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FISHERMEN'S ASSOCIATION

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North Pacific Fishery Management Council
605 West 4th Avenue Suite 306
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October 27, 2016

Dear Chairman Hull and Members of the Council,

On behalf of the Alaska Longline Fishermen's Association (ALFA), I am submitting these comments on **Agenda Item D-1 BSAI Halibut Abundance-Based PSC Management (ABM)**.

ALFA appreciates the Council and the work groups progress on this important issue, and we urge ongoing high priority attention to reducing halibut bycatch. When the Council took action in June 2015 on halibut bycatch, Council members committed to the industry and the public that the action taken at that time was a first step, and that more meaningful action would follow. ALFA considers the current work on abundance-based PSC to be an important step toward meeting that commitment. That said, we are increasingly concerned that work on ABM may not move quickly enough to prevent another crisis for Bering Sea halibut stocks, fishermen and fishery dependent communities, and suggest that the Council may need to take interim steps while the work group continues to make progress on identifying the best long-term strategy for halibut bycatch management. Our recommendations relative to these issues are below.

<u>Purpose and need and work group objectives</u>
The Council launched the ABM amendment with a strong purpose and need statement that identifies inconsistencies between Council and IPHC abundance-based management of directed fisheries and the Council's static management of halibut bycatch. The statement goes on to identify the impact of this disconnect on the halibut directed fishery as a reason for developing an alternative approach, along with the importance of protecting the halibut spawning biomass, particularly at low levels of abundance. Finally, the purpose and need statement identifies as a Council concern the possibility of "*unnecessarily constraining*" groundfish fisheries under an abundance-based approach. ALFA considers these statements a reasonably guide for this action.

In our view, the objectives translated from this purpose and need statement by the workgroup depart to a disconcerting degree from Council intent by identifying as one of three objectives

the goal: "avoid constraining" groundfish harvest. The Magnuson-Stevens Act calls for reducing halibut bycatch to the extent practicable; practicable is nowhere defined as "not constraining." In fact, the Council's June action reduced halibut BSAI PSC caps to a non-constraining level—that objective is already being met. The success of the groundfish fleet in reducing halibut bycatch in 2015 is evidence that the "extent practicable" has not yet been reached, at least at these low levels of abundance. We would point out that this reduction has been achieved with only a subset of groundfish operations participating in deck sorting and other bycatch avoidance strategies. Clearly the bar needs to be higher than "avoid constraining," and we ask the Council to provide this direction to the work group.

Abundance-based index

ALFA appreciates the Work Groups development of an abundance-based index, and we look forward to learning the SSC's review of the index as proposed. From our initial review, we question the inclusion of the GOA trawl survey in the index for two reasons:

a. Current understanding of halibut migration indicates that halibut migrate from the BSAI to the Gulf, and only seldom in the other direction, therefore halibut abundance in the Gulf may have limited impact on halibut abundance in the Bering Sea.
b. As the graph on page 29 of the BSAI ABM paper establishes, when halibut abundance in the Gulf is high but Bering Sea abundance is low, the index as proposed would allow relatively high levels of bycatch at the expense of the directed fishery, in effect perpetuating the current problem the Council is trying to solve.

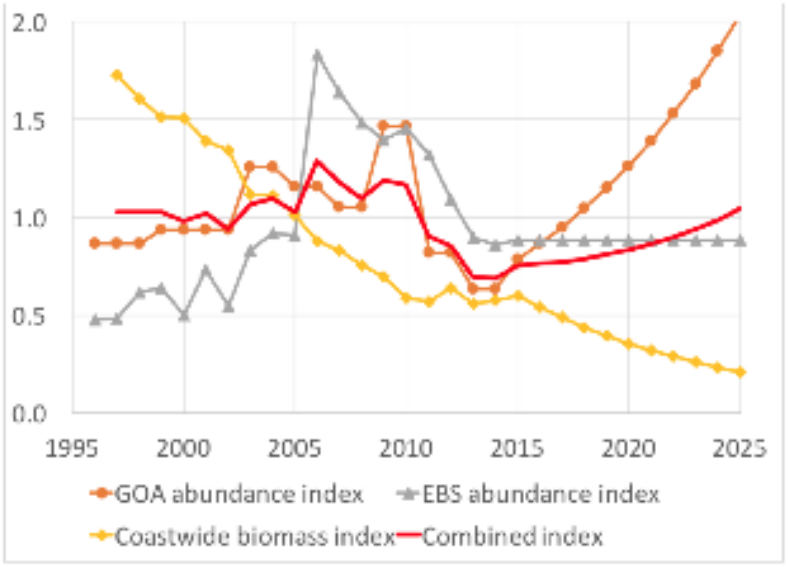

Figure 17 Illustrative example of how changes in the relative value of each survey index influences the resulting integrated index. The upper panel illustrates when the EBS trawl survey index is declining while GOA and coastwide indices are flat. Bottom panel illustrates when the GOA index is increasing while coastwide is declining.

In short, ALFA is not convinced that the workgroup has identified the best possible abundance index. We question the inclusion of the GOA trawl survey based on halibut stock dynamics and based on the Council objective of addressing the disproportional effect of bycatch on the directed fishery. If the Council finds reason to incorporate the GOA trawl survey in the index, then it is imperative that the Council provide protection to the directed halibut fishery through a control rule or other effective actions.

Prioritizing the directed halibut fishery

As the Council is aware, the current halibut management system establishes halibut bycatch as a *de facto* priority in the IPHC quota setting process: PSC bycatch "needs" are deducted from the area constant exploitation yield before what is left, if anything, is allocated to the directed fishery. ALFA requests that the Council take steps to reverse this priority. In our view, the needs of the directed halibut fishery and the fishery dependent communities of the Bering Sea should come first. We request the Council include a control rule alternative that protects the directed fishery at a baseline level, provided BSAI halibut abundance supports that level, then allocates between directed and bycatch fisheries according to the index the Council identifies. ALFA considers incorporation of this control rule alternative a necessity to meet the Council's purpose and need statement, particularly given the current index proposed by the work group and the failure of the index to protect the direct fishery.

Ceilings and floors (or cliffs)

ALFA requests that the Council add an alternative for a PSC ceiling to the control rule section that caps bycatch by rate, numbers of fish and/or pounds at higher levels of abundance. While we recognize the intent behind abundance-based management is for the PSC limit to track upwards to some degree when the halibut stock increases, MSA mandates preclude unnecessary waste or bycatch. A rate-based ceiling, if implementable, would be consistent with MSA objectives and provide ongoing incentive for responsible fishing. If rate-based management is not achievable, then the ceiling should be expressed both in pounds and numbers of halibut mortality.

To protect the spawning biomass, ALFA requests the Council add a control rule "cliff." Halibut mortality, particularly the mortality of juvenile fish, MUST stop when the halibut spawning biomass fall below the 20% threshold that stops the directed fishery. In other words, rather than holding bycatch constant or allowing bycatch to decline linearly as the halibut stock falls to zero, bycatch must stop at the same point that the directed fishery stops.

Fisheries footprint

Last year, the IPHC introduced the Council and the public to the halibut fisheries footprint concept after IPHC staff published a paper on the implications of bycatch, discards and size limits on the halibut fishery.[1] This paper (attached) and the IPHC presentation identified the

[1] http://doi.org/10.4027/fbgics.2015.03

importance of considering the size of halibut killed, not just the total pounds of mortality, and the impact to the spawning potential ratio (SPR) of killing juvenile halibut. ALFA understands that the IPHC is moving toward an SPR management system for halibut that accounts for all age classes and mortality on all age classes. We support this direction and believe the Council should look for an index and a management approach that either incorporates or allows opportunity for future assimilation of this approach into halibut bycatch management. The current high mortality of BSAI juvenile halibut has a significant effect on the SPR and the amount of mature halibut available for harvest. Strong year classes contribute significant bio-complexity to the halibut stock, and are thought to substantially change the geographic distribution of the stock by flowing out of the Bering Sea into the Gulf of Alaska. High mortality on these small fish interrupts these patterns in ways that may not yet be fully understood, but certainly imposes substantial costs on the directed fisheries, as the paper documents. ALFA asks that the Council continue to develop strategies that account for and manage halibut PSC based on numbers as well as pounds of halibut. We also ask request that the Council continue to explore strategies suggested in the Fisheries Footprint approach that incentivize bycatch reduction.

In closing, ALFA supports the Council's commitment to halibut bycatch reductions and we support on-going work to develop an abundance-based halibut PSC management strategy. We ask that the Council align work group objectives with the Council's purpose and need statement for this action, and that you focus the work group on protecting the spawning biomass, prioritizing needs of the directed fishery, and providing for the sustained participation of fishery dependent communities by modifying the index or adding control rules. Finally, ALFA asks that the Council and work group proceed with options that incorporate both numbers and weight of halibut mortality, consider the "fisheries footprint" on the halibut stock, and develop strategies to incentivize further halibut bycatch reductions.

