

## GROUND FISH ADVISORY SUBPANEL REPORT ON PART 1 OF MANAGEMENT MEASURES FOR 2011-2012 FISHERIES

The Groundfish Advisory Subpanel (GAP) considered options for 2011-2012 acceptable biological catches (ABCs) and associated annual catch limits (ACLs) for groundfish species. There are two parts to this statement: the first contains general comments; the second covers ACL recommendations for overfished species (OFS) under rebuilding plans.

For this report, the GAP referenced Agenda Item I.2.a, Attachment 2, "Tables and Graphics Relevant to Deciding 2011-2012 Groundfish Annual Catch Limits," table 2-4: Estimated time to rebuild and SPR harvest rate relative to alternative 2011-2012 ACLs for depleted west coast groundfish species. (Attached)

Regarding management measures, the GAP referenced Agenda Item I.4.a, Attachment 2, "Preliminary Range of Management Measures for 2011-12 Groundfish Fisheries."

### GENERAL COMMENTS

#### *Needs of Fishing Communities*

Status quo harvest levels are not meeting the needs of fishing communities. In the past, optimum yields (OYs) for overfished species have been set extremely low, which greatly affects fishing opportunity for healthier stocks that are caught in association with less abundant species. As noted in the April 8, 2008, GAP statement, Neah Bay is an example of this worst-case scenario: Neah Bay's trawl fleet no longer exists due to management measures associated with extremely low harvest guidelines for some species. Westport's traditional groundfish trawl fleet, once active in significant numbers, now has only two vessels whose total catch is trucked away from Westport for processing.

The GAP understands the need to endure short-term consequences for long-term gain, but the two are linked. Short-term management measures must allow the opportunity for recreational and commercial businesses to survive the immediate future and prosper in the years to come.

Most all the rebuilding stocks have come in under their respective OYs for most of the last 10 years, with the exception of canary. Six of the other overfished species went over their respective OYs only once or twice between 1999 and 2008, according to their 2009 stock assessments: POP in 2001 and 2007; petrale in 2005; darkblotched in 1999 and 2000; bocaccio in 2000 and 2001; and yelloweye in 2002 (cowcod was difficult determine because it was managed as part of a mixed stock for some years). Widow has not exceeded its OY during this time. This performance demonstrates that current management measures are working and that we know how those management measures will affect fishing behavior.

### ***TIQ program uncertainty***

As everyone is well aware, the trawl individual quota program (TIQ) is scheduled to go into effect on Jan. 1, 2011. With it comes unanticipated changes, despite the council's and advisory bodies' best efforts to account for everything. Higher ACLs, especially on overfished species, will add more flexibility overall to a system that is a radical change from status quo and make the switch easier for fishermen and processors.

Higher ACLs will help alleviate the zero allocation problem coastwide. An example of this has recently become apparent when fishermen from Fort Bragg notified the council they had no allocation of yelloweye – or effectively not enough yelloweye to accommodate targeted fisheries on healthy stock.

The zero-allocation issue is a two-part problem: 1) Limited ACLs of overfished species and 2) an inadequate initial allocation formula in the TIQ program.

### ***Rebuilding paradox***

Much has been made about the need to justify even the smallest increases in OYs of depleted species. It's expected that recent and current levels of exploitation are somehow adequate – that people have been able to “make-it” on these low levels, so increases that result in slightly longer rebuilding periods are not justified.

This is not the case.

We know that people have not been able to “make it,” as is apparent in Neah Bay and Westport, Wash. We also know that all species currently under rebuilding plans are in fact rebuilding – some at a much faster pace than anticipated. Higher ACLs of overfished species are primarily justified based on this rebuilding paradox. As stocks are rebuilding at accelerated rates, the incidence of interactions with these stocks also increases.

### ***Closed areas***

When most if not all of a depleted species' habitat is off limits to fishing through rockfish conservation areas (RCAs), it is unclear why further restrictions on catch outside of these sensitive habitats are warranted. For example, the Cowcod Conservation Area is more than 4,600 square miles and protects the majority of cowcod habitat. However, we still need to press for even a status quo harvest outside of this massive protected area. The addition of MPAs to existing closed areas – the RCA, the CCA, the Yelloweye Conservation Area, etc. – are further reducing the fishing opportunity for both recreational and commercial fishermen.

There is going to be a huge economic impact due to the Marine Life Protection Act process in California – and with similar plans in Oregon and Washington. Raising of the ACLs will help offset any of the economic impacts, particularly to nearshore recreational fishermen.

We need to remember that the RCA was a quick and simple approach to capture the minimum and maximum depths at which most of the overfished species occurred. This wide swath was created at a time when we did not have enough information to capture species' specific hot spots. In short, we've taken a shotgun approach to a target shooting event.

It is time to readdress the rebuilding plans based on the effectiveness of those closed areas.

### ***Cumulative effects***

As noted in the comments below related to the overfished species, the cumulative effects of closed areas, gear changes, bag limits, seasonal closures, trip limits and other management measures for individual species have created a cumulative effect that has depressed the economic potential of the recreational and commercial fleets. It's the “death by a thousand cuts” syndrome: Over a period of time, each change eliminates another person or business from the community.

### ***Data collection***

Higher ACLs would result in fewer regulatory discards and make more fish available for biological data collection in both the recreational and commercial sectors. This is data that is needed for continued management.

### ***General economic conditions***

#### ***Commercial fishery***

Generally, for the period from 1981 through 1997, the ex-vessel value of the commercial non-whiting groundfish fishery was very good. The average annual value, when adjusted for inflation, was \$110 million during those 16 years.

Then things changed. The Sustainable Fisheries Act of 1996, amendments to the Magnuson Act, came into play. By 1998, management changed to include consideration of depleted species and plans to rebuild those species. Nine species were declared overfished in 2000 and the council and National Marine Fisheries Service instituted rebuilding plans that effectively reduced harvests to protect those species. The effects of those changes became readily apparent during the last 12 years, starting in 1998.

During the second time period, from 1998 through 2009, the annual average ex-vessel value of the fishery was \$54 million, in figures adjusted for inflation. This is roughly half the average value of the pre-1998 fishery. (See the attached “West Coast Groundfish values, 1981-2009” table.)

