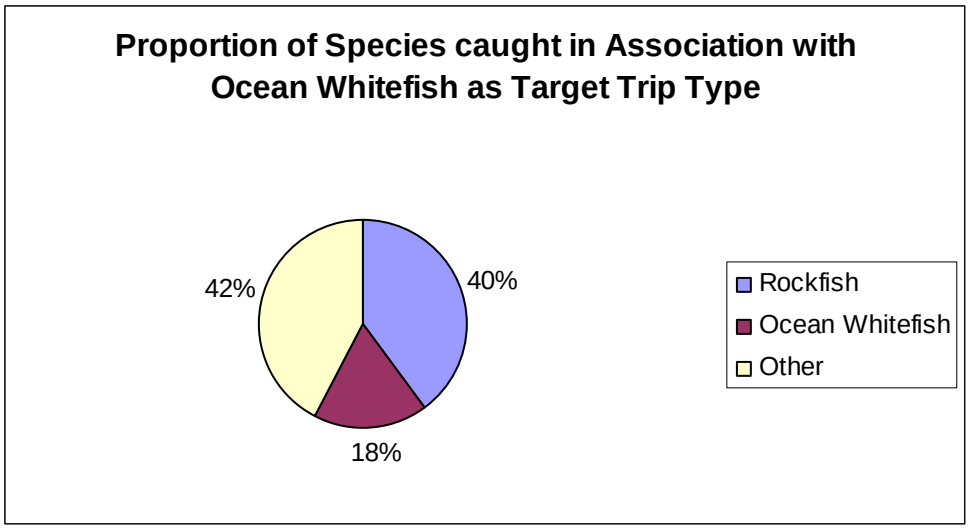

Figure 4-19. The proportion of rockfish and other species caught in association with Ocean Whitefish for Party and Charter boats from 2005-07.

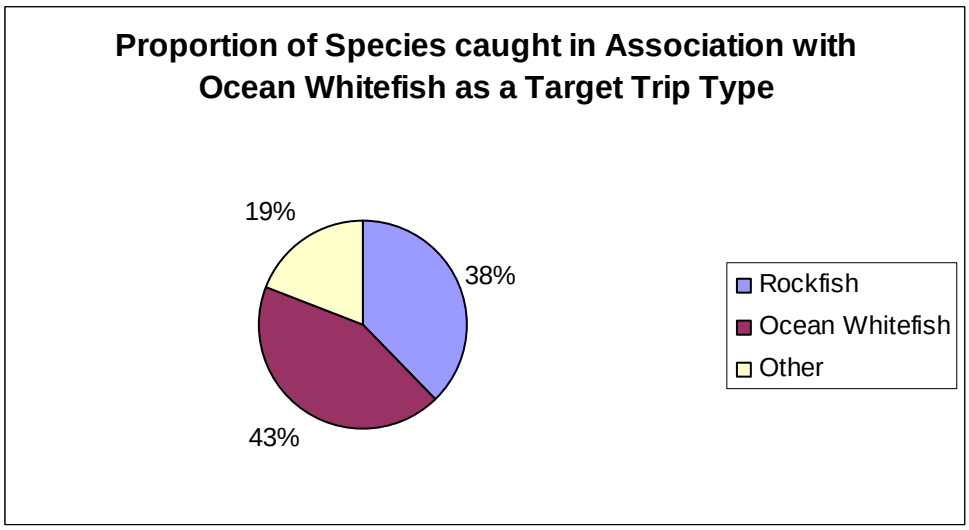

Figure 4-20. The proportion of rockfish and other species caught in association with ocean whitefish for Private and Rental boats from 2005-07.

The high percentage of rockfish caught when targeting ocean whitefish may mean that ocean whitefish targeted trips are not efficient at catching ocean whitefish and could cause more problems in the future with this high bycatch of rockfish.

Specifically, one species of concern as bycatch for ocean whitefish trip types is bocaccio. The analysis shows that an estimation of 3.61 mt of bocaccio will be caught in association with ocean whitefish as a trip target type in Party and Charter mode for the combined months of January and February. The bocaccio harvest guideline (HG) for the state of California for 2009-10 is 66.3 mt. This bycatch of 3.61 mt is 5% of the total HG for 2009/2010. If statewide bocaccio catch levels closely approach HGs, the effects of ocean whitefish trips on bocaccio catch levels may preclude opening ocean whitefish seasons during January and February in southern California.

Lingcod-Yelloweye Rockfish Associations

One measure under consideration for the 2009-10 groundfish management cycle involves a decrease in the lingcod recreational and commercial minimum size limit from 24 inches to 22 inches. This measure is being considered for areas in the northern part of the state to help relieve fishing pressure on yelloweye rockfish, an overfished species. In analyzing the potential effects of this measure, it is necessary to understand the relationship between lingcod catch and yelloweye rockfish bycatch.

Yelloweye rockfish is the primary overfished species of concern in California, and there is concern that recreational boat-based trips catching lingcod have relatively high yelloweye rockfish encounter rates. The California yelloweye rockfish OY catch-sharing option has yet to be finalized by the Council; however, regardless of which option is chosen for California, yelloweye rockfish will continue to be the most constraining species for the state. Lowering the encounter rate of this species will ultimately lead to more fishing opportunities for the public.

The objective of this analysis is to determine the amount of yelloweye rockfish encountered on recreational boat-based trips where lingcod are caught. The goal is to determine the extent of association between these two species.

This analysis involved two parts. Both parts used RecFIN sample data from the CRFS database. For the purposes of this study:

- All catch data are from recreational sector boat-based anglers using primarily hook-and-line gear from all marine areas north of Point Sal, Santa Barbara County.
- Encounter is defined as an angler interaction with a fish, either harvested or released.
- Catch is defined as all fish caught by the fishing gear of the angler and brought to the surface for removal. A catch event is the same as an encounter.
- Landed is defined as the harvested catch examined by a fisheries sampler ("A" catch).
- Released is defined as the bycatch "let go" by anglers that was reported to a fisheries sampler in either alive or dead condition ("B2" and "B1" catch).

Part 1: To get an idea of the number of yelloweye rockfish encountered relative to the number of lingcod encountered, sample data were extracted pertaining to all catch events in which lingcod was represented (A, sampler-examined catch, or B1+B2, angler-reported catch). The 2004-07 sample data were extracted for the CRFS districts north of Point Sal (Redwood, Wine, San Francisco, and Central). Data were arranged by target species (not necessarily lingcod) and year. A sum of the number of fish harvested or released was calculated for lingcod and yelloweye rockfish by year, district and fishing mode (party/charter or private/rental). CRFS districts were then reconfigured into CDFG Management Areas (Northern, North-Central, and South-Central). A ratio of yelloweye rockfish catch to lingcod catch was determined for each criteria mentioned above.

These data only include trips where lingcod were represented in the catch, regardless of target species. Trip target species was not of concern because associations can occur regardless of what fish anglers target. However, using the straight sample data from RecFIN does not allow analysis by trip ID. True associations between species have to be somewhat inferred because there is no way to link catches of lingcod and yelloweye rockfish within the same trip (e.g. there may have been 20 lingcod and zero yelloweye rockfish caught on trip X, but only one lingcod and 20 yelloweye rockfish caught on trip Y). Therefore, this method is a "quick and dirty" analysis.

Part 2: To get a better idea of the number of yelloweye rockfish encountered relative to the number of lingcod encountered, sample data were extracted from an Access database where data is linked by trip ID. 2005-2007 lingcod and yelloweye rockfish data were pulled from this database for all sampler-examined catch (A). The same was done for all angler-reported catch (B1+B2). The two outputs were then combined to give all trips where lingcod *and* yelloweye were encountered (both species on the same trip). Final data were arranged and analyzed in the same format described above under Part 1: by year, district and mode. A ratio of yelloweye rockfish catch to lingcod catch was determined for each criteria mentioned above.

Table 4-59 shows the catch ratios of yelloweye rockfish to lingcod to be much higher in the Redwood and Wine CRFS Districts, corresponding to the Northern Management Area and the portion of the North-Central Management Area north of Marin County, respectively. The Central CRFS District, or the South-Central Management Area, has much lower yelloweye rockfish-to-lingcod catch ratios. In fact, yelloweye rockfish catch in relation to lingcod catch south of San Francisco is very low. Yellow shading depicts ratios of yelloweye rockfish to lingcod of 1:10 or greater.

Both party/charter (PC) and private/rental (PR) boat modes in the Redwood and Wine Districts have relatively high yelloweye rockfish-to-lingcod catch ratios. In the Northern Management Area, more yelloweye rockfish were encountered on PR trips, whereas in the North-Central Management Area, the majority of yelloweye rockfish were encountered on PC trips; however, PR trips were also high. The years 2007 and 2006 show the highest associations between yelloweye rockfish catch and lingcod catch.

The more complete analysis with the Access database shows a similar trend as in Part 1; however the ratios of yelloweye rockfish to lingcod are much higher. Table 4-60 shows yelloweye rockfish are caught at least half as often as lingcod for the northern part of the state. In many instances, yelloweye rockfish were caught as often as lingcod, sometimes twice as often, and in one case, five times as often as lingcod. The most robust sample sizes come from the PR mode. In the PR mode north of Pigeon Point, the catch rates of yelloweye to lingcod are well above the 50% mark in 2006 and 2007. In 2007 specifically, the catch ratios were well above 1:1. This more thorough analysis also shows a greater association between these two species in the South-Central Management Area and in the southern portion of the North-Central Management Area (San Francisco). Bold values depict ratios of yelloweye rockfish to lingcod of 1:2 or greater (i.e. where yelloweye rockfish were caught at least half the time). Italicized values represent at least a 1:1 ratio, and values surrounded in bold borders represent ratios of at least 1:1 where the sample sizes are robust.

Figures 4-21 and 4-22 are Venn diagrams of the sampler-examined and angler-reported data, respectively, showing the number of lingcod caught, and the number of yelloweye rockfish caught for the period of 2005-07. From 2005-07, fisheries samplers examined 172 yelloweye rockfish; 76% of those fish were caught in conjunction with landed lingcod.

The results for the yelloweye rockfish bycatch analysis show that, at least in the northern portion of the state, lingcod catch (harvested and released) is highly associated with yelloweye rockfish encounters. This has been especially true for the past two groundfish seasons. Lowering the recreational lingcod minimum size limit to 22 inches may get anglers off the water sooner (by meeting their bag limit in less time), thus decreasing the amount of yelloweye rockfish encounters. However, a lower size limit might persuade more anglers to participate in the lingcod fishery as a whole, landing more fish. More lingcod caught by boat-based anglers will ultimately mean more yelloweye rockfish caught as well.

Table 4-59. Sampler examined and angler reported harvested and released numbers of counted fish sampled from marine recreational anglers using all gear by year for all boat based fishing in all marine areas for trips where filtered species: lingcod were caught for districts 6-3 (Redwood, Wine, SF, Central) for January 2004 - December 2007.

Management Area	CRFS District by Mode & Year						
Northern	Redwood PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	*All trips contain lingcod (AB1B2), some trips targeted lingcod, others just included lingcod as AB1B2		
	2004	224	7	0.0313			
	2005	123	1	0.0081			
	2006	287	11	0.0383			
	2007	381	53	**0.1391**			
	total	1015	72	0.0709			
	Redwood PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD			
	2004	3941	168	0.0426			
	2005	5181	199	0.0384			
	2006	4618	556	**0.1204**			
	2007	3636	857	**0.2357**			
	total	17376	1780	0.1024			
	Wine PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	# LNGCD	# YE	Ratio of YE to LNGCD
	2004	171	2	0.0117	636	2	0.0031
	2005	43	2	0.0465	487	0	0.0000
	2006	48	2	0.0417	524	2	0.0038
	2007	32	7	**0.2188**	425	3	0.0071
	total	294	13	0.0442	2072	7	0.0034
	Wine PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD	# LNGCD	# YE	Ratio of YE to LNGCD
	2004	2158	20	0.0093	4433	20	0.0045
	2005	2496	59	0.0236	6071	63	0.0104
	2006	2569	155	0.0603	6422	180	0.0280
	2007	923	155	**0.1679**	2241	161	0.0718
North-Central	total	8146	389	0.0478	19167	424	0.0221
	San Fran PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	The North-Central Management Area = District Wine + District SF		
	2004	465	2	0.0043			
	2005	444	0	0.0000			
	2006	476	2	0.0042			
	2007	393	3	0.0076			
	total	1778	7	0.0039			
	San Fran PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD			
	2004	2275	0	0.0000			
	2005	3575	4	0.0011			
	2006	3853	25	0.0065			
	2007	1318	6	0.0046			
	total	11021	35	0.0032			

Table 4-59. Sampler examined and angler reported harvested and released numbers of counted fish sampled from marine recreational anglers using all gear by year for all boat based fishing in all marine areas for trips where filtered species: lingcod were caught for districts 6-3 (Redwood, Wine, SF, Central) for January 2004 - December 2007 (continued).

Management Area	CRFS District by Mode & Year			
South-Central	Central PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD
	2004	1151	0	0.0000
	2005	634	32	0.0505
	2006	169	0	0.0000
	2007	232	1	0.0043
	total	2186	33	0.0151
	Central PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD
	2004	6932	1	0.0001
	2005	4254	10	0.0024
	2006	4105	1	0.0002
	2007	2234	3	0.0013
	total	17525	15	0.0009

Table 4-60. Sampler examined and angler reported harvested and released numbers of counted fish sampled from marine recreational anglers using all gear by year for all boat-based fishing in all marine areas for trips where lingcod were caught with yelloweye rockfish for districts 6-3 (Redwood, Wine, SF, Central) for January 2005 – December 2007.

Management Area	CRFS District by Mode & Year				
Northern	Redwood PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	Data are for boat-based (linked) trips with all gear types in marine waters where both lingcod **and** yelloweye rockfish were encountered (AB1B2)
	2005	0	0	0.0000	
	2006	6	9	*1.5000*	
	2007	17	27	*1.5882*	
	total	23	36	1.5652	
	Redwood PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD	
	2005	288	140	0.4861	
	2006	619	418	**0.6753**	
	2007	514	500	**0.9728**	
	total	1421	1058	0.7445	Wine+ SF

Table 4-60. Sampler examined and angler reported harvested and released numbers of counted fish sampled from marine recreational anglers using all gear by year for all boat-based fishing in all marine areas for trips where lingcod were caught with yelloweye rockfish for districts 6-3 (Redwood, Wine, SF, Central) for January 2005 – December 2007 (continued).

	Wine PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	# LNGCD	# YE	Ratio of YE to LNGCD
	2005	4	2	**0.5000**	4	2	**0.5000**
	2006	1	1	*1.0000*	3	2	**0.6667**
	2007	1	5	*5.0000*	3	6	*2.0000*
	total	6	8	1.3333	10	10	1.0000
	Wine PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD	# LNGCD	# YE	Ratio of YE to LNGCD
	2005	86	49	**0.5698**	86	49	**0.5698**
	2006	151	115	**0.7616**	178	132	**0.7416**
	2007	70	104	1.4857	83	109	1.3133
North-Central	total	307	268	0.8730	347	290	0.8357
	San Fran PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD	The North-Central Management Area = District Wine + District SF		
	2005	0	0	0.0000			
	2006	2	1	**0.5000**			
	2007	2	1	**0.5000**			
	total	4	2	1.0000			
	San Fran PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD			
	2005	0	0	0.0000			
	2006	27	17	**0.6296**			
	2007	13	5	0.3846			
	total	40	22	0.5500			
	Central PC Boats	# LNGCD	# YE	Ratio of YE to LNGCD			
	2005	0	0	0.0000			
	2006	0	0	0.0000			
	2007	0	0	0.0000			
South-Central	total	0	0	0.0000			
	Central PR Boats	# LNGCD	# YE	Ratio of YE to LNGCD			
	2005	3	1	0.3333			
	2006	6	1	0.1667			
	2007	3	2	0.6667			
	total	12	4	0.3333			

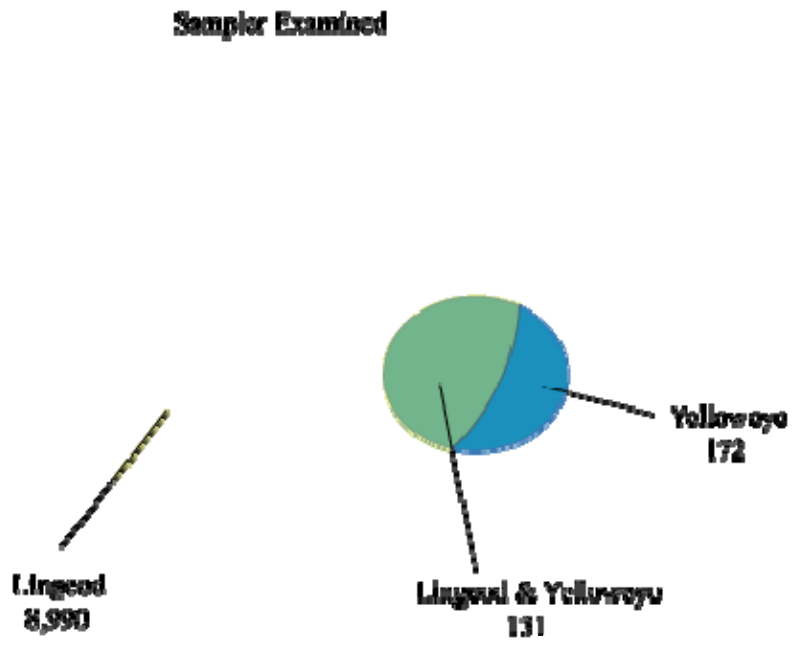

Figure 4-21. Sampler-examined catch in number of fish (harvested and released) for lingcod and yelloweye rockfish.

