AGENDA C-1(c)
JUNE 2012

MEMORANDUM

TO: Council and AP Members

FROM: Chris Oliver
Executive Director

DATE: May 30, 2012

SUBJECT: Halibut Bycatch

ESTIMATED TIME
20 HOURS
All C-1 Items

ACTION REQUIRED

Discussion paper on GOA comprehensive halibut bycatch amendments.

BACKGROUND

Over the course of the past few years, the Council has advanced a number of actions to reduce the use of prohibited species catch (PSC) in the Bering Sea and Aleutian Islands and Gulf of Alaska groundfish fisheries. The Council recently introduced Chinook PSC limits in the Gulf pollock fisheries. The Council is also considering an action to extend similar Chinook PSC limits to non-pollock groundfish fisheries in the Gulf. At this meeting, the Council is considering taking action to reduce halibut PSC available to trawl and longline fisheries throughout the Central and Western Gulf. This series of actions reflects the Council's interest in controlling prohibited species catch in the Gulf groundfish fisheries. Participants in these fisheries have raised concerns that the current limited access management creates a substantial disincentive for participants to take actions to reduce PSC usage (particularly actions that could reduce target catch rates). Other participants, who choose not to exert efforts to avoid PSC, stand to gain additional target catch by continuing to harvest fish at a higher catch rate, at the expense of vessels engaged in PSC avoidance. Throughout the discussions of PSC reductions in the Gulf fisheries, the Council has acknowledged that a more comprehensive look at the available tools to aid fleets in achieving PSC reductions is needed. The Council has requested the attached discussion paper (**Item C-1(c)**) to assist it in focusing its discussions.

Measures to address Gulf bycatch
North Pacific Fishery Management Council
June 2012

1 Introduction

Over the course of the past few years, the Council has advanced a number of actions to reduce the use of prohibited species catch (PSC) in the Bering Sea and Aleutian Islands and Gulf of Alaska fisheries. The Council recently introduced Chinook PSC limits in the Gulf pollock fisheries. The Council is also considering an action to extend similar Chinook PSC limits to non-pollock groundfish fisheries in the Gulf. At this meeting, the Council is considering taking action to reduce halibut PSC available to trawl and longline fisheries throughout the Central and Western Gulf. This series of actions reflects the Council's commitment to reduce prohibited species catch in the Gulf fisheries. Participants in these fisheries have raised concerns that the current limited access management creates a substantial disincentive for participants to take actions to reduce PSC usage (particularly actions that could reduce target catch rates). Other participants, who choose not to exert efforts to avoid PSC, stand to gain additional target catch by continuing to harvest fish at a higher catch rate, at the expense of vessels engaged in PSC avoidance.

In other fisheries where the Council has pursued PSC reductions, participants have typically had more tools at their disposal to attempt to maintain catches while meeting those reductions. In the Bering Sea, as a part of Amendment 80, the Council adopted a series of annual halibut and crab PSC reductions culminating with the sector receiving 80 percent of its historical usage.[1] In the Bering Sea pollock fishery, the Council also undertook a variety of measures to reduce Chinook PSC, including closed areas, a rolling hotspot closure system, and an incentive program with binding limits. The Council is also currently considering additional measures to reduce chum salmon PSC in the pollock fishery. In the Central Gulf of Alaska, as a part of the rockfish cooperative program, the Council reduced the allocation of halibut PSC to 87.5 percent of the historical usage in the fishery. Each of these fisheries, where PSC reduction actions have been applied, is a rationalized fishery. Consequently, participants who choose to change their effort to reduce PSC usage have limited risk of losing access to target catch. Throughout the discussions of PSC reductions in the Gulf fisheries (which are not rationalized), the Council has acknowledged that a more comprehensive look at the available tools to aid fleets in achieving PSC reductions is needed.