Thank you for the opportunity to comment.

Sincerely,

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Implications of Bycatch, Discards, and Size Limits on Reference Points in the Pacific Halibut Fishery

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Abstract

The current harvest policy for the Pacific halibut fishery uses a 32-inch minimum size limit in the directed commercial fishery, and total annual catches in each of the eight regulatory areas are based on area-specific exploitation rate targets. In nondirected fisheries retention of halibut is prohibited. Post-release survival rates are gear dependent and partially based on observer accounts of halibut release condition. The current assumption is that 84% of the sub-legal halibut discarded from the directed halibut fishery survive each year and this rate is the same for all sizes of fish. This paper examines how sensitive estimates of maximum sustainable yield (MSY) and spawning biomass per recruit–based reference points are to the assumptions of post-release survival and the cumulative effects of size-selective fishing. A joint probability model for surviving the capture process is developed for modeling the instantaneous rates of retention and discarding in directed fisheries, as well as the cumulative effects of size-selective mortality from all sources. Evaluation of the current minimum size limit and discard mortality rates, and alternatives, for MSY-based reference points is based on assumptions about an underlying stock-recruitment relationship. The trade-offs between discard mortality, size limits, bycatch, and fishing intensity are examined from a long-term equilibrium perspective using isopleths that describe per recruit changes in spawning biomass,

yield, discard, and mean weight and composition of the landed catch. Determining optimal harvest rates for the directed fishery is strongly linked with amounts of bycatch mortality, size limits, and discard mortality rates. Three alternative bycatch mortality scenarios of 0, 10, and 20 million pounds were explored. Potential losses in landed value to the directed fishery associated with discarding sub-legal fish are on the order of $10 to $24 million per year, while total losses associated with discarding and bycatch mortality are on the order of $70 to $120 million per year.

Introduction

The Pacific halibut fishery explicitly accounts for two forms of nontarget mortality in its catch accounting system: (1) bycatch from nontarget fisheries (Williams 2014), and (2) discards from the directed fishery (defined as wastage in Gilroy and Hare [2010] and Gilroy and Stewart [2013]). Retention of halibut is prohibited in trawl fisheries and other longline and pot fisheries that target other species. There are a few exceptions, for example where individuals that hold quota for both sablefish and halibut, halibut can then be retained in nondirected halibut fishing activity. The directed halibut longline fishery currently has a minimum size limit of 82 cm (32 inches), and wastage is defined as halibut mortality associated with discarding sub-legal fish and legal size fish above the landings limits in Washington and Oregon, as well as lost gear. Since the rationalization of the fishery in 1995, wastage due to lost gear has decreased substantially.

Reference point calculations based on maximum sustainable yield (MSY) rarely take into consideration the impacts of discard mortality rates or bycatch associated with nontarget fisheries. MSY-based reference points usually consider only the target fishery in question and assume other fishing related sources of mortality are constant. Reference point calculations based on the concept of spawning potential ratio (SPR) usually serve as a proxy for MSY and greatly simplify the numerical computations in age or size-structured models. All sources of mortality are easily accommodated in SPR-based reference points. Reference point calculations are a function of all fisheries selectivities including undersize animals that are discarded (Goodyear 1993, Coggins et al. 2007). In cases where there are multiple fishing gears with different selectivities that capture halibut, the proportions of the total catch taken by each of the gears also influences reference point calculations. As these proportions change over time, or fisheries selectivities change over time, both SPR-based and MSY-based reference points require updating to reflect these changes.

In 2004, total catch of Pacific halibut peaked at just over 100 million net pounds (45,359 net metric tons, net weight reflects head-off

and eviscerated weight, roughly 75% of round weight). In 2013, the coast-wide directed catch in the commercial longline fisheries had declined 60% from the 2002 catch levels (Stewart and Martell 2014). By comparison, halibut bycatch had declined by 37% over the same time period. Since the implementation of Individual Fishing Quotas (IFQs) for the halibut fishery in 1995, sub-legal discards averaged 3.1% of the directed catch, and since 2010 sub-legal discards have been decreasing.

Empirical observations on size-at-age in Pacific halibut over the last century have shown considerable variation over time (Stewart 2014). Recent trends in weight-at-age have shown large declines for older age classes and have been relatively stable for halibut less than 10 years of age. For example, in the early 1990s the average weight of age-18 female halibut was roughly 100 pounds, and since 2011, the average weight is less than 40 pounds. One hypothesized factor for this shift in size-at-age relates to the cumulative effects of size-selective fishing. Under this hypothesis, faster growing individuals recruit to the legal size limit of 82 cm earlier relative to slower growing individuals. Under intensive fishing, faster growing individuals experience a much higher total mortality rate than slower growing individuals. Extremely slow growing individuals may not even recruit to the legal size, and therefore are only subject to natural mortality and discard mortality rates in the event they are captured and discarded.

The overarching objective of this paper is to address operational efficiency of the directed commercial halibut fishery and how ratios of bycatch:catch and discard:catch influence reference points used in decision making. Operational efficiency is defined as the fraction of halibut retained in the directed fishery relative to the total catch associated with all fishing activities including discard and bycatch. Specific objectives are: (1) to determine how size limits and discard mortality rates influence reference point calculations in the directed fisheries; (2) to determine how changes in the ratio of bycatch:catch alter these reference points; (3) to examine how cumulative effects of size-selective fishing impact these reference points; and (4) to discuss alternative options to increase the operational and economic efficiency of the directed halibut fisheries. To address these objectives, we use a modified version of an age-structured equilibrium model developed by Pine et al. (2008) that was used to address catch-release policies for recreational billfish fisheries.

Methods

Equilibrium model

The following description of the equilibrium age-structured model is simplified to the dimensions of age only for the purpose of clarity.

Equilibrium calculations for yield, biomass, recruitment, and other quantities of interest are based on sex-specific parameters, and also assume that the population consists of a normal distribution of individuals that vary in their asymptotic length. In other words, the model consists of a number of distinct groups that differ only in size-at-age, and hence length-based processes (e.g., selectivity) differ for each group. The purpose of modeling this distribution of groups is to capture the cumulative effects of size-selective fishing. This is described in further detail in the section on cumulative effects of size selective fishing.

At equilibrium, the annual yield (Y) is calculated as the sum over ages of the fraction of individuals that die due to fishing multiplied by the total number or biomass of individuals available for harvest. Thus the equilibrium yield equation, assuming both natural and fishing mortality occur simultaneously, can be written as:

$$Y = \sum_{a=1}^{\infty} \frac{B_a F_a [1 - \exp(-M_a - F_a)]}{M + F_a} \tag{1}$$

where F_a is the age-specific fishing mortality rate which can be parsed as $F\nu_a$, where ν_a is the age-specific fraction that is vulnerable to fishing mortality (also termed selectivity in models that do not distinguish between landed and discarded fish). It is common to use a simple parametric function (i.e., a logistic curve) to describe age-based selectivities. For this application we use the length-based coefficients from the set line survey that were internally estimated in the 2012 stock assessment model and convert these coefficients into age-based logistic selectivities based on the mean length-at-age and the coefficient of variation in the mean length-at-age. Recall that we model a distribution of groups that vary in growth, therefore the age-specific coefficients differ for each group. Biomass at age (B_a) is defined as the numbers-at-age (N_a) times the average weight-at-age (w_a). Assuming steady-state conditions, this can be expressed as the product of recruitment (R), survivorship (l), and the average weight-at-age (w_a). Assuming unfished conditions (i.e., $F = 0$), survivorship to a given age is given by the following recursive equation and natural mortality rates M_a:

$$\begin{aligned} l_a &= 1, && \text{for } a = 1 \\ l_a &= l_{a-1} \exp(-M_a), && \text{for } a > 1 \end{aligned} \tag{2}$$

and survivorship under fished conditions (l') is given by:

$$\begin{aligned} l'_a &= 1, && \text{for } a = 1 \\ l'_a &= l'_{a-1} \exp(-M_a - F\nu_a), && \text{for } a > 1. \end{aligned} \tag{3}$$