We are not taking advantage of the cumulative success at improving fisheries management through rebuilding programs. The council, NMFS, fishermen, processors – the industry – has made great strides in the last 20 years, the time during which rebuilding plans were instituted. The annual value of groundfish has slowly been improving since 2004, when the lowest non-whiting groundfish value was only \$45 million, but they are still at levels drastically reduced

from historical highs that sustained boats and crews, processors and crews, and related businesses.

### *Recreational fishery*

It is difficult to estimate the social and economic value of recreational fishing. All West Coast communities are suffering heavy economic losses from increasing closures and management restrictions. While we agree that a sustainable fishery is in the public best interest, we implore the Council to consider the needs of communities when implementing management measures to rebuild groundfish stocks. Whenever possible, longer periods to rebuild the stocks should be considered when these devastating effects of heavy regulations are placed upon the groundfish industry.

### California

In California, management changes and restrictions are having serious impacts to the coastal fisheries and the local communities. The smaller communities that rely upon fisheries for economic health are being stressed to the breaking point. To illustrate, the groundfish draft environmental impact statement (DEIS) from June 2006 notes that the values calculated were drawn from the dollars anglers spent pursuing the fishery. In 2005, California Recreational Survey data in northern California recorded almost 57,000 angler trips for the months of September and October. To develop the economic value of these trips, local businesses, harbor masters, restaurants, motels, sports shops, marine mechanics and suppliers, fuel docks, harbors, and businesses that support the fishing community have all been affected and must be considered.

Loss of time on the water due to restrictions, closures, bag limit reductions and effort shift to other areas by tourists have resulted in the loss of tens of millions of dollars to the coastal communities. At a time when all areas within the state are under economic pressure from revenue losses due to the recession, it is particularly hard on these small coastal communities.

An illustration of these effects is the early closure of the groundfish season in 2008 to the northern coastal California region due to yelloweye impacts. In September and October of 2008, the season was closed in an emergency action. That specific closure resulted in the direct loss of more than \$3.7 million per month to the Humboldt County area alone.

Using the ports of Shelter Cove, Eureka and Trinidad, the number of local boats, number of anglers, mooring, launch fees, equipment, gear, ice, food, fuel, lodging, mileage and vehicle and boat costs and other related expenses are factored in as supporting information (see attached table, "Recreational Fishing Expenses for Humboldt County.") Using the information supplied by businesses such as Englund Marine, Trinidad Harbor, RecFIN survey information, Humboldt Bay Harbor District, local marine mechanics such as Redwood Marine and Full-on Marine, estimates of losses to the local community were developed. Local suppliers experience large capital costs when they cannot sell inventory and materials. Local mechanics have lost as much as 90% of their marine income due to season closures.

Daily trip costs per angler were conservatively estimated to be \$105 per day with an additional \$25 per day per angler for annual vehicle, boat, license fees and maintenance costs. Using \$130

per day per angler and using the California Survey Data as corroboration, more than \$3.7 million were lost per month for the closure in 2008. With the subsequent loss of the salmon season in 2009, more than \$14.8 million was lost to Humboldt County. That is devastating to the region and is symptomatic of small communities from Crescent City to the Southern California area. California is showing a long downward trend of fishing license sales and tourist visits due to restrictions and loss of fishing opportunities.

### Oregon

The recreational charter fleet in Oregon has been reduced from 232 boats in 2001 to 76 in 2008. About 25% of the boats are not full-time operators – many are small 6-pack boats that are on trailers and may operate only on weekends. Management measures implemented since 2001 have greatly reduced and changed the make-up of the fleet. Many of the full-time operators have already gone out of business, especially when combined with the devastating salmon closures of recent years. The few full-time operators that are left are barely holding on. As management continues to tighten it takes fewer restrictions to break the remaining participants.

Under low OY conditions, the Oregon recreational fleet stands to lose even more small businesses and private recreational opportunity – and these also are essential to the health and economy of our coastal communities.

### Washington

For the Washington recreational fleet, both private and charter operations are operating under restrictions that are difficult to quantify. Businesses in all sectors (hotel/motel, bait and tackle shops, charter offices, etc.) are showing a downturn in revenues from the same time the previous year. This is a cumulative effect of short halibut seasons, fathom restrictions, fuel prices, and a poor economy.

## GAP RECOMMENDATIONS FOR ACLs FOR SPECIES UNDER REBUILDING PLANS

In general, the GAP would like to remind the Council that any liberalization of OYs – or ACLs, as they are now called – on overfished species does not present new fishing opportunities. We are looking to reinstate significant lost opportunities and ease constraints for some existing fisheries. In the last five years, some of the commercial and recreational participants have been permanently lost, shoreside infrastructure and facilities have closed, ice machines have had to be subsidized in some ports and buyers have stopped buying product due to reduced availability. This has led to increased competition of imported and aquaculture products to fill traditional market demands.

**Summary of GAP Recommendations:**

Species	2010 OY (for reference)	Alternative	2011 ACL	2012 ACL
Bocaccio	288	5	373	384
Canary rockfish	105	6	155	162
Cowcod	4	modified*	5	5
Darkblotched rockfish	291	modified*	364	360
Pacific Ocean perch	200	4	265	269
Widow rockfish	509	6	3000	3000
Yelloweye rockfish	17	6	20	21
Petrals – w/winter fishery	1,200	4	976	1,222

\* The GAP consulted the rebuilding analyses for these species to find higher ACLs to afford more flexibility while still meeting rebuilding targets

**Bocaccio**

The GAP recommends an ACL of 373 mt in 2011 and 384 mt in 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR	Basis
				2011	2012		
Bocaccio ( S of 40°10' N lat.)a/		1	2019	0	0	F100%	
		2	2019	53	56	F95%	Varying the range of SPR harvest rates
		3	2020	109	115	F90%	Varying the range of SPR harvest rates
		4	2022	263	274	F77.7%	SPR harvest rate in the current rebuilding plan
		5	2024	373	384	F70%	Varying the range of SPR harvest rates
			2028	539	545	F60%	
		2031	605	609	F56%	Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax	

*Justification for recommendation*

- The 373 and 284 mt ACLs equate to an SPR harvest rate of F70% and result in rebuilding by 2024 – two years earlier than the Ttarget.

