

## SUMMARY OF THE BIOLOGICAL AND SOCIOECONOMIC EFFECTS OF THE 2007-2008 ACTION ALTERNATIVES

### **Introduction**

The preliminary draft environmental impact statement (DEIS), “Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2007- 2008 Pacific Coast Groundfish Fishery and Amendment 16-4: Rebuilding Plans for Seven Depleted Pacific Coast Groundfish Species – Preliminary Draft Environmental Impact Statement” (Agenda Item F.2.a, Attachment 4), includes extensive analysis of the effects of rebuilding the seven depleted groundfish species subject to revised rebuilding plans under Amendment 16-4. These rebuilding analyses explore the time to rebuild under various levels of harvest (i.e., alternative optimum yields (OYs)), including a “no fishing” scenario (F=0); and the corresponding economic implications to groundfish sectors, ports, and fishing communities; and the interaction of depleted species within the marine ecosystem.

Alternative 2007-2008 groundfish management measures, referred to as Action Alternatives in the preliminary DEIS, are designed to provide fishing opportunities to harvest healthy, target species within the constraints of alternative depleted species’ OYs. The three Action Alternatives decided by the Council in April 2006 follow a gradient of conservatism, with Action Alternative 1 being the most conservative in that these management measures constrain fishing opportunities the most, but result in faster rebuilding. Conversely, Action Alternative 3 has the most liberal management measures and provides the most fishing opportunity at a cost of longer rebuilding times. Action Alternative 2 is intermediate in the predicted effects to fishing opportunities and rebuilding times.

The Council decided preferred 2007-2008 OYs for all non-depleted species and two OY alternatives (a preferred Low OY Alternative and a preferred High OY Alternative) for detailed analysis at their April 2006 meeting. Action Alternative 1 management measures are designed to stay within the preferred Low OYs for depleted species and Action Alternative 3 management measures are designed to stay within the preferred High OYs for depleted species in 2007-2008. Action Alternative 2 has intermediate effects, staying within the preferred Low OY for some depleted species and otherwise staying within the preferred High OY. Table 1 depicts the estimated take of depleted species in Action Alternatives 1-3, respectively.

This document summarizes the key effects of the No Action Alternative, the three action alternatives, and the F=0 scenario in terms of impacts to rebuilding periods for depleted species and socioeconomic impacts. These summary effects are depicted in Table 1 of this document. Table 2 summarizes the combined recreational and commercial income impacts of the No Action and action alternatives by West Coast region. Figure 1 depicts trends in groundfish exvessel revenues since 1981, with projections through 2008 under each of the action alternatives. Table 3 lists the most vulnerable counties associated with changes in groundfish management measures. These tables and Figure 1 provide a “snapshot” of the bottom line biological and socioeconomic effects of the action alternatives.

### **The F=0 Alternative**

The shortest possible rebuilding times are predicted for depleted species under the F=0 alternative (denoted  $T_{F=0}$ , the time to rebuild in the absence of fishing-related mortality) since fishing-related mortality is eliminated beginning in 2007. This alternative is a comparison “benchmark” in this preliminary DEIS since the Council has decided to allow some harvest under groundfish rebuilding plans to avoid disastrous short-term socioeconomic impacts.

Under the F=0 alternative, multiple sectors are closed and fishing communities experience substantial losses of commercial fishing-related revenue and recreational fishing effort and expenditures (Table 7-69 of the preliminary DEIS). Compared to 2005 revenues, commercial fishery exvessel revenue would be decreased by over \$177 million, and the number of recreational angler trips would decrease by over 1.1 million. These figures represent a closure of all groundfish-related commercial revenues, all groundfish-related recreational angler trips, and multiple non-groundfish sectors.

### **Action Alternative 1**

Action Alternative 1 constrains fisheries to the preferred Low OYs for depleted species and therefore results in the shortest rebuilding times considered by the Council for Amendment 16-4 rebuilding plans. Rebuilding is extended by less than five years relative to  $T_{F=0}$  for bocaccio, cowcod, darkblotched rockfish, Pacific ocean perch, and widow rockfish. Canary and yelloweye rockfish rebuilding periods are extended by an estimated 7 and 35 years, respectively under Action Alternative 1.