The total age-specific biomass is given as:

$$B_a = Rl_a w_a, \quad (4)$$

where R is the equilibrium number of age-1 recruits.
Substituting (4) into (1) and parsing fishing mortality into age-specific components yields the following expression:

$$Y = FR \sum_{a=1}^{\infty} \frac{l_a w_a v_a [1 - \exp(-M_a - Fv_a)]}{M + Fv_a}, \quad (5)$$

where R is the equilibrium recruitment obtained under a fishing mortality rate F. The summation term in (5) represents the yield per recruit (ϕ_q), and the yield equation simplifies to:

$$Y = FR\phi_q. \quad (6)$$

For a given equilibrium fishing mortality rate F, the equilibrium recruitment is a function of the available spawning biomass relative to the unfished spawning biomass. For the Beverton-Holt model, this can be expressed as:

$$R = \frac{R_o(\kappa - \phi_e / \phi_f)}{\kappa - 1} \quad (7)$$

where the spawning biomass per recruit ϕ_e and ϕ_f for unfished and fished conditions, respectively, is based on the survivorship and mature female weight-at-age, or fecundity-at-age (f_a). Two leading parameters are the unfished age-1 recruits R_o, which serves the purpose of providing the overall population scale, and the recruitment compensation parameter κ, which is defined as the relative improvement in juvenile survival rate as the spawning biomass tends to zero. For the Beverton-Holt model this can be derived from steepness (Mace and Doonan 1988) as $\kappa = 4h / [1 - h]$ (see Martell et al. 2008 for further details on the derivation of [7]). Spawning biomass per recruit is given by:

$$\phi_e = \sum_{a=1}^{\infty} l_a f_a \quad (8)$$

$$\phi_f = \sum_{a=1}^{\infty} l'_a f_a . \quad (9)$$

Note that it is not necessary to have absolute estimates of fecundity (f_a) as the units cancel out in the ϕ_e / ϕ_f ratio in (7). What is important is the relative egg contribution by age, and here it is assumed that fecundity is proportional to mature female body weight.

Based on equations (1)-(9) it is now possible to calculate the equilibrium yield given estimates of the following parameters: $\Theta = \{R_o, \kappa, M_a, f_a, w_a, v_a\}$. The following subsections describe how these equilibrium calculations can be modified to include mortality associated with catch-release, and how the cumulative effects of size-selective fishing can lead to changes in mean size-at-age.

Including release mortality

The equilibrium model described in the previous section considers only the case in which all fish captured for a unit of fishing mortality F are removed from the population and not for cases in which some fish captured will be discarded because they are not within the legal size range. To include the effects of post-release mortality associated with discarding fish outside the size limits, the vulnerability age-schedule (v_a) was modeled as a joint probability, where the probability of dying due to fishing is based on the probability of capture and being retained times the probability of being captured, released, and dying after release. This joint probability is as follows:

$$v_a = v_c[v_r + (1 - v_r)\lambda], \tag{10}$$

where v_a is the age-specific vulnerability associated with a unit of fishing mortality, v_c is the age-specific probability of being captured by fishing gear, v_r and $(1 - v_r)$ are the age-specific retention and release probabilities, and λ is the probability of dying after being discarded (assumed to be 0.16 in the directed halibut longline fishery [Gilroy and Stewart 2013]).

To implement the effects of size limits and post-release mortality rates on the equilibrium yield calculations defined in the previous section, we simply substitute (10) for all the v_a terms in equations (3) and (6) above. In addition to calculating equilibrium yield (Y), the equilibrium discards (live and dead) can also be calculated in a similar manner as (6), where the discard per recruit (ϕ_d) is defined as:

$$\phi_d = \sum_{a=1}^{\infty} \frac{l_a w_a v_c (1 - v_r)[1 - \exp(-M_a - F v_a)]}{M + F v_a}, \tag{11}$$

and the total discards are given by:

$$D = FR\phi_d. \tag{12}$$

Note that equation (12) represents the total biomass of discarded fish; the total discard mortality is the discard mortality rate (λ) multi-

plied by *D*. In this paper we assume the discard mortality rate is independent of size or age.

Cumulative effects of size-selective fishing

To account for variation in growth and represent the cumulative effects of size-selective fishing, the population is divided into a number of distinct groups (*G*) that have a unique growth curve ($l_{a,g}$). Growth was based on fitting a growth model to the 2011 sex-specific length-age data collected in the fishery independent set-line survey (Martell et al. 2013). The variance in length-at-age for each of the G groups is set to a fraction of the estimated total variance from the set-line survey length-at-age data:

$$\sigma_{l_a}^2 = \frac{1}{G}(l_a CV)^2,$$

where l_a is the estimated mean length-at-age, and *CV* is the estimated coefficient of variation. Partitioning growth into *G* groups that vary in the mean length-at-age can then be integrated into the equilibrium model as a series of *G* subpopulations, where each of the above calculations in equations (1)-(9) represents subpopulations that differ only in growth and relative numerical abundance. A similar model was developed by Mulligan and Leaman (1992) for Pacific ocean perch to explain poor residual patterns obtained when fitting a standard growth curve that assumes size-at-age is normally distributed (see also Taylor and Methot 2013, where platoons are analogous to *G* groups).

The proportion of recruitment to each of these G groups is assumed to be normally distributed with 99.7% of all individuals falling within 3 standard deviations of the mean asymptotic length. There are no assumptions about the composition of the spawning stock biomass and recruitment into each of these groups (i.e., no genetic selection effects due to fishing was assumed), and irrespective of spawning stock size, recruitment to each of these groups follows the same normal distribution. Genetic extensions could be included to examine fishery induced evolution, if desired.

The per-recruit functions described in the previous equations are then modified to include both age and size effects. For example, the spawning biomass per recruit described in (9) is now calculated as:

$$\phi_f = \sum_{g=1}^{G} p_g \sum_{a=1}^{\infty} l'_{a,g} f_{a,g}, \tag{13}$$

where p_g is computed using the normal density function with a mean 0 and a standard deviation of 1 over $G = 11$ discrete intervals from –1.96 to 1.96:

$$p_g = \int_{g=-1.96}^{g=1.96} (2\pi\sigma^2)^{-1/2} \exp(-g^2) dg .$$

In other words, the equilibrium population consists of 11 discrete subpopulations that differ only in their mean length-at-age, and the relative abundance of each subpopulation at recruitment to each subpopulation follows a normal distribution. In such a case, nonzero fishing mortality ($F > 0$) would then impose differential total mortality, where faster growing individuals would be subjected to a higher overall F relative to slower growing individuals because they recruit to the size-selective fishing gear at a younger age. The use of multiple groups to represent cumulative size-selective fishing effects also assumes there is no compensation in growth rates as densities are reduced through fishing. Although not implemented here, density effects on growth could also be accommodated in this model (see Post et al. 1999 for an example).

Growth, maturity, and natural mortality

Mean size-at-age for Pacific halibut was modeled using a modified von Bertalanffy growth model:

$$l_j = l_\infty (1 - \exp(-k(j - t_0)))^p . \quad (14)$$

Parameters for this model were estimated by fitting the model to the size-at-age data collected in the set-line survey in 2011. Data for the model was restricted to International Pacific Halibut Commission regulatory areas 2B-4A (British Columbia to Unalaska in the Aleutian Island chain), as these areas represent the majority of the halibut stock. Area-specific parameter estimates are available in Martell et al. 2013. Note, however, that estimates of growth rates based on these data are likely biased as these data have already been subject to size-selective fishing.

Estimates of natural mortality rates were jointly estimated in the stock assessment model (Stewart and Martell 2014). Estimates of natural mortality rates are slightly higher for females than males (Table 1) and natural mortality in this equilibrium model is assumed to be independent of age and constant over time. Maturity-at-age for female halibut was assumed to follow a logistic function with the mean age-at-maturity at 10.91 years and a standard deviation of 1.406 years (a logistic model was fitted to proportion mature-at-age).

Including bycatch in reference point calculations

A technical challenge in calculating reference points when fixed amounts are permitted for bycatch is determining the relative contribution to the total mortality rate. The age-specific total mortality rate with the addition of bycatch is defined as $Z_a = M + F\nu_a + F_b\psi_a$. For a fixed

Table 1. Assumed growth parameters based on size-at-age data collected in the 2011 set-line survey, sex-specific natural mortality rate, and mean age-at-maturity for females.

Parameter		
B_0	476.891	
h	0.75	
	Female	**Male**
l_∞	156.86	101.52
κ	0.0684	0.0842
t_0	−5.2	−4.8
p	1.451	1.0424
M	0.202	0.170
$\hat{a}$	10.91	–
$\sigma_{\hat{a}}$	1.406	–

bycatch amount X_e, the instantaneous fishing mortality rate F_b is a function of the equilibrium biomass, which is determined by the fishing mortality F that is used in the directed fishery. For example, assuming steady state conditions and fishing at a rate of F in the directed fishery with no bycatch will result in an average biomass B_e. If the value of F_e increases, the resulting equilibrium biomass decreases. In the case of a fixed bycatch amount, the fishing mortality rate associated with bycatch fisheries increases as equilibrium biomass decreases, or if the fishing mortality rate in the target fishery increases.