*Regained opportunities:*

- Recreational: There is a significant benefit to charter boat operations when retention of more bocaccios is made available (current retention is two fish). Increasing this could reduce regulatory discards. It is also well documented that passenger counts have decreased due to the severe restrictions currently in place.
- Recreational: Bocaccio is of more importance to recreational fisheries in central and southern California.
- Fixed-gear and open access: A 373 mt ACL combined with increased ACL for canary could allow open access fishermen to capture their deeper nearshore and shelf trip limits as well as their lingcod trip limits.
- Trawl: Under the new TIQ program, boats have substantial opportunity to catch chilipepper, however, that opportunity is constrained by low ACLs in the rebuilding plan.

## Canary rockfish

The GAP recommends an ACL of 155 mt in 2011 and 162 mt in 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Canary	2021	1	2024	0	0	F100%
		2	2025	49	51	F94.4%
		3	2026	69	72	F92.2%
		4	2027	102	107	F88.7%
		5	2027	129	135	F86%
		6	2028	155	162	F83.4%
			2031	253	263	F74.4%
			2035	308	318	F70%
			2043	396	408	F63.4%
			2046	415	426	F62.1%

The SPR rate that results from a 2010 OY of 44 mt (possible reduction under interim)  
The SPR rate that results from a 2009/2010 OY of 105 mt  
SPR harvest rate in the current rebuilding plan, 2027 is also the Ttarget from the 2009  
50% probability to recover by 2027, which is a year that occurs between TF=0 and Ttr  
OY resulting from applying an SPR harvest rate of 88.7% to the 2007 assessment resul  
50% probability to recover by 2031, which is a year that occurs between TF=0 and Ttr  
50% probability to recover by 2035, which is a year that occurs between TF=0 and Ttr  
50% probability to recover by 2043, which is a year that occurs between TF=0 and Ttr  
Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax,

### *Justification for Recommendation*

- The 155 and 162 mt ACLs are achieved by applying an SPR harvest rate of 88.7% to the 2007 assessment results. Rebuilding should be achieved by 2028, seven years later than the Ttarget of 2021.
- Alternatives 4 and 5 have a rebuilding Ttarget of 2027. Our recommendation pushes the rebuilding time back by only one year, to 2028. This is an increase of about 50 mt from the option that would rebuild the stock by 2027. However, canary is a very critical species. This increase will afford much greater flexibility for bycatch in all sectors and slow the loss of our valuable fishing heritage.
- The new Ttarget date is not a result of management failure, but rather reflects revised estimates of productivity in the new assessment. Because of the unrealistic Ttarget date, OYs were set excessively low, resulting in severe negative repercussions for fishermen and fishing communities.
- Several cumulative management measures are already in place to support rebuilding of canary. As cited on page 12 of the updated 2009 canary stock assessment:

“Managers employed several tools in an effort to constrain catches ... . These included: reductions in trip/bag limits for canary and co-occurring species, the institution of spatial closures and new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls.”

The most recent stock assessment suggests that, based on the biology of the stock, rebuilding will not be possible by the previous Ttarget date of 2021. These measures do lend themselves to a more realistic Ttarget of 2028. This new Ttarget takes into account the needs of the communities and community infrastructure.

*Regained opportunities:*

- Trawl whiting: A higher ACL for canary rockfish will increase flexibility for the whiting fishery, which has been constrained by canary bycatch.
- Trawl: A higher ACL is expected to provide some yellowtail opportunity for the mid-water trawl fishery whose yellowtail fishery has been completely eliminated in recent years due to imposed restrictions. The TIQ plan has provided ample yellowtail opportunity north of 40° 10', but it is constrained by canary bycatch.
- Recreational, open access, fixed-gear: A higher ACL could move the shoreward RCA boundary above 40°10' from 20 fathoms out to 30 fathoms. This presents reinstated opportunities for shelf rockfish for commercial fishermen as well as potentially longer seasons for recreational fishermen.
- Recreational: A higher ACL could lead to a one-fish bag limit that would help achieve bag limits more quickly, resulting in boats spending less time on the water, which in turn would have fewer impacts on yelloweye and nearshore species. In short, regulatory discards would be reduced.
- Recreational: One fish equates to a 14.28% reduction of impacts to other fish in Oregon and a 10% reduction in both California and Washington.
- Trawl: The directed fishery for arrowtooth in Washington waters was eliminated in 2005 due to a lack of canary to accommodate bycatch.
- Trawl: A higher ACL would provide more opportunities both inside and outside of the RCA boundaries for prosecution of the chilipepper fishery south of 40°10', and a yellowtail north of 40°10'.
- Trawl: For the non-whiting trawl fleet, canary reductions have resulted in forgone opportunities for lingcod, a fishery for sanddabs, a shallow fishery for English sole and the arrowtooth fishery. Large areas have been closed inshore of the RCA, such as between Port Orford and Coos Bay, and a virtual elimination of the inshore trawl fishery off of Neah Bay. While a higher canary ACL does not bring all of these fisheries back, it is a step in the direction toward reinstating some of this lost opportunity.
- Trawl: In many instances, the trawl fleet still does not have access to enough canary to prosecute a fishery on target species. The council and staff recognized this problem in September 2009 and realized the problem warranted reconsideration of initial allocations of canary during the November 2009 council meeting. It also should be noted that this problem exists for other overfished species.
- Trawl: 2010 was the first year for a 105-mt OY. The most recent scorecard shows canary fully subscribed (97.3%).
- Fixed-gear: With canary and yelloweye limits somewhat higher, allowing the fixed-gear fleet inside the 125-fm and 150-fm RCA is justified. Historical catches of sablefish in the

fall typically yielded a larger, more valuable fish in waters shallower than 125 or 150 fm with a catch of lingcod. Being able to fish shallower would benefit the smaller vessels and enhance at-sea safety. Smaller vessels can be limited due to the increased gear that is required when fishing in deeper waters.

