GROUNDFISH MANAGEMENT TEAM REPORT PACIFIC WHITING MANAGEMENT FOR 2006

The Groundfish Management Team (GMT) reviewed the Pacific Hake (Whiting) stock assessment and stock assessment review (STAR) Panel report. As with past whiting assessments, the STAR Panel recommended two equally plausible models to represent the uncertainty in the relative depletion level and productivity of the stock; one in which q was fixed at 1 and the other in which q was estimated with an informative prior. The result of the second model gave an estimated q of 0.69, consistent with the general tendency of this model to estimate a lower q.

Whiting Stock Trajectories and Risk Assessment

In both models, the estimated biomass trends are robust. The greatest difference from the q=0.69 relative to the q=1 model was a scaling upward in total biomass across the entire time series, a slightly greater upswing in the strength of the 1999 year class, and a slightly lower level of depletion (0.38) in 2006. By contrast, the q=1 scenario estimated a depletion of 0.31 in 2006. The most striking difference is the wide range of resulting optimum yields (OYs) from the two models, with very little change in overall goodness of fit. The projected OYs under either scenario indicate that if the entire OY were harvested, the harvest rates and total catches would be among the highest ever observed, at a time when the relative biomass is close to the lowest measured, and projected to decline regardless of the harvest level as the 1999 year class declines. These are displayed in Figure 1 from the STAR Panel Report, which is reproduced here because the report inadvertently cut off the right-hand side of the figure.

The STAR panel requested projections from both models with a range of coastwide catches (from 0 to 400,000 mt, in 100,000 mt increments) to explore the relative impact of fishing levels on future stock biomass. These are presented graphically in figures 2a and 2b of the STAR Panel report. For both models, even with zero harvest in 2006 onward, the biomass continues to decline (albeit modestly) until 2009 when it increases slightly. All of these estimates are presented in a decision table format in Table 1 of this report. Summarizing these results, both models predict that over the next few years the spawning biomass will decline to levels very close to 25% of the unfished biomass. Exactly how close depends on which model best represents the true condition of the stock, what the allowable catch is, and the strength of incoming 2003 and 2004 year classes.

Assuming the two models are equally plausible, any catch level above 200,000 mt will result in overfishing for the q=1 model. Section 104-297 (e) of the Magnuson-Stevens Act states that "a fishery shall be classified as approaching a condition of being overfished if, based on trends in fishing effort, fishery resource size, and other appropriate factors, the Secretary estimates that the fishery will become overfished within two years." The GMT notes that while there is no specific guidance with respect to a scenario in which a fishery has what is essentially a 50:50 chance of being overfished, there is reason to be concerned over the projected trends in whiting abundance. The GMT also estimated that coastwide catch streams of 370,000 mt and 267,000 mt would result in depletion levels of 0.25 in 2008 and 2009, respectively, when depletion is blended across the two models.

Adopting an OY at or above the status quo for 2006 could require lower OYs in future years, depending upon the results of the next (2007) assessment, particularly estimates of future recruitment. Currently, the assessment predicts close to mean recruitment in both 2003 and 2004; with the former being informed by the age composition results from the 2005 hydroacoustic survey, and the latter being informed by the Santa Cruz Lab juvenile survey. Should either, or both, of these year classes prove to be stronger than estimated by the model, stock biomass should increase more rapidly than expected. Conversely, if these year classes prove to be weaker than estimated by the model, stock biomass may increase more slowly than expected.

Sector Allocations and Estimated Bycatch Impacts for the US Portion of the OY

Sector allocations and estimated bycatch of overfished species associated with three potential OY values are reported in Table 2 for three potential OY values. These three OY values are intended to bracket the status quo (365,000 mt coastwide) with substantially lower and higher OYs (200,000 mt and 594,000 mt). Bycatch estimates for the 2006 whiting season were developed using the weighted average approach used to predict overfished species mortality in 2004 and 2005, with updated data from the 2005 fishery. Bycatch estimates in the whiting fishery are characterized by varying degrees of uncertainty depending on the species. For example, the bycatch rate of widow rockfish appears to have been increasing over the past couple of years, while canary rockfish has been characterized by large year-to-year variations.