In the course of its deliberations of Gulf PSC reductions, several management measures to address PSC have been discussed. Individual or vessel bycatch quotas have been suggested as a potential tool to address PSC reduction incentives. Although bycatch quotas may address the distribution of allowable PSC among participants, some stakeholders have suggested that absent allocations of target species, incentives for PSC avoidance may be diminished. These stakeholders suggest that a more comprehensive program that includes target allocations is necessary to achieve PSC reduction objectives. Incentive programs, such as those adopted in the Bering Sea pollock fishery and Central Gulf of Alaska rockfish fishery have also been suggested as worthy of consideration. Area closures and hot spot programs have also been suggested as potential measures to achieve PSC reductions. Given the range of potential tools to achieve PSC reductions, the Council has requested this discussion paper to assist it in developing focusing its discussions.

[1] At this meeting, the Council is also considering an action to further reduce halibut PSC usage in the Bering Sea and Aleutian Islands fisheries. The extent of any proposed reductions and the fleets that would be subject to the reductions have yet to be decided.

The paper begins with a brief background section that describes current management of PSC in the Gulf of Alaska groundfish fisheries. The paper goes on to relative management objectives found in the Magnuson Stevens Act and the Gulf groundfish fishery management plan to any action intended to provide participants with tools to reduce PSC usage in Gulf fisheries. The discussion of objectives considers the range of management tools that the Council could consider and the relevance of various objectives to those measures. These first two sections could be used by the Council to develop a purpose and need statement for any action it might choose to advance. The third section of the paper provides brief summaries of various management programs that might be used to address PSC reductions. Each discussion focuses on the potential of the program to serve the various objectives described in the preceding section, as well as the potential for different ancillary measures to increase the effectiveness of (or mitigate possible harms that might arise under) the program.

This section of the paper could be used by the Council to begin to define possible actions to consider. Although it is unlikely that the Council could fully define alternatives at this meeting, it is possible that the Council could narrow the scope of management actions that it wishes to consider. In addition, the Council could identify a process for adding specificity to the alternatives (such as further development by the Council and Advisory Panel, development of alternatives by stakeholder group, or a call for stakeholder proposals).

To aid the Council in considering the different management actions, the appendix at the end of this paper describes other programs that are either directed at PSC reduction or have PSC reduction components. These brief profiles are intended to provide further context for the discussion of alternatives in this paper.

2 Current management of PSC in Gulf fisheries

Most groundfish fisheries in the Gulf of Alaska fisheries are currently managed as limited access derby fisheries, in which NOAA Fisheries opens each fishery on a specified date, then monitors catch inseason, timing the closure of the fishery with the harvest of the available portion of the total allowable catch. Currently, the Council has identified the catches of two species, halibut and Chinook salmon[2], that are to be constrained by prohibited species catch apportionments in Gulf fisheries. Halibut prohibited species catch limits apply in the hook-and-line and trawl fisheries, while Chinook salmon PSC limits will apply in the pollock trawl fisheries.

In the hook-and-line fisheries, Southeast Outside demersal shelf rockfish (DSR) are subject to a 10 metric ton (mt) annual limit of halibut PSC. Since 2007, fewer than three vessels have prosecuted the DSR fishery. With such minimal participation and PSC usage, the directed DSR fishery is not believed to have the current incentive issues that are prevalent in other fisheries. All other hook-and-line groundfish fisheries are subject to a 290 mt halibut PSC, which is divided seasonally and by operation type (catcher vessel/catcher processor). Historically, Pacific cod fisheries were divided between inshore and offshore sectors, under which minimal at sea processing was allowed in the inshore sector. The recent Pacific cod sector split action has divided the Gulf Pacific cod catch between gear and operation types and has divided hook-and-line PSC between catcher vessels and catcher processors based on the portion of the annual Pacific cod TAC available to the two sectors, which varies annually with the distribution of the TAC across the Western and Central Gulf management areas. The Council is currently considering an action to reduce these apportionments by as much as 15 percent.

Hook-and-line halibut PSC usage is almost exclusively in the Pacific cod target. Since 2003, fewer than 25 freezer longline vessels have participated in the catcher processor groundfish fisheries in the Gulf. All but one of the holders of licenses eligible for the catcher processor sector are members of a cooperative

[2] The Chinook salmon PSC limit is expected to be implemented in Gulf fisheries beginning on August 25, 2012.

that internally manages the catches of Pacific cod by vessels in this fleet. To date, these vessels have constrained their harvests of Pacific cod and usage of halibut PSC to ensure that the non-member has access to its historical share of the harvests of Pacific cod in the Gulf. Since this fleet has been able to organize to effectively manage its catches in the Gulf, it may need no further regulatory actions to enable it to address halibut PSC usage.