## Cowcod

The GAP recommends a 5 mt ACL in 2011 and a 5 mt ACL in 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Cowcod	2072	1	2060	0	0	F100%
		2	2064	2	2	F90%
		3	2068	3	3	F82.7%
		4	2071	4	4	F79%
		5	2097	9	9	F59.7%
						Amendment 16-4 SPR harvest rate
						SPR harvest rate in the current rebuilding plan; also the 2009/2010 OY of 4 mt
						Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax

### *Justification for recommendation*

- The 5-mt ACLs are taken from the 2009 Cowcod Rebuilding Analysis, Table 5 (attached) run No. 5. The 2.4 mt should be doubled, which, when rounded up, results in a 5-mt ACL that equates to a 74.2% SPR harvest rate and a 50% probability of recovery by 2074, only two years later than the current Ttarget of 2072. (*Note: the 2.4 mt should be doubled to take into account the **entire range** of the cowcod stock, not just the Conception area, per GMT recommendations.*)
- The cowcod conservation area covers 4,600 square miles of essential cowcod habitat.
- The majority of cowcod habitat is protected by this area and harvesting up to 5 mt outside of this area should not be an issue.

### *Regained opportunities*

- Trawl, fixed-gear, open access, recreational: Cowcod, like canary, is a cross-cutting species that constrains all these sectors in California below 40°10'. Even a 25% increase that barely extends the rebuilding time would help at least 31 ports and communities in California survive. A 5-mt ACL is not opening up any new opportunity or regaining any old opportunity; it is simply maintaining current limited opportunity to catch other, targeted species.

## Darkblotched rockfish

The GAP recommends 364 mt for 2011 and 360 mt for 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Darkblotched	2028	1	2016	0	0	F100%
		2	2018	130	131	F81.8%
		3	2022	222	222	F71.9%
		4	2025	298	296	F64.9%
		5	2027	332	329	F62.1%
			2037	461	453	F52.8%

Varying the range of ACLs for analysis  
 SPR harvest rate that results in a 50% probability of rebuilding by 2022 a year between  
 The SPR rate that results from a 2009/2010 OY of 285 and 291 mt, respectively  
 SPR harvest rate in the current rebuilding plan  
 Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax

### Justification for recommendation

- The 364-mt and 360-mt ACLs are taken from the 2009 Darkblotched Rebuilding Analysis<sup>1</sup>, Table 2 (attached), with the column for a Ttarget year of 2028. The 364-mt and 360-mt ACLs equate to a 60% SPR harvest rate and a 50% probability of recovery by 2028, the same year as the current rebuilding Ttarget.

### Regained opportunities

- Trawl, open access (shrimp): Currently, darkblotched constrains slope rock, sablefish, whiting, short and longspines, Dover and all other fisheries seaward of the RCA.
- Whiting trawl: An increase in darkblotched could ease the already restrictive bycatch caps in the whiting fishery.
- Open access: Here again, darkblotched is another rebuilding species that turns up more frequently due to the rebuilding paradox in the fishery. A current example of this is with the open access fishery, in the shrimp fleet. Shrimpers, during good years, encounter more darkblotched. A higher ACL would accommodate this while not constraining other fisheries.

## Pacific Ocean perch (POP)

The GAP recommends a 265 mt ACL for 2011 and 269 mt for 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
POP	2017	1	2018	0	0	F100%
		2	2020	180	183	F86.4%
		3	2021	204	208	F84.8%
		4	2021	265	269	F81.1%
			2024	404	408	F73.6%
			2031	635	635	F63.6%
			2038	751	747	F59.5%
				2045	836	829

SPR harvest rate in the current rebuilding plan  
 The SPR rate that results from a 2009/2010 OY (189, 200 mt respectively)  
 SPR harvest rate that results in a 50% probability of rebuilding by 2021, a year between  
 SPR harvest rate that results in a 50% probability of rebuilding by 2024, a year between  
 SPR harvest rate that results in a 50% probability of rebuilding by 2031, a year between  
 SPR harvest rate that results in a 50% probability of rebuilding by 2038, a year between  
 Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax

1 Darkblotched Rebuilding Analysis, p. 6

*Justification for recommendation*

- The 265-mt and 269-mt ACLs equate to an F81.1% SPR harvest rate that results in a 50% probability of rebuilding by 2021, only four years beyond the current Ttarget of 2017. This species is similar to canary in that the rebuilding plan clearly isn't meeting the goals: even under a no-fishing alternative, the rebuilding date would be beyond the Ttarget. At the same time, it is needlessly constraining primarily trawl fisheries. The 2021 Ttarget is more realistic while regaining lost opportunity in the trawl fishery.
- In reality, this is a mid-range alternative; however, it's the highest one in the list of GMT-analyzed alternatives requested by the council.

*Regained opportunities*

- Trawl: This would provide greater access to the slope complex, especially during summer months on the north coast.
- Whiting trawl: POP is a constraining factor in both the tribal and non-tribal whiting fisheries.

**Widow rockfish**

The GAP recommends a 3,000 mt ACL for 2011 and 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Widow	2015	1	2010	0	0	Constant catch scenarios
		2	2010	200	200	
		3	2010	400	400	
		4	2010	600	600	
		5	2010	1,000	1,000	
		6	2010	3,000	3,000	

*Justification for recommendation*

- A 3,000 mt ACL represents a constant catch scenario under the rebuilding plan. In other words, widow rockfish is already rebuilt and that level can be maintained without diminishing the stock.
- An in-season correction could be accommodated through the use of annual catch targets (ACTs).

*Regained opportunities*

- Trawl: Higher ACLs for widow would eventually allow a targeted mid-water yellowtail fishery to be pursued, which has been constrained by both canary and widow.
- Whiting trawl: A higher ACL for widow allows the whiting fishery additional flexibility as widow rockfish has affected fishing behavior and constrained the tribal and non-tribal whiting fishery in the past.