In March 2004 the Council approved the inclusion of bycatch limits as a management tool available for the 2005 and 2006 fishery. Although each sector of the whiting fishery is monitored for total catch, only the at-sea sectors have a catch tracking system in place that can provide estimated catch totals in a near real-time manner. The GMT considered a bycatch limit for the at-sea sectors, however this would require a formal allocation, which involves a two meeting process and full rulemaking (proposed and final), as specified in the Groundfish FMP. Therefore, sector specific bycatch limits are not available for 2006. However, the GMT understands that sector specific bycatch limits may be available for 2007 and beyond if the necessary monitoring and tracking of catch is adequate in all sectors of the whiting fishery, and is analyzed in the 2007-2008 EIS.

In 2004 and 2005, participants in the Pacific whiting fishery were able to demonstrate successful avoidance of overfished species to stay within established bycatch limits, thereby attaining higher levels of whiting catch relative to predicted bycatch. However, disaster events still occurred as demonstrated in the 2004 fishery. Due to the high bycatch ratio of canary rockfish in the 2004 fishery, canary appears to be the most constraining species relative to the current bycatch limits. For example, keeping the non-tribal whiting fishery to within the 2005 bycatch limit of 4.7 mt of canary could require setting the US portion of the whiting OY to 234,330 mt (coastwide OY equals 317,150). Under this OY, widow bycatch is predicted to be 110 mt, and darkblotched bycatch is predicted to be 13.9 mt. However, as demonstrated in the 2004 and 2005 fisheries, participants in the whiting fishery are able to successfully avoid species with a bycatch limit.

Management Considerations for the 2006 Whiting Fishery

In 2004 the Council established bycatch limits for darkblotched and canary rockfish, while in 2005 the Council established bycatch limits for widow and canary rockfish. The Council may

want to consider maintaining or revising the bycatch limits for canary and widow because canary rockfish remains a constraining species to multiple sectors and widow can potentially be caught in large amounts by the whiting fishery. The Council may also wish to consider establishing a bycatch limit for darkblotched rockfish due to the reduction in the 2006 darkblotched OY to 200 mt.

- Considerations for revising the canary bycatch limit: Federal regulations set the 2006 canary rockfish bycatch limit at 7.3 mt. With a US portion of the whiting OY ranging from 147,760 to 438,847 mt, the predicted US bycatch of canary rockfish ranges from 4.0 to 11.0 mt (non-tribal bycatch of canary rockfish is 2.8 to 9.5 mt.) In 2005, the bycatch limit was initially set at 7.3 mt, which the Council later revised to just affect the non-tribal fishery at 4.7 mt.
- Considerations for revising the widow bycatch limit: Federal regulations set the 2006 widow rockfish bycatch limit at 243.2 mt. With a US portion of the whiting OY ranging from 147,760 to 438,847 mt, the predicted US bycatch of widow rockfish ranges from 67.5 to 216.4 mt (non-tribal bycatch of widow rockfish is 63.2 to 210.3 mt.). In 2005 the non-tribal bycatch limit was originally set at 200 mt, but adjusted inseason to 212 mt.
- Considerations for setting a darkblotched bycatch limit: The amount of darkblotched caught in the fishery from 1998-2005 has ranged from 3.2 mt to 22.1 mt. With a US portion of the whiting OY ranging from 147,760 to 438,847 mt, the predicted US bycatch of darkblotched rockfish is 8.4 to 28 mt (non-tribal bycatch of darkblotched rockfish is 8.4 to 27.9 mt). In 2005, the predicted bycatch was 22.3 mt and would be equivalent to 26.8 mt in 2006 once adjusted by the SPR harvest rate (the method partially used to justify a 2006 darkblotched OY of 200 mt). The GMT notes that if the Council wishes to establish a darkblotched bycatch limit, that it be weighed appropriately so as not to discourage the whiting fleet from fishing deep to avoid salmon. That is, if the whiting fishery moves further offshore inseason in order to reduce Chinook salmon bycatch, darkblotched rockfish encounter rates may increase.

The GMT suggests that if the Council wishes to establish a darkblotched bycatch limit, that it is set at a level that is not unduly constraining to the whiting fishery. The GMT views a darkblotched bycatch limit as insurance against the possibility of the whiting fishery taking amounts of darkblotched that would require further constraints on other fisheries.