Bycatch selectivity in the halibut fishery is assumed to be a dome-shaped function of age, where age-5 is assumed to be fully recruited to the bycatch fisheries. Age-1 and age-2 fish are not vulnerable; 38% of the age-3, and 92% of age-4 fish are vulnerable. For the descending limb in

ψ_a, age-6 fish are 74% vulnerable and fish ages 7+ are assumed to be 65% vulnerable. For this equilibrium model we approximate the age-based selectivity with a dome-shaped length-based selectivity. This approximation was necessary to ensure that cumulative effects of size-selective removal of bycatch are captured in the population dynamics. A double logistic function of length was used to approximate this function, where the mean and standard deviation of the ascending limb were 40 cm and 5 cm, respectively. The mean and standard deviation of the descending limb were 100 cm and 5 cm, respectively.

To determine the bycatch fishing mortality rate (F_b), we first calculate the equilibrium biomass B_e obtained in the absence of bycatch and then solve for the equilibrium fishing mortality rate that would achieve the bycatch amount (X_e). This additional source of mortality is then used to iteratively update the survivorship calculations (3), update estimates of biomass per recruit (11), and the available biomass (12) that is used to derive the fishing mortality rate F_b. This iterative solution converges in just a few iterations in cases where the bycatch fishing mortality rate is relatively low. In cases where the bycatch fishing mortality rate is approaching $F_{\max}$ (the fishing mortality rate at which extinction occurs), the convergence rate requires a larger number of iterations. If the rate exceeds $F_{\max}$, the population would be fished to extinction.

Note that the above procedure has a very strong assumption that bycatch is independent of halibut abundance. In practice, total bycatch would likely decline with decreasing halibut abundance. However, the North Pacific Fishery Management Council generally sets bycatch caps for a number of species in specific fisheries. These caps work as potential bottlenecks, where the bycatch fishery would be shut down if the bycatch caps were attained or exceeded. It is entirely reasonable to calculate reference points for a given bycatch amount (i.e., a bycatch cap), but we note here that at extremely low halibut abundance, it is unlikely that bycatch fisheries would exceed these caps due to lower encounter rates with halibut.

Results

Equilibrium yield isopleth diagrams are used to examine how size limits, fishing mortality rates, discard mortality rates, and bycatch amounts influence MSY-based reference points (Fig. 1). The fishing mortality rate associated with MSY in the directed fishery (hereafter, F_{MSY}) can be determined from these isopleths by first choosing a size limit, and then finding the corresponding fishing mortality rate that maximizes long-term yield. In addition to the size limit, F_{MSY} is also determined by the assumed discard mortality rate (Fig. 2) as well as the level of bycatch. For example, under the current 82 cm size limit esti-

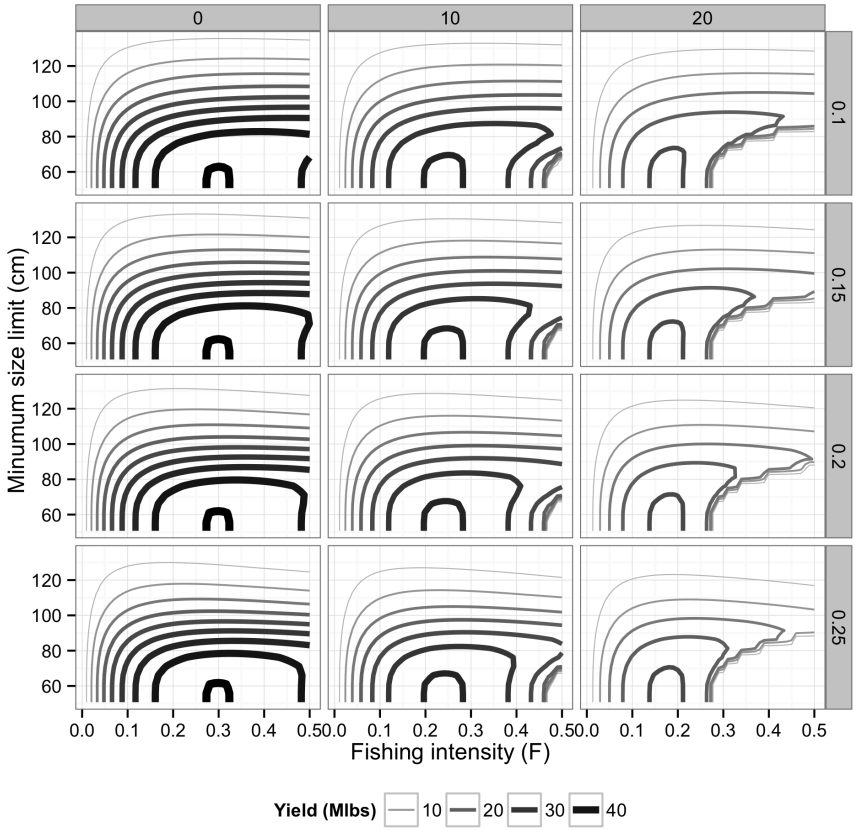

Figure 1. Equilibrium yield isopleths for various combinations of fishing mortality rates and minimum size limits. Three columns represent bycatch caps of 0, 10, and 20 million pounds. Each row corresponds to discard mortality rates in the directed fishery of 0.10, 0.15, 0.2, and 0.25 per year. Gray shading of each contour line represents total equilibrium catch in the directed fishery.

mates of F_{MSY} decrease from a maximum of 0.30 to 0.27 with increased in discard mortality rates from 0.1 to 0.25, assuming 10 million pounds of bycatch mortality (Table 2). Estimates of F_{MSY} range from 0.22 to 0.21 with increasing discard mortality rates when there are 20 million pounds of bycatch. Note that fishing mortality rate estimates for the bycatch mortality are relatively minor (0.02-0.03) compared to the estimates of F_{MSY} for the directed fishery.

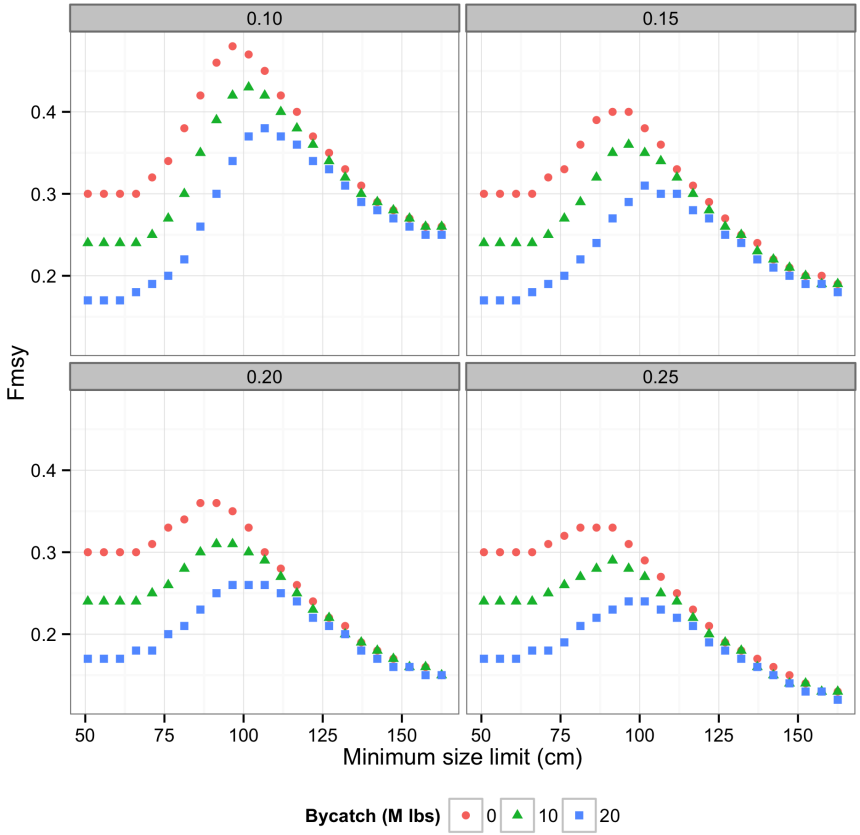

Figure 2. Estimates of F_{MSY} versus alternative minimum size limits and three levels of bycatch. Each panel represents an alternative discard mortality rate (indicated on the top of the panel).

