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Re: Pacific groundfish bycatch and discard assessment

The Ocean Conservancy (formerly the Center for Marine Conservation) respectfully submits these comments on the issue of discarded bycatch of canary rockfish and other species of Pacific groundfish, especially the "overfished" species that are under rebuilding. The Ocean Conservancy is a nonprofit organization with more than 120,000 members who are committed to protecting ocean environments and conserving the global abundance and diversity of marine life, including over 20,000 members on the west coast. We have been actively involved in this issue for several years through participation on the Groundfish Advisory Subpanel and the Habitat Steering Group and we have commented previously on bycatch as well as groundfish management issues.

### Request

The Pacific Council and NMFS should immediately begin estimating discard using scientific survey data or on the co-occurrence of groundfish species. This type of approach is necessary because existing discard estimates are based on outdated information and likely to produce highly inaccurate results. Current discard estimates are flawed because they only relate discards to landings of the same species. The problem is demonstrated by the following example: **if fishers discarded all canary rockfish that were caught, the current PFMC approach would estimate zero discard because there would be zero landings of canary rockfish.**

### Summary

Pacific groundfish discard assumptions are now so out of date that they can produce results that make no sense. For example, **if fishers discard all of the canary rockfish they catch, discard would be 100% but the PFMC would assume no canary rockfish were discarded because none were landed.** This problem arises because canary rockfish discard is assumed to be about 1 canary rockfish for every 5 canary rockfish landed, so as landings decline the assumed discard declines. At this extreme, the PFMC discard assumptions are of little value for fisheries management. Unfortunately, this extreme may be all too real. As the Groundfish

Management Team (GMT) has pointed out on more than one occasion, incentives exist that encourage fishers to discard even legal catches of canary rockfish.<sup>1</sup>

The lack of accurate discard information has become a critical problem for Pacific groundfish fisheries. The Pacific Fishery Management Council's advisory panels have stated clearly that current discard estimates lack credibility, and unmeasured discard threatens the success of rebuilding plans for overfished species (see discussion below). The observer program now under development will be a partial solution at best because of sparse coverage of the fleet, a dependence on uncertain government funding, and the 2-3 years required to begin producing useful results.

Improved discard information is needed immediately to evaluate new groundfish management strategies that were implemented with little opportunity for scientific review. If these fishing strategies fail, then greatly increasing discards of depleted species is the likely result, and mortality that exceeds mortality targets. The Pacific Council's advisory panels have expressed concern about the potential for increased discarding of groundfish under current regulations (see discussion below).

There is a data source available that can be used immediately to estimate bycatch systematically and objectively for most species of Pacific groundfish. The trawl surveys done by NMFS provide co-occurrence data for nearly all groundfish caught in commercial fisheries, and this can be used for bycatch estimates. To estimate bycatch of depleted species during fisheries for a selected species that is more abundant, hauls with successful catch of the selected species can be identified and bycatch of other species can be estimated as a fraction of the "target" species. A sensitivity analysis can be used to fine-tune the choice of hauls to use in bycatch estimates. A preliminary analysis suggests that this approach can produce useful and reasonable estimates of bycatch of depleted species during fisheries that target more abundant species.

### *The issue of extrapolation in making discard estimates*

The issue of "extrapolation" in making discard estimates requires serious consideration. Some have objected to the use of scientific survey data because it requires extrapolation from different gear types and different fishing strategies. However, extrapolation is not unique to the use of scientific survey data. Some type of extrapolation is necessary to make discard estimates for Pacific groundfish because there is not 100% observation of fishing activities. Thus, since extrapolation can not be avoided, it is essential to identify which extrapolations are likely to produce acceptable risks and which are likely to produce unacceptable risks.

While the extrapolation necessary to use scientific survey data is a concern, other extrapolations currently used by the PFMC appear more likely to create unacceptable risks. In particular, the assumption that discards are a fixed % of landings of the same species makes a very risky extrapolation because it could lead to serious underestimates of fisheries-caused mortality, as explained below. For species under rebuilding, it is critically important to avoid making large underestimates of fisheries-caused mortality. The need to move beyond discard

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<sup>1</sup> Groundfish Management Discussion paper on "full retention" of groundfish species. Exhibit F.9, GMT Report, April 2000 PFMC meeting. Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

estimates that are only linked to landings of the same species was clearly stated by the the PFMC's Scientific and Statistical Committee (SSC): "the current procedure for estimating discard as a fraction of the total catch of a target species is no longer applicable to today's fishery."<sup>2</sup>