Action Alternative 1 reduces rebuilding species OYs compared to status quo catch levels, and as a result, revenues generated by commercial fisheries directed at groundfish are lower than status quo levels, and the number of recreational bottomfish trips is lower than status quo. Under this alternative, many of the target species OYs are not attained, and fishing area is decreased for all sectors as the size of groundfish conservation areas is expanded to encompass more area where rebuilding species are found. Under this alternative, exvessel revenues for the major directed groundfish sectors are estimated to be approximately \$42.8 million, and the number of recreational angler trips for bottomfish is estimated to be 350,690. These figures represent approximately 62% of exvessel revenues generated in 2005, and 65% of the number of angler trips in 2005.

### **Action Alternative 2**

Action Alternative 2 effects are intermediate to the other action alternatives. Alternative 2 management measures explore different ways to constrain fishing-related mortality of depleted species and reveal distributional effects to fishing sectors and regions resulting from these alternative measures. Table 1 shows the estimated impacts to depleted species under Action Alternative 2 management measures are within the preferred Low OY for cowcod, but within the preferred High OY for the other six depleted species. Predicted rebuilding times under Action Alternative 2 are likewise intermediate to those under the other action alternatives and proportional to the amount of allowable harvest if that harvest rate is maintained during the entire rebuilding period.

Action Alternative 2 brings rebuilding species OYs to levels that are near status quo catch amounts for many rebuilding species except for yelloweye rockfish. While OYs for rebuilding species are near status quo, negative economic impacts are greater than alternative 1, but less

than Action Alternative 3. In addition, a larger portion of the OY remains unattributed to any particular sector.

While many of the OYs for rebuilding species are near status quo, and there are relatively large amounts of OYs not attributed to any particular sector, the amount of exvessel revenues are different for certain sectors and regions of the fishery when compared to 2005 and 2006 revenues. While some sectors have higher exvessel revenues than 2005 or 2006, others have lower exvessel revenues. The difference in the distribution of revenues is directly attributed to changes in target species abundance and OYs. For example, the increase in the 2007 OY for Dover sole results in larger exvessel revenue for the bottom trawl sector as a whole, while the decrease in the 2007 OY for sablefish results in lower coastwide exvessel revenues for the fixed gear sablefish sectors.

On a coastwide basis, combined exvessel revenues for the major directed groundfish sectors are estimated to be approximately \$59.7 million, and the number of recreational angler trips for bottomfish is estimated to be 421,271. These figures represent approximately 87% of 2005 exvessel revenues, and 78% of 2005 bottomfish angler trips.

### **Action Alternative 3**

Action Alternative 3 constrains fisheries to the preferred High OYs for depleted species and therefore results in longer rebuilding times relative to the other action alternatives. Rebuilding is extended by five years or less relative to  $T_{F=0}$  for bocaccio, darkblotched rockfish, Pacific ocean perch, and widow rockfish. Cowcod, canary and yelloweye rockfish rebuilding periods are extended by an estimated 8, 10, and 36 years, respectively under Action Alternative 3.

Action Alternative 3 brings rebuilding species OYs to levels that are near status quo catch amounts for many rebuilding species except for yelloweye rockfish. The overall economic impact of Action Alternative 3 is that many sectors are expected to achieve social and economic benefits that are similar to status quo levels. However, like Action Alternative 2, there are differences in the distribution of exvessel revenue and angler trips on a regional basis and on a sector-by-sector basis. This change is driven by changes in the abundance and OYs for target species, as well as changes in the yelloweye OY. The change in the yelloweye OY negatively impacts recreational fisheries in the northern areas, but recreational fisheries in the southern areas are able to attain a higher number of angler trips than under 2005 and 2006 regulations. In the case of commercial fisheries, the bottom trawl sector is able to attain higher levels of exvessel revenues when compared to 2005 and 2006, primarily as a result of the increase in the Dover sole OY. Alternatively, the fixed gear sablefish sectors achieve lower levels of revenue because of a decrease in the sablefish OY.