Lowering the minimum legal size limit from 82 cm (32 inches) to 66 cm (26 inches) results in a lower estimate of F_{MSY}, and a much lower average weight of the catch (Table 2). These changes reflect the retention of more abundant, smaller fish in the directed fishery. The overall yield from the fishery is expected to increase on the order of 9-13% with a lower size limit. Moreover, the expected retained catch per unit effort (CPUE) would also increase due to both increased legal biomass and the reduced amount of effort required to obtain the annual catch. This increase in CPUE does not reflect an increase in abundance; on the contrary, abundance would decline, but the catch rate of legal sized fish would increase. Shifting the size limit from 82 cm to 66 cm results in

Table 2. Estimated MSY-based reference and bycatch fishing mortality rates (F_b) versus minimum size limit (26 inch and 32 inch), discard mortality rates, bycatch mortality levels of 10 and 20 million pounds, and the average weight of the catch in the directed fishery.

Size limit (cm)	Discard mortality rate	Bycatch (million lbs)	F_{MSY}	F_b	B_{MSY}	SPR at MSY	MSY (million lbs)	Average weight (lbs)
66.04	0.10	10	0.24	0.02	110.0	0.295	35.4	12.6
66.04	0.10	20	0.18	0.03	110.7	0.296	25.6	13.1
66.04	0.15	10	0.24	0.02	109.8	0.294	35.3	12.6
66.04	0.15	20	0.18	0.03	110.6	0.296	25.6	13.1
66.04	0.20	10	0.24	0.02	109.7	0.294	35.2	26.1
66.04	0.20	20	0.18	0.03	110.4	0.296	25.6	13.1
66.04	0.25	10	0.24	0.02	109.5	0.294	35.2	12.6
66.04	0.25	20	0.18	0.03	110.2	0.295	25.5	13.1
81.28	0.10	10	0.30	0.01	115.6	0.306	32.5	16.3
81.28	0.10	20	0.22	0.03	116.9	0.308	23.8	17.1
81.28	0.15	10	0.29	0.01	117.1	0.308	31.8	16.4
81.28	0.15	20	0.22	0.03	114.9	0.304	23.4	17.1
81.28	0.20	10	0.28	0.01	118.8	0.312	31.2	16.5
81.28	0.20	20	0.21	0.03	118.0	0.310	23.0	17.2
81.28	0.25	10	0.27	0.01	120.8	0.316	30.6	16.7
81.28	0.25	20	0.21	0.03	116.1	0.306	22.5	17.2

an increased MSY from 32.5-35.4 million pounds to 25.4-25.6 million pounds, assuming 10 million pounds of bycatch mortality and a discard mortality rate of 10% (Table 2). However, lowering the size limit results in a trade-off with the equilibrium spawning biomass. Estimates of B_{MSY} under a 66 cm size limit are slightly lower due to increased fishing mortality rates on smaller, immature fish. These conservation concerns are exacerbated if the discard mortality rate is high. Note also that under the lower size limit, estimates of F_{MSY} are very similar over a range of alternative discard mortality rates and only differ relative to the amount of bycatch taken. Under the lower size limit, the estimated selectivity for the directed fishery catches few fish that are below the legal size limit, and nearly all of the fish captured are retained (hence the insensitivity of F_{MSY} to discard mortality rates).

Size limits, discard mortality rates, and bycatch amounts have a significant effect on the spawning potential ratio (Fig. 3). Under steady-state conditions, spawning potential ratio (SPR) is also a measure of total mortality in the population. The effect of imposing a minimum size limit in the Pacific halibut fishery has the desired conservation effect of increasing spawning biomass per recruit for a fixed fishing mortality rate. However, with increasing discard mortality rates, SPR values are reduced for a given size limit and fishing mortality rate. For example, with low discard mortality rates of 0.1 and a size limit of 82 cm, the SPR = 0.3 isopleth reaches a horizontal asymptote with increasing fishing mortality rate (Fig. 3, upper left panel). However, as discard mortality rates increase, the conservation of spawning biomass diminishes as shown by the SPR isopleths turning upward toward a vertical asymptote. In other words, under conditions of high discard mortality rates, fishing effort must be reduced in order to maintain the same level of mortality as measured by the SPR.

Another way to think about the SPR isopleths in Fig. 3 is that contours that tend toward a horizontal asymptote imply that the size limit helps guard against overfishing the spawning biomass. Contours with vertical asymptotes imply the spawning biomass is hypersensitive to small changes in fishing mortality rates. Both increases in bycatch mortality and discard mortality rates increase the risk of depleting the spawning biomass.

The use of SPR as a proxy for MSY-based reference points is also of great interest because it's a relatively simple quantity to calculate. Table 2 compares the SPR values obtained when fishing at F_{MSY}. Over the range of discard mortality rates and 10 to 20 million pounds of bycatch mortality, the SPR values obtained when fishing at MSY levels is relatively insensitive, indicating that it is a relatively stable proxy for accounting for all sources of mortality when developing SPR-based reference points. For example, in the size-limit discard mortality rate and bycatch amounts considered in MSY-based reference points shown in Table 2, the SPR values only range between 0.294 and 0.316. In other words, maintaining a spawning potential ratio of roughly 30% is a good proxy for maximum sustainable yield.

Increasing levels of bycatch exacerbate total mortality as measured by SPR (Fig. 3). For example, 10 million pounds of bycatch reduces the $F_{\mathrm{SPR=30\%}}$ from 0.28 to 0.23 with a 50 cm minimum size limit (Fig. 3). Increasing bycatch cap levels results in decreasing $F_{\mathrm{SPR=30\%}}$.

The operational efficiency, which is defined as the proportion of the total mortality that is landed, increases with decreasing size limits and reductions in bycatch (Fig. 4). In the absence of bycatch, nearly 100% efficiency is obtained only in the absence of all size limits (including maximum size limits, or slot limits). As minimum size limits increase, the operational efficiency declines due to discards and mortality of

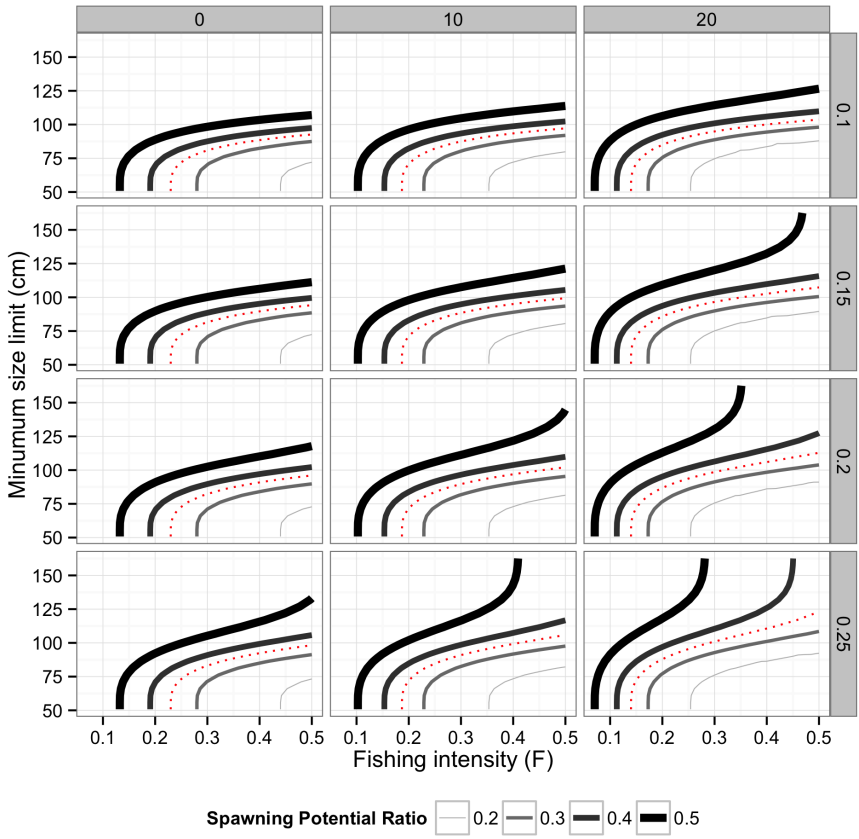

Figure 3. Isopleths for spawning potential ratio (SPR) for combinations of fishing mortality, minimum size limit, discard mortality rates (rows), and bycatch caps of 0, 10, and 20 million pounds (columns). The stippled line corresponds to an SPR value of 0.3.

discarded fish. High levels of operational efficiency can be obtained only if discard mortality rates are negligible. Additional bycatch mortality associated with nondirected fisheries also reduces the operational efficiency as the overall total mortality increases. Under certain circumstances, however, it is possible that bycatch fisheries can increase the operational efficiency of the directed fishery. This occurs when the selectivity of the bycatch fisheries reduces the densities of sub-legal size halibut; however, this occurs at the expense of reducing overall yields in the directed fishery (Fig. 1).