In summary, the GMT would like to draw the Council's attention to several considerations for managing the 2006 Pacific Whiting season.

- Option 1: Set a coastwide ABC. The GMT recommends setting the ABC with the value calculated from the q=1 model (661,680 mt). Although the GMT does not recommend one model over the other, the GMT notes that the q=1 ABC is more risk averse.

- Option 2a: Set the OY based on the risk of being below 25% of unfished biomass in 2 years. Adoption of either OY estimated by the 40-10 policy, which are both substantially above the status quo OY, would have a moderately high probability of resulting in an overfished condition by 2007, and a very high probability of being overfished by 2009. These values are the lower two scenarios shown in Table 1. The risk of being in an overfished condition in the near term should be weighed against the risk of foregone yield in setting an OY for 2006.

- Option 2b: Set a U.S. whiting OY which is constrained by bycatch of canary rockfish. The current status-quo non-tribal bycatch limit of 4.7 mt corresponds to a US OY of 234,330 mt (and a coast wide OY of 317,150)

- Option 2c: Status-quo approach. Set a U.S. whiting OY that is higher than the OY associated with the 4.7 mt canary bycatch limit and close the whiting fishery sectors when the sector allocations are attained or when a whiting fishery bycatch limit is reached – whichever comes first. If current bycatch limits remain in place, the non-tribal fishery would close when their catch of canary reaches 4.7 mt, or when the total non-tribal whiting sector catch of widow reaches the established bycatch limit (which is currently 243.2 mt in federal regulations), or when the whiting OY is attained – whichever comes first.

- Option 3: Set a bycatch limit for darkblotched rockfish in addition to canary and widow rockfish bycatch limits, in order to avoid early closure of winter bottom trawl fisheries. The level should be high enough to not unduly constrain the fishery, so that fishing in deeper water to avoid salmon bycatch can continue.

Options 2b and 2c reflect differing levels of risk with regard to bycatch and fishery revenue. The GMT feels that the risk of exceeding bycatch limits in the whiting fishery is less with Option 2b. Under Option 2c, delays in processing catch data could lead to the fishery exceeding bycatch limits before managers have the opportunity to close the fishery, although this was avoided in 2005 and 2004. Additionally, the whiting sectors may have an increased incentive to achieve attainment of their whiting allocation before a bycatch limit is reached. If this results in an incentive to race for fish, participants may focus more on whiting catch than on bycatch reduction, potentially leading to an earlier closure than if a lower whiting OY was specified. Due to the differential season timing among sub-sectors, and the fact that sub-sector bycatch caps cannot be specified in 2006, higher OYs pose an increased risk to the shore-based fleet that an overall bycatch limit will be reached before their whiting allocation has been achieved.

Relative to bycatch limits, the GMT recommends that under this agenda item, the Council decide whether they want to adopt bycatch limits for canary, widow or darkblotched rockfish, and whether other sectors' bycatch should be accommodated prior to setting the amount for any whiting bycatch limit. If so, the GMT notes that bycatch estimates for all fisheries in 2006 will be provided in an updated 2006 bycatch scorecard during Consideration of Inseason Adjustments (Agenda Item F.5). The scorecard will reflect the amount of the OYs that are not assigned to any fishery, and may inform the Council relative to setting the amounts of the catch limits for the whiting fishery (should the Council adopt them under this agenda item).

<u>GMT Recommendations:</u>

1. Adopt a coastwide ABC
2. Adopt a coastwide and U.S. whiting OY
3. Consider bycatch limits for canary, widow and darkblotched rockfish