## Yelloweye rockfish

The GAP recommends an ACL of 20 mt in 2011 and 21 mt in 2012.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Yelloweye	2084	1	2047	0	0	F100%
		2	2058	9	9	F86%
		3	2065	13	13	F80.7%
		4	2074	17	17	F76%
		5	2084	20	20	F72.8%
		6	2087	20	21	F71.9%
			2092	21	22	F70.9%

Apply the harvest rate that generated the 2009/2010 OY of 17 mt  
 SPR harvest rate that results in a 50% probability of rebuilding by 2065, a year between  
 SPR harvest rate that results in a 50% probability of rebuilding by 2074, a year between  
 SPR harvest rate that results in a 50% probability of rebuilding by 2084, the Ttarget in  
 SPR harvest rate in the current rebuilding plan under constant harvest rate strategy  
 SPR harvest rate that results in a 50% probability of rebuilding by 2092, which is Tma

### *Justification for recommendation*

- The 20-mt and 21-mt ACLs represent an SPR harvest rate (71.9%), that is in the current rebuilding plan under the constant harvest rate strategy with a rebuilding date of 2087, only three years beyond the current Ttarget of 2084.
- Increasing the ACLs for yelloweye is the only way to maintain current opportunities for recreational and commercial fisheries north of 40°10', given increased International Pacific Halibut Commission research fisheries bycatch and uncertainty in the trawl IQ program.
- Without an ACL increase, allowing continued effort on other fisheries relying on yelloweye as bycatch is precarious at best.
- The higher ACL will allow for some exempted fishing permit (EFP) opportunity so we can still obtain valuable research and data on this species. The authors of the 2009 yelloweye stock assessment noted that, "Data for yelloweye rockfish are sparse and relatively uninformative, especially regarding current trend."<sup>2</sup> Continuing EFPs that gather data about this species should continue to be supported as the stock rebuilds.
- Yelloweye total catch has consistently been below limits set by managers since 2003 due to cumulative effects of management changes – and it is increasingly difficult to do so. Yelloweye harvest is at a fraction of its historic levels. This was noted in the 2009 stock assessment:

“Since then (2002), there has been species-specific management and total catch has been below both the ABC and OY for yelloweye each year. These catch levels represent a 95% reduction from average catches observed in the 1980s and 1990s. Managers have constrained catches by eliminating all retention of yelloweye rockfish in both commercial and recreational fisheries, instituting broad spatial closures (some specifically for moving fixed-gear fleets away from known areas of yelloweye abundance) and creating new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf

<sup>2</sup> Yelloweye rockfish assessment, 2009; p. 13

flatfish trawls. ... The total 2008 catch (16.7 mt) is estimated to be just 4% of the peak annual catch that occurred in the early 1980s.”<sup>3</sup>

- Yelloweye is another example of a species with a Ttarget date that doesn't take into consideration the needs of the community.
- The 2010 OY of 17 mt is already fully subscribed in the scorecard and is constraining fisheries across the board. Staying below the 17 mt-ton limit is clearly a burden on the management system.

*Regained opportunities*

- Data needs: A few current EFPs are designed to take minimal amounts of yelloweye while obtaining valuable information for a data-poor species and these efforts should lead to increased opportunity in the future.
- Recreational: An increased ACL for yelloweye could open some closed areas, enabling recreational fleets to access other popular groundfish stocks, such as lingcod and yellowtail.
- Trawl, fixed-gear, open access: This is very similar to cowcod: We are not gaining new opportunities or reinstating old ones. It is simply maintaining current limited opportunity to catch targeted species. In addition, this could help alleviate the zero initial allocations to some vessels under the proposed TIQ system.

**Petrale sole**

The GAP recommends an ACL of 976 mt in 2011 and 1,222 mt in 2012 that include the winter petrale fishery.

Species	Current Ttarget	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
				2011	2012	
Petrale (with a winter fishery) <i>cf</i>	NA	1	2014	0	0	F100%
		2	2014	459	624	F50%
		3	2016	695	1,125	25:6.25 rule
		4	2017	1,021	1,279	F30%

Actual harvest control rule for flatfish is 25:5. This needs to be recalculated  
Projected OFL under the F30% Frmsy proxy

*Justification for recommendation*

- The ACLs of 976 mt in 2011 and 1,222 mt in 2012 represent a 25:5 harvest control rule that results in a rebuilding date of 2017.
- Trawl: Petrale is a main driver for much of the trawl fleet coastwide and for keeping a year-round fishery going. Inshore, offshore, north and south.

3 Yelloweye rockfish assessment, 2009; p. 13

- Processors: To the processing sector, petrale is a critical component of processors' abilities to sell other products. Furthermore, petrale has a significant place in the market. Interrupting that year-round flow of product to the market makes it possible for competing products -- including imported fish, competing protein products, or farmed fish -- to gain a foothold.
- All sectors: This is a prime case in which the council can devise a rebuilding plan in the quickest time possible, less than 10 years, while considering the economic needs of the communities and fleet. All of the rebuilding scenarios are less than 10 years. This is an instance in which the council could deviate from the shortest rebuilding time because the economic needs of communities are paramount -- yet at the same time the fish will be protected and will be rebuilt.
- Trawl ports: Petrale is caught by large boats and smaller boats, in all three states. The value to ports from Washington to California is very important, as is noted on Table 5-13, "Revenues 2007," (attached) from the 2008 groundfish Stock Assessment and Fishery Evaluation.

### **Management Measures**

The GAP considered Agenda Item I.4.a, Attachment 2, and agrees that the overarching measures are high-priority items that need to be analyzed. The GMT confirmed these measures already are in the process of analysis.

Members of the GAP appreciate the heavy workload these management measures demand of NMFS and state staff and carefully considered the benefits that would be gained from these measures vs. the time and work needed to accomplish these tasks.

The GAP also requests that management measures associated with higher ACLs (GAP recommendations for ACLs will be presented as a separate item) should be on the high priority list, especially given the uncertainty resulting from a transition to a rationalized fishery in the trawl sector.

For the other categories, the GAP has the following recommendations:

#### *Vessel monitoring systems (VMS)*

The first bullet point, evaluate gear stowage requirements for fixed-gear vessels transiting closed areas, should remain on the high-priority list. Furthermore, the third measure, reconvening the Ad Hoc Vessel Monitoring System Committee to analyze VMS issues related to both limited entry and open access, also should remain on the list.

The second bullet point can be dropped, since reconvening the VMS committee will address any other VMS issues such as drifting.