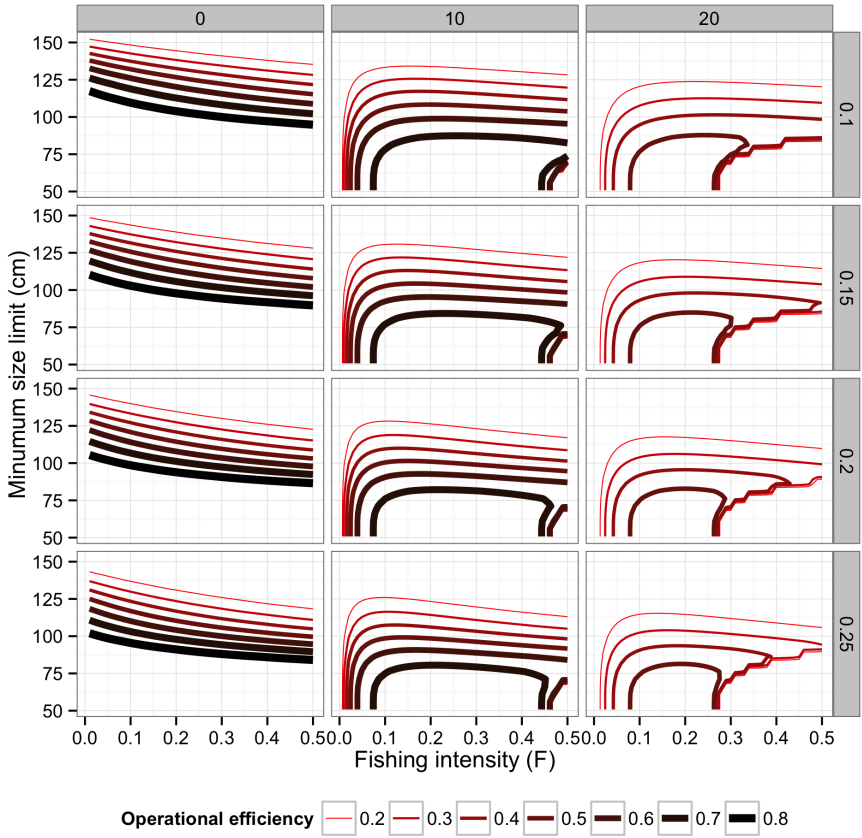

Figure 4. Isopleths for operational efficiency (defined as the proportion of the total mortality that is landed) for combinations of fishing mortality, minimum size limit, discard mortality rates (rows), and bycatch caps of 0, 10, and 20 million pounds (columns).

Relative economic losses associated with bycatch, size limits, and discard mortality rates are based on the following arbitrary price schedule: 10-20 pound fish are valued at $6.75 per pound, 20-40 pound fish at $7.30 per pound, and fish greater than 40 pounds are valued at $7.50 per pound. We assume no value for fish less than 10 pounds (roughly 82 cm in length) when evaluating the potential value of regulatory discards. For the current minimum legal size limit of 82 cm in the Pacific halibut fishery, the equilibrium yield versus directed fishing mortality and alternative bycatch rates and discard mortality rate are shown in Fig. 5. Note that these estimates are based on the assumed values of

natural mortality and steepness of the stock-recruitment relationship. The relative effect of discard mortality rates in the directed fishery on MSY-based reference points was relatively minor in comparison to the effects of bycatch in nondirected fisheries. For example, the difference in maximum sustainable yield (MSY) for the directed fishery with is roughly 2.6 million pounds over a range of discard mortality rates of 0.1 to 0.25. The difference in landed value between the two discard mortality rates is roughly $15.9 million and roughly $20.4-$23.8 million worth of halibut are discarded in the directed fishery in the form of sub-legal fish that are greater than 10 pounds (Table 3).

The effects of bycatch from nontarget fisheries are greater in terms of impacts on the maximum sustainable yield and landed value in the directed fisheries (Table 3). Ten million pounds of bycatch mortality has the potential to reduce the average directed fisheries landings from 40.0 million pounds to 31.8 million pounds, assuming a discard mortality rate of 0.15 in the directed fishery. This corresponds to a loss of 8.2 million pounds in the directed fishery, which amounts to a difference of $53.6 million in landed value and the additional loss of $16.2 million associated with discarding sub-legal fish (for a total of $69.8 million). Bycatch amounts of 20 million pounds result in a loss of approximately $120 million in the directed fishery (Table 3).

To demonstrate the cumulative effects of size-selective fishing, we examine the contours of the average weight of age-18 female halibut against fishing intensity and minimum size limits (Fig. 6). For age-18 female halibut the size-at-age can change by as much as 10 pounds due to the cumulative effects of size-selective fishing and discard mortality (based on the size-limit ranges and fishing mortality ranges examined herein). Larger changes in size-at-age occur with higher fishing mortality rates, and the scale in which the average weight changes is a function of the size limit and discard mortality rates. For a given fishing mortality rate, the average size declines with increases in the minimum size limit until the size limit is large enough to protect an age-18 halibut. Under higher discard mortality rates, changes in size-at-age are less pronounced for a given fishing mortality rate because a larger fraction of the sub-legal fish die (e.g., compare isopleths in the left column in Fig. 6). Increases in size-selective bycatch also contribute to declines in size-at-age; however, bycatch effects on size-at-age are less pronounced as the relative bycatch fishing mortality rates are substantially less than the directed fishing mortality rate (Table 2). Increases in the ratio of bycatch to landed catch result in further declines in size-at-age if the bycatch fishery is size-selective.

Table 3. Estimates of MSY and for alternative discard mortality rates and bycatch levels assuming a minimum size limit of 82 cm in the directed commercial longline fishery. Landed value is the expected landed value in the directed fishery, discard value is the value of sub-legal halibut thrown overboard, and bycatch value is the value of halibut taken as regulatory discards that are discarded at sea.

Discard mortality rate	MSY	F_{MSY}	Landed value ($ million)	Discard value ($ million)	Bycatch value ($ million)
No bycatch					
0.10	40.9	0.38	276.1	23.8	0.0
0.15	40.0	0.36	270.4	22.4	0.0
0.20	39.1	0.34	265.3	21.2	0.0
0.25	38.2	0.33	260.2	20.4	0.0
10 million pounds of bycatch					
0.10	32.5	0.30	221.2	16.8	20.4
0.15	31.8	0.29	216.8	16.2	20.5
0.20	31.2	0.28	212.8	15.5	20.6
0.25	30.6	0.27	209.8	14.9	20.7
20 million pounds of bycatch					
0.10	23.8	0.22	163.3	10.8	41.8
0.15	23.4	0.22	160.2	10.6	41.5
0.20	23.0	0.21	157.5	10.2	41.8
0.25	22.5	0.21	154.7	10.0	41.5

Discussion

Management of the Pacific halibut fishery poses many challenges for both analyst and decision maker with respect to utilizing the resource in a responsible and efficient manner. Limits on annual total catches in the directed commercial fishery for halibut are determined each year by the International Pacific Halibut Commission (IPHC). Bycatch limits are set by other regulatory agencies including the North Pacific Fishery Management Council (prohibited species caps), Pacific Fishery Management Council, and Department of Fisheries and Oceans Canada. This arrangement puts the trade-off between allocation for retained use and bycatch utilization in multiple agencies. Communication between these agencies is paramount to moving forward with developing harvest policies for Pacific halibut and effectively managing bycatch in large multispecies fisheries.

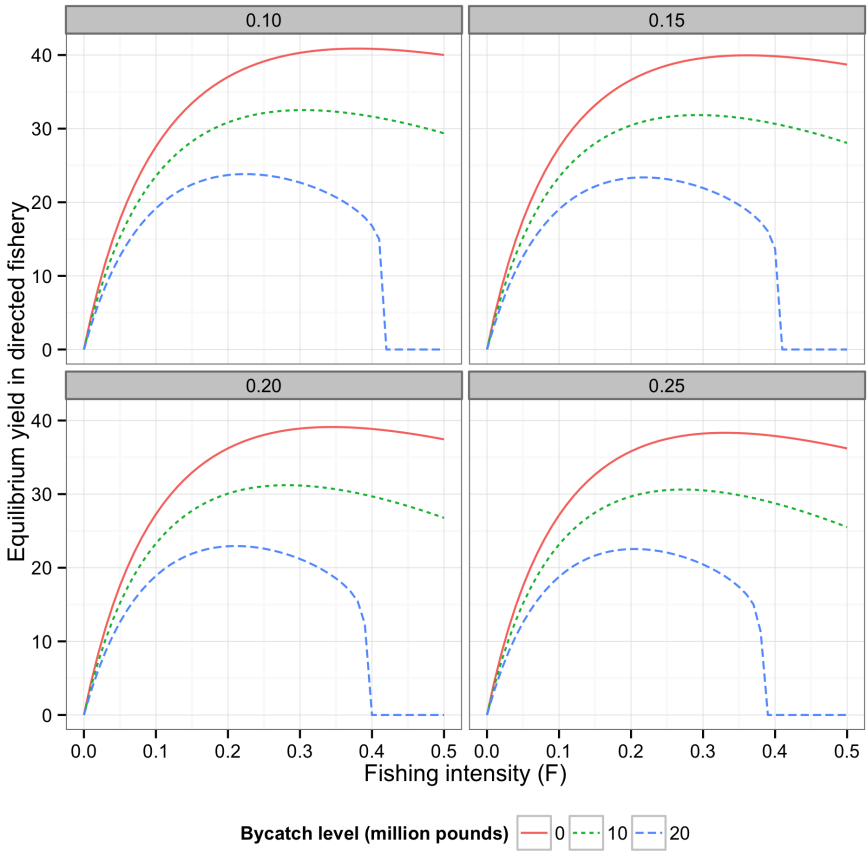

Figure 5. Equilibrium yield in the directed fisheries under four alternative hypotheses about discard mortality rates (0.1 top left, 0.15 top right, 0.2 bottom left, and 0.25 bottom right) and a minimum legal size limit of 82 cm. On each panel, alternative ranges of bycatch from 10 to 20 million pounds are represented by alternative line types.