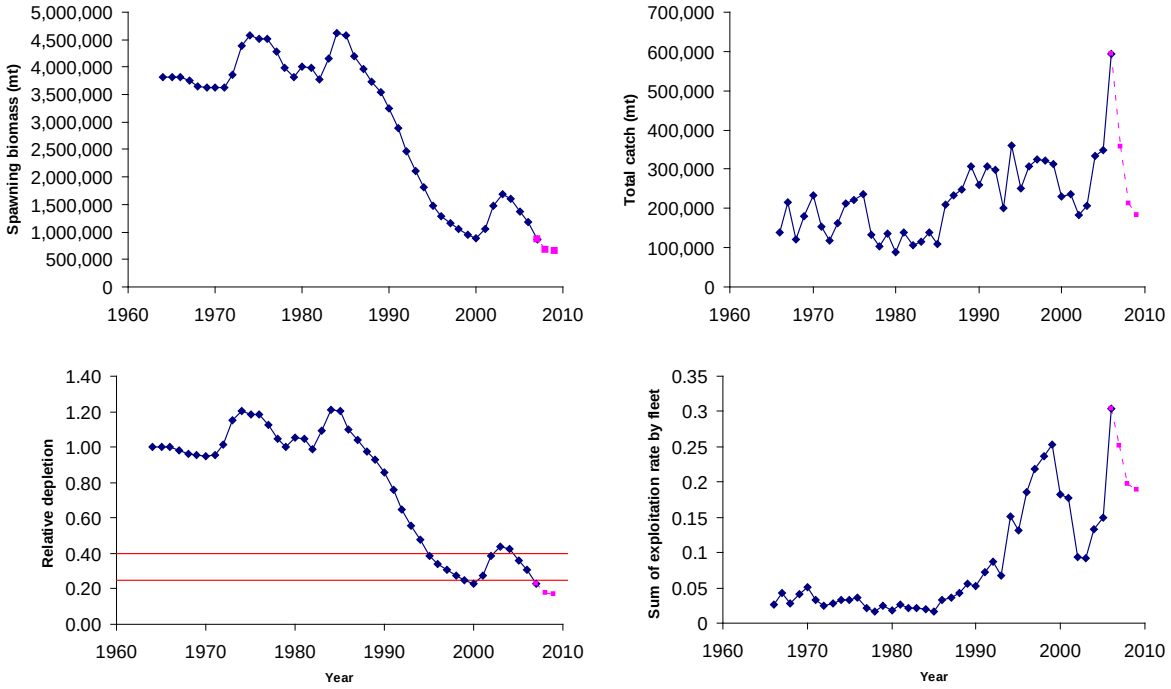
Table 1: Expanded decision table provided by STAT Team

Relative probability				**State of nature**	
Model				**0.50**	**0.50**
Management action				q = 1.0	q=0.69
	Total coastwide Catch (mt)	U.S. Catch (mt)	Year	Relative depletion (2.5%-97.5% interval)	
Total coastwide	0	0	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
catch = 0 mt	0	0	2007	0.305 (0.233-0.376)	0.372 (0.287-0.458)
	0	0	2008	0.293 (0.212-0.374)	0.354 (0.260-0.447)
	0	0	2009	0.299 (0.187-0.411)	0.353 (0.231-0.475)
Total coastwide	100,000	73,880	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
catch = 100,000 mt	100,000	73,880	2007	0.293 (0.221-0.365)	0.362 (0.275-0.448)
	100,000	73,880	2008	0.272 (0.190-0.354)	0.334 (0.240-0.429)
	100,000	73,880	2009	0.269 (0.156-0.381)	0.326 (0.203-0.449)
Total coastwide	200,000	147,760	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
catch = 200,000 mt	200,000	147,760	2007	0.282 (0.209-0.354)	0.351 (0.264-0.438)
	200,000	147,760	2008	0.250 (0.167-0.333)	0.315 (0.219-0.411)
	200,000	147,760	2009	0.239 (0.125-0.352)	0.299 (0.175-0.423)
Total coastwide	300,000	221,640	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
catch = 300,000 mt	300,000	221,640	2007	0.274 (0.201-0.348)	0.341 (0.253-0.429)
	300,000	221,640	2008	0.232 (0.148-0.316)	0.296 (0.199-0.393)
	300,000	221,640	2009	0.212 (0.097-0.326)	0.272 (0.147-0.398)
Total coastwide	400,000	295,520	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
catch = 400,000 mt	400,000	295,520	2007	0.258 (0.184-0.332)	0.330 (0.241-0.419)
	400,000	295,520	2008	0.207 (0.122-0.292)	0.276 (0.177-0.375)
	400,000	295,520	2009	0.178 (0.063-0.294)	0.245 (0.118-0.372)
OY, q=1.0 model	593,746	438,660	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
(ABC=661,681)	358,416	264,798	2007	0.227 (0.181-0.272)	0.310 (0.219-0.401)
	213,223	157,529	2008	0.178 (0.135-0.221)	0.263 (0.164-0.363)
	183,620	135,658	2009	0.172 (0.092-0.253)	0.254 (0.127-0.380)
OY, q=0.69 model	883,490	652,722	2006	0.308 (0.247-0.369)	0.380 (0.304-0.457)
(ABC=904,944)	522,511	386,031	2007	0.202 (0.125-0.279)	0.268 (0.215-0.322)
	302,298	223,338	2008	0.144 (0.056-0.232)	0.202 (0.155-0.249)
	240,702	177,831	2009	0.136 (0.020-0.252)	0.188 (0.104-0.273)