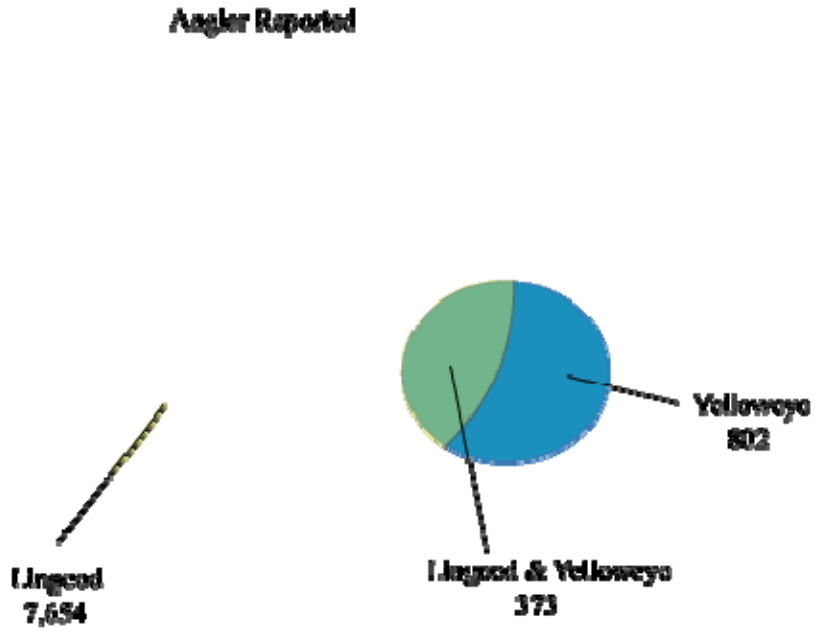

Figure 4-22. Angler reported catch in number of fish (harvested and released) for lingcod and yelloweye rockfish.

4.5.2 Impacts of Management Measure Alternatives by Sector

4.5.2.1 *Limited Entry Non-Whiting Trawl*

The alternative trip limits and RCA configurations for the non-whiting trawl sector designed to stay within the constraints imposed by the rebuilding alternatives are described in section 2.1.1.8.

One Bottom Trawl Gear on Board North of 40°10' N Latitude

The intention of the one bottom trawl gear on board is to increase the certainty that large footrope gear is not being used shoreward of the Rockfish Conservation Area (RCA). Large footrope is better able to fish in rocky habitats and using this gear in shoreward areas tends to increase bycatch of overfished species found on the shelf. Additionally, allowing a vessel to fish only one bottom trawl net type has been viewed as a potential way to more accurately predict target fishery participation. The bycatch model estimates depleted species' impacts, shoreward and seaward of the RCA. Allowing only one bottom trawl net type to be used, or aboard the vessel, during an entire cumulative fishing period is one way of achieving a more accurate prediction.

If a vessel chooses to use multiple bottom trawl gears during one trip, there could be trip limit enforcement concerns. Cumulative limits are applied to the most restrictive gear used during the period. Common practice is to record the gear which caught the most fish (i.e., dominant gear) on the landing receipt, when multiple gear types are used. If most of the trip employs a less restrictive gear and the fish ticket only reflects the dominant gear, then enforcing the proper cumulative limit could become problematic.

Additionally, sampling concerns are associated with the use of multiple trawl gears during one trip and implementation of a one trawl gear onboard regulation would resolve these concerns. Fish are not kept in separate holds by gear type and therefore samples taken at the dock cannot be associated to a specific gear or area fished (shoreward or seaward of the RCA). Gear and area codes cannot be recorded on fish tickets and logbooks when more than one gear is used. When samples cannot be linked to the gear and area fished, they are unable to be used, which results in a loss of important information used in stock assessments.

No data are available to inform the number of vessels or trips where multiple trawl gears are on board a vessel. However, landing summaries indicate the number of trips where multiple gears have been used. In Washington and California, samplers rarely see multiple trawl gears used during one trip (even though vessels may have two gears on board). From 2005-07, approximately 2.7% of Oregon landings were composed of trips where multiple gears were used (Table 4-61). The number of trips where multiple gears were used has declined in recent years. Using multiple gears on one trip primarily occurs in Astoria (Table 4-62).

Table 4-61. Number of non-whiting trawl trips using multiple gear landed into Oregon.

Year	Number of Multiple Gear Trips	Total Number of Bottom Trawl Trips	% Multiple Gear Trips
2005	28	1,040	2.69%
2006	32	1,119	2.86%
2007	18	689	2.61%

Table 4-62. Number of non-whiting trawl trips using multiple gear landed into Astoria, Oregon.

Year	Number of Multiple Gear Trips	Total Number of Bottom Trawl Trips	% Multiple Gear Trips
2005	27	466	5.79%
2006	30	550	5.45%
2007	18	300	6.00%

Several issues were identified with a one trawl gear provision. If trawlers are held to a single trawl gear during a period, this may inadvertently result in increased trawl effort on the shelf for those vessels that currently fish both seaward and shoreward but are restricted to the smaller limits. Based on historical practices, if a one gear on board provision was adopted, it would primarily constrain Oregon vessels, and particularly those vessels in Astoria. In addition, switching between one trawl gear and another may force vessels to incur a cost that they currently do not incur, thus having an adverse economic impact to trawl vessels. Anecdotal evidence indicates that the cost to switch nets ranges from approximately $100 to $300.

4.5.2.2 *Limited Entry Whiting Trawl*

The implications to 2009-10 whiting fisheries posed by alternative widow rockfish OYs are described in section 2.1.1.8.

Bycatch limits have been used to constrain the incidental catch of overfished rockfish species in the non-tribal Pacific whiting fishery (i.e., all sectors) since 2004 (Table 4-63). If a bycatch limit is reached, all commercial Pacific whiting fisheries are closed for the remainder of the year, regardless of whether or not the Pacific whiting allocations have been reached. This catch management tool has been used to prevent exceedance of ABCs and OYs and also to prevent harm to other fishery sectors that may be impacted by higher than expected catch amounts of bycatch species.

Table 4-63. Range of Overfished Species Bycatch Limits (mt) set by the Pacific Fishery Management Council for the non-tribal Pacific whiting fishery.

Species	**2004**	**2005**	**2006**	**2007**	**2008**
Canary	6.2 – 7.3	4.7	4.0 – 4.7	4.7	4.7
Darkblotched	9.5	n/a	25	25	40
Widow	n/a	200 – 212	200 – 220	220 – 275	275 a/
a/ Year 2008 values represent the numbers currently outlined in the Federal Regulations, which can be modified by the Council during inseason action.					

Historically, the Council has adopted the ABC/OY of Pacific whiting while taking into account bycatch projections, in order to promote harvesting of the whiting OY relative to overfished species constraints. This performance standard approach has worked well. However, in 2007, the non-tribal Pacific whiting fishery was closed when the widow bycatch limit for all sectors was exceeded. This was the first time the non-tribal whiting fishery had been closed upon attainment of a bycatch limit prior to achieving the whiting OY. The fishery did reopen on October 7, 2007 after the Council increased the widow cap from 220 to 275 mt (72 FR 56664, October 4, 2007).

In response to the early season closure, the Council requested the analysis of several bycatch limit management measures for the non-tribal Pacific whiting fishery including 1) sector-specific bycatch caps, 2) seasonal releases of bycatch limits, 3) closing the fishery upon attainment of a bycatch limit, and 4) depth-based restrictions as an inseason measure upon the projected attainment of one or more

bycatch caps for canary rockfish, widow rockfish, and darkblotched rockfish or the Chinook harvest guideline. The goal of these management measures is to reduce cross-sector competition and reduce the race-for-bycatch and to reduce bycatch.

2009-10 Area Restriction Alternatives

In order to assess the effects of Rockfish Conservation Areas in the whiting fishery, bycatch rates were calculated by sector and by depth. This data was taken from at-sea observers in the at-sea fishery, and from logbook data in the shoreside fishery. Bycatch rates are defined as the poundage of overfished species taken per pound of whiting. These bycatch rates were applied to each sector's allocation of a hypothetical 250,000 metric ton whiting OY to simulate the possible effects of implementing RCAs on the whiting fishery. Depth contours of 100, 125, and 150 fm were analyzed.

This bycatch rate analysis suggests that it is not unequivocally the case that deeper depths result in less bycatch. In fact, for widow and darkblotched deeper depths may actually result in a higher rate, while canary and yelloweye rates and associated catch may decrease at depths greater than 150 fm. These rates and their implications appear to vary by sector as well. Table 4-64 illustrates the effect of this approach on bycatch of overfished groundfish.

Since the whiting fishery is managed with a performance standard management tool (bycatch limits), the actual performance of the whiting fishery with respect to bycatch could differ quite substantially from the table above. Indeed, depending on fleet behavior, bycatch could be substantially greater or substantially lower than the numbers indicated above. One reasonable approach at assessing bycatch of overfished species in a performance standard-based fishery is to assess the risk of encountering relatively large amounts of overfished species on a depth basis. The concept behind this approach is that industry is attempting to avoid overfished stocks in order to access whiting. Successful avoidance will mean the fishery can continue operating. However, there is some uncertainty associated with fishing and relatively large and unexpected overfished species catch events can occur. The risk of encountering a relatively large and unexpected catch event can be assessed in a simple fashion by examining the variability of overfished species catch and the size of certain catch events by depth.

A simple, somewhat qualitative, assessment of risk was done to inform the risks associated with various depth contours and the associated implementation of a whiting fishery RCA. This simple assessment was done by plotting the catch of overfished groundfish by whiting sector by depth (Figures 4-23 to 4-28). These figures indicate that substantially more risk of widow rockfish and canary rockfish encounters may exist when participants are operating at depths less than 150 fm than when they are operating at depths greater than 150 fm. The greatest amount of risk may exist when operating between 50 and 125 fm. This information suggests that the implementation of a 150 fm RCA in the whiting fishery may minimize the risk that relatively large encounters of canary and widow rockfish will occur. The minimization of this risk may mean the fishery is better able to prosecute whiting while avoiding overfished stocks.

Table 4-64. Predicted bycatch by non-tribal sectors of the whiting trawl fishery under alternative depth-based RCA restrictions.

Fm Restriction	Sector	Allocation	Canary	Darkblotched	POP	Widow	Yelloweye
No Fm Restriction	Tribal	32,500	0.98	0.00	0.51	2.50	0.00
	Mothership	51,720	1.98	5.83	1.05	113.78	0.01
	CP	73,270	0.24	5.73	1.08	139.21	0.01
	Shoreside	90,510	1.51	2.72	0.32	144.82	0.02
	Total	248,000	4.71	14.28	2.96	400.31	0.04
100 Fm Restriction	Tribal	32,500	0.98	0.00	0.51	2.50	0.00
	Mothership	51,720	2.06	6.24	1.10	117.18	0.00
	CP	73,270	0.24	5.44	1.08	136.48	0.01
	Shoreside	90,510	2.64	8.30	0.67	121.43	0.01
	Total	248,000	5.91	19.98	3.36	377.59	0.02
125 Fm Restriction	Tribal	32,500	0.98	0.00	0.51	2.50	0.00
	Mothership	51,720	2.66	5.12	1.28	104.07	0.00
	CP	73,270	0.18	4.90	0.66	139.64	0.01
	Shoreside	90,510	3.08	11.36	0.41	120.59	0.01
	Total	248,000	6.90	21.38	2.86	366.80	0.02
150 Fm Restriction	Tribal	32,500	0.98	0.00	0.51	2.50	0.00
	Mothership	51,720	0.27	5.27	1.60	93.94	0.00
	CP	73,270	0.13	3.98	0.48	196.90	0.01
	Shoreside	90,510	0.56	12.44	0.48	118.65	0.01
	Total	248,000	1.94	21.69	3.06	411.99	0.02

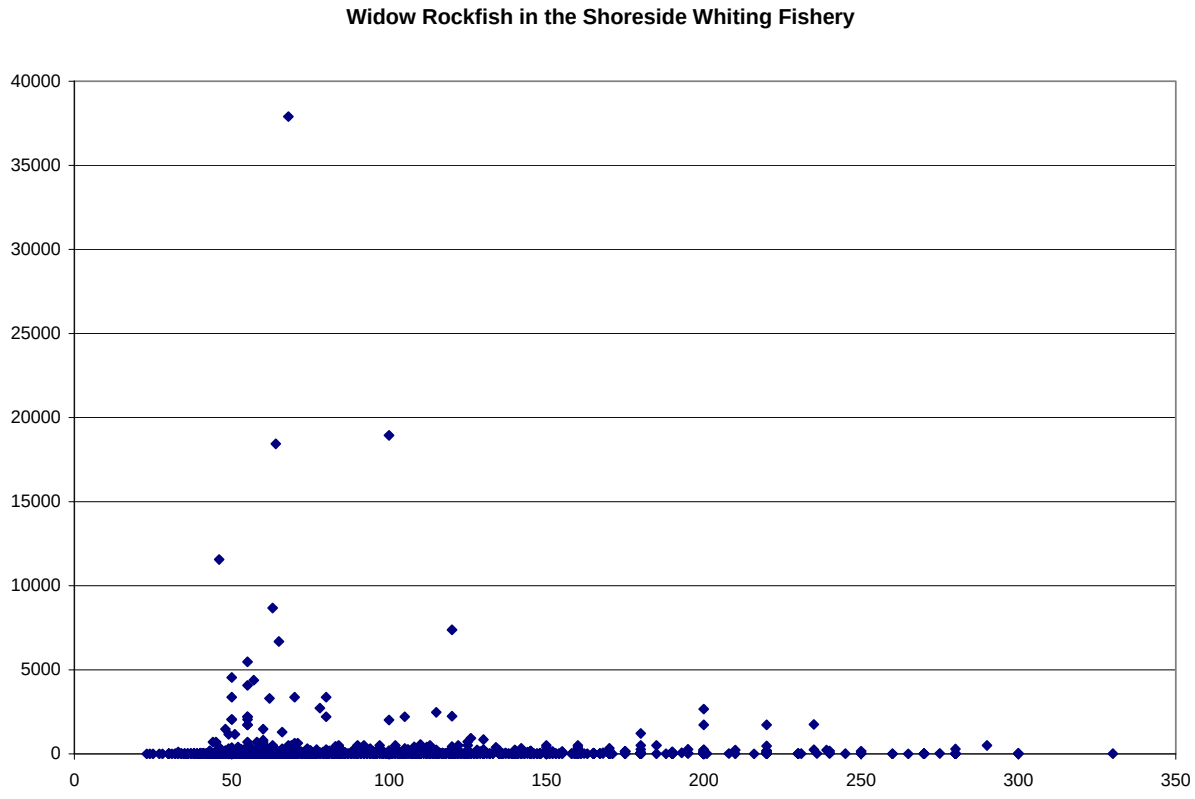

Figure 4-23. Plot of widow rockfish caught in the shoreside whiting fishery by depth (fm).