Surprisingly, the most recent examination of discard estimation for Pacific rockfish fails to evaluate whether using a fixed % of landings of the same species is the best way to estimate discards.<sup>3</sup> Instead, it focuses on the narrower question of which % of landings is the most appropriate estimate. Some data were examined which relate discards of one species to landings of other species, but the 8/20/2001 draft of the paper does not discuss the possibility of developing formal discard estimates that are linked to landings of co-occurring species that are still the target of a directed fishery. Instead, this paper apparently concludes that there is no problem with current discard estimates because the catch of depleted species such as canary rockfish are only a few % of the catch of more abundant species such as arrowtooth flounder. Unfortunately, because limits for depleted species such as canary rockfish are so low, even a few % catch of these depleted species can be a problem during fisheries for more abundant species such as arrowtooth flounder.

The PFMC's current discard estimate uses what is probably the most questionable possible extrapolation. The current discard estimate predicts discards of species under strict rebuilding plans based on extrapolation from fishing practices when such strict limits were not in place. Once catch limits have been lowered to promote rebuilding, there is a severe potential penalty for landings that exceed these limits. Fishermen are well aware that excess landings could lead to fishery closures. Thus, there is a strong incentive to avoid landing species with low limits under rebuilding plans. The Groundfish Management Team has made this point quite clearly: "the GMT believes there is a great incentive for fishers not to retain canary rockfish out of fear the optimum yield will be reached early and the fishery closed."<sup>4</sup> Thus, the current discard estimate relies on a highly questionable extrapolation that ignores current incentives and can lead to dramatic underestimates of discards of species under rebuilding.

The current discard estimate also makes other problematic extrapolations because it is based on overages of widow rockfish during both midwater trawling and bottom trawling in the late 1980s. Thus, the current discard estimates rely on extrapolations across species, across decades, across gear types, and across major differences in fishing strategies. Use of other data sources such as logbooks and the Oregon voluntary observer program (EDCP program) also require extrapolations of various types because they use some hauls selected to "represent" the fishing strategy under examination.

The following table illustrates how severe the discard estimation errors would be if current incentives identified by the GMT led fishers to discard more than 16% of canary rockfish landed. The table shows discards (in pounds) and errors (in pounds and %) for varying rates of discarding, from 0% to 100% of total catch. **Note the last two rows in the table. If fishers follow incentives to discard even legal catches of canary rockfish, then dramatically**

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<sup>2</sup> Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.

<sup>3</sup> Evaluation of existing *Sebastes* discard assumptions and possible alternatives. Jim Hastie, 8/20/2001 draft

<sup>4</sup> Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

**increasing discards of canary rockfish would be identified by the PFMC as declining discards of canary rockfish.** This error is especially significant because the magnitude of the error is large, and the high level of discards are totally missed by the PFMC discard assessment methods.

Table 1: Example of the errors that would be present in PFMC discard estimates under varying levels of discarding of canary rockfish.

actual discard (% of total catch)	canary catch (lbs)	actual landings (lbs)	actual discard (lbs)	PFMC discard estimate (lbs) (using 16% of landings)	error in discard estimate (lbs)	error in discard estimate (as % of total canary catch)
0	1000	1000	0	160	(160)*	(16%)*
16	1000	840	160	134	26	2.6%
50	1000	500	500	80	420	42%
100	1000	0	1000	0	1000	100%

\* errors in brackets are overestimates of discards, all other errors are underestimates of discards

**Bycatch estimation using NMFS survey data**

A review of co-occurrence ratios to identify likely bycatch problems would provide a badly-needed scientific review of some new fishing strategies that have been implemented by the Pacific Council. At present, there is no discard estimate available for the new fishing strategies implemented to rebuild depleted groundfish species. Thus, the Pacific Council is essentially managing blindly, with no way to evaluate and control overfishing and discards. This point has been made repeatedly by the Council’s Groundfish Management Team (GMT) and Scientific and Statistical Committee (SSC). For example, the GMT and SSC both stated in March 2000 that the “continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program.”<sup>5</sup>

One strategy that requires a thorough scientific review is the Pacific Council’s reliance on reductions in landing limits to allow depleted species to rebuild. If depleted species are still caught and discarded during fisheries that target other species, then reduced landing limits will not be a successful rebuilding strategy. The best way to provide an immediate scientific review of this and other new fishing strategies is by using co-occurrence ratios to predict likely discard levels.