Table 2: Whiting sector allocations and estimated bycatch of selected groundfish species for three potential OY alternatives

								Depletion in 2007		
Optimal Yield				Bycatch (mt)				Mod 1	Avg	Mod 2
Coast wide	U.S.	Sector	Allocatn	Cnry	Drkbl	POP	Wdow	(q=1)		(q=0.69)
200,000	147,760	Tribal	25,000	1.1	0	0.5	4.3	0.28	0.32	0.35
		Mothersh	28,982	1.8	2.4	0.5	15			
		CP	41,058	0.4	3.3	1.5	26			
		Shoreside	50,719	0.7	2.7	0.9	22.2			
		Total	145,760	4	8.4	3.4	67.5			
		non-tribal sum	120,760	2.8	8.4	2.9	63.2			
316,730	234,330	Tribal	32,500	1.46	0.03	0.6	5.62	~.30	~.34	~.38
		Mothersh	47,959	2.9	4.01	0.83	24.8			
		CP	67,942	0.61	5.4	2.52	43.0			
		Shoreside	83,929	1.19	4.5	1.51	36.7			
		Total	232,330	6.15	13.9	5.46	110			
		non-tribal sum	199,830	4.69	13.9	4.9	104.4			
365,000	269,662	Tribal	35,000	1.6	0	0.6	6	0.27	0.3	0.33
		Mothersh	55,839	3.4	4.7	1	28.9			
		CP	79,105	0.7	6.3	2.9	50.2			
		Shoreside	97,718	1.4	5.2	1.8	42.8			
		Total	267,662	7	16.2	6.3	127.8			
		non-tribal sum	232,662	5.5	16.2	5.7	121.8			
594,000	438,847	Tribal	35,000	1.6	0	0.6	6	0.23	0.27	0.31
		Mothersh	96,443	5.8	8.1	1.7	49.9			
		CP	136,628	1.2	10.9	5.1	86.6			
		Shoreside	168,776	2.4	9	3	73.8			
		Total	436,847	11	28	10.4	216.4			
		non-tribal sum	401,847	9.5	27.9	9.8	210.3			
Current 2006 non-tribal bycatch Limit				4.7			243.2			
Non-Tribal Fisheries										
2005 scorecard projections (total)				6.7	22.3	5.6	213.9			
2005 Bycatch limits				4.7			212			
2005 Actual catch				3.3	16.4	1.6	155.8			

Figure 1: (From STAR Panel report). Graph of the time series from the beginning of the modeled time period to 2009 for the q=1 model that includes catch (based on the estimated OY from the q=1 model), spawning biomass, depletion and exploitation rate (relative to vulnerable biomass).