More than 500 hook-and-line catcher vessels typically participate in groundfish fisheries in the Gulf. Three times from 2000 through 2011, the Western or Central Gulf inshore Pacific cod fisheries have been closed before the available Pacific cod was fully harvested due to use of available halibut PSC during the third season. Reductions to PSC allowances under consideration by the Council could result in further closures for the catcher vessel hook-and-line sector. An analysis that assumes historical usage by catcher vessels suggest that the Pacific cod fishery would have closed once during the second season and five times during the third season from 2003 through 2011. With a large number of vessels participating in the Gulf hook-and-line fishery, it is unlikely that any vessel in the fishery has an incentive to pursue halibut PSC reductions that would forgo target catch due to the large number of competing vessels. In addition, the large number of participants limits any prospect for participants to develop voluntary agreements to address halibut PSC.

Trawl fisheries have also been the subject of recent actions to reduce PSC usage. First, the Council incorporated a reduction in trawl halibut PSC into the Central Gulf rockfish program. The reduction is realized through a direct set aside of 12.5 percent of historical usage in the fishery, as well as through a set aside of 45 percent of any halibut PSC that is not used by rockfish cooperatives prior to rolling over unused halibut PSC to other fisheries. Since the Central Gulf rockfish fishery is managed through exclusive cooperative allocations, participants in that fishery are able to adapt fishing effort to reduce PSC usage without jeopardizing access to target catches. As a result, the Central Gulf rockfish fishery is unlikely to require modifications to allow its participants to address PSC usage.

Currently, the Council is considering an action that would reduce halibut PSC available in Gulf trawl fisheries (other than the Central Gulf rockfish fishery) by as much as 15 percent. Halibut PSC in Gulf trawl fisheries is divided between shallow-water complex fisheries (primarily Pacific cod and shallow-water flatfish) and deep-water complex fisheries (primarily rockfish, rex sole, and arrowtooth flounder) across four seasons, with a fifth season apportionment available for use by fisheries in either complex. In recent years, deep-water complex fisheries have frequently used all of the available seasonal apportionments of halibut PSC. Seasonal apportionments in shallow-water complex fisheries are periodically fully used, with the first season limit being reached the least frequently. That season receives a relatively large apportionment to allow for prosecution of the first season in the Pacific cod fishery.

Since 2003, approximately 20 catcher processors and 125 catcher vessels have participated in fisheries that use these halibut PSC apportionments. Vessel participation patterns vary, with some vessels participating only in one management area (the Central Gulf or the Western Gulf) and some vessels participating only in the certain seasons or fisheries. For example, some Western Gulf vessels will participate only in the Pacific cod fishery in the A season, choosing to instead fish salmon during the summer months. The shared seasonal apportionments – available to catcher vessels and catcher processors in multiple target fisheries across two management areas – create a substantial barrier to the formation of agreements to address halibut PSC usage. Despite these circumstances, participants have, at times, coordinated the timing of fishing, shared halibut PSC rate information to address halibut PSC usage. For example, participants have agreed not to begin fishing until cod aggregations allowed for reasonably high catch rates, which typically reduces halibut PSC rates. These efforts have often been stimulated by NOAA Fisheries, which has indicated that management of fleet effort may only be possible using brief, scheduled openings, which drive up costs to participants. In response, some fleets have coordinated harvests to prevent overages. At times, these fleet efforts have been thwarted by vessels that have elected to fish while other vessels have honored the voluntary standdowns. The potential for future

voluntary coordinated efforts to reduce halibut PSC declines as a result of vessels failing to abide by the standdowns, as vessels that fish through a standdown increase their share of the available TACs.

The proposed reductions in halibut PSC could increase the pressure on participants who might attempt to organize coordinated efforts to reduce halibut PSC. With less halibut PSC available, participants that adopt halibut avoidance measures that reduce target catch rates (such as standdowns) risk losing an even greater share of the available catch. If halibut constrains a fishery and vessels that fish through a standdown are likely to lead to an earlier closure of the fishery, vessels abiding by the standdown would lose more days of fishing and more catch to those vessels that elect to fish through the standdown.