NMFS survey data must be used carefully to provide useful bycatch estimates, because survey methods differ substantially from commercial fishing operations. One concern is the random choice of survey sites which results in unproductive hauls. To eliminate unproductive hauls, survey hauls should only be used for bycatch estimates if they effectively caught “target” species. Another concern is that gear differences such as mesh size of nets makes some

<sup>5</sup> Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting. Scientific and Statistical Committee comments on bycatch mortality for rockfish. Supplemental SSC Report G.5. March 2000 PFMC meeting.

extrapolation across gear types necessary in predicting bycatch during commercial fishing. The significance of these and other factors is discussed above and compared to current discard estimation procedures.

Objections to the use of scientific survey data to estimate discards were more valid in years past when discarded bycatch resulted from trip limit overages or other factors unique to fishing operations. Now, however, bycatch of depleted species results from the unavoidable presence of species with low catch limits in habitats where more abundant species are legally pursued. This type of bycatch is strictly a result of the co-occurrence of target species together with species that fishermen are trying to avoid. The NMFS survey data is the best available estimate of co-occurrence, and thus can provide a valid and useful estimate of the likelihood of bycatch in today's Pacific groundfish fisheries.

**Examples of bycatch estimation using NMFS survey data**

Catch ratios were compared for some species commonly caught together, to provide some sample estimates of bycatch rates using National Marine Fisheries Service (NMFS) survey data. This example is only designed to illustrate the approach, and other criteria and assumptions could be used. The goal of these examples is to demonstrate that it is possible to estimate bycatch of depleted species relative to landings of other, more abundant species that are still the target of fisheries.

The first example uses National Marine Fisheries Service (NMFS) survey data to estimate bycatch of canary rockfish during fishing for arrowtooth flounder. For each year of survey data, two selection criteria were used. First, the best hauls of arrowtooth flounder were selected as most likely to represent fishing that targets arrowtooth flounder. Second, hauls were eliminated from the analysis if canary catch exceeded arrowtooth catch, to represent avoidance of high canary bycatch. From these data, a canary "bycatch" ratio was obtained by dividing canary catch by arrowtooth catch. The data are reported for the top 25 arrowtooth hauls and the top 100 arrowtooth hauls. Bycatch estimates are provided for each survey year treated individually, and for the mean of all survey years.

Table 2a: Estimate of canary rockfish bycatch as % of catch of arrowtooth flounder.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for arrowtooth *	3.9	2.6	2.4	2.4	2.8	7.0	0.4	6.9	3.5
top 100*	4.6	2.9	4.3	2.5	3.1	6.2	1.1	5.7	3.8

\* hauls excluded from analysis if canary catch exceeded arrowtooth catch

The second example uses NMFS survey data to estimate bycatch of bocaccio (rockfish) in the fishery for chilipepper (rockfish).

Table 2b: Estimate of bocaccio bycatch as % of catch of chilipepper.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for chilipepper*	1.4	19	8.1	8.3	2.0	0.9	1.8	0.5	5.2
top 100*	3.5	19	8.0	8.5	2.9	0.9	1.9	0.7	5.6

\* hauls excluded from analysis if bocaccio catch exceeded chilipepper catch

The third example uses NMFS survey data to estimate bycatch of bocaccio during fishing that targets yellowtail rockfish.

Table 2c: Estimate of bocaccio bycatch as % of catch of yellowtail rockfish.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for yellowtail*	4.1	3.5	2.0	2.6	1.6	1.2	1.0	0.3	2.1
top 100*	4.4	3.9	2.4	2.3	1.6	1.7	1.0	0.4	2.2

\* hauls excluded from analysis if bocaccio catch exceeded yellowtail catch

These examples illustrate the utility of the NMFS survey data; it can be used to estimate bycatch of any species during fishing activities that target any other species. The draft rebuilding plans for bocaccio and canary rockfish state that their goal is to eliminate targeting of these depleted species. Under this management approach, bycatch must be recognized as resulting from fishing activities that target other species, and bycatch estimates should link bycatch to the level of catch of the target species. This would be a substantial improvement over existing estimates which “are no longer applicable to today’s fishery” according to the Council’s SSC, because they continue to link bycatch only to landed catch of the same species. This outdated approach fails to acknowledge changes in the fishery that have occurred since the 1980s when the study was done which forms the basis for current bycatch estimates.