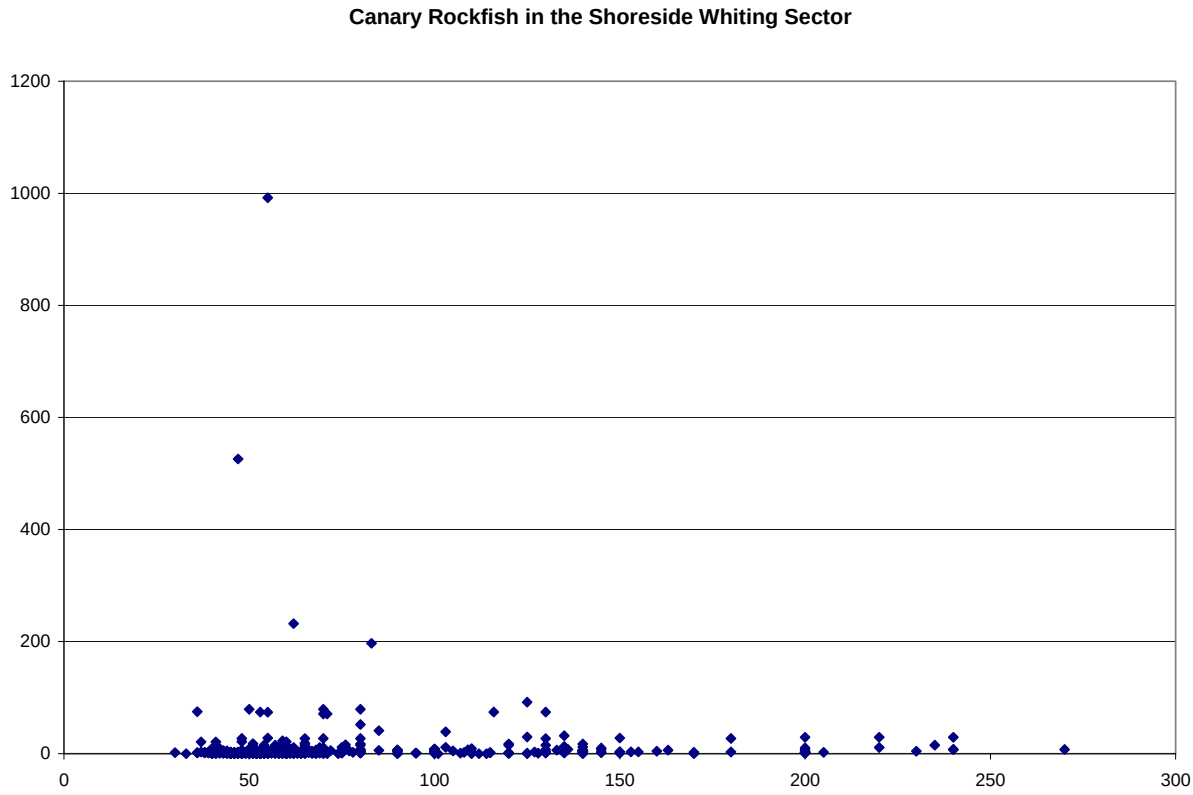

Figure 4-24. Plot of canary rockfish caught in the shoreside whiting fishery by depth (fm).

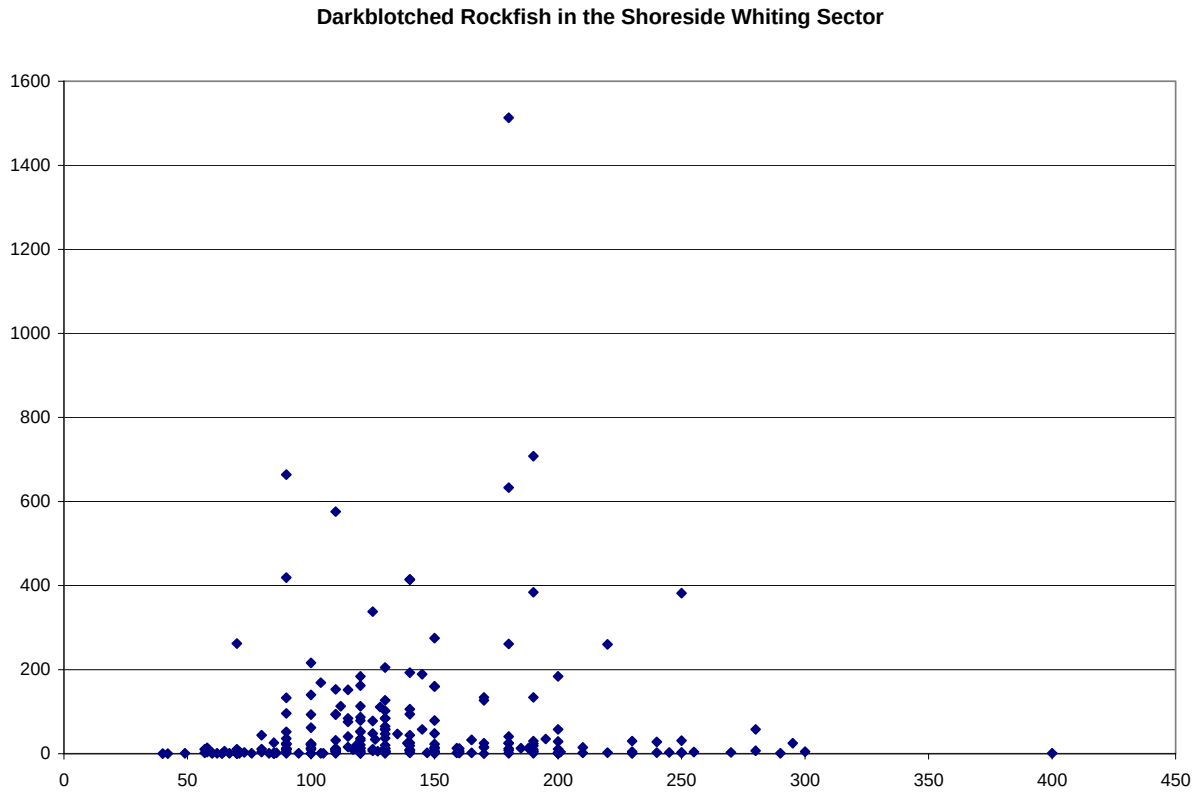

Figure 4-25. Plot of darkblotched rockfish caught in the shoreside whiting fishery by depth (fm).

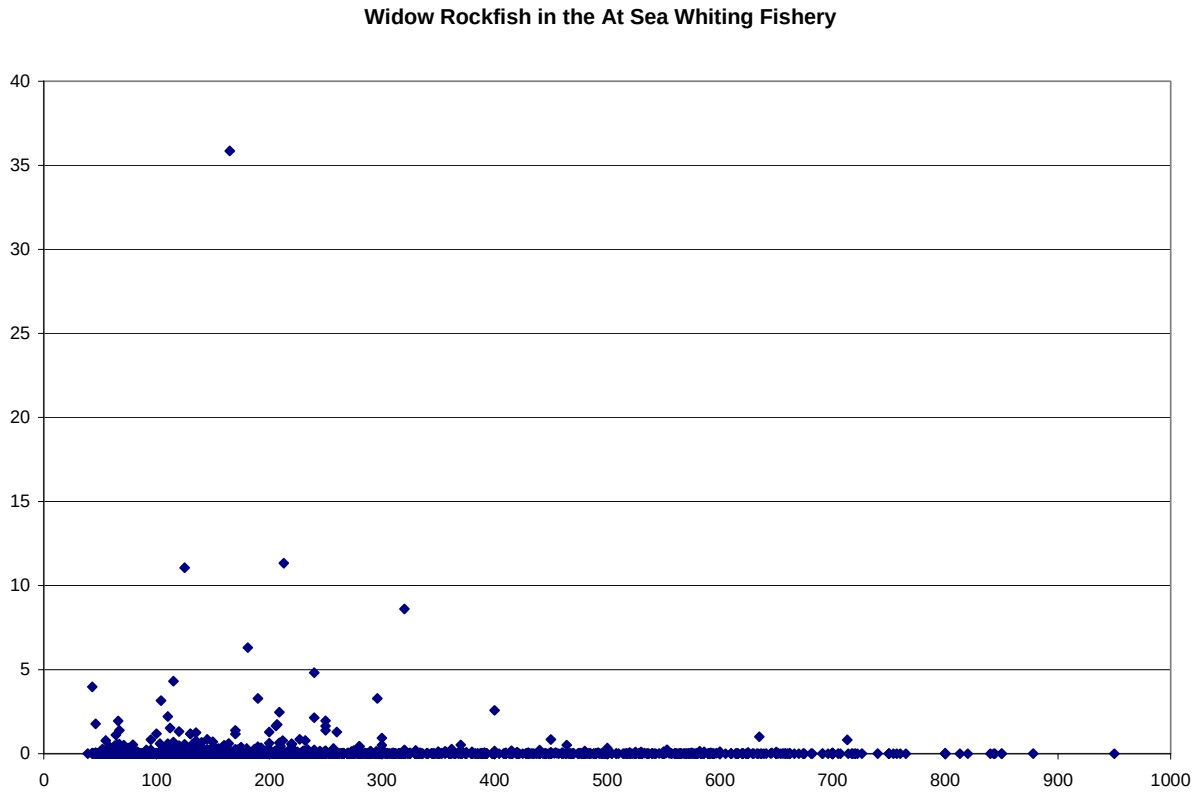

Figure 4-26. Plot of widow rockfish caught in the at-sea whiting fishery by depth (fm).

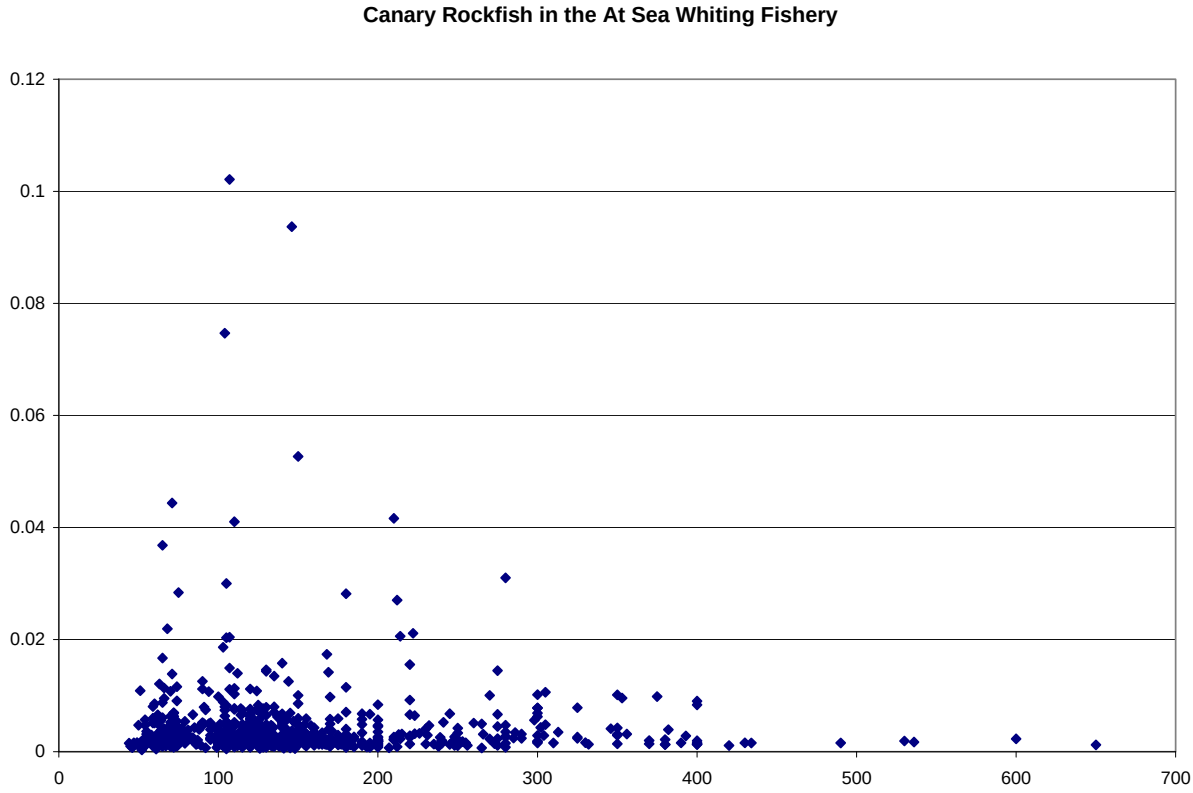

Figure 4-27. Plot of canary rockfish caught in the at-sea whiting fishery by depth (fm).

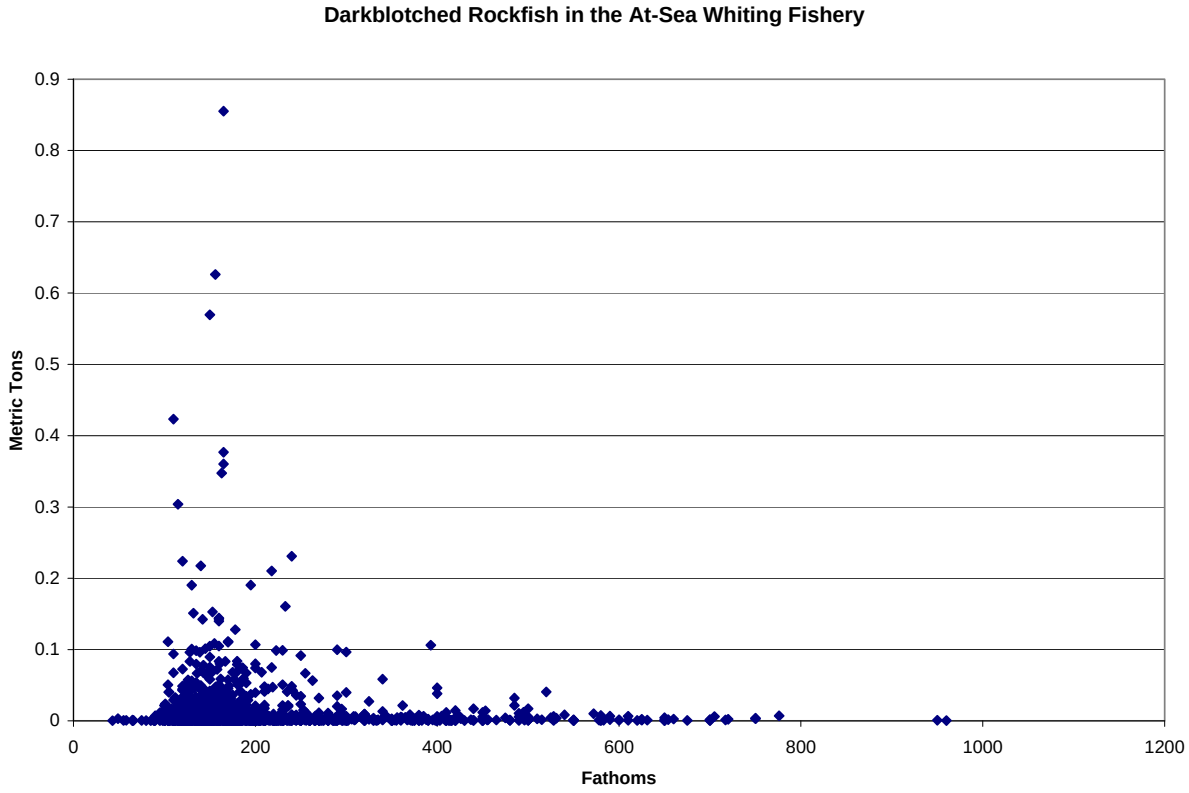

Figure 4-28. Plot of darkblotched rockfish caught in the at-sea whiting fishery by depth (fm).

Sector-specific Bycatch Caps

The Council recommended two options for analysis to determine sector-specific bycatch caps: 1) pro-rata distribution based on whiting allocations and 2) distributions based on whiting bycatch model rates. Additionally, the Council specified two provisions that provide for an unused bycatch limit to either be rolled over to other non-tribal whiting sectors on a pro-rata basis (based on initial whiting allocations), or for use as residual yields by any other sector as needed.

Pro-Rata Distribution Results

Pro-rata distributions of overfished species currently managed with bycatch limits in the Pacific whiting fishery are found in Tables 4-65 to 4-68. The distributions are based on the 2008 status quo bycatch limits as well as bycatch projections from the whiting bycatch model for the highest and lowest whiting OYs specified by the Council for analysis (Tables 2-1a and 2-1b).