### *Limited Entry Non-whiting trawl*

The first two bullet points, 1) analyzing management measures for the LE trawl fishery as a contingency plan if TIQ is implemented later than Jan. 1, 2011; and 2) comparing current trawl gear regulations with specifications used during trawl bycatch reduction studies, should remain as high-priority items.

The third measure, analyzing trawl latitudinal management lines south of 40° 10', can be dropped.

The fourth, analyzing size limits for lingcod, can be dropped.

### *Fixed-gear fisheries*

All five measures in this category are important and should remain on the high-priority list.

Bullet point No. 4, analyzing the impacts of allowing fishing inside the 100 fm line around Catalina Island, is especially important to fishermen in southern California.

Similarly, bullet No. 5, ownership and control issues, are important to the fishermen in the Pacific Northwest.

### *Recreational fisheries*

Bullet points 1, 4, 5, 6 and 9 are the most important and should stay on the high-priority list (these are: 1) analyzing lingcod size limits; 4) analyzing management measures for cabezon in Oregon; 5) analyzing removing the lingcod spawning closure in California; 6) consideration of exempting flatfish from the groundfish depth and season closures in California and; 9) analyzing changes to the depth restriction and retention of shelf and slope rockfish in the Cowcod Conservation Area).

No. 9, pertaining to the depth restriction and retention of shelf and slope rock in the CCA, is of major importance to fishermen south of Pt. Conception.

The second measure, developing a long-leader fishery, can be dropped altogether.

### *Low-priority issues*

Of the six bullet points, three can be removed: Nos. 3, 4 and 6 – 3) analyzing retention of shelf and slope rockfish in the CCA for California commercial fisheries; 4) analyzing removal of the Period 2 closure for limited entry and open access non-trawl fisheries south of 34°27' N; and 6) consideration of mandatory logbooks for recreational charter/for hire vessels in Oregon and Washington. The charter logbook measure can be removed because a high level of shoreside sampling that already occurs would create redundant information.

Of the remaining three – 1) modifying the definition of dressed weight for halibut (if necessary); 2) generating midwater trawl trip limits for Pacific whiting during the primary

season south of 42° N; and 5) developing additional management lines for California and Oregon recreational fisheries – can remain on the low priority list.

However, the trip limits for Pacific whiting south of 42° N should be considered *only* if the TIQ program is not implemented in 2011.

PFMC  
04/14/10

Table 2-4. Estimated time to rebuild and SPR harvest rate relative to alternative 2011-2012 ACLs for depleted west coast groundfish species.

Species	Current Target	ACL Alt.	Mediau Time to Rebuild	ACLs (mt)	SPR HR	Basis			
			2019	2011	2012				
Bocaccio (S of 40°10' N lat.) a/	2026	1	2019	0	0	F100%	Varying the range of SPR harvest rates Varying the range of SPR harvest rates SPR harvest rate in the current rebuilding plan Varying the range of SPR harvest rates Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax		
		2	2019	53	56	F95%			
		3	2020	109	115	F90%			
		4	2022	263	274	F77.7%			
		5	2024	373	384	F70%			
			2028	539	545	F60%			
			2031	605	609	F56.6%			
			2024	0	0	F100%			
			2025	49	51	F94.4%			
			2026	69	72	F92.2%			
Canary		4	2027	102	107	F88.7%	The SPR rate that results from a 2010 OY of 44 mt (possible reduction under interim analysis) The SPR rate that results from a 2009/2010 OY of 105 mt SPR harvest rate in the current rebuilding plan, 2027 is also the Target from the 2009 rebuilding analysis 50% probability to recover by 2027, which is a year that occurs between TF=0 and Tmax, given a 2010 OY of 105 mt 50% probability from applying an SPR harvest rate of 88.7% to the 2007 assessment results 50% probability to recover by 2031, which is a year that occurs between TF=0 and Tmax, given a 2010 OY of 105 mt 50% probability to recover by 2035, which is a year that occurs between TF=0 and Tmax, given a 2010 OY of 105 mt 50% probability to recover by 2043, which is a year that occurs between TF=0 and Tmax, given a 2010 OY of 105 mt Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax, given a 2010 OY of 105 mt		
		5	2027	129	135	F86%			
		6	2028	155	162	F83.4%			
			2031	253	263	F74.4%			
			2035	308	318	F70%			
			2043	396	408	F63.4%			
			2046	415	426	F62.1%			
			2060	0	0	F100%			
			2064	2	2	F90%			
			2068	3	3	F82.7%			
Cowcod	2072	4	2071	4	4	F79%	Amendment 16-4 SPR harvest rate SPR harvest rate in the current rebuilding plan; also the 2009/2010 OY of 4 mt Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax		
		5	2097	9	9	F59.7%			
	Darkblotched	2028	1	2016	0	0		F100%	Varying the range of ACLs for analysis SPR harvest rate that results in a 50% probability of rebuilding by 2022 a year between TF=0 and Tmax The SPR rate that results from a 2009/2010 OY of 285 and 291 mt, respectively SPR harvest rate in the current rebuilding plan Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax
			2	2018	130	131		F81.8%	
			3	2022	222	222		F71.9%	
			4	2025	298	296		F64.9%	
			5	2027	332	329		F62.1%	
				2037	461	453		F52.8%	
				2018	0	0		F100%	
				2020	180	183		F86.4%	
			2021	204	208	F84.8%			
			2021	265	269	F81.1%			
POP		4	2024	404	408	F73.6%	SPR harvest rate in the current rebuilding plan The SPR rate that results from a 2009/2010 OY (189, 200 mt respectively) SPR harvest rate that results in a 50% probability of rebuilding by 2021, a year between TF=0 and Tmax SPR harvest rate that results in a 50% probability of rebuilding by 2024, a year between TF=0 and Tmax SPR harvest rate that results in a 50% probability of rebuilding by 2031, a year between TF=0 and Tmax SPR harvest rate that results in a 50% probability of rebuilding by 2038, a year between TF=0 and Tmax Highest ACL that meets legal requirement for 50% probability of rebuilding by Tmax		
			2031	635	635	F63.6%			
			2038	751	747	F59.5%			
			2045	836	829	F56.8%			

Table 2-4 (continued). Estimated time to rebuild and SPR harvest rate relative to alternative 2011-2012 ACLs for depleted west coast groundfish species.