**Evidence of the need for improved discard estimates**

**Current discard estimates no longer applicable to today’s fishery**

The Pacific Council’s technical advisory panels have stated clearly that current discard estimates lack credibility. The first problem is that discard for most species of Pacific groundfish is assumed to be a fixed % of the landed catch of the same species. This assumption makes little sense for species with very low limits that are only caught incidentally during fishing that targets other species. This point has been made by the Pacific Council’s Scientific and Statistical Committee (SSC). For example, in September 2000 the SSC stated that: “the current procedure for estimating discard as a fraction of the total catch of a target species is no longer applicable to today’s fishery.”<sup>6</sup>

<sup>6</sup> Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.

Canary rockfish discard provides a good illustration of this discard problem. Canary discard is estimated as 16% of the landed catch of canary, despite extremely low landing limits that discourage targeting of canary. Under these circumstances, the landed catch of canary may be reached early in a fishing trip and all further catch of canary would be discarded. The draft canary rockfish rebuilding plan describes which fishing activities are expected to result in mortality of canary rockfish:

“The proposed rebuilding program is intended to rebuild the stock while allowing minimal fishing impacts from recreational fisheries, commercial fisheries targeting non-groundfish species, and commercial species targeting groundfish in areas and with methods that are expected to have little impact on the canary stock.”<sup>7</sup>

The rebuilding plan clearly acknowledges that canary rockfish mortality is expected to occur in fisheries targeting species other than canary rockfish. Indeed, the rebuilding plan indicates that targeting of canary rockfish should not occur: “In the short term, all groundfish and non-groundfish fishers will need to avoid canary rockfish as much as possible in order to keep catch to the target level.” There is no justification for estimating canary discard as 16% of landed catch of canary. Instead, estimates of total mortality for canary rockfish should be based on canary discard rates in the other fisheries expected to catch canary rockfish and total effort in these other fisheries.

#### *Discard incentives undermine mortality estimates and rebuilding*

A further difficulty is created by the possibility that even legal catches of depleted species of groundfish may now be discarded to avoid exceeding very low catch limits now in place. The SSC has addressed this problem in a statement from September 2000: “fishers may become reluctant to land any catch of rockfish stocks with OY levels of just a few 100 tons to ensure landings do not exceed OY.”<sup>8</sup> In addition, the GMT has addressed this problem more than once. For example, the GMT statement in April 2000 says that: “the small harvest targets required by some of the current rockfish rebuilding plans may be creating incentives for fishers not to land even their legal catches.”<sup>9</sup> The GMT reiterated this point in April 2001:

“With respect to canary rockfish in particular, the GMT believes there is a great incentive for fishers not to retain canary rockfish out of fear the optimum yield will be reached early and the fishery closed.”<sup>10</sup>

The result of these problems is that total mortality in the groundfish fisheries can not be estimated. The GMT addressed this problem in March 2000, and again in April 2001:

“The Council directed the GMT to provide an evaluation or estimation of discard rates that might be applied during 2000 in order to account for total fishing mortality of some rockfish categories. The GMT would like to provide such an analysis but must again point out we lack the tools to estimate bycatch/discard. Therefore, the

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<sup>7</sup> Initial Rebuilding Plan for West Coast Canary Rockfish, *Sebastes pinniger*. Pacific Fishery Management Council. April 2001.

<sup>8</sup> Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.

<sup>9</sup> Groundfish Management Discussion paper on “full retention” of groundfish species. Exhibit F.9, GMT Report, April 2000 PFMC meeting.

<sup>10</sup> Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

GMT cannot advise the Council whether the management measures implemented for 2000 will achieve the desired reduction in total mortality. This is especially true with respect to catches of rockfish...<sup>11</sup>

“The GMT is growing more and more concerned about the inability to know whether we are achieving the harvest levels required by the rebuilding plans.”<sup>12</sup>

How serious is the problem of poor discard estimates? Both the GMT and the SSC have referred to this problem as a “serious defect.” The GMT said:

“The rockfish discard information we are using today applies only to trawl gear and is based on information collected in the 1980s. Fishermen and others have already questioned the applicability of this information to current fisheries, and the substantial management changes for 2000 make its continued use even more suspect... The continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program.”<sup>13</sup>

The final statement in this critique was endorsed by the SSC:

“The SSC endorses the GMT statement that “...continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program.”<sup>14</sup>

These comments from the Pacific Council’s advisory panels clearly document the lack of information on total fisheries-caused mortality of Pacific groundfish. Without this information, it is not possible to evaluate whether rebuilding targets are being met, and whether overfishing of depleted species has been stopped.