Some caution should be exercised when interpreting the bycatch projections from the model as it is based on an extension of the linear trend analysis for predicting widow bycatch that the Groundfish Management Team has been using since the start of 2007. Data used to inform the model is through 2007, and therefore, the trend is predicting bycatch rates two years into the future. This creates some substantial uncertainty, so the estimates are best treated as order of magnitude estimates. The whiting bycatch model uses both weighted averages (canary and darkblotched) and a linear interpolation (widow) from 2004-2007 fishery data. This approach assumes that fleet depth distributions are similar

to 2004-2007. However, in 2008 the Council adopted a new bycatch limit strategy which is intended to result in more catcher-processor and mothership effort occurring in deeper depths, potentially reducing canary and widow rockfish bycatch rates relative to previous years. The expected reduction in widow rockfish impacts as a result of the potential effort shift, are provided in Table 4-68.

Table 4-65. Predicted sector distributions of canary rockfish under status quo bycatch limits, a high whiting OY scenario, and a low whiting OY scenario.

Non-tribal Whiting Sector	Status Quo Distribution (mt)	High Whiting OY Bycatch Projection (mt)	Low Whiting OY Bycatch Projection (mt)
Catcher-Processor	1.60	2.16	0.64
Mothership	1.13	1.52	0.45
Shoreside	1.97	2.67	0.79
Total	4.7	6.35	1.89

Table 4-66. Predicted sector distributions of darkblotched rockfish under status quo bycatch limits, a high whiting OY scenario, and a low whiting OY scenario.

Non-tribal Whiting Sector	Status Quo Distribution (mt)	High Whiting OY Bycatch Projection (mt)	Low Whiting OY Bycatch Projection (mt)
Catcher-Processor	13.60	8.27	2.46
Mothership	9.60	5.84	1.74
Shoreside	16.80	10.22	3.04
Total	40	24.33	7.23

Table 4-67. Predicted sector distributions of widow rockfish under status quo bycatch limits, a high whiting OY scenario, and a low whiting OY scenario.

Non-tribal Whiting Sector	Status Quo Distribution (mt)	High Whiting OY Bycatch Projection (mt)	Low Whiting OY Bycatch Projection (mt)
Catcher-Processor	93.50	230.54	68.53
Mothership	66.00	162.74	48.37
Shoreside	115.50	284.79	84.66
Total	275	678.07	201.56

Table 4-68. Predicted sector distributions of widow rockfish under status quo bycatch limits, a high whiting OY scenario, and a low whiting OY scenario. the bycatch projections for the high and low whiting OY scenarios are adjusted for the new darkblotched rockfish strategy.

Non-tribal Whiting Sector	Status Quo Distribution (mt)	High Whiting OY Bycatch Projection (mt)	Low Whiting OY Bycatch Projection (mt)
Catcher-Processor	13.60	192.12	57.11
Mothership	9.60	135.61	40.31
Shoreside	16.80	237.33	70.55
Total	40	565.06	167.97

Sector-Specific Bycatch Limits

Sector-specific bycatch limits were also calculated based on the whiting bycatch model projections (Tables 4-69 to 4-71). Distributions are based on the 2008 whiting OY as well as the highest and lowest whiting OYs specified by the Council for analysis (Tables 2-1a and 2-1b). As mentioned previously, some caution should be exercised when interpreting the bycatch projections from the model as it is based on an extension of the linear trend analysis for predicting widow bycatch two years into the future. This creates some substantial uncertainty, so the estimates are best treated as order of magnitude estimates. Also, this approach assumes that fleet depth distributions are similar to 2004-2007 and does not account for the potentially deeper depth distributions of the at-sea fleet which may occur in 2008. The expected reduction in widow rockfish impacts, as a result of the potential effort shift, are estimated in the final column of each table.

Table 4-69. Bycatch model predictions of canary, darkblotched, and widow rockfish by sector under a high whiting OY scenario.

Non-tribal Whiting Sector	Canary (mt)	Darkblotched (mt)	Widow (mt)	Widow - New Strategy (mt)
Catcher-Processor	0.41	9.76	237.29	
Mothership	3.37	9.94	193.94	
Shoreside	2.57	4.63	246.84	
Total	6.35	24.33	678.07	565.06

Table 4-70. Bycatch model predictions of canary, darkblotched, and widow rockfish by sector under the status quo whiting OY.

Non-tribal Whiting Sector	Canary (mt)	Darkblotched (mt)	Widow (mt)	Widow - New Strategy (mt)
Catcher-Processor	0.26	6.18	150.22	
Mothership	2.13	6.29	122.78	
Shoreside	1.63	2.93	156.27	
Total	4.02	15.40	429.28	357.73

Table 4-71. Bycatch model predictions of canary, darkblotched, and widow rockfish by sector under a low whiting OY scenario.

Non-tribal Whiting Sector	Canary (mt)	Darkblotched (mt)	Widow (mt)	Widow - New Strategy (mt)
Catcher-Processor	0.12	2.90	70.54	
Mothership	1.00	2.95	57.65	
Shoreside	0.76	1.38	73.37	
Total	1.89	7.23	201.56	167.97

The sector allocation of whiting differs significantly from historical utilization of bycatch by sector (Table 4-72). For example, historically the catcher-processor sector utilized 7.91 percent of the total canary rockfish take while successfully achieving the sector's whiting allocation. Under a pro-rata distribution, the catcher-processor fleet would receive 34 percent, an allocation that may be unnecessarily high. Additionally, data indicates that the darkblotched rockfish limit has been restricting fishing flexibility for both the catcher-processor and mothership fleets. Historically, the catcher-processor and mothership fleets utilized 42 percent and 37.57 percent, respectively, of the total darkblotched rockfish take (Table 4-69). Shoreside, however, only used 20.42 percent. The pro-rata distribution based on the whiting allocation would result in 42 percent of the darkblotched rockfish limit being distributed to the shoreside fleet, which may be unnecessarily high and may further constrain the at-sea sectors. Therefore, adjustments to the pro-rata distributions, taking into consideration historical utilization, may be necessary to prevent setting an overly constraining or unreasonably high limit.

Table 4-72. Historical utilization (2005-07) of overfished species impacts, compared to the whiting sector allocation.

Non-tribal Whiting Sector	Canary Rockfish	Darkblotched Rockfish	Widow Rockfish	Whiting Allocation
Catcher-Processor	7.91%	42.00%	31.96%	34%
Mothership	32.36%	37.57%	31.55%	24%
Shoreside	59.73%	20.42%	36.49%	42%

The disparity between historical utilization of bycatch limit species and the pro-rata allocations are likely a result of fleet depth and latitude distributions. Generally, shoreside vessel activities are restricted by the distance from shore, and thus the fleet's depth distribution is also limited. This restriction occurs because shoreside vessels must remain in close proximity to the shoreside processing plants in order to maintain product quality. Also, some smaller shoreside vessels do not have the equipment necessary to fish at deeper depths (e.g., horsepower). Catcher vessels participating in the mothership fishery and catcher-processors have greater flexibility in terms of fishing location and depth since they are not tied to a port area. Since the three bycatch limit species have different depth distributions, it is anticipated that each sector will have different bycatch needs based on the sector's depth distribution. Generally, canary and widow rockfish are found along the continental shelf while darkblotched rockfish are found along the slope. As such, an upward adjustment in the canary and widow rockfish limit may be appropriate for the shoreside sectors while an upward adjustment in the darkblotched rockfish limit may be appropriate for the at-sea sectors.

Sector-specific bycatch limits generated from the whiting bycatch model reflect historical the depth distributions of the fleet. Therefore, the allocations more closely aligned with historical utilization may result in less disruption to status quo operations.

Implementing sector-specific bycatch limits, either through pro-rata distributions or by using the bycatch model, may be appropriate for species with relatively larger limits and may be overly constraining for species with relatively lower limits. For example, the status quo canary rockfish bycatch limit is 4.7 mt. Under a pro-rata distribution, the catcher-processor sector would receive 1.60 mt, mothership sector would receive 1.13 mt, and shoreside would receive 1.97 mt (Table 4-65). Dividing this relatively small limit by three sectors may limit fleet flexibility in some cases, but may reduce the probability that one sector may affect another in other cases. For a species like widow rockfish where the total limit is greater, division among sectors may not reduce flexibility to the same degree as a divided canary rockfish limit.

Sector-specific bycatch limits provides the surety that some amount of bycatch will be available regardless of the season or other sector's operations. This could reduce cross-sector competition and the race for bycatch that currently exists in the whiting fishery. Specifically, sector-specific limits could provide the opportunity for a sector to change the primary season in which they operate, which could provide the opportunity to enhance their participation in other fisheries, maximize profit, and potentially reduce bycatch. For example, the catcher-processor sector has stated a preference for a fall fishery given a sector-specific bycatch limit. Data indicate that there is less bycatch and improved whiting product recovery in the fall {Larkin and Sylvia, 1999}. Thus a fall fishery might be preferable for this sector. However, a fall fishery may not be desirable for the mothership or shoreside sectors. Under sector-specific bycatch limits, these sectors would still have the opportunity to choose the season which provides them the greatest operational flexibility.

The Council specified two provisions that provide for unused bycatch limits to be either rolled over to other non-tribal whiting sectors on a pro-rata basis (based on initial whiting allocations) or placed back into the scorecard for use by all sectors. If rollovers are done on a pro-rata basis, the distributions may not match up with the sector's historical depth distribution. Therefore, it may be more appropriate to re-distribute the rollover based on projected needs from the bycatch model. For efficiency, these rollovers could be done automatically outside of a Council meeting to prevent a stop and start fishery. Further, once the whiting allocation for all sectors has been reached, it would be logical to roll any excess back into the scorecard for use by the non-whiting sectors.

The second option for unused bycatch limits is to rollover the excess into the scorecard for use by non-whiting sectors, prior to the whiting allocation for all sectors being reached. If this option is selected, there is a possibility that the excess could be used by a non-whiting sector and none would be remaining if a whiting sector required more. This could result in a situation where the whiting allocation for that sector remains unharvested.

Rollovers that are scheduled only when a sector achieves its whiting allocation may restrict fleet flexibility. For example, consider a scenario where two sectors are fishing concurrently and sector A runs out of bycatch prior to achieving its whiting allocation. Sector B may be willing to release some bycatch to sector A, depending on the amount needed, prior to attaining its sector allocation. However, if the rollover provisions state that a sector's whiting allocation must be harvested prior to the rollover, this option would not be available. In order to provide for greater flexibility, an option similar to the current whiting reapportionment rule could be considered. Under the whiting reapportionment, on a certain date (September 15) NMFS consults with industry to determine whether the sector intends to harvest their remaining whiting allocation. If the Regional Administrator determines that the whiting allocation will not be used by the end of the fishing year, it may be made available for harvest by all

sectors. Depending on the amount of bycatch needed, it may be feasible to consider a rollover prior to the sector achieving its allocation. An examination of the current season bycatch rates would provide an indication of how much bycatch a sector could rollover without jeopardizing the opportunity to harvest their remaining whiting allocation. A rollover could be considered on a certain date or at a Council meeting, instead of restricting the rollover period to the time after a sector harvests its whiting allocation.

Seasonal Releases of Bycatch Limits

At its April 2008 meeting, the Council recommended an analysis of seasonal releases of bycatch limits in the non-tribal Pacific whiting fishery (Table 4-73). Seasonal releases are one means of protecting individual sectors from one another. In particular, a seasonal release can protect the shoreside sector (which starts June 15) from the at-sea sectors (which start on May 15). Since the three fisheries share a common bycatch limit, the activities of one sector can affect others making it possible that the at-sea sectors can preempt the shoreside sector, which is similar to status quo conditions.

Table 4-73. Council-recommended seasonal releases of bycatch limit species.

	April 15	June 15	Fall a/
Option 1	45%	40%	15%
Option 2	50%	40%	10%
Option 3	50%	45%	5%
a/ September 1, September 15, or October 1.			

The whiting bycatch model was used to estimate bycatch needs based on the status quo whiting OY as well as the highest and lowest whiting OYs adopted by the Council for analysis. Then, the Council recommended proportions were applied to the bycatch projections in order to reflect the amounts available under each of the seasonal distributions (Tables 4-74 to 4-76).

Table 4-74. Predicted scheduled release of widow rockfish assuming a status quo bycatch limit and high/low whiting OYs.

Status Quo Widow Bycatch Limit (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	123.75	110.00	41.25
Option 2	137.50	110.00	27.50
Option 3	137.50	123.75	13.75
			Widow Bycatch Limit 275 mt
Projection Under the High Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	305.13	271.23	101.71
Option 2	339.04	271.23	67.81
Option 3	339.04	305.13	33.90
			Widow Bycatch Limit 678.08 mt
Projection Under the Low Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	90.70	80.62	30.23
Option 2	100.78	80.62	20.16
Option 3	100.78	90.70	10.08
			Widow Bycatch Limit 201.56 mt
Projection Under the High Whiting OY, Incorporates New Darkblotched Strategy (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	254.28	226.02	84.76
Option 2	282.53	226.02	56.51
Option 3	282.53	254.28	28.25
			Widow Bycatch Limit 565.06 mt
Projection Under the Low Whiting OY, Incorporates New Darkblotched Strategy (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	75.59	67.19	25.20
Option 2	83.99	67.19	16.80
Option 3	83.99	75.59	8.40
			Widow Bycatch Limit 167.97 mt
a/ September 1, September 15, or October 1.			

Table 4-75. Predicted scheduled release of canary rockfish assuming a status quo bycatch limit and high/low whiting OYs.

Status Quo Canary Bycatch Limit (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	2.12	1.88	0.71
Option 2	2.35	1.88	0.47
Option 3	2.35	2.12	0.24
			Canary Bycatch Limit 4.7 mt
Projection Under the High Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	2.86	2.54	0.95
Option 2	3.18	2.54	0.64
Option 3	3.18	2.86	0.32
			Canary Bycatch Limit 6.35 mt
Projection Under the Low Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	0.85	0.76	0.28
Option 2	0.95	0.76	0.19
Option 3	0.95	0.85	0.09
			Canary Bycatch Limit 1.89 mt
a/ September 1, September 15, or October 1.			

Table 4-76. Predicted scheduled release of darkblotched rockfish assuming a status quo bycatch limit and high/low whiting OYs.

Status Quo Limit (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	18.00	16.00	6.00
Option 2	20.00	16.00	4.00
Option 3	20.00	18.00	2.00
			Darkblotched Bycatch Limit 40 mt
Projection Under the High Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	10.95	9.73	3.65
Option 2	12.17	9.73	2.43
Option 3	12.17	10.95	1.22
			Darkblotched Bycatch Limit 24.33 mt
Projection Under the Low Whiting OY (mt)			
	15-Apr	15-Jun	Fall a/
Option 1	3.25	2.89	1.08
Option 2	3.62	2.89	0.72
Option 3	3.62	3.25	0.36
			Darkblotched Bycatch Limit 7.23 mt
a/ September 1, September 15, or October 1.			

Additionally, whiting bycatch data was initially analyzed with Generalized Additive Models, where the independent variables included sector, year, month, week into season, and the interactions of these main effects. Smoothing of these variables was used, where possible. Most of the interactions were significant; however, trends were difficult to interpret with this small, unbalanced dataset. Therefore, separate sector models with only month as a categorical variable was used to look at the monthly trend, over all years, and by sector (Figures 4-29 to 4-31). The plots reveal that bycatch of darkblotched, POP, and widow in the catcher-processor sector decreases as the season progresses. The trend for canary is less certain but there is a slight decline. Mothership participation in the whiting fishery is greatest in May and June, but less in summer and fall. As a result, confidence intervals are wide and trends are less certain. However, for darkblotched, widow, and canary rockfish some decrease in bycatch is evident. For the shoreside fishery, seasonal bycatch trends are less evident, though an increase in POP bycatch is seen later in the year. Specifically, the lack of data later than August precludes meaningful insight for seasonal trends in this sector.