The operational efficiency of the directed halibut fishery is related to the trade-offs between size limits and discard mortality rates of sub-legal fish. In addition, bycatch caps in nondirected fisheries also play a significant role in determining optimal harvest rates and appropriate harvest control rules for managing the directed commercial halibut fishery. Traditional use of MSY or SPR-based proxies for MSY related reference points are largely carried out using only information from the directed fisheries and rarely take into consideration the role of

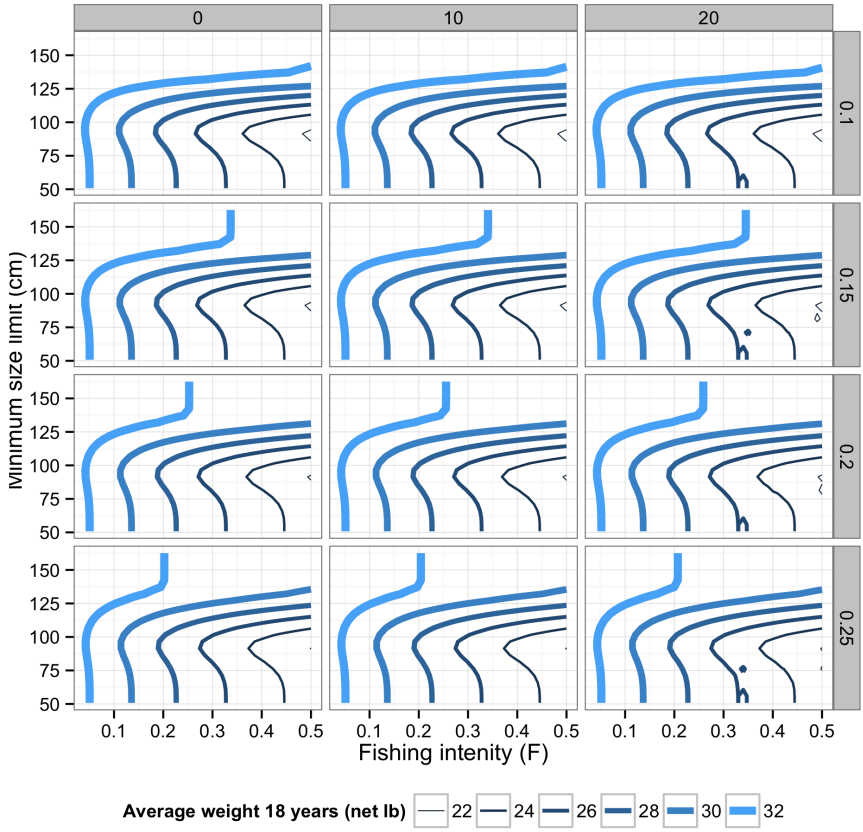

Figure 6. Changes in average weight of an 18 year old female halibut versus fishing intensity and size limits. From left to right, the bycatch mortality is 0, 10, and 20 million pounds, and from top to bottom the discard mortality rates in the directed fishery range from 10% to 25%.

nontarget bycatch and discard mortality rates in determining sustainable harvest policies.

The first specific objective is to understand how size limits and discard mortality rates influence reference point calculations in the directed fisheries. The results of this paper are not dissimilar to Coggins et al. 2007, where increasing the minimum size limit and increases in discard mortality rates substantially decrease the efficacy of protecting spawning biomass. This is due to increased overall total mortality associated with increases in fishing effort required to obtain a fixed quota. The spawning potential ratio (SPR) is a measure of fished to unfished

reduction in the spawning potential and is often used as a proxy for fishing mortality, especially in cases where multiple fisheries impact the same stock. Increasing the minimum size limit does preserve the SPR; however, increases in bycatch and discard mortality rates reduce the overall efficacy of using minimum size limits to guard against the potential of recruitment overfishing (Pine et al. 2008).

Another concern in the directed Pacific halibut fishery has been the recent reductions in mean size-at-age (Clark et al. 1999, Martell et al. 2013). Reduced growth rates and corresponding reductions in the mean size-at-age alone result in shifts toward lower yields and lower estimates of F_{MSY} in MSY-based reference point calculations. One of the key features not fully explored in this model is the cumulative effects of size-selective fishing on halibut reference points and changes in the mean size-at-age for this stock. The current harvest policy used by the IPHC was developed around the concept of density-dependent growth; however, there are several other competing hypotheses that could also explain recent reductions in size-at-age for Pacific halibut. Sinclair et al. (2002) have looked more carefully at this issue for Atlantic cod in the Gulf of St. Lawrence and found that the primary effect of reductions in size-at-age was due to variation in size-selective mortality in the directed fisheries, but also noted that a combination of selective fishing, density-dependent growth, and bioenergetic effects associated with temperature differences also plays a role. In spite of what the underlying mechanism is for change in halibut size-at-age, fisheries efficiency decreases with reductions in size-at-age due to the minimum size limits (Clark and Parma 1995). The effects are even more pronounced in the Gulf of Alaska where the current size-at-age is small in comparison to other regulatory areas (Stewart 2014).

The equilibrium age-structured model used in this analysis is markedly different from previous models used to address harvest policy for the Pacific halibut fishery. Previous models explicitly modeled the fate of 26 inch and larger halibut. Bycatch and discarding Pacific halibut less than 26 inches were not taken into explicit consideration. Until recently (2006), the assessment model for Pacific halibut accounted for only fish age 6 and older (Clark and Hare 2006); the vast majority of these age classes are greater than 26 inches. Under 26 inch mortality was deducted from the estimate of age-6 recruits; therefore, changes in the under 26 inch bycatch levels had no impact on the harvest policy advice because these numbers would be soaked up in the annual estimates of recruitment. The equilibrium model herein is based on all age classes and size classes, and hence an increase in under 26 inch bycatch in trawl fisheries more directly impacts estimates of MSY and SPR-based reference points.

Lastly, the economic implications in this paper are based on a subjective price schedule that is a dynamic variable which changes from

year to year. We use these values merely to explore the impacts of bycatch and wastage on both the relative landings and potential value in the directed fishery. These dollar amounts do not likely reflect the absolute values, but merely illustrate that a small loss due to bycatch (e.g., 20 million pounds of bycatch mortality translates into $40+ million worth of dead halibut) add up to significant financial losses in the directed fishery (e.g., roughly $70 to $120 million dollar loss to the directed fishery). Traditionally, bycatch mitigation has only examined the loss ratios of bycatch:catch, where 1 pound of bycatch (26+ inch) translates into 1 pound of (32+ inch) loss to the directed fishery; the same ratio from a dollar perspective is approximately 4:10.

Acknowledgments

We greatly appreciate discussions with members of the IPHC Management Strategy Evaluation Board, and feedback from Robyn Forrest, Bruce Leaman and Jim Ianelli. The first author is hugely indebted to Carl J. Walters for the idea of capturing the cumulative effects of size-selective fishing in this model. We appreciate the helpful comments and suggestions from two anonymous reviewers. Special thanks to Jane DiCosimo for handling the editorial reviews.

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Bering Sea Elders Group
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September 27, 2016

Dan Hull, Chair
North Pacific Fishery Management Council
605 W. 4th Ave., Suite 306
Anchorage, AK 99501-2252

Dr. James Balsiger, Regional Administrator
NOAA Fisheries, Alaska Region
709 W. 9th St.
Juneau, AK 99802

Re: Agenda Item D-1 – Bering Sea/Aleutian Islands Halibut PSC

Dear Chairman Hull, Dr. Balsiger and Members of the Council,

The Bering Sea Elders Group (Elders Group) is an association of elders appointed by 39 participating tribes from Kuskokwim Bay to the Bering Strait. Our mission is to speak and work together as one voice to protect and respect our traditional ways of life, the ocean web of life that supports the resources we rely on, and our children's future.