The Council also recently established limits on Chinook PSC in the Gulf of Alaska pollock fisheries. That action divided a combined limit of 25,000 fish per year between the Western Gulf, which would be subject to a 6,684 fish limit, and the Central Gulf, which would be subject to a 18,316 fish limit. These limits would have been reached in the pollock fisheries once in the Western Gulf and twice in the Central Gulf in the period from 2003 through 2010. While these limits may stimulate some efforts on the part of participants to reduce Chinook PSC, the incentive for reducing Chinook PSC could be affected by a number of factors. First, as in many other Gulf fisheries, the number and diversity of participant could be a barrier to development of arrangements that are agreeable to all. The fact that limits are not seasonally divided and some participants do not participate in all seasons could lead some A season participants to disregard interests of others who rely on later seasons in the fisheries. The potential for entry to the fisheries (arising because many holders of eligible licenses do not currently participate in the fisheries) also poses a threat to any agreement, as entrants might disregard those agreements to obtain a share of the available catch. In addition, movement of vessels between the two areas could disrupt agreements. For example, a vessel licensed for both management areas may gain an opportunity to move between the areas, if vessels in one area standdown to reduce Chinook PSC. In short, the structure of current management could be a significant impediment to actions that might achieve Chinook PSC reductions.

The Council is also currently considering an action that would establish a Chinook PSC limit in non-pollock groundfish trawl fisheries in the Gulf. Options would allow for the limit to be apportioned among operation types and management areas. Although the effects of an prospective cap have yet to be analyzed, these fisheries are prosecuted by a number of vessels throughout the year. A number of license holders are also eligible to enter the fisheries, creating uncertainties for participants that adopt fishing practices to reduce Chinook PSC.

Over time, Gulf fishery participants have expressed concerns that individual incentives under the current management measures run counter to the Council's objective of reducing PSC rates in the fisheries. Specifically, these participants fear that vessels that adopt the PSC avoidance measures (and reduced target catch rates) will suffer a loss of catch due to the race for fish that arises under limited access management. The proposed reduction of available halibut PSC, together with new limits on Chinook PSC, have heightened these concerns, as the individual incentives to disregard PSC rates may be worsened, particularly when those limits are constraining (and therefore, most meaningful and effective). The Council has responded to this concern by requesting this discussion paper concerning the potential management measures that may better align individual incentives with the Council's objective of reducing PSC and PSC rates.

3 Magnuson Steven Act and Gulf groundfish fishery management plan objectives that relate to possible bycatch reduction actions

The primary objective of any action contemplated by the Council when requesting this discussion paper is to improve incentives for PSC reductions; however, several other secondary objectives are likely to arise, depending on the specific action that the Council pursues. This section relates the primary objective with several other objectives from the Magnuson Stevens Act and Gulf fishery management plan that might

motivate the Council's action. Together with the previous section, this section could be used by the Council to develop a purpose and need statement for the action.

National standards are the primary source of fishery management objectives for federal marine fisheries. A number of management objectives from the national standards may be relevant for any action to address PSC incentives in Gulf fisheries. Foremost, national standard 9 provides:

> Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent that bycatch cannot be avoided, minimize mortality of such bycatch. (MSA Sec. 301(a)(9)).

Any action that the Council might pursue is likely to be primarily motivated by the objective of reducing bycatch, as required by this national standard. While the requirement to reduce bycatch in the standard is unequivocal, its mandate is qualified, requiring minimization only to the extent practicable. This limitation suggests that other dictates of national standards be considered when defining measures to address bycatch.