On a coastwide basis, commercial exvessel revenues for the major directed groundfish sectors are estimated to be approximately \$64.9 million, and the number of recreational bottomfish trips is estimated to be 587,873. These figures represent 94% of 2005 exvessel revenues, and 109% of 2005 recreational angler trips.

### **The Economic Implications of Uncertainty and Management Flexibility**

The economic impact estimates in the preliminary DEIS are based on management measures that achieve some level of target and non-target species catch or recreational fishing opportunity. Catch projections, revenue estimates, and recreational effort projections are, as with any

projection or estimate, subject to varying degrees of accuracy. While they do in fact represent the best estimate of catch and socioeconomic impacts, these estimates will inherently differ from what actually occurs in the fishery when the 2007 fishing year progresses. These differences can be due to such things as changes in catch per unit effort, unexpected weather patterns, unexpected ocean conditions, changes in the behavior or availability of the fish stocks, or changes in effort on the part of fishermen, amongst other things. Empirical evidence and past experience has shown that catch projections will ultimately differ to some degree from what actually occurs. Some projections will be less than what occurs and some will be higher than what actually occurs. Rebuilding species catch estimates that end up being less than what actually occurs in the fishery have the potential to negatively impact fishing sectors if an inseason management response is necessary to keep the catch of that rebuilding species within the OY. While the catch of rebuilding species that are higher than expected may provide for some amount of revenue or angler satisfaction, rebuilding species provide little social and economic benefit because they represent a small portion of the fishery, but constrain abundant target species. This is because of the mixed stock nature of the fishery. When an inseason action is necessary to stay within a rebuilding species OY because of unexpectedly high catch, that inseason action will typically result in a loss of social and economic benefits as the fishery becomes constrained to minimize further catch of that rebuilding species. While it is impossible to know which species are likely to have higher or lower actual catches than predicted, it can almost always be expected that it will occur to some degree. That is, it is a matter of when catches will differ from predictions and for what species, not a matter of if actual catches will differ from predictions.

The amount of uncertainty related to the catch projections of rebuilding species is directly related to the economic impacts of management measures designed to achieve a given catch level. If OYs are constructed in a manner that takes into account the reality that catch predictions have a certain level of uncertainty (that is, if OYs are higher than predicted total catch) then the economic impact that is predicted prior to the start of the season for a given set of management measures becomes more certain. As the difference between the OY of rebuilding species and predicted catch increases, the economic impacts resulting from management measures becomes increasingly more certain. Inversely, as the difference, or “buffer” between the OY of a rebuilding species and predicted catch decreases, the certainty of the economic impacts predicted for that particular management scheme is reduced. If the OY for all rebuilding species is determined from predicted catch, it can be guaranteed that the actual economic impacts resulting from that suite of OYs will be lower than what is predicted because the actual catch of one or more rebuilding species will be higher than expected and some constraining management response will be necessary at some point during the year. A management system designed in a manner where each stock is equally constraining has no flexibility to respond to likely departures from predictions.

Management of groundfish fisheries throughout much of the 2002-2006 period have relied on some degree of management flexibility to keep rebuilding species catch levels within their respective OYs while maintaining some amount of social and economic benefits. For example, a typical review of inseason catches will reveal that the catch of one or more rebuilding species is higher than what was anticipated. The response has often been to implement a change in management regulations which shifts major portions of the fishery to areas where rebuilding species that are experiencing higher than anticipated catch levels may not be as abundant, but other rebuilding species may be found in greater abundance. This effectively reduces catches of

rebuilding species that may be tracking ahead of projections, but it may increase the catch of other rebuilding species. The social and economic impact of restricting the fishery in some areas is often mitigated by the ability to move the fishery to other areas. Without a buffer between predicted catch of rebuilding species and rebuilding species OYs, this type of management flexibility would not be possible, and the actual social and economic impact associated with particular catch levels is likely to be lower than what was expected. Therefore, if it is an objective to maintain some certainty that a level of social and economic benefit related to fishing activities will occur over the course of a year, then a buffer between predicted catches of rebuilding species and the OY of rebuilding species is necessary.