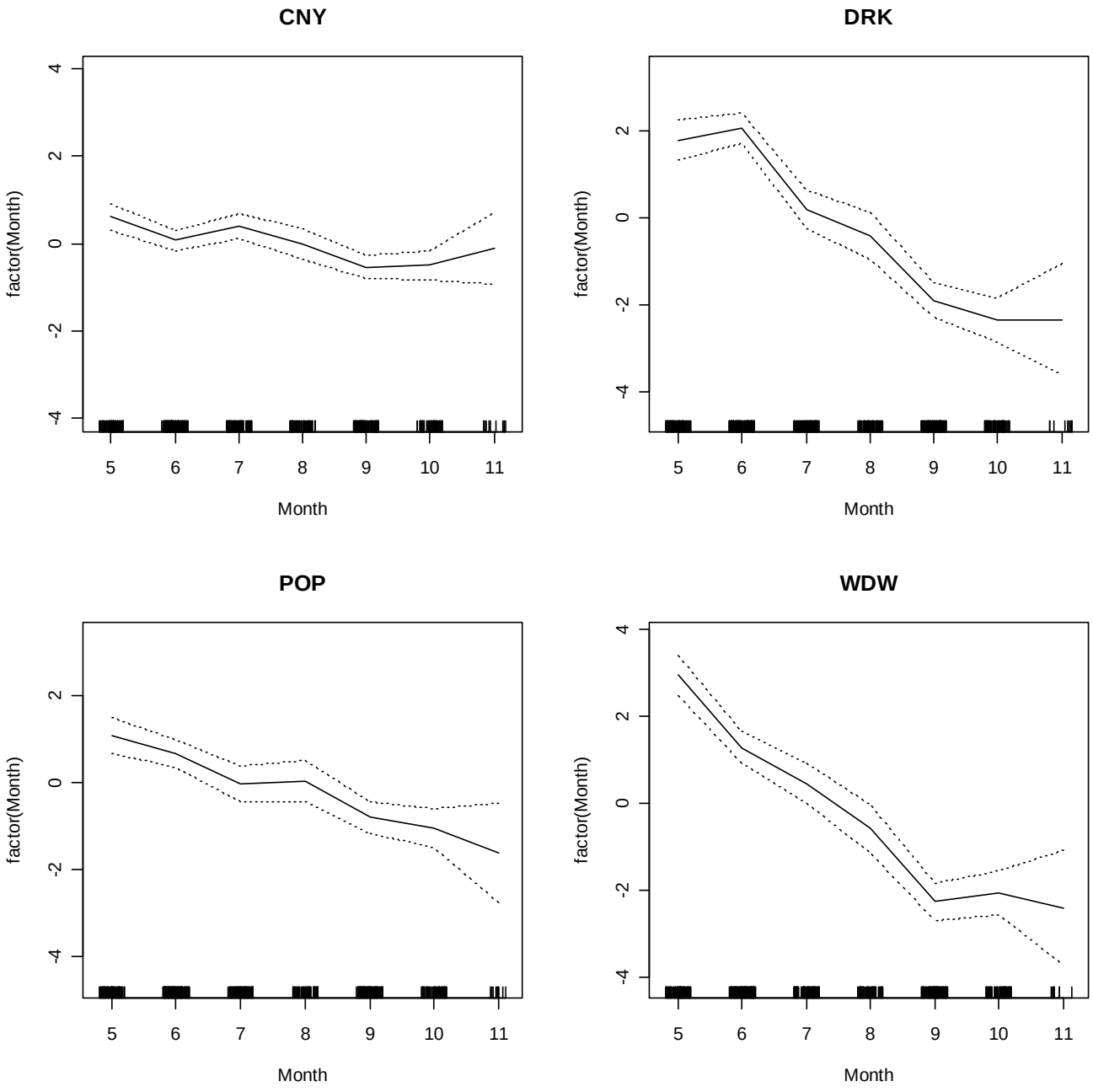

Figure 4-29. 2004-2007 catcher-processor data bycatch data (does not include data from the 2007 re-opening). Dependent variable is log of daily aggregated bycatch weight divided by daily aggregated Pacific whiting catch. The independent variable is month as a category. Y-axes contain relative coefficients. Note that the ranges on the y-axes are equal.

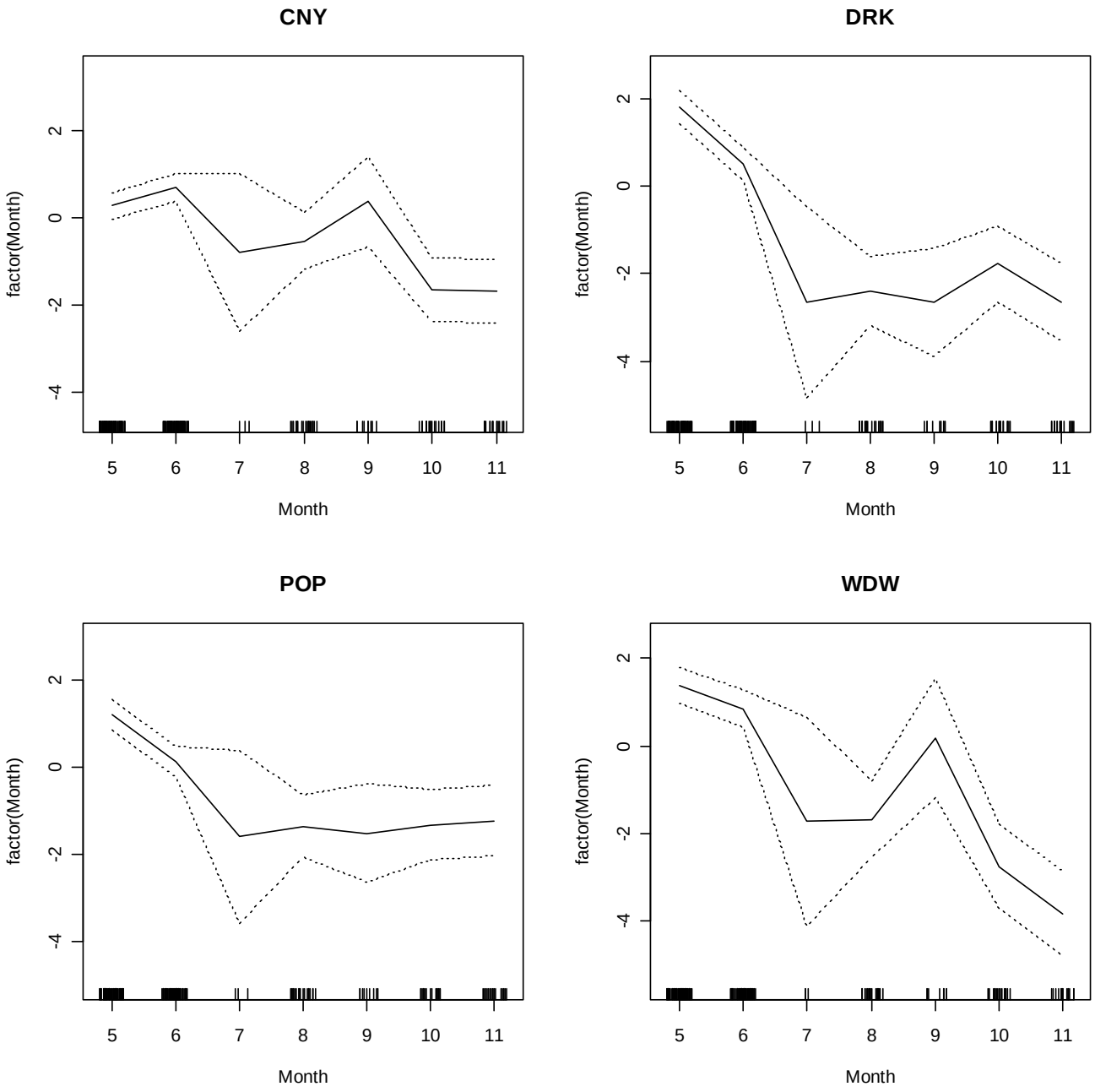

Figure 4-30. Mothership bycatch data modeled (does not include data from the 2007 re-opening). Dependent variable is log of daily aggregated bycatch weight divided by daily aggregated Pacific whiting catch. The independent variable is month as a category. Y-axes contain relative coefficients. Note that the ranges on the y-axes are equal.

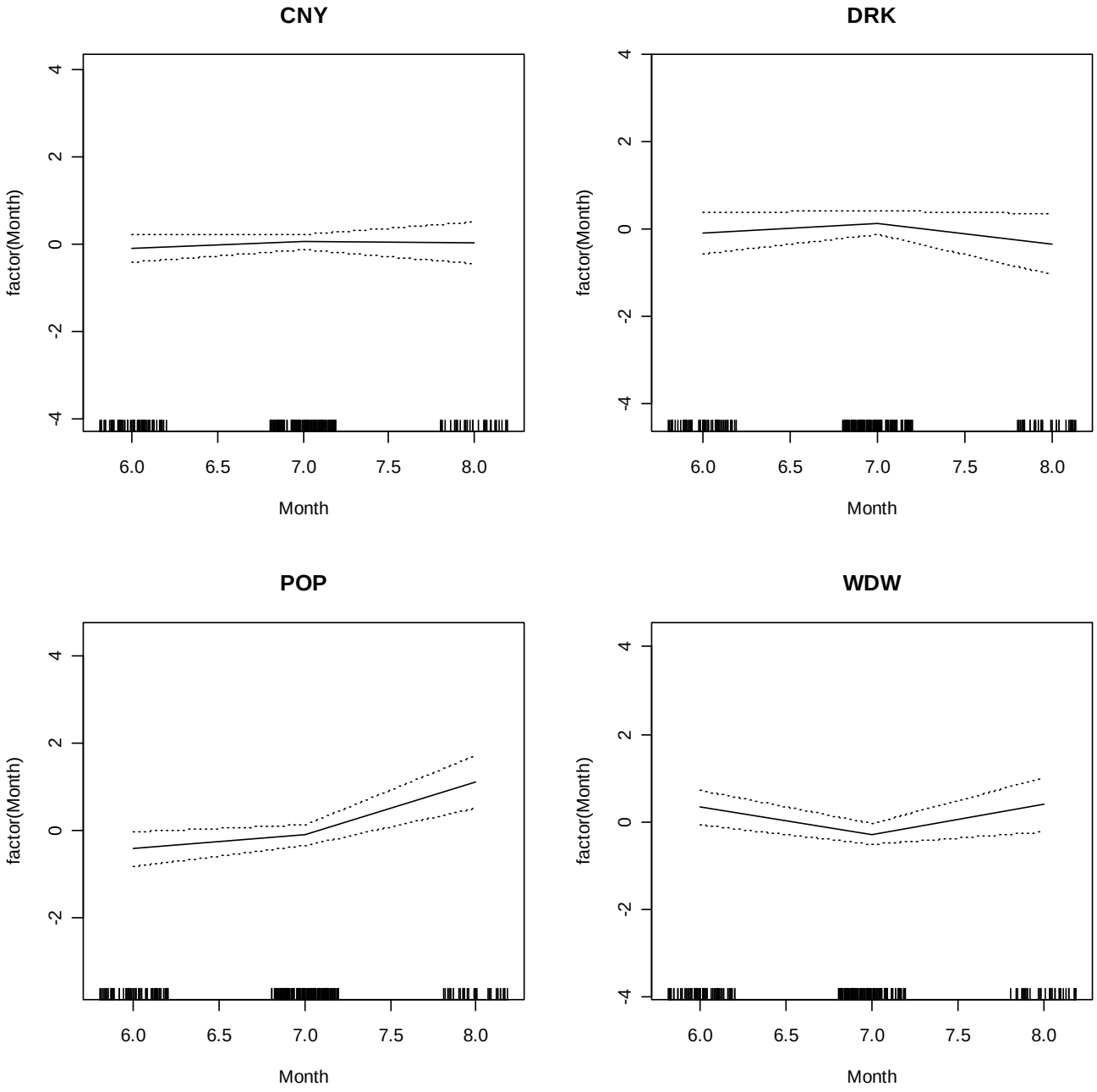

Figure 4-31. Shoreside data bycatch data modeled (does not include data from the 2007 re-opening). Dependent variable is log of daily aggregated bycatch weight divided by daily aggregated Pacific whiting catch. The independent variable is month as a category. Y-axes contain relative coefficients. Note that the ranges on the y-axes are equal.

Seasonal releases of bycatch can be viewed as a bycatch management tool used in lieu of sector-specific allocations of bycatch. Seasonal releases are one method of protecting one sector from another (since the sectors traditionally operate at different times) and minimizing the risk of bycatch occurring in one sector affecting the opportunities in another sector. If the amount of bycatch allocated to each season is structured in an appropriate fashion, such seasonal releases may allow successful prosecution of whiting activity while insuring that the sector that starts later in the year is not pre-empted by the attainment of a bycatch limit from sectors operating earlier in the year.

Figure 4-29 reveals that bycatch of darkblotched, POP, and widow in the catcher-processor sector decreases as the season progresses. Therefore, bycatch in this sector may be reduced if seasonal releases are structured to leave sufficient amounts available for a fall fishery. Although no bycatch limits are currently specified for the whiting fishery, the seasonality of POP interactions in the catcher-processor sector should also be taken into consideration.

Historical participation in the mothership sector is greatest in May and June with less fall fishing. As a result, confidence intervals are wide and seasonal bycatch trends are less certain. However, for darkblotched, widow, and canary rockfish, some decrease in bycatch is evident. The timing of mothership participation in the whiting fishery is coordinated with both the mothership and catcher vessel participation in the Alaska pollock fishery. If seasonal releases of bycatch are used to alter the seasonal structure of the mothership whiting fishery, complicated logistics could arise. For example, some whiting catcher vessels participate in the shorebased pollock sector and some in the at-sea pollock sector. Catcher vessels are then restricted to periods where the shoreside plants or motherships are accepting pollock deliveries. Further, approximately half of the whiting mothership catcher vessels also fish in the shoreside whiting fishery. Therefore, it is uncertain how much whiting fall fishing would occur in the mothership sector if seasonal distributions provided for a larger fall fishery.

For the shoreside fishery, seasonal bycatch trends are less evident due to a lack of a historical fall fishery. Thus, it is uncertain how much fall fishing would occur and what the associated bycatch interactions would be if seasonal distributions provided for a larger fall fishery. Approximately half of the shoreside vessels also participate as catcher vessels in the whiting mothership fishery. Therefore, the timing of the shoreside fishery is somewhat related to the timing of the mothership fishery. Additionally, some shoreside catcher vessels also participate in the Alaska pollock fishery, so their participation in the whiting fishery is also coordinated with the pollock seasons. Finally, processing companies may be affected by changing the seasonal distribution of the shoreside fishery. For example, processing facilities need to coordinate the volume of whiting deliveries relative to other processing activities (e.g., sardines, groundfish, etc).

One restriction created by a seasonal release of bycatch is that it may make it difficult for harvesters in a sector to change the timing of their fishing opportunity. If, for example, 50 percent of the widow is allocated to the time period between April and June, that 50 percent allocation of widow may work effectively at preserving fishing opportunity based on past practice. If one sector desires to spend more time fishing in the fall months however, that amount of widow allocated to the April through June time period may be inappropriate and may make it difficult for harvesters to fish later in the year (because there would presumably be less widow later in the year than would otherwise be the case). Compare this situation to a case where each sector has their own bycatch limit and harvesters can choose the harvest timing they find most appropriate and use the allocated bycatch during that time. Under this latter situation, changing harvest timing may be relatively simpler compared to a case where seasonal releases of bycatch are made.

Changing the At-Sea Processing Restrictions in the Shoreside Whiting Fishery

In 2006 and 2007, a 68 foot shore-based vessel headed and gutted Pacific whiting at sea (NOAA, April 2008). The vessel used a smaller net and shorter tows to maintain product quality. Head and gut machines were used at sea and the product was immediately placed in thick slurry of ice. As a result, the vessel was able to significantly increase its at-sea production and ex-vessel price of Pacific whiting. The ex-vessel price of the headed and gutted catch was approximately four times greater than the price for whiting landed whole in unsorted EFP landings, and approximately double the price when taking the weight conversion from dressed head off form to round weight into account (i.e., when comparing prices on the basis of a common weight measure). Because fish that are headed and gutted (i.e., leaving the tail on) with no further processing (such as freezing) are not considered to be a final product, under current regulations, the vessel's activities do not qualify as a catcher-processor. The operation, which occurred during the primary season for the shore-based sector, was allowed to operate within the Rockfish Conservation Areas without an EFP and an electronic monitoring system (EMS).

At its April 2008 meeting, the Council requested an analysis of an at-sea processing exemption for Pacific whiting vessels 75 feet and less for 2009-10. The intent of the proposal is to explore the expansion of this value-added operation and to allow for further processing (i.e., tailing and freezing) by small vessels. The Council stipulated that vessels qualifying for the small vessel processing exemption would fish under the shoreside whiting allocation and be exempt from current catcher-processor monitoring requirements.