A second consideration, arising under national standard 1, is the achievement of "optimum yield" for the fishing industry on a continuing basis (MSA Sec. 301(a)(1)). Optimum yield is defined as "the amount of fish which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems" and "is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor" (see MSA Sec.3(33)). Under this dictate, the Council is to manage a fishery to achieve the greatest overall net benefit, considering several factors, including not only recreational and commercial fishery benefits, but also economic, social, and ecological factors. As with the national standard 9 bycatch minimization requirement, this national standard suggests that the Council must balance the objective of maximizing net benefits in a fishery with these other general considerations. Given the scope of possible bycatch management measures, a variety of factors could be pertinent. Within the fishery, the Council may need to consider distributional impacts, such as the whether some participants may be advantaged by the measure due to their fishing patterns and fishery dependence. Economic and social impacts could be felt by crewmembers, if the measure contributes to fleet consolidation, and processors, if landings distributions are affected. Indirect effects could be felt by fisheries that depend on the bycatch species, but also could extend to other fisheries. If a management measure alters the timing of fishing, gear conflicts or landing schedules could be affected. In general, the first national standard requires the Council to achieve optimum yield, the relatively broad definition of that term suggests that in developing bycatch measures the Council will need to weigh a number of potentially competing interests (including the interests of participants whose bycatch is being constrained, as well as persons who may participate in fisheries that harvest the bycatch species in their directed fisheries). These considerations are made in the context of overall benefits to the Nation, suggesting that the calculus extends to shore-based businesses (including a variety of support industries and downstream producers and consumers). In addition, the definition makes clear that the optimum yield is not necessarily equal to the maximum sustainable yield, but may be reduced from the maximum sustainable yield to address economic, social, and ecological factors.

While the ninth and first national standards are the most relevant, several other national standards could be relevant depending on the Council's action. National standard 5 provides that, where practicable, efficiency in utilization of fishery resources shall be considered. National standard 7 requires management measures to minimize costs, where practicable. So, in developing measures to address bycatch reductions, the Council should consider developing measures to allow for efficiencies in the fishery and minimize costs, to the extent practicable. These two national standards, at times, may need to be counterbalanced with national standard 8, which requires that management actions provide for sustained participation of fishing communities and minimize adverse economic impacts on fishing communities to the extent

practicable. For example, management measures that achieve efficiencies through consolidation that draws activities away from some communities may need to be mitigated by measures that protect community interests.

National standard 4 provides that any program that allocates or assigns fishing privileges must do so in a manner that is fair and equitable and must be carried out in a manner that prevents any individual or entity from acquiring an excessive share of privileges. If the Council were to pursue an allocation of individual (or vessel) bycatch quotas or any form of catch share or rationalization program (such as a cooperative program), the limitations in this national standard would apply.

Lastly, national standard 6 requires that management measures take into account and allow for variations among, and contingencies in, fisheries, their resources, and catches. Although not specific in its applicability to any management measure, this standard suggests that management measure should be flexible enough to accommodate changes that might occur in a fishery.

In addition to national standards, several other provisions of the Magnuson Stevens Act may be relevant to the development of objectives for the Council's action.[3] As a part of fishery management plans, the Council is required to include conservation and management measures that, to the extent practicable, minimizes bycatch and mortality of bycatch which cannot be avoided (MSA Sec. 303(a)(11)). In addition, the Council may include measures "that provide harvest incentives for participants within each gear group to employ fishing practices that result in lower levels of bycatch or in lower levels of the mortality of bycatch. (Sec. 303(b)(10)).

If the Council elects to allocate individual or vessel bycatch quota (either exclusively or as part of a more comprehensive allocation of target and PSC species), several other aspects of the MSA are applicable. The MSA defines a limited access privilege as a "Federal permit...to harvest a quantity of fish expressed by a unit or units representing a portion of the total allowable catch of the fishery that may be received or held for exclusive use by a person" (MSA Sec.3(26)). Although the use of the term "harvest" suggests that the definition would apply only to retained catches, "bycatch" is defined by the Act as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards" (MSA Sec. 3(2)). This definition makes clear that "harvests" includes discards, such as PSC (see MSA Sec. 3(38)). Consequently, any exclusive allocation of PSC allowances (which would include individual or vessel bycatch quota or cooperative allocations of PSC) appears to be subject to the requirements for limited access privilege programs. Similarly, any action that the Council might consider that includes both PSC allowances and allocations of target species (whether allocated to vessels, individuals, or cooperatives) would also be clearly subject to the limited access privilege program requirements.