Species	Current Target	ACL	Median Time to Rebuild	ACLS (mt)	2011	2012	SPR HR	Basis
Widow	1	2015	2010	0	0	0		Constant catch scenarios
	2		2010	200	200	200		
	3		2010	400	400	400		
	4		2010	600	600	600		
	5		2010	1,000	1,000	1,000		
	6		2010	3,000	3,000	3,000		
Yelloweye	1	2084	2047	0	0	0	F100%	Apply the harvest rate that generated the 2009/2010 OY of 17 mt SPR harvest rate that results in a 50% probability of rebuilding by 2065, a year between TF=0 and Tmax SPR harvest rate that results in a 50% probability of rebuilding by 2074, a year between TF=0 and Tmax SPR harvest rate that results in a 50% probability of rebuilding by 2084, the Target in the current rebuilding plan SPR harvest rate in the current rebuilding plan under constant harvest rate strategy SPR harvest rate that results in a 50% probability of rebuilding by 2092, which is Tmax
	2		2058	9	9	9	F86%	
	3		2065	13	13	13	F80.7%	
	4		2074	17	17	17	F76%	
	5		2084	20	20	20	F72.8%	
	6		2087	20	21	21	F71.9%	
Petrale (with a winter fishery) c/	1	NA	2014	0	0	0	F100%	Actual harvest control rule for flatfish is 25:5. This needs to be recalculated Projected OFL under the F30% Frmsy proxy
	2		2014	459	624	624	F50%	
	3		2016	695	1,125	1,125	25:6.25 rule	
	4		2017	1,021	1,279	1,279	F30%	
Petrale (without a winter fishery) c/	1	NA	2014	0	0	0	F100%	Actual harvest control rule for flatfish is 25:5. This needs to be recalculated Projected OFL under the F30% Frmsy proxy
	2		2014	586	732	732	F50%	
	3		2016	810	1,192	1,192	25:6.25 rule	
	4		2017	1,170	1,369	1,369	F30%	
a/ All bocaccio alternatives have been reduced from the rebuilding analysis results by 6% to represent the portion of the stock south of 40°10' N. Latitude. (Agonda Item E.2.c. Supplemental SSC Report, September 2009).								
b/ All cowcod alternatives have been doubled from the rebuilding analysis to account for the Monterey contribution (see the 2009-2010 Spex FEIS).								
c/ Projected ACLs for petrale sole differ whether winter fishing on spawning aggregations is allowed or not due to differences in fishery selectivity (i.e., larger, more mature fish are caught in the winter).								

## West Coast Groundfish values, 1981-2009

### raw data and annual values adjusted for inflation

*Dotted line represents a marked change in management after the implementation of the Sustainable Fisheries Act of 1996, at which point rebuilding plans began to take effect.*

year	all groundfish (in \$1,000) <sup>1</sup>	non-whiting groundfish (in \$1,000) <sup>1</sup>	inflation rate (as of Dec. 2009) <sup>2</sup>	all groundfish in 2009 dollars (in \$1,000)	non-whiting groundfish in 2009 dollars (in \$1,000)
2009	73,653.30	59,611.80	--	73,653.30	59,611.80
2008	113,342.60	54,846.10	-0.36%	112,939.35	54,650.97
2007	77,620.40	45,017.00	3.47%	80,313.91	46,579.14
2006	79,250.30	44,824.30	6.42%	84,335.92	47,700.75
2005	71,865.50	43,076.80	9.85%	78,944.23	47,319.85
2004	61,054.30	39,373.40	13.57%	69,340.43	44,717.05
2003	58,944.30	41,696.70	16.60%	68,726.81	48,616.77
2002	52,222.00	38,598.30	19.25%	62,276.55	46,029.81
2001	59,835.90	45,815.30	21.14%	72,484.55	55,500.15
2000	75,311.80	54,364.20	24.59%	93,827.92	67,730.15
1999	69,147.70	50,795.00	28.77%	89,044.06	65,410.61
1998	61,837.30	48,749.90	31.62%	81,388.89	64,163.54
1997	99,445.00	72,731.00	33.67%	132,926.06	97,218.01
1996	88,630.50	77,008.60	36.73%	121,188.79	105,297.60
1995	96,982.70	78,956.30	40.77%	136,524.79	111,148.61
1994	79,438.10	62,903.90	44.76%	114,996.03	91,060.82
1993	70,314.20	60,942.30	48.47%	104,394.45	90,480.13
1992	88,692.50	65,396.50	52.91%	135,622.40	99,999.78
1991	94,377.80	69,126.60	57.52%	148,660.28	108,885.56
1990	65,030.50	62,793.50	64.14%	106,744.06	103,072.14
1989	68,752.80	67,695.40	73.01%	118,951.77	117,122.32
1988	68,377.90	67,254.80	81.35%	124,003.29	121,966.55
1987	71,696.40	71,031.50	88.85%	135,400.80	134,145.11
1986	56,449.70	56,000.20	95.75%	110,497.71	109,617.84
1985	55,927.10	55,345.50	99.38%	111,509.59	110,349.98
1984	48,574.50	48,169.10	106.48%	100,298.63	99,461.54
1983	52,317.80	52,122.30	115.40%	112,691.81	112,270.70
1982	59,998.20	59,816.60	122.32%	133,386.88	132,983.15
1981	49,463.00	49,322.20	136.01%	116,739.75	116,407.45

<sup>1</sup> Taken from PacFIN GMT reports: "PFMC INPFC Area Report: Estimated Ex-vessel Revenue (\$1,000) of Groundfish Landed-catch for All Gears," extracted 4/2/2010

<sup>2</sup> Data taken from U.S. Bureau of Labor Statistics Consumer Price index table on which the inflation rate is based: <ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt> and BoLS inflation