The proposed rule for Amendment 10 contains provisions for a maximized retention and monitoring program for the shoreside Pacific whiting fishery (NOAA, May 2007). Maximized retention encourages full retention while recognizing that minor discard events that include large animals (> 6 ft) and minor levels of operational discard may occur. The Amendment 10 proposed rule also allows qualifying vessels to obtain a waiver which would allow for sorting at-sea, an activity necessary to conduct the proposed small vessel processing activities. Under the Amendment 10 waiver, vessels are required to carry and pay for an observer so discards can be monitored. Preliminary analyses indicate that, based on the qualifying criteria, only one vessel qualifies for the sorting waiver. If a small vessel processing exemption is desired, then a modification of the Amendment 10 sorting waiver may be necessary in order to allow additional vessels to sort at sea. Furthermore, modifications to shoreside monitoring or reporting requirements may be necessary in order to track Pacific whiting landings relative to the shoreside allocation.

The proposed rule for Amendment 15 would create a limited entry program for the non-tribal sectors of the Pacific whiting fishery. Amendment 15 is intended to be an interim measure until the implementation of a trawl individual quota or cooperative management program under Amendment 20; however, no sunset provision has been established. The total number of eligible vessels that qualify in each Pacific whiting sector (i.e., shoreside, catcher-processor, and mothership) will be limited under Amendment 15 and thus the total number of vessels eligible for the small vessel processing exemption would also be limited. However, limitations on entry could expire upon Amendment 20 implementation, as early as 2011, and the total number of vessels eligible for the small vessel processing exemption would be unlimited.

Of the vessels that qualify under the Amendment 15 criteria with a current limited entry permit, 12 vessels are 75 feet and less and thus would be eligible for the proposed small vessel processing exemption. Thirty seven vessels would be excluded. Seventeen additional vessels qualify under Amendment 15, but do not currently hold a limited entry permit. The lengths of these vessels are unknown. The number of vessels that would be eligible if/when Amendment 15 sunsets would be unlimited. Additionally, depending on the management measures adopted for the catcher-processor

sector (IFQ or co-ops) under Amendment 20, participation in the catcher-processor sector could also be unlimited if/when Amendment 15 sunsets. Under the current regulatory structure, there are no limitations on length for the catcher-processor sector.

Thus far, one vessel has expressed interest in the small vessel processing exemption. Preliminary discussions with the Groundfish Advisory Subpanel did not indicate concern if the Pacific whiting removals under the small vessel processing exemption were deducted from the shoreside sector whiting allocation. However, if small boat processing became significantly more efficient than traditional shoreside catcher vessel operations and greatly expanded, inequity concerns could arise. As previously mentioned, 12 vessels are eligible vessels under the proposed processing exemption under Amendment 15. Information on the capacity and potential processing capabilities of the 12 vessels is unavailable, thus potential Pacific whiting removals are unknown. If Amendment 20 is adopted and Amendment 15 sunsets, participation would be unlimited and removals could greatly increase. The Council may wish to consider a limit to the amount of Pacific whiting that can be processed under the small vessel processing exemption.

In April 2008, the Council specified that small vessels under the proposed exemption would not be subject to the same catch monitoring requirements as catcher-processors. It may be impractical and overly burdensome, given space constraints and the type of operations, to require the catcher-processor monitoring requirements on vessels 75 feet or less. However, some at-sea monitoring specific to the proposed operations is appropriate given the need to adequately track the incidental take of Chinook salmon, as required in the Endangered Species Act (ESA) Section 7 Biological Opinion for Chinook salmon catch in the Pacific Whiting Fishery, to meet the standardized reporting methodology defined by the Magnuson-Stevens Act and to track the catch of target and overfished groundfish species such that the fishing industry is not unnecessarily constrained and that OYs, harvest guidelines, sector allocations and bycatch limits are not exceeded (NOAA, May 2007). The following considerations were identified with regard to catch monitoring requirements for small vessels processing at-sea: 1) sample design, 2) levels of observer coverage, 3) logistics and cost structure of observer coverage, and 4) inseason monitoring and data storage.

A sampling program for vessels sorting at sea would likely focus on discards, especially Chinook salmon and bycatch limit species, since the Pacific whiting would be landed and tracked shoreside. Prior to 1994, at-sea observers were used in the shoreside whiting fishery and information from those operations may be useful in developing a new program. Sample design for these vessels may also be similar to the discard sampling that occurs in the non-whiting groundfish fisheries. Additionally, at-sea sampling occurs in the catcher-processor and mothership sectors of the whiting fishery. Factory sampling on these large vessels will likely be very different from small vessel operations, however some similarities may exist.

Currently, the WCGOP observes approximately 25 percent of the non-whiting trawl fleet. Less than 100 percent catch monitoring on small vessels processing whiting may not be sufficient to meet the objectives outlined above (monitoring of Chinook salmon, bycatch limits, etc.). Therefore, consideration should be given to developing a program with independent funding in order to adequately sample the operations.

If a monitoring program for small processing vessels is desired, the cost structure and training model from the catcher-processor sector could be adopted. Currently, catcher-processors and motherships hire and pay for groundfish observers through a NMFS approved contractor. Training for these observers is coordinated with NMFS personnel and also paid for by industry.

At-sea data on discards collected from these small processing vessels would need to be incorporated into a database and monitored inseason. Currently, at-sea data are stored at the Alaska Fisheries Science Center in the NORPAC database and shoreside data are stored at the Northwest Region. Sample data collected from small vessels processing at sea would be similar in nature to data collected in the catcher-processor sector (i.e., discard data); however, tracking of whiting and bycatch would be specific to the shoreside sector. Therefore, some forethought and data coordination would be necessary to accommodate these new data.

4.5.2.3 *Limited Entry Fixed Gear*

The 2009-10 limited entry fixed gear management measure alternatives are designed to progressively avoid yelloweye rockfish impacts by moving all or a portion of the seaward boundary of the non-trawl RCA north of 40°10' N latitude from 100 fm to 125 fm or 150 fm (Table 4-77). The yelloweye rockfish impacts predicted under each alternative are compared against the yield amounts available under alternative catch sharing scenarios using the 2005 or 2007 scorecard amounts (Table 2-8) and alternative yelloweye rockfish OYs in Table 4-78. This comparison reveals that the status quo RCA configuration cannot be sustained under yelloweye OYs less than 15 mt unless more yelloweye impacts are allocated to the limited entry fixed gear sector than provided under the 2005 or 2007 scorecard catch sharing scenarios. However, predicted impacts under all the other management measure scenarios under those two catch sharing scenarios can be accommodated under lower yelloweye OYs. A minimal change to the northern non-trawl RCA configuration under OYs less than 15 mt are provided under LEFG Alternatives 5 and 6, both of which are predicted to result in a 1.2 mt yelloweye impact. These two alternatives move the seaward RCA boundary to 125 fm in the area north of Pt. Chehalis under LEFG Alternative 5 or between 43° N latitude (the Columbia-Eureka line near Cape Blanco, Oregon) and Cascade Head, Oregon under LEFG Alternative 6. These two subareas exhibited the two highest bycatch rates of yelloweye by the observed fixed gear fleets of the four northern subareas analyzed (Tables 4-35 to 4-37).

The amounts of retained sablefish associated with aggregated observed trips in these two subareas at depths deeper than 125 fm (Table 4-29) are approximately 79% and 76% of retained sablefish associated with aggregated observed trips in these two subareas at depths deeper than 100 fm (Table 4-28) for the subarea north of Pt. Chehalis and the subarea between 43° N latitude and Cascade Head, respectively. It is likely that fixed gear fishermen targeting sablefish in these two subareas would still be able to attain their sablefish allocations by moving to depths greater than 125 fm in either area, although overhead costs associated with longer runs to open fishing grounds may increase. There may also be a disproportionate cost to some areas of the coast under these alternatives. For instance, fixed gear fishermen fishing from Puget Sound ports may need to run further south as well as further off shore to fish productive grounds if the RCA is extended to deeper waters given the bathymetry of the area adjacent to the Juan de Fuca canyon.

Extending the northern non-trawl RCA further seaward would also affect fixed gear fishermen targeting Pacific halibut either in a directed fishery or incidental to sablefish targeting north of Pt. Chehalis. However, as summary data from the IPHC provided in Table 4-79 indicates, subarea extensions to deeper depths may not prohibit full attainment of commercial Area 2A halibut quotas given the significant proportion of halibut catch in depths greater than 125 fm. For instance, Table 4-79 indicates approximately 70% of the commercial halibut catch north of Pt. Chehalis occurred in depths greater than 125 fm. This compares to about 41% of the commercial halibut catch in depths greater than 125 fm in the area between 43° N latitude and Cascade Head. The same increased cost of fishing halibut can be posited if the RCA is extended seaward as was done above for sablefish targeting due to longer transits to open fishing grounds.

While it may be concluded that sablefish and halibut target opportunities may not be significantly affected by extending the non-trawl RCA seaward to reduce yelloweye impacts, it is likely that the small fixed gear fishery targeting spiny dogfish north of Pt. Chehalis would be significantly impacted. Those vessels targeting spiny dogfish seaward of the existing 100 fm RCA line in waters off northern Washington fish very close to the 100 fm line since that is where dogfish apparently congregate at certain times of the year. Past testimony of fishermen that participate in the target dogfish fishery off northern Washington was that extending the RCA to depths of 125 fm or deeper would terminate the fishery since they would be pushed seaward of those areas where dogfish aggregate.

Table 4-77. Limited entry fixed gear alternatives designed to progressively avoid yelloweye rockfish by moving all or a portion of the seaward boundary of the non-trawl RCA north of 40°10' N latitude from 100 fm to 125 and 150 fm.

Limited Entry Fixed Gear Alternatives		Longline						Pot		Yelloweye (mt)
		36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat	
LEFG Alt. 1	100 Fm 125 Fm 150 Fm	X	X					X	X	0.6
LEFG Alt. 2	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	0.7
LEFG Alt. 3	100 Fm 125 Fm 150 Fm	X	X					X	X	1
LEFG Alt. 4	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	1
LEFG Alt. 5	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	1.2
LEFG Alt. 6	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	1.2
LEFG Alt. 7	100 Fm 125 Fm 150 Fm	X	X					X	X	1.5

Table 4-78. The 2009-10 limited entry fixed gear management alternatives predicted to meet yelloweye impacts (denoted "*") under alternative catch sharing scenarios and OYs.

Management Measure Alternative	Catch Sharing Scenario	Predicted Total Catch (mt)	Yelloweye OY Alternatives							
			OY Alt. 2		OY Alt. 3		OY Alt. 4		OY Alt. 5	
			2009 13 mt	2010 14 mt	2009 17 mt	2010 14 mt	2009 15 mt	2010 15 mt	2009 17 mt	2010 17 mt
No Action		1.5	~~Fails~~	~~Fails~~	*	~~Fails~~	*	*	*	*
LEFG Alt. 1	2005%	0.6	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 2	2005%	0.7	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 3	2005%	1.0	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 4	2005%	1.0	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 5	2005%	1.2	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 6	2005%	1.2	*	*	*	*	*	*	*	*
	2007%		*	*	*	*	*	*	*	*
LEFG Alt. 7	2005%	1.5	~~Fails~~	~~Fails~~	*	~~Fails~~	*	*	*	*
	2007%		~~Fails~~	~~Fails~~	*	~~Fails~~	*	*	*	*

Table 4-79. Commercial halibut catch from directed commercial and incidental to sablefish longline fisheries associated with logbook data, 2003-2007 (weight: net weight pounds, excludes treaty tribes).

Region	Depth Category	Longline/Target Halibut	Longline/All Targets	All Gear/All Targets	All/All Distinct Vessels
North of Pt. Chehalis	100-124 fm	a/	55,065	55,065	25
	125-149 fm	a/	40,839	40,839	26
	≥150 fm	-	85,297	85,297	27
Cascade Head to Pt. Chehalis	100-124 fm	58,548	59,408	59,408	33
	125-149 fm	36,247	36,328	36,328	22
	≥150 fm	4,809	5,221	5,221	6
Col/Eur to Cascade Head	100-124 fm	183,092	183,092	184,542	67
	125-149 fm	245,905	245,905	245,905	55
	≥150 fm	53,619	53,619	53,619	21
OR/CA to Col/Eur	100-124 fm	b/	b/	b/	< 3

a/ < 3 vessels in the incidental to sablefish fishery set skates targeting halibut.
b/ < 3 vessels, poundage was added to the Col/Eur to Cascade Head category, Magnitude: less than 2% of the All/All log poundage total.

4.5.2.4 *Directed Open Access*

Fishing opportunities in the directed open access sector in 2009-10 will be limited by the available yield of yelloweye rockfish. There are two fishing strategies in the directed open access sector that incidentally catch yelloweye – the offshore sablefish DTL fishery and the nearshore commercial

fisheries off California and Oregon. Adjustments to the seaward non-trawl RCA affect yelloweye impacts in the DTL fishery and adjustments to the shoreward boundary affect yelloweye impacts in the nearshore fisheries. Alternatives for the 2009-10 open access DTL fishery are based on the same adjustments to the seaward boundary of the non-trawl RCA north of 40°10' N latitude as the limited entry fixed gear fishery (Table 4-80).

Alternatives for the nearshore commercial fisheries are ranged by alternatively adjusting either the shoreward boundary of the northern non-trawl RCA from the status quo 30 fm line to the 20 fm line or by progressive reduction of trip limits to avoid yelloweye (Table 4-81). Table 4-81 also provides the predicted landed catch amounts of target nearshore groundfish species and depleted groundfish species associated with each alternative. From that table, it is clear that extending the northern RCA shoreward to 20 fm provides far more benefits to the fishery than trip limit reductions for the same amount of yelloweye bycatch savings.

Trip limits are also reduced in concert with shoreward RCA extensions under the nearshore alternatives to achieve yelloweye bycatch impacts down to the minimal levels required under low yelloweye OYs and the 2005 catch sharing scenario. *[GMT: What are the trip limits under the open access nearshore alternatives?]* While the Council guidance to use the shares under the 2005 and 2007 bycatch scorecards is helpful for initial analysis of management measures, there are some caveats regarding the data informing those scorecards that apply directly to the open access sector. At the end of 2004 when the initial 2005 scorecard was developed, there were few WCGOP observations of the nearshore commercial fleets; therefore, the 2005 catch shares may not be representative of actual bycatch rates in the fishery. The yelloweye impacts for the directed open access sector, which are largely in the nearshore fisheries, are much lower in the 2005 scorecard than the 2007 scorecard. At the end of 2006 when the initial 2007 scorecard was developed, many more observations of the nearshore commercial fishery were available. Also, the 2005 scorecard shows some yelloweye impact in the limited entry whiting trawl fishery (0.4 mt), while the 2007 scorecard shows no yelloweye bycatch in the whiting fisheries. The GMT believes the latter situation is much more plausible for the whiting fishery given that whiting are targeted by midwater small footrope trawls that would be destroyed in the high relief habitats where yelloweye occur. For these reasons, the GMT believes the yelloweye catch shares in the 2007 scorecard for the open access sector are much more representative of actual conditions.

The yelloweye impacts associated with the open access DTL and nearshore fisheries are compared against the yelloweye yields available to the entire sector under alternative catch shares and yelloweye OYs in Table 4-82. While this table compares the yelloweye impacts by alternative against the available yields in Table 2-8 independently for the DTL and nearshore fisheries, it is noted that the available yields in Table 2-8 are for the entire directed open access sector. Therefore, impacts from DTL and nearshore alternatives should be combined to determine whether alternatives for the entire sector stay within available yelloweye yields.

Table 4-80. Open access sablefish daily-trip-limit alternatives designed to progressively avoid yelloweye rockfish by moving all or a portion of the seaward boundary of the non-trawl RCA north of 40°10' N latitude from 100 fm to 125 and 150 fm.