The MSA provides extensive direction for identifying management objectives for limited access privilege programs. Any program is required to promote fishing safety, fishery conservation and management, and social and economic benefits, as well as reduce capacity in any fishery that is found to be overcapacity (MSA Sec. 303A(c)(1)(B) and (C)). The Council is also required to undertake an expansive consideration of social, cultural, and economic issues in the development of a limited access privilege program. Any allocation is also required to be fair and equitable, considering current and historical harvests, employment in harvesting and processing, investments in and dependence on the fishery, and current and

[3] Although not directly relevant to defining objectives for the action, the MSA also includes authority for the Council to "establish a system of incentives to reduce total bycatch,...bycatch rates, and post-release mortality in fisheries... including (1) measures to incorporate bycatch into quotas, including the establishment of collective or individual bycatch quotas, (2) measures to promote the use of gear with verifiable and monitored low bycatch...rates, and (3) measures that...will reduce bycatch...bycatch mortality, post-release mortality, or regulatory discards in the fishery." (MSA Sec.316(b)).

historical participation of fishing communities (MSA 303A(c)(5)(A)). In addition, the program should provide for sustained participation of small owner operated vessels and dependent communities, as well as provide for these interests and captains and crew through set asides, where necessary and appropriate (MSA 303A(c)(5)(B), (C), and (D)). Privileges under the program are to be held and used only by persons who substantially participate in the fishery, and program elements should prevent excessive consolidation in harvesting and processing, as well as geographic consolidation of the fishery (MSA 303A(c)(5)(D) and (E)). The Council should also develop a policy on transferability of shares, consistent with the objective and goals of the program (MSA 303A(c)(7)).

Beyond the MSA, guidance for development of management objectives is also found in the Council's Gulf fishery management plan (FMP). While the FMP policy is largely derived from the management objectives of the MSA, it may provide additional direction and focus for specific actions. The Council's policy is to apply judicious and responsible fisheries management practices, proactively rather than reactively, to ensure the sustainability of fishery resources. The objective is to be carried out by considering reasonable, adaptive management measures. As part of its policy, the Council intends to consider and adopt, as appropriate, measures that accelerate the Council's precautionary, adaptive management approach through community-based or "rights-based" (i.e., catch share)[4] management, and where appropriate and practicable, increase habitat protection and bycatch constraints. These lead to overall fishery management goals of providing sound conservation of the living marine resources and providing socially and economically viable fisheries for the well-being of fishing communities.

The FMP also includes specific objectives. The first group of objectives that is directly relevant as addresses management of incidental catch and reduction of bycatch and waste. The first of these is a general standing commitment to continue and improve the bycatch management program. The second is an objective to develop incentive programs for bycatch reduction, including development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems. This objective suggests that any measures should include incentives for bycatch reductions. Programs should also include measures that encourage the use of gear and fishing techniques that reduce bycatch. Seasonal distributions and geographic restrictions on gear use (such as closed areas) are also supported. Improving accuracy of mortality assessments for PSC, controlling bycatch of PSC through limits, and reducing waste to socially and biologically acceptable levels are also stated objectives.

A second group of FMP objectives relevant to the action concerns the promotion of sustainable fisheries and communities. The first of these provides that the Council should work to promote conservation, while providing for optimum yield, as define in the Magnuson Stevens Act. The second provides that management measures should achieve conservation objectives, while avoiding significant disruption to existing social and economic structures. The third objective (which could be relevant, if the Council pursues allocations of bycatch quota or target species allocations) provides that allocations should be fair and equitable while preventing any sector, group, or entity from acquiring an excessive share of fishing privileges.

A third group of FMP objectives, which may have relevance depending on the Council's action, is intended to promote equitable and efficient use of fishery resources. The first of these objectives is to provide economic and community stability to the harvesting and processing sectors through fair allocations. The second objective is to maintain the license limitation program and further decrease excess capacity by eliminating latent licenses, as well as extending that program through community and rights-based management, as appropriate. The last objective is to develop measures that, when practicable,

[4] The use of the term "rights-based" could be read to suggest that the shares under such a program are a right, rather than a privilege. Since fishing permits are a privilege, this paper does not use the term rights-based elsewhere. As noted previously, these programs are defined by the Magnuson Stevens Act as "limited access privilege programs". The terms limited access privileges and catch shares are used interchangeably in the remainder of this document.

consider efficient use of resources taking into account the interests of harvesters, processors