### **Effects on West Coast Fishing Communities**

A consideration in deciding groundfish rebuilding plans is the effect of management measures on West Coast fishing communities. Chapter 7 and Appendix A of the preliminary DEIS explores the socioeconomic impacts of alternative harvest levels and corresponding management measures on West Coast fishing sectors, ports, and communities. This report summarizes these effects at the county level by listing those counties that are considered “vulnerable” and “most vulnerable” to changes in management measures by ranking those counties that are most engaged in fishing or dependent on the groundfish fishery and least resilient to negative socioeconomic impacts (Table 3).

In this analysis, a county is “commercially engaged” in fishing if it ranks among the top one-third of all coastal counties in at least one of four indicators (number of vessels, permits, dealers, or revenue). A county is “commercially dependent” on groundfish resources if it ranks among the top one-third of all coastal counties in at least one of three indicators (groundfish permits and two groundfish revenue measurements). A county is “recreationally engaged or dependent” on fishing if it ranks among the top one-third of all coastal counties in at least one of four indicators (four measurements of the number of angler and charter trips). A county is “least resilient” if it ranks among the top one-third of all coastal counties in at least one of four indicators (industry diversification, unemployment rate, percentage of the population living below the poverty level, and population) used as proxies for economic resiliency. A county is listed as “vulnerable” if it is commercially engaged and least resilient, commercially dependent and least resilient, or recreationally engaged or dependent and least resilient. A county is listed as “most vulnerable” if it is listed among the top one-third of “commercially engaged”, “commercially dependent”, or “recreational engaged or dependent” indicators at least three times and is listed among the top one-third of resiliency indicators at least three times.

Table 1. Estimated rebuilding duration for depleted groundfish fisheries and predicted socioeconomic impacts under 2007-2008 Action Alternatives and a “no fishing” scenario.

Action Alternative	Depleted Species	OY (mt)	Estimated Impacts <sup>a/</sup> (mt)	Median Time to Rebuild <sup>b/</sup>	Exvessel Revenue for Major Groundfish Sectors <sup>c/</sup>	Recreational Effort <sup>d/</sup> (no. of trips)
No Action Alternative (2006 specifications and management measures)	Bocaccio	309	135	2029		
	Canary	47	44	2064		
	Cowcod	4.2	3.4	2039		
	Darkblotched	200	182	2010		
	Pacific Ocean Perch	447	74	2023		
	Widow	289	257	2015		
	Yelloweye	27	20	2120		
	<b>Socioeconomic Impacts</b>					
F=0 (No groundfish fishing)	Bocaccio	0	0	2021		
	Canary	0	0	2053		
	Cowcod	0	0	2035		
	Darkblotched	0	0	2009.5		
	Pacific Ocean Perch	0	0	2014.6		
	Widow	0	0	2013		
	Yelloweye	0	0	2048		
	<b>Socioeconomic Impacts</b>					
Action 1 (Constrains fisheries to the preferred Low OYs for depleted species)	Bocaccio	40	39	2022		
	Canary	32	25	2060		
	Cowcod	4	0.5	2039		
	Darkblotched	130	81	2010		
	Pacific Ocean Perch	44	44	2015		
	Widow	120	116	2014		
	Yelloweye	12.6	11	2083		
	<b>Socioeconomic Impacts</b>					
Action 2 (Intermediate constraints to fisheries)	Bocaccio	218	111	2026		
	Canary	44	33	2063		
	Cowcod	8	3.3	2043		
	Darkblotched	229	197	2010		
	Pacific Ocean Perch	100	99	2016		
	Widow	368	144	2015		
	Yelloweye	Ramp-down <sup>e/</sup>	14.3	2084		
	<b>Socioeconomic Impacts</b>					
Action 3 (Constrains fisheries to the preferred High OYs for depleted species)	Bocaccio	218	186	2026		
	Canary	44	41	2063		
	Cowcod	8	3.5	2043		
	Darkblotched	229	203	2010		
	Pacific Ocean Perch	100	100	2016		
	Widow	368	191	2015		
	Yelloweye	Ramp-down <sup>e/</sup>	18.3	2084		
	<b>Socioeconomic Impacts</b>					

a/ Estimated impacts are from the GMT's bycatch scorecards for each alternative. The No Action Alternative represents impacts with inseason adjustments implemented in May 2006.