Recreational Fishing Expenses For Humboldt County

Trip Expenditures:	Residents	Non Residents	Totals
Transportation	\$225,000	\$810,000	\$1,035,000
Rental/Mooring	\$116,000	\$0	\$116,000
Launch Fees	\$51,000	\$110,000	\$161,000
Charter Fees	\$247,000	\$576,000	\$823,000
Food	\$450,000	\$1,350,000	\$1,800,000
Lodging	\$0	\$1,150,000	\$1,150,000
Boat Fuel	\$685,000	\$457,000	\$1,142,000
Bait and Ice	\$180,000	\$108,000	\$288,000
<b>Subtotal</b>	<b>\$1,954,000</b>	<b>\$4,561,000</b>	<b>\$6,515,000</b>
<b>Annual Expenditures</b>			
Tackle	\$300,000		\$300,000
Club Dues	\$6,000		\$6,000
Vehicle License Fees	\$20,000		\$20,000
Boat Maintenance Exp	\$400,000		\$400,000
Fishing Vehicle	\$800,000		\$800,000
Fishing License	\$52,000		\$52,000
<b>Subtotal</b>	<b>\$1,578,000</b>		<b>\$1,578,000</b>
<b>Totals</b>	<b>\$3,532,000</b>	<b>\$6,139,000</b>	
<b>Total Expenditures</b>			<b>\$9,671,000</b>

Estimate 1000 anglers times 62 days = 62,000 angler days.

Trip Expenditure: \$6,515,000 / 62,000 angler days = \$105 /angler/day

Annual Expenditure: \$1,578,000 / 62,000 anglers = \$25 /angler/day

Total angler day cost is \$105 + \$25 = \$130 per angler per day.

57,000 anglers per month from the CA Rec. Survey = 28,500 anglers/month

28,500 anglers per month X \$130 per day = \$3,705,000 per month

\$3,705,000 X 4 months = \$14,820,000 lost revenue.

# COWCOD

Table 5. Rebuilding reference points for requested model runs (see text for run descriptions).

	Run								
	1	2	3	4	5	6	7 (ABC)	7 (40:10)	8
<b>SPR in 2011</b>	90.0%	77.9%	79.0%	n/a	74.2%	59.7%	50%	100%	100%
<b>50% prob. recovery by:</b>	2064	2072	2071	n/a	2074	2097	2283	2215	2060
<b>2011 OY (mt)</b>	0.8	2	1.9	n/a	2.4	4.4	0	0	0
<b>2011 ABC (mt)</b>	6.2	6.2	6.2	n/a	6.2	6.2	6.2	6.2	6.2
<b>2012 OY (mt)</b>	0.9	2.1	2.0	n/a	2.5	4.5	0	0	0
<b>2012 ABC (mt)</b>	6.4	6.4	6.4	n/a	6.4	6.4	6.4	6.4	6.4
<b>Probability of recovery by</b>									
<b>2059 (new Tmin)</b>	46.7%	40.2%	40.2%	n/a	33.8%	27.6%	15.9%	21.6%	46.7%
<b>2060 (old Tmin)</b>	46.7%	40.2%	40.2%	n/a	40.2%	27.6%	15.9%	21.6%	52.5%
<b>2072 (current Ttarget)</b>	59.8%	53.3%	53.3%	n/a	46.7%	33.8%	22.2%	27.6%	59.8%
<b>2097 (new Tmax)</b>	72.4%	66.2%	66.2%	n/a	66.2%	50.0%	33.8%	40.2%	78.4%
<b>2098 (old Tmax)</b>	72.4%	66.2%	66.2%	n/a	66.2%	53.3%	33.8%	40.2%	78.4%

Cowcod Rebuilding Analysis, Sept. 29, 2009  
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# DARKBLOTCHED

Table 2. Darkblotched projections. The vertical double lines demarcate the evenly spaced quartile increments. Note that if an integer year is wanted for the year in which 50% probability is achieved, then, given the yearly nature of fishery management, that number should only be "rounded up" to the next highest integer.

SPR (target)	OLD FMP SPR	2009-2010 OY SPR	SPR on which current OY's are based	Current FMP		FMP		Yr = 2021	Yr = 2026	Yr = 2031	New T <sub>max</sub> = 2037	ABC Rule	40-10 rule
				T <sub>target</sub> , Yr = 2028	T <sub>max</sub> = 2033	T <sub>target</sub> = 2011 & F = 0	T <sub>max</sub> = 2037						
0.607	0.649	0.621	0.621	0.596	0.551	1.000	0.719	0.629	0.564	0.528	0.500	0.507-0.526 <sup>†</sup>	
50% Prob Yr	2027.0	2024.4	2026.1	2028.0	2033.0	2015.5	2021.3	2025.6	2031.0	2037.0	2045.5	2040.7	
OY (2011)	349.2	297.6	331.5	363.6	427.1	0.0	221.6	322.0	407.1	461.4	507.8	465.7	
ABC (2011)	507.8	507.8	507.8	507.8	507.8	507.8	507.8	507.8	507.8	507.8	507.8	507.8	
OY (2012)	346.1	296.1	329.0	360.0	421.6	0.0	221.8	319.9	401.6	453.3	497.0	465.2	
ABC (2012)	503.3	505.3	504.0	502.7	500.1	517.1	508.3	504.3	501.0	499.8	497.0	498.7	

  

Year	Probability of Recovery by Year											
	(See the '50% Prob Yr' row above for the year of 50% probability of recovery.)											
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
2020	11.2	19.0	13.5	10.1	5.6	100.0	38.5	15.1	6.6	4.4	3.1	3.8
2024	35.4	47.7	39.8	31.9	20.8	100.0	70.3	41.9	23.6	7.3	12.2	13.9
2028	53.6	66.3	58.0	50.0	36.2	100.0	84.6	59.5	40.8	22.5	21.4	25.0
2032	66.4	78.5	70.9	62.9	48.0	100.0	91.4	73.1	52.7	37.9	30.3	34.3
2036	74.9	85.2	78.8	71.4	57.2	100.0	95.1	80.3	62.8	48.8	37.6	42.5
2040	80.7	90.0	85.1	78.3	64.5	100.0	97.3	86.5	68.6	55.9	42.9	48.7

<sup>†</sup> Range of the 40-10 rule SPR is for years 2011-2040.

2009 Darkblotched Retooling Analysis, Sept. 2009  
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