Open Access DTL Alternatives		Longline						Pot		Yelloweye (mt)
		36° - 40°10' N lat	North of 40°10' N lat	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°	36° - 40°10' N lat	North of 40°10' N lat	
OA DTL Alt. 1	100 Fm 125 Fm 150 Fm	X	X					X	X	0.1
OA DTL Alt. 2	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	0.2
OA DTL Alt. 3	100 Fm 125 Fm 150 Fm	X	X					X	X	0.2
OA DTL Alt. 4	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	0.2
OA DTL Alt. 5	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	0.3
OA DTL Alt. 6	100 Fm 125 Fm 150 Fm	X		X	X	X	X	X	X	0.3
OA DTL Alt. 7	100 Fm 125 Fm 150 Fm	X	X					X	X	0.4

Table 4-81. Predicted landed catch (mt) of target nearshore groundfish species and total catch (mt) of depleted groundfish species under open access commercial nearshore fishery alternatives. Alternatives are based on alternative shoreward RCA boundaries north of 40°10' N latitude, alternative catch sharing scenarios based on either the 2005 or 2007 scorecard, and alternative trip limits.

Species	No Action (30 fm RCA boundary)	OA NS Alt. 1 (20 fm RCA; 2005 Catch Sharing)	OA NS Alt. 2 (30 fm RCA; 2005 Catch Sharing; Reduced Trip Limits)	OA NS Alt. 3 (20 fm RCA; 2005 Catch Sharing)	OA NS Alt. 4 (30 fm RCA; 2005 Catch Sharing; Reduced Trip Limits)	OA NS Alt. 5 (20 fm RCA; 2007 Catch Sharing)	OA NS Alt. 6 (30 fm RCA; 2007 Catch Sharing; Reduced Trip Limits)	OA NS Alt. 7 (20 fm RCA; 2007 Catch Sharing)	OA NS Alt. 8 (30 fm RCA; 2007 Catch Sharing; Reduced Trip Limits)	OA NS Alt. 9 (30 fm RCA; 2007 Catch Sharing; Reduced Trip Limits)
Southern Target Species										
Shallow nearshore species	54.1	30.74	12.72	40.98	16.96	112.70	46.64	122.95	50.88	63.60
Black Rockfish	4.4	2.24	0.93	2.98	1.23	8.20	3.39	8.94	3.70	4.63
Blue Rockfish	10.4	3.86	1.60	5.14	2.13	14.14	5.85	15.42	6.38	7.98
Other deeper nearshore species	31.2	16.82	6.96	22.43	9.28	61.68	25.52	67.29	27.84	34.80
Cabezon	22.5	12.29	5.09	16.39	6.78	45.08	18.65	49.18	20.35	25.44
Kelp Greenling	1.5	0.79	0.33	1.05	0.43	2.89	1.19	3.15	1.30	1.63
Lingcod	19.8	10.62	4.39	14.16	5.86	38.93	16.11	42.47	17.58	21.97
California Sheephead	31.8	17.32	7.17	23.10	9.56	63.52	26.29	69.30	28.68	35.84
All nearshore groundfish	175.8	94.67	39.18	126.23	52.24	347.14	143.65	378.69	156.71	195.89
Northern Target Species										
Black Rockfish	163.7	90.53	37.46	120.71	49.95	331.96	137.37	362.13	149.86	187.32
Blue Rockfish	19.8	7.27	3.01	9.69	4.01	26.64	11.02	29.06	12.03	15.03
Other minor nearshore rockfish	35.5	9.50	3.93	12.67	5.24	34.83	14.42	38.00	15.73	19.66
Cabezon	25.2	11.74	4.86	15.65	6.48	43.03	17.81	46.94	19.43	24.28
Kelp Greenling	18.2	9.50	3.93	12.67	5.24	34.83	14.42	38.00	15.73	19.66
Lingcod	62.0	33.53	13.88	44.71	18.50	122.95	50.88	134.12	55.50	69.38
All nearshore groundfish	324.4	162.07	67.06	216.09	89.42	594.24	245.90	648.26	268.26	335.32
Rebuilding Species										
Canary	3.04	1.24	0.71	1.66	0.93	4.64	2.58	4.96	2.8	3.51
Bocaccio	0.02	0.01	0	0.01	0.01	0.02	0.02	0.03	0.02	0.02
Widow	0.05	0.02	0.01	0.03	0.01	0.08	0.04	0.08	0.04	0.05
Yelloweye	1.30	0.3	0.3	0.4	0.4	1.1	1.1	1.2	1.2	1.50

Table 4-82. The 2009-10 open access DTL and nearshore management alternatives predicted to meet yelloweye impacts (denoted "*") under alternative catch sharing scenarios and OYs.

Sector	Management Measure Alternative	Catch Sharing Scenario	Predicted Total Catch (mt)	Yelloweye OY Alternatives							
				OY Alt. 2		OY Alt. 3		OY Alt. 4		OY Alt. 5	
				2009 13 mt	2010 14 mt	2009 17 mt	2010 14 mt	2009 15 mt	2010 15 mt	2009 17 mt	2010 17 mt
Directed Open Access (DTL sablefish)	No Action	2005%	0.4	~~Fails~~	~~Fails~~	*	~~Fails~~	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 1	2005%	0.1	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 2	2005%	0.2	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 3	2005%	0.2	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 4	2005%	0.2	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 5	2005%	0.3	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 6	2005%	0.3	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA sable Alt. 7	2005%	0.4	~~Fails~~	~~Fails~~	*	~~Fails~~	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
Directed Open Access (OR, CA Nearshore)	No Action	2005%	1.4	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
		2007%		~~Fails~~	*	*	*	*	*	*	*
	OA NS Alt. 1	2005%	0.1	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OA NS Alt. 2	2005%	0.6	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
		2007%		*	*	*	*	*	*	*	*
	OA NS Alt. 3	2005%	0.8	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
		2007%		*	*	*	*	*	*	*	*
	OA NS Alt. 4	2005%	1.0	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
		2007%		*	*	*	*	*	*	*	*
	OA NS Alt. 5	2005%	1.2	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
		2007%		~~Fails~~	*	*	*	*	*	*	*

4.5.2.5 *Incidental Open Access*

Incidental Catch of Lingcod in the Salmon Troll Fishery

At the April 2008 meeting, the Council approved for public review two options that would allow retention of lingcod in the salmon troll fishery:

- Option 1: Allow the retention of 1 lingcod for every 15 Chinook salmon, plus one additional lingcod, not to exceed 10 lingcod per trip, up to a maximum limit of 400 lbs/month.

- o Option 2: Allow the retention of 1 lingcod for every 20 Chinook salmon, plus one additional lingcod, not to exceed 10 lingcod per trip, up to a maximum limit of 400 lbs/month.[4]

Both options would change current regulations to allow retention of lingcod caught inside the RCA. Neither option would permit retention of lingcod caught in Washington state waters. The number of lingcod that could be retained under both options at different levels of Chinook landed is displayed in Table 4-83.

Table 4-83. Number of lingcod allowed and Chinook-to-lingcod ratio based on Chinook landed in the salmon troll fishery under 2009-10 options for lingcod retention.

Chinook Caught on Trip	15	25	30	40	50	60	75	100	135	150	200
Option 1: 15-to-1, +1											
Lingcod allowance	2	2	3	3	4	5	6	7	10	10	10
Chinook per lingcod	7.5	10.0	10.0	13.3	12.5	12.0	12.5	14.3	13.5	15.0	20.0
Option 2: 20-to-1, +1											
Lingcod allowance	1	2	2	3	3	4	4	6	7	8	10
Chinook per lingcod	15.0	12.5	15.0	13.3	16.7	15.0	18.8	16.7	19.3	18.8	20

A similar retention allowance of 1 lingcod for every 10 Chinook was considered during the 2007-2008 management measures process. The Council rejected that proposal out of concern that it might lead salmon trollers to target lingcod.[5] Targeting is of concern because it would presumably increase bycatch of canary and yelloweye based on the known co-occurrence of the three species. No information would be available to quantify or monitor the magnitude of these presumed impacts because the salmon troll fleet is not covered by the WCGOP.

Some empirical information on the rate of lingcod bycatch in the salmon troll fishery is available from a WDFW study that deployed observers in the commercial salmon troll fleet off the Washington coast during the 2003, 2004 and 2005 fishing seasons. Observed effort represented approximately 4 percent of the total WA troll effort and landed Chinook over the three-year period of the study. The observed ratios of Chinook-to-lingcod were 24-to-1 in 2003, 14-to-1 in 2004, and 7-to-1 in 2005. The average ratio across all three years of the study was 12-to-1. Because lingcod retention was prohibited during the study, these observed ratios can be assumed to represent truly incidental catches of lingcod. However, the representativeness of the data to the entire coast and current conditions is questionable given the limited observer coverage, geographic area, and duration of the study.
The "plus 1" feature of Option 1 and Option 2 causes the effective Chinook-per-lingcod ratio of the two options to vary depending on the amount of Chinook caught (Table 4-83). A gap between this ratio and the "true" incidental Chinook per lingcod bycatch rate would create the potential for targeting. However, for this potential to occur, there would also need to be an economic incentive to target. Large revenues from retained lingcod combined with low costs of the extra fishing activity required to catch them would create a strong incentive. In contrast, small revenues and high costs of targeting would translate into a weak incentive.

The cost side of the equation cannot easily be evaluated. Targeting could involve additional travel and search time, yet it is also feasible that trollers could target lingcod at little or no additional cost.

[4] *Supplemental WDFW Motion in Writing*, Agenda Item H.5.e. April 2008
[5] [add 2007-2008 FEIS citation, (section 4.5.4.3, p. 401)]

Revenues, on the other hand, can be evaluated. Revenue available to trollers from a retention allowance would be foremost a function of the number of lingcod that could be retained with only non-incidental lingcod contributing to the incentive to target. Table 4-84 shows what the maximum non-incidental catch of lingcod would be for Option 1 and Option 2 under four alternative scenarios of the natural or "true" Chinook per lingcod bycatch ratio.

Catch per unit effort (CPUE) in the troll fishery was 21 Chinook per boat day fished in 2005, 10 Chinook per boat day in 2006, and 11 Chinook per boat day in 2007.[6] A Chinook trip can last longer than a single day but landings of more than 50 Chinook have been rare under these recent CPUE levels. In Washington, the West Coast state with the highest CPUE during the period, 95-99 percent of the landings consisted of less than 50 fish; and, the majority of landings consisted of less than 15 fish (Table 4-85). And in 2008, trollers are fishing under trip limits of 50 or 35 Chinook. If these regulations or CPUE levels continue in 2009-2010, then the most non-incidental lingcod expected on a Chinook trip would be four fish under Option 1 or three fish under Option 2. Under the WDFW observed average ratio, the majority of landings would result in one non-incidental lingcod under Option 1 and zero under Option 2.

Table 4-84. Estimated non-incidental catch ("+") and regulatory discard ("-") of lingcod for Option 1 and Option 2 under four scenarios of the "true" Chinook-to-lingcod bycatch rate.

Chinook caught on Trip	**15**	**25**	**30**	**40**	**50**	**60**	**75**	**100**	**135**	**150**	**200**
Zero incidental catch											
Lingcod encountered	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Option 1	+2	+2	+3	+3	+4	+5	+6	+7	+10	+10	+10
Option 2	+1	+2	+2	+3	+3	+4	+4	+6	+7	+8	+10
12-to-1 incidental catch (WDFW observed average)											
Lingcod encountered	*1*	*2*	*2*	*3*	*4*	*5*	*6*	*8*	*11*	*12*	*16*
Option 1	+1	0	+1	0	0	0	0	-1	-1	-2	-6
Option 2	0	0	0	0	-1	-1	-2	-2	-4	-4	-6
30-to-1 incidental catch (low natural bycatch)											
Lingcod encountered	*0*	*0*	*1*	*1*	*1*	*2*	*2*	*3*	*4*	*5*	*6*
Option 1	+2	+2	+2	+2	+3	+3	+4	+4	+6	+5	+4
Option 2	+1	+2	+1	+2	+2	+2	+2	+3	+3	+3	+4
7-to-1 incidental catch (high natural bycatch)											
Lingcod encountered	*2*	*3*	*4*	*5*	*7*	*8*	*10*	*14*	*19*	*21*	*28*
Option 1	0	-1	-1	-2	-3	-3	-4	-7	-9	-11	-18
Option 2	-1	-1	-2	-2	-4	-4	-6	-8	-12	-13	-18

[6] *See* Table I-4in PFMC, *Review of 2007 Ocean Salmon Fisheries* (2008).

Table 4-85. Washington Chinook landings frequency statistics, 2005-2007.

Chinook Landed	2005			2006			2007		
	# of Landings	% of Landings	Cum.	# of Landings	% of Landings	Cum.	# of Landings	% of Landings	Cum.
15	1,490	65.52%	65.5%	1,504	82.32%	82.3%	1,476	83.01%	83.0%
30	425	18.69%	84.2%	244	13.36%	95.7%	237	13.33%	96.3%
50	241	10.60%	94.8%	63	3.45%	99.1%	61	3.43%	99.8%
75	71	3.12%	97.9%	6	0.33%	99.5%	4	0.22%	100.0%
100	46	2.02%	100.0%	8	0.44%	99.9%	0	0.00%	100.0%
>100	1	0.04%	100.0%	2	0.11%	100.0%	0	0.00%	100.0%

The average price paid per fish is the second major factor to consider in evaluating possible revenues. According to PacFIN 2005-2007 landings data, the price of troll and other hook and line caught lingcod on the West Coast ranged from $0.40 per pound to $3.08 per lb with an average of $1.24 per lb. The best available information on the average size of lingcod comes from the 2004 NMFS Trawl Survey where males averaged 48.9 cm in length and females 51 cm.[7] Using the length-weight conversion from the latest stock assessment, these lengths correspond to average weights of 2.4 lbs for males and 2.6 lbs for females.[8] However, lingcod encountered in the salmon troll fishery in 2009-2010 would likely be larger because of growth in the population over since 2004. Table 4-86 displays potential revenue that could be earned from a single lingcod based on a range of fish weights and exvessel prices.

Table 4-86. Potential revenue earned per lingcod under various possible average weights and exvessel prices.

Avg. Price/lb Weight	$0.80	$1.30	$1.60	$1.80	$2.25
2.5 lb	$2.00	$3.25	$4.00	$4.50	$5.63
5.0 lb	$4.00	$6.50	$8.00	$9.00	$11.25
8.0 lb	$6.40	$10.40	$12.80	$14.40	$18.00
10.0 lb	$8.00	$13.00	$16.00	$18.00	$22.50
12.0 lb	$9.60	$15.60	$19.20	$21.60	$27.00
15.0 lb	$12.00	$19.50	$24.00	$27.00	$33.75

Applying the per lingcod revenues from Table 4-86 to the estimates of non-incidental catch in Table 4-84 establishes some bounds on what the overall economic incentives to target could be Option 1 and Option 2. For example, if the Option 2 retention allowance were adopted and 95-99 percent of salmon troll trips continued to land less than 50 Chinook, then revenues available from targeting would be between $0 and $101.25 (three, 15 lb lingcod at $2.25 per lb).

Given the decision to target lingcod occurs on a trip-by-trip basis, the 400lb monthly lingcod limit included in Option 1 and Option 2 would not have much influence on the incentive to target unless a troller was near enough to the limit that it affected how many lingcod could be retained on a trip. At an average weight of 15lb, it would take 27 lingcod to exceed the 400 lb limit. And with a landing of 50

[7] Keller, A. A., et. al. (2007). *The 2004 U.S. West Coast bottom trawl survey of groundfish resources off Washington, Oregon, and California: Estimates of distribution, abundance, and length composition*. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-87, 134 p.

[8] *See* Table 16 in Jagielo, T.H. and Wallace, F.R. (2005). *Assessment of Lingcod (Ophiodon elongatus) for the Pacific Fishery Management Council in 2005.*

Chinook or less, the highest number of lingcod a troller could retain is four. Under such circumstances, the 400lb limit might affect the incentive to target if a troller makes more than six trips in a month.

4.5.2.6 *Tribal*

The canary and yelloweye impacts associated with the proposed 2009-10 tribal management measures are provided in Table 2-5.