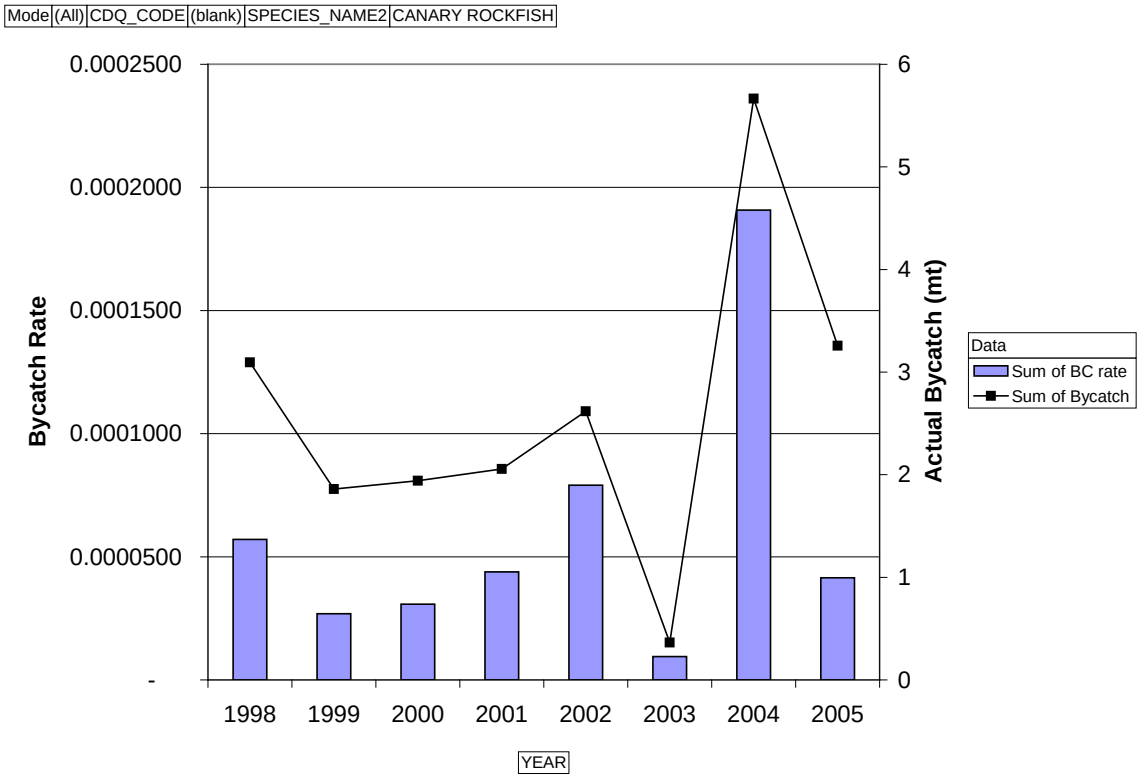


Figure 2

Annual Canary Bycatch Rate by non-tribal Sector

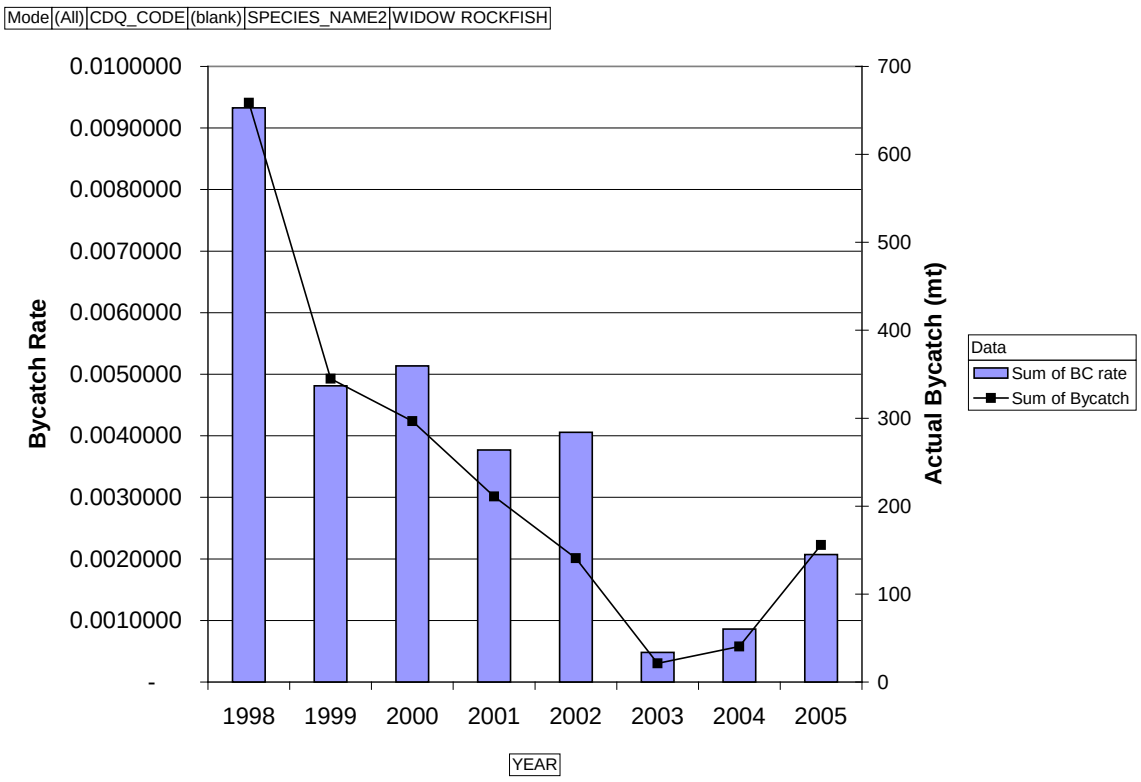