The Elders Group is commenting on the ongoing halibut bycatch issue because the halibut resource is an important contribution to our local economies as food, income, and jobs. Local fishermen harvest halibut from small boats for commercial use. We also value halibut as food to share among our families.

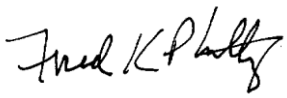
Over the past few years the high level of bycatch has limited opportunity for tribal members along the coast to harvest halibut for our families and to participate in local commercial fisheries. Halibut bycatch in the groundfish trawl fleet has been out of balance with responsible conservation of the resource and the needs of coastal communities. In our culture, wasting natural resources, such as the bycatch of halibut, is disrespectful and leads to negative consequences. We have always been taught to respect everything that the land and sea provides and not to waste what we harvest. We are also concerned about the amount of juvenile fish in the bycatch because the small fish are the future of a healthy halibut population.

The Elders Group appreciates that the bottom trawl fleet succeeded in voluntarily reducing their bycatch in 2015 and that they have operated below the reduced cap that went into place in 2016. This gives us hope and we are encouraged that more progress can be made. We also appreciate the work now being undertaken by the Council and IPHC to develop new scientific tools for managing halibut bycatch.

The goal of the Elders Group is to strengthen the health of the Bering Sea halibut population, and improve the possibility of healthy halibut fisheries for our people as soon as possible. Toward this end, we urge the Council to develop management options that *minimize* bycatch. Allowing a large

volume of bycatch to continue cannot be an acceptable cost of doing business while opportunities for our communities, and the proper care of traditional resources, are compromised. We recommend that the Council address the halibut bycatch cap measured by weight, as well as the large proportion of juvenile fish in the bycatch.

Sincerely,



Fred Phillip
Executive Director

North Pacific Fisheries Association
P.O. Box 796 · Homer, AK · 99603

To: Mr. Dan Hull, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue Suite 306
Anchorage, AK 99510
September 27, 2016
Re: Agenda Item D-1 – Halibut Abundance-based PSC Limit

North Pacific Fisheries Association (NPFA) is headquartered in Homer, Alaska, and represents members who fish along the coast of Alaska in both state and federal fisheries -- from Dixon Entrance to Adak to St. Mathews Island. Many of our members are direct users of the halibut resource.

NPFA recognizes the need for an adjustment of Prohibited Species Catch (PSC) limits in the BSAI PSC-limited fisheries. Whereas the current system not only disproportionately taxes the halibut biomass, it prioritizes bycatch as the International Pacific Halibut Commission removes the designated amount of PSC before allotting the resource to direct users. NPFA finds it important that all users be held accountable as the biomass fluctuates to promote a sustainable and abundant resource.

At the June 2015 NPFMC meeting in Sitka (item C2) it was stated that the PSC reductions adopted by the Council were the first steps. The current caps are not as restraining as they should be on the fleets especially at the current low level of halibut abundance. This cap cannot be the starting point. Bycatch PSC's must be reduced under abundance-based management to protect the spawning biomass, if not, it renders the PSC Limit useless. The number of fish that are being harvested by all users is a crucial management component and should be addressed in setting PSC limits.

NPFA does not see unnecessary constraints on PSC at high abundance the mission, but rather imposing more constrictive PSC at low abundance and conservative restraints at high abundance.

Thank you for your consideration,
Respectfully,

G Malcolm Milne
North Pacific Fisheries Association

NPFMC comments - NOAA Service Account <npfmc.comments@noaa.gov>

support of abundance based modle

1 message

Robert Savage <dutchsavage@gmail.com> Fri, Sep 23, 2016 at 4:21 PM
To: npfmc.comments@noaa.gov

dear npfmc
my name is robert savage, area 4cde fisherman that has lost over 20,000 lbs of halibut quota to the over bi-catch fishing of the 80 and the mid-water pollack fleets. halibut and salmon bi-catch has destroyed the economic stability of both of my halibut and salmon fisherys. To midigate the over fishing of the last ten years, I support the abundance based halibut concept proposed at this oct. npfmc meeting. I also support the bi-catch control rule #1. I also support annual varying psc limits,changing the catch accounting system to in-season management to facilitate annual varing psc limits,giving nmfs athority to close certain fisherys if sugnificant psc's are not avalable. Constraining ground fisherys are the only way to enhance halibut recrutment.

I would like to comment on the notion that the pollack fleet does not impact the area 4 halibut fisherys. Halibut feed in the mid-water,as any salmon troller will tell you,You have to fight through the halibut to get to the salmon on the bottom. It is long past the time that 100% video coverage of all bottom and midwater vessels is imposed; the drag fleets have fought this because they want to continue the wanton waste of their discards, the observers could be reduced to video tech's and the truth would be a public record.

I would like the npfmc to consider the degridation of the yukon river systems king salmon fisherys. The pollack fisherys of area 4 have reduced king salmon fisherys to a national discrace.The native fishers of the yukon river don't fish for kings anymore, and they don't care any more. Why don't they care,because the gold rush for pollack has promised easy money for native corporation that don't tradtionally fish for salmon, at the expence of the yukon and koyukon nations.Every time a pollack dragger sets a net they steal from the in-river quota to the point that the in-river fishery and the native ways of life are a thing of the past pushing the in-river natives out. I am calling for dramatic reductions in the berring sea pollack fishery to return economic stability to the yukon king salmon fishery.

This is my 40th year in the fisherys of the pacific rim, I hope my coments have more weight than the influence of the japanese fisherys complex.
thank you
robert savage
p.s. I will see those draggers in the parking lot

D1 Public Comment
OCTOBER 2016

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Halibut proposals

1 message

Marc Schoenfeld <marc.schoenfeld@wirelessusa.com> Wed, Sep 28, 2016 at 5:10 AM
To: npfmc.comments@noaa.gov

I used to come up to Kodiak Island every other year to fish. Its not an inexpensive proposition to book a lodge for 4-5 days, book a flight from St. Louis, Missouri to the Island and then pay to have the fish shipped back etc. Frankly it's a $5,000 short week vacation. However given that the halibut that I can fish for and keep has been severely limited from what used to be 2 fish, any size, I have not come up this year. As to whether I come up in the future is directly dependent on what the Commission decides. If the populations are not at the proper size, I am not asking to go back to the prior limits but you need to understand that $5,000 vacations to Alaska will be a thing of the past with 4 fish per year, slot limits or just one fish a day. Not worth the trip. It seems that buying quota from commercial fishermen if they want to do that just might be an answer. Might cost me a little more but I go home with more fish for my family. Its not the salmon that bring people up there as there are other places to go for that. I can fish Oregon for a whole lot less money if that is all I wanted. It's the Halibut!

Marc Schoenfeld

St. Louis, Missouri

SEAGO SouthEast Alaska Guides Organization

Dan Hull, Chairman
North Pacific Fishery Management Council
605 W. 4th Avenue, Ste. 306
Anchorage, AK 99501

September 27, 2016

Re: D1 BSAI Halibut Abundance-based PSC Limit

Chairman Hull,

SEAGO writes to encourage the Council to decrease halibut bycatch in the BSAI fisheries by developing abundance-based Prohibited Species Catch (PSC) limits. BSAI halibut stock remains subject to concern and fixed cap management of PSC will continue to impact the directed fisheries. Directed halibut fisheries carry a heavy burden, with allocations regularly slashed in response to conservation concerns, despite steady bycatch allowance. In Southeast Alaska, charter anglers are down to a bag limit of one halibut per day of a restricted size.

Charter captains are the face of Alaska halibut fishing for many members of the touring public, who want the chance to catch their own fish. Imagine anglers' surprise to learn that while they are restricted to one fish, which they fight to land, halibut are being discarded by the ton in the Bering Sea nursery area. Many of the discarded fish have not even reached reproductive potential. This is detrimental to the stock and directed fisheries, as a significant amount of Bering Sea halibut migrate south and east, populating grounds throughout Alaska, British Columbia, and the lower 48.

Much like allocations shift with halibut abundance, halibut PSC limits should be indexed to and fluctuate with abundance, with a predetermined floor and ceiling. The management plan should also include measures to protect and enhance spawning stock biomass. The index used to determine PSC limits should take into account, to the extent possible, halibut age, geographic range, migration to different regions, and stock status, especially spawning stock.

Sincerely,

Samantha Weinstein
Executive Director, SEAGO
Samantha@seagoalaska.org