4.5.2.7 *Washington Recreational*

The WDFW is proposing to allow incidental groundfish retention caught in deeper waters in Marine Areas 3 and 4 on days when Pacific halibut fishing is allowed. The regulation is due to the habitats where halibut are caught off the north Washington coast and the distribution of rockfish and lingcod there. The distribution of rockfish on the Washington coast is directly linked to the bottom topography. The northern coast is characterized by high relief rocky habitat with many offshore rocks, pinnacles and canyons. The rocky habitat transitions through rock/cobble bottom to a sandy/muddy flat bottom as you move south toward the Columbia River. Lingcod tend to inhabit the same areas as halibut off the north coast, which often results in their incidental catch when anglers are targeting halibut. Off the central and southern coast, halibut can be found on flat, sandy bottom offshore, whereas lingcod tend to occur in rocky areas closer to shore. Anglers fishing the south coast will typically target halibut in one area, and then change their location to target lingcod. Regulations are in place in Marine Areas 1 and 2 (along Washington's southern coast) that prohibit the retention of lingcod and rockfish during halibut trips. These rules are intended to discourage targeting of lingcod offshore where yelloweye rockfish may occur. However, as noted above, because lingcod and yelloweye are commonly encountered while targeting halibut in the northern area, such regulations would likely not accomplish the same result.

The predicted total catches of canary and yelloweye rockfish by 2009-10 alternative Washington recreational management measures are shown in Table 4-87.

Table 4-87. Predicted total catches (mt) of canary and yelloweye rockfish by 2009-10 alternative management measures for the Washington recreational fishery.

2009-10 Washington Recreational Alternatives	Marine Area	Predicted Total Catches (mt)	
		Canary	Yelloweye
No Action Alt.	3 & 4 (N. Coast)	0.97	2.25
	2 (S. Coast)	0.05	0.23
	1 (Col. River)	0.01	0.02
	Total	1.0	2.5
WA Rec. Alt. 1	3 & 4 (N. Coast)	0.59	1.51
	2 (S. Coast)	0.04	0.20
	1 (Col. River)	0.01	0.02
	Total	0.6	1.7
WA Rec. Alt. 2	3 & 4 (N. Coast)	0.63	1.54
	2 (S. Coast)	0.04	0.21
	1 (Col. River)	0.01	0.02
	Total	0.7	1.8
WA Rec. Alt. 3	3 & 4 (N. Coast)	0.70	1.70
	2 (S. Coast)	0.04	0.21
	1 (Col. River)	0.01	0.02
	Total	0.7	1.9

The yelloweye impacts associated with the alternative Washington recreational management measures are compared against the available yelloweye yields under alternative catch shares and yelloweye OYs in Table 4-88. The No Action Alternative exceeds the available yelloweye yield under OYs less than 17 mt and Washington Recreational Alternatives 2 and 3 under the 2005 catch sharing scenario exceed the available yelloweye yields under the 13 mt yelloweye OY.

Table 4-88. The 2009-10 Washington recreational management alternatives predicted to meet yelloweye impacts (denoted "*") under alternative catch sharing scenarios and OYs.

Sector	Management Measure Alternative	Catch Sharing Scenario	Predicted Total Catch (mt)	Yelloweye OY Alternatives							
				OY Alt. 2		OY Alt. 3		OY Alt. 4		OY Alt. 5	
				2009 13 mt	2010 14 mt	2009 17 mt	2010 14 mt	2009 15 mt	2010 15 mt	2009 17 mt	2010 17 mt
Washington Recreational	No Action		2.5	~~Fails~~	~~Fails~~	*	~~Fails~~	~~Fails~~	~~Fails~~	*	*
	WA Rec. Alt. 1	2005%	1.7	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	WA Rec. Alt. 2	2005%	1.8	~~Fails~~	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	WA Rec. Alt. 3	2005%	1.9	~~Fails~~	*	*	*	*	*	*	*
		2007%		~~Fails~~	*	*	*	*	*	*	*

4.5.2.8 *Oregon Recreational*

The predicted total catches of important groundfish species by 2009-10 alternative Oregon recreational management measures are shown in Table 4-89.

Table 4-89. Predicted total catches (mt) of important groundfish species by 2009-10 alternative management measures for the Oregon recreational fishery.

Species	2009-10 Oregon Recreational Alternatives						
	No Action Alt.	OR Rec. Alt 1	OR Rec. Alt 2	OR Rec. Alt 3	OR Rec. Alt 4	OR Rec. Alt 5	OR Rec. Alt 6
Canary	2.3	1.7	2.0	2.2	2.3	2.6	2.5
Yelloweye	2.2	1.6	1.8	2.0	2.2	2.5	2.5
Black	371.8	356.5	430.1	430.1	371.8	278.5	283.6
Blue	28.8	24.5	33.4	33.4	28.8	21.7	22.2
Brown	0.1	0.1	0.1	0.1	0.1	0.1	0.1
China	3.3	3.3	3.8	3.8	3.3	2.5	2.5
Copper	6.5	6.3	7.2	7.2	6.5	5.3	5.3
Grass	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Quillback	5.6	5.6	6.5	6.5	5.6	4.1	4.2
Lingcod	119.1	104.8	119.1	119.1	119.1	119.1	119.1
Kelp Greenling	19.7	19.5	20.4	20.4	19.7	18.5	18.6
Cabezon	29.8	28.3	34.4	34.4	29.8	22.7	23.0

The yelloweye impacts associated with the alternative Oregon recreational management measures are compared against the available yelloweye yields under alternative catch shares and yelloweye OYs in Table 4-90.

Table 4-90. The 2009-10 Oregon recreational management alternatives predicted to meet yelloweye impacts (denoted "*") under alternative catch sharing scenarios and OYs.

Sector	Management Measure Alternative	Catch Sharing Scenario	Predicted Total Catch (mt)	Yelloweye OY Alternatives							
				OY Alt. 2		OY Alt. 3		OY Alt. 4		OY Alt. 5	
				2009 13 mt	2010 14 mt	2009 17 mt	2010 14 mt	2009 15 mt	2010 15 mt	2009 17 mt	2010 17 mt
Oregon Recreational	No Action		2.2	Fails	Fails	*	Fails	Fails	Fails	*	*
	OR Rec. Alt. 1	2005%	1.6	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	OR Rec. Alt. 2	2005%	1.8	Fails	*	*	*	*	*	*	*
		2007%		Fails	*	*	*	*	*	*	*
	OR Rec. Alt. 3	2005%	2.0	Fails	Fails	*	Fails	*	*	*	*
		2007%		Fails	Fails	*	Fails	*	*	*	*
	OR Rec. Alt. 4	2005%	2.2	Fails	Fails	*	Fails	Fails	Fails	*	*
		2007%		Fails	Fails	*	Fails	*	*	*	*
	OR Rec. Alt. 5	2005%	2.5	Fails	Fails	*	Fails	Fails	Fails	*	*
		2007%		Fails	Fails	*	Fails	Fails	Fails	*	*
	OR Rec. Alt. 6	2005%	2.5	Fails	Fails	*	Fails	Fails	Fails	*	*
		2007%		Fails	Fails	*	Fails	Fails	Fails	*	*

4.5.2.9 *California Recreational*

The 2008 California recreational groundfish season is shown in Figure 2-13. The predicted total catches of important groundfish species by 2009-10 alternative California recreational management measures are shown in Table 4-91. *Note that the alternative seasons are revised from the Chapter 2 description of alternative 2009-10 California recreational groundfish seasons. Go to Agenda Item F.4.b, Supplemental CDFG Report for the revised seasons. Chapter 2 will be updated accordingly after the June 2008 Council meeting.*

The yelloweye impacts associated with the alternative California recreational management measures are compared against the available yelloweye yields under alternative catch shares and yelloweye OYs in Table 4-92.

Table 4-91. Predicted total catch (mt) of important groundfish species by alternative 2009-10 management measures for the California recreational fishery.

Species	Mgt. Area	2009-10 California Recreational Alternatives					
		Revised CA Rec. Alt 1	Revised CA Rec. Alt 2	Revised CA Rec. Alt 3	Revised CA Rec. Alt 4	Revised CA Rec. Alt 5	Revised CA Rec. Alt 6
Canary	N	0.1	0.3	0.5	0.5	0.6	0.5
	NCN	0.0	0.1	0.3	0.3	0.4	0.9
	NCS	2.4	3.8	3.8	3.8	3.8	3.8
	SC - Mont	1.4	1.5	1.4	1.4	1.4	1.5
	SC - Morro	0.7	0.8	0.7	0.7	0.7	0.8
	S	0.3	0.3	0.3	0.3	0.3	0.3
	Total	4.9	6.8	7.0	7.0	7.2	7.8
Yelloweye	N	0.1	0.4	0.6	0.7	0.8	0.7
	NCN	0.1	0.2	0.4	0.4	0.6	1.4
	NCS	0.3	0.5	0.5	0.5	0.5	0.5
	SC - Mont	0.0	0.0	0.0	0.0	0.0	0.0
	SC - Morro	0.0	0.0	0.0	0.0	0.0	0.0
	S	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.5	1.1	1.5	1.6	1.9	2.6
Black	N	16.2	52.5	58.9	74.3	80.4	74.3
	NCN	1.6	3.1	5.3	5.3	7.5	11.9
	NCS	27.6	31.2	31.2	31.2	31.2	31.2
	SC - Mont	6.2	6.5	6.2	6.2	6.2	6.5
	SC - Morro	2.8	2.9	2.8	2.8	2.8	2.9
	S	0.0	0.0	0.0	0.0	0.0	0.0
	Total	54.4	96.2	104.4	119.8	128.1	126.8
Blue	N	0.9	3.1	3.5	4.4	5.3	4.4
	NCN	0.9	1.7	3.0	3.0	4.2	6.7
	NCS	48.8	72.2	72.2	72.2	72.2	72.2
	SC - Mont	17.8	20.0	17.8	17.8	17.8	20.0
	SC - Morro	48.2	54.1	48.2	48.2	48.2	54.1
	S	11.3	11.4	11.4	11.4	11.4	11.4
	Total	127.9	162.5	156.1	157.0	159.1	168.8
Bocaccio	N	-	-	-	-	-	-
	NCN	0.0	0.0	0.0	0.0	0.0	0.1
	NCS	2.0	3.1	3.1	3.1	3.1	3.1
	SC - Mont	2.9	3.0	2.9	2.9	2.9	3.0
	SC - Morro	3.4	3.5	3.4	3.4	3.4	3.5
	S	34.5	39.9	39.9	39.9	39.9	39.9
	Total	42.8	49.5	49.3	49.3	49.3	49.6
Cabezon	N	1.3	2.3	2.7	3.3	3.7	3.3
	NCN	0.7	0.7	1.3	1.3	1.9	3.0
	NCS	4.7	5.4	5.4	5.4	5.4	5.4
	SC - Mont	0.7	0.8	0.7	0.7	0.7	0.8
	SC - Morro	1.7	2.0	1.7	1.7	1.7	2.0
	S	7.6	7.6	7.6	7.6	7.6	7.6
	Total	16.7	18.8	19.4	20.0	21.0	22.1

Table 4-91. Predicted total catch (mt) of important groundfish species by alternative 2009-10 management measures for the California recreational fishery (continued).

	N	-	-	-	-	-	-
	NCN	0.0	0.0	0.0	0.0	0.0	0.0
	NCS	0.0	0.0	0.0	0.0	0.0	0.0
Cowcod	SC - Mont	0.0	0.0	0.0	0.0	0.0	0.0
	SC - Morro	0.0	0.0	0.0	0.0	0.0	0.0
	S	0.1	0.1	0.1	0.1	0.1	0.1
	Total	0.1	0.1	0.1	0.1	0.1	0.1
	N	0.0	0.0	0.0	0.0	0.0	0.0
	NCN	0.0	0.0	0.0	0.0	0.0	0.0
	NCS	0.3	0.7	0.7	0.7	0.7	0.7
Widow	SC - Mont	2.3	2.5	2.3	2.3	2.3	2.5
	SC - Morro	0.0	0.0	0.0	0.0	0.0	0.0
	S	1.1	2.8	2.8	2.8	2.8	2.8
	Total	3.7	6.0	5.8	5.8	5.8	6.0
	N	-	-	-	-	-	-
	NCN	0.5	0.9	1.5	1.5	2.1	3.3
	NCS	14.2	20.4	20.4	20.4	20.4	20.4
Shallow NS	SC - Mont	8.8	9.5	8.8	8.8	8.8	9.5
	SC - Morro	14.2	15.3	14.2	14.2	14.2	15.3
	S	8.5	8.6	8.6	8.6	8.6	8.6
	Total	46.2	54.7	53.5	53.5	54.1	57.1
	N	-	-	-	-	-	-
	NCN	2.0	3.9	6.8	6.8	9.7	15.5
	NCS	97.1	145.4	145.4	145.4	145.4	145.4
Deeper NS	SC - Mont	40.2	44.6	40.2	40.2	40.2	44.6
	SC - Morro	72.9	80.8	72.9	72.9	72.9	80.8
	S	53.1	53.4	53.4	53.4	53.4	53.4
	Total	265.3	328.1	318.7	318.7	321.6	339.7
	N	1.2	8.3	9.4	11.8	14.1	9.4
	NCN	-	-	-	-	-	-
Other Minor	NCS	-	-	-	-	-	-
North	SC - Mont	-	-	-	-	-	-
Rockfish	SC - Morro	-	-	-	-	-	-
	S	-	-	-	-	-	-
	Total	1.2	8.3	9.4	11.8	14.1	9.4
	N	-	-	-	-	-	-
	NCN	0.0	0.0	0.0	0.0	0.0	0.0
	NCS	0.0	0.0	0.0	0.0	0.0	0.0
CA	SC - Mont	0.0	0.0	0.0	0.0	0.0	0.0
Scorpionfish	SC - Morro	0.0	0.0	0.0	0.0	0.0	0.0
	S	43.4	43.5	43.5	43.5	43.5	43.5
	Total	43.4	43.5	43.5	43.5	43.5	43.5

Table 4-91. Predicted total catch (mt) of important groundfish species by alternative 2009-10 management measures for the California recreational fishery (continued).

	N	0.3	0.5	0.6	0.7	0.8	0.7
	NCN	0.6	0.6	0.9	0.9	1.3	2.0
	NCS	1.5	2.1	2.1	2.1	2.1	2.1
Greenlings	SC - Mont	0.4	0.4	0.4	0.4	0.4	0.4
	SC - Morro	0.1	0.1	0.1	0.1	0.1	0.1
	S	0.0	0.0	0.0	0.0	0.0	0.0
	Total	2.9	3.7	4.1	4.2	4.7	5.3
	N	10.9	20.4	24.4	29.9	34.9	29.9
	NCN	3.8	3.8	7.1	7.1	7.1	16.9
	NCS	57.3	80.4	80.4	80.4	80.4	80.4
Lingcod	SC - Mont	8.2	9.1	8.2	8.2	8.2	9.1
	SC - Morro	22.4	24.7	22.4	22.4	22.4	24.7
	S	33.8	34.8	34.8	34.8	34.8	34.8
	Total	136.4	173.2	177.3	182.8	187.8	195.8

Table 4-92. The 2009-10 California recreational management alternatives predicted to meet yelloweye impacts (denoted "*") under alternative catch sharing scenarios and OYs.

Sector	Management Measure Alternative	Catch Sharing Scenario	Predicted Total Catch (mt)	Yelloweye OY Alternatives							
				OY Alt. 2		OY Alt. 3		OY Alt. 4		OY Alt. 5	
				2009	2010	2009	2010	2009	2010	2009	2010
				13 mt	14 mt	17 mt	14 mt	15 mt	15 mt	17 mt	17 mt
California Recreational	No Action	2005%	4.1	~~Fails~~	~~Fails~~	*	~~Fails~~	~~Fails~~	~~Fails~~	*	*
		2007%		~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
	Revised CA Rec. Alt. 1	2005%	1.1	*	*	*	*	*	*	*	*
		2007%		*	*	*	*	*	*	*	*
	Revised CA Rec. Alt. 2	2005%	1.2	*	*	*	*	*	*	*	*
		2007%		~~Fails~~	*	*	*	*	*	*	*
	Revised CA Rec. Alt. 3	2005%	1.7	*	*	*	*	*	*	*	*
		2007%		~~Fails~~	~~Fails~~	*	~~Fails~~	~~Fails~~	~~Fails~~	*	*
	Revised CA Rec. Alt. 4	2005%	1.8	*	*	*	*	*	*	*	*
		2007%		~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
	Revised CA Rec. Alt. 5	2005%	2.1	~~Fails~~	*	*	*	*	*	*	*
		2007%		~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~
	Revised CA Rec. Alt. 6	2005%	2.8	~~Fails~~	~~Fails~~	*	~~Fails~~	~~Fails~~	~~Fails~~	*	*
		2007%		~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~	~~Fails~~

4.5.3 Discussion of the Council-Preferred Alternative

This section to be completed after the June 2008 Council meeting.