b/ Median rebuilding time is the estimated time to rebuild the stock if the entire OY is taken and the harvest rate is maintained after 2008 and through the entire course of rebuilding (i.e., harvest is taken at the rate used to determine the OY).

c/ "Major groundfish sectors" includes nearshore groundfish, limited entry bottom trawl, limited entry whiting, fixed gear sablefish, and fixed gear groundfish south of Pt. Conception.

d/ Recreational effort includes only bottomfish trips.

e/ The yelloweye ramp-down strategy ramps the harvest rate down from the status quo harvest rate and resumes a constant harvest rate strategy in 2011. The 2007-2010 OYs are 23 mt, 20 mt, 17 mt, and 14 mt, respectively under the ramp-down strategy.

Table 2. Change (from No Action) in combined estimated commercial and recreational income impacts by region under the action alternatives (million \$).

<b>Region</b>	<b>No Action</b>	<b>Alt 1</b>	<b>Alt 2</b>	<b>Alt 3</b>
<b>Puget Sound</b>	15.4	-2.0	-0.5	-0.4
<b>North Washington Coast</b>	16.6	-1.6	-1.2	-0.8
<b>South &amp; Central WA Coast</b>	121.1	-11.0	-6.5	-1.0
<b>Astoria-Tillamook</b>	97.2	-8.1	-1.0	0.7
<b>Newport</b>	49.7	-10.4	-4.3	-0.8
<b>Coos Bay</b>	32.4	-3.1	-0.3	0.0
<b>Brookings</b>	17.7	-1.5	-0.2	-0.2
<b>Crescent City-Eureka</b>	19.4	-3.1	-0.1	0.3
<b>Fort Bragg</b>	11.3	-2.4	-0.4	0.3
<b>Bodega Bay - San Francisco</b>	43.7	-4.2	-3.3	0.6
<b>Monterey - Morro Bay</b>	37.7	-5.3	-4.0	1.9
<b>Santa Barbara</b>	62.6	-1.2	-0.7	0.3
<b>Los Angeles - San Diego</b>	144.2	-3.7	-1.9	0.9
<b>At-Sea Whiting (including Tribal)</b>	43.4	-18.9	-11.1	-1.4
<b>TOTAL</b>	712.42	-76.55	-35.49	0.40

Table 3. The vulnerable and most vulnerable counties to change in groundfish management measures.

State	Port Group Area	County	vulnerable*/most vulnerable**
<b>Washington</b>	Puget Sound	Whatcom	*
		San Juan	*
		Skagit	
		Snohomish	
		King	
		Pierce	
		Thurston	
		Mason	
	North Washington Coast	Jefferson	
		Clallam	*
South & Central WA Coast	Grays Harbor	**	
	Pacific	**	
<b>Oregon</b>	Astoria-Tillamook	Clatsop	*
		Tillamook	*
	Newport	Lincoln	**
	Coos Bay	Lane	
		Douglas	
		Coos	**
Brookings	Curry	*	
<b>California</b>	Crescent City	Del Norte	*
	Eureka	Humboldt	**
	Fort Bragg	Mendocino	**
	Bodega Bay	Sonoma	
		Marin	
	San Francisco	Alameda	
		Contra Costa	
		San Mateo	
		San Francisco	
	Monterey	Santa Cruz	
		Monterey	*
	Morro Bay	San Luis Obispo	*
	Santa Barbara	Santa Barbara	*
		Ventura	
Los Angeles	Los Angeles	*	
	Orange		
San Diego	San Diego		