Figure 3 Annual Widow Bycatch Rate by non-tribal Sector

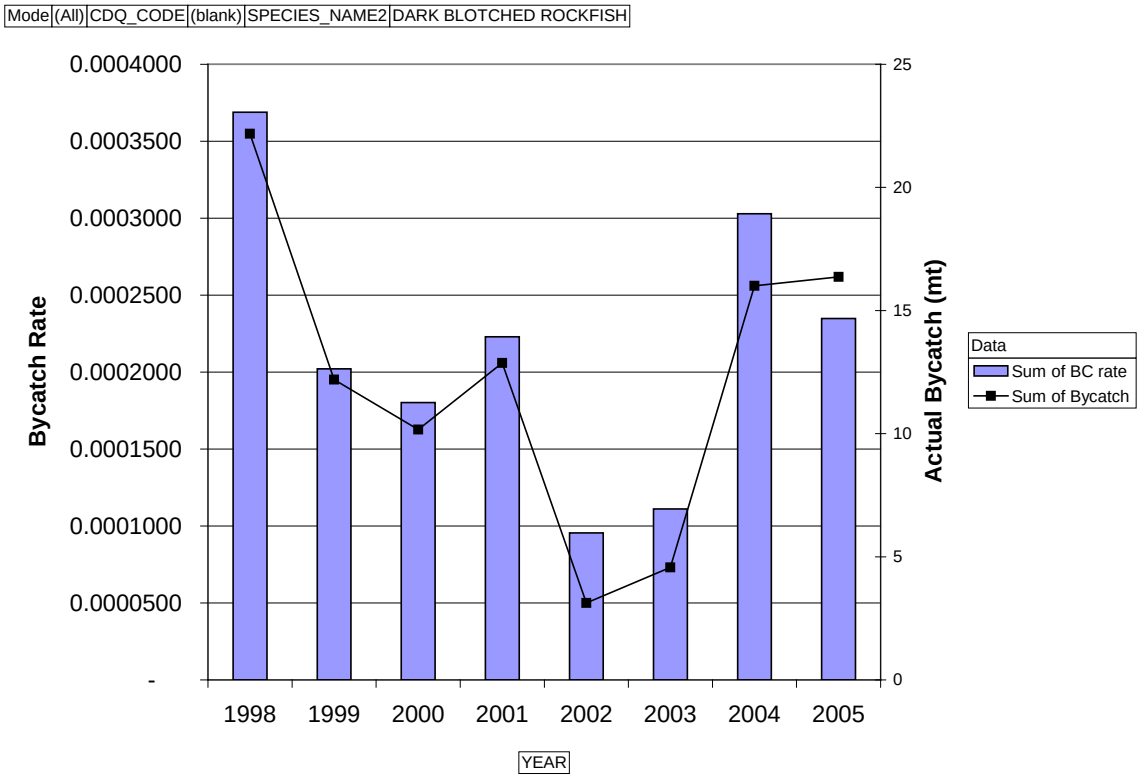


Figure 4 Annual Darkblotched Bycatch Rate by non-tribal Sector