#### Existing scientific studies do not support current discard estimates

Current discard estimates are in conflict with existing scientific studies of discard in Pacific groundfish fisheries. This problem has arisen because discard estimates have not been updated to reflect the known problem of increased discard that results from decreased period limits. The two scientific studies that are often cited as the basis for discard estimates provide a clear demonstration of this problem.

The bycatch and discard mortality assumed for canary and some other rockfish species is 16% of the landed catch. This assumed discard level is apparently derived from the “Pikitch study,” which was published in 1988 (using data from 1985-1987).<sup>15</sup> The 16% discard assumption is apparently based on the finding that fishermen caught 116 percent of their harvest limits of widow rockfish during the study period and thus 16% of the catch was discarded. However, the Pikitch study identifies a complicating factor; discard rates were higher when

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<sup>11</sup> Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting.

<sup>12</sup> Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

<sup>13</sup> Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting.

<sup>14</sup> Scientific and Statistical Committee comments on bycatch mortality for rockfish. Supplemental SSC Report G.5. March 2000 PFMC meeting.

<sup>15</sup> Pikitch, Ellen K., Daniel L. Erickson, and John R. Wallace. An Evaluation of the Effectiveness of Trip Limits as a Management Tool. Nov. 1988. NMFS Northwest and Alaska Fisheries Center Processed Report 88-27.



relatively small trip limits were in place. Reductions in trip limits since 1988 seriously undermine the applicability of the 16% discard derived from the Pikitch study.

To examine more closely the applicability of the results of the Pikitch study, we reviewed discard rates across a variety of trip limits for bottom trawl catches of all species examined in the study. For trip limits of 10,000 lbs or higher, discards ranged from near 0% to over 40%. For trip limits below 10,000 lbs, discard rates ranged from 7% to over 90%. The data in the Pikitch study do not support an assumption of 16% for the current fishery with very low trip limits. Instead, discard rates of at least 50% and perhaps approaching 100% are more likely for trip limits below 1,000 lbs, similar to the current canary trip limits of 50-300 lbs. The discard % measurement used in this study is the portion of the catch that was discarded, so 100% discard means the entire catch was discarded.

The Pikitch study is not alone in finding that discard rates increased as vessels approached period catch limits (one month or two month limits, similar to "trip" limits). An analysis by the National Marine Fisheries Service of data collected by the Oregon Enhanced Data Collection Program and presented to the Council by Rick Methot at a meeting in fall 2000 also showed that discarding increased as vessels approached cumulative period limits<sup>16</sup>.

"The greatest tendency was for the highest levels of discard to occur in trips that had a low remaining cumulative limit at the end of that trip. In some cases, this will occur as a vessel accidentally overshoots its intended catch of a target species. In other cases, this will occur as a vessel accidentally catches some of a species after it has attained its limit for that species but continues to fish for other species in the assemblage that tend to occur with the first species."

This analysis was done for species with period limits much higher than current canary rockfish period limits. The species in this study with the lowest period limits is shortspine thornyhead. Discard rates for shortspine thornyhead averaged 29% and for some trips were substantially higher. During this study, period limits (often 1-2 months) for shortspine were 1,000-4,000 lbs, and typical limits were 2,000-3,000 lbs per period (although there was one month with a limit of 0 lbs). Such limits are substantially higher than typical canary limits of 50-300 lbs per cumulative limit period (often 1-2 months). These data suggest that discards of canary rockfish (and other rockfish) are substantially higher than the assumed 16% because the current groundfish fishery is always operating close to period limits.

Thank you for considering these comments. Please do not hesitate to contact me if you have any questions or if I can be of any further assistance.



Mark Powell

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<sup>16</sup> Methot, Richard, Thomas Helser, James Hastie. A Preliminary Analysis of Discarding in the 1995-1999 West Coast Groundfish Fishery. Report presented to the Pacific Fishery Management Council.