### Trends in Groundfish Ex-vessel Revenues

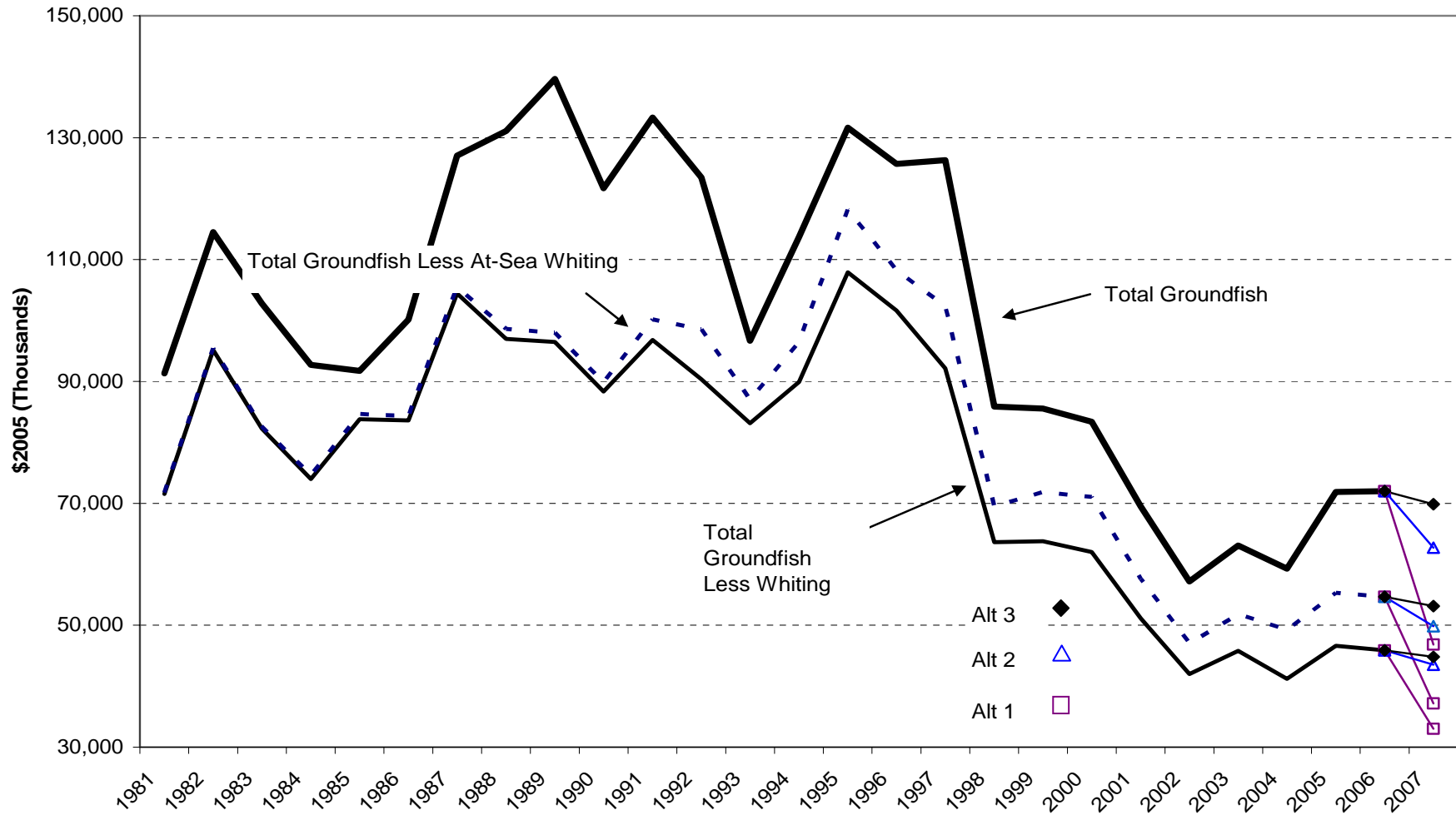


Figure 1. Trends in exvessel revenues from the West Coast groundfish fishery and projected revenues under the 2007-2008 action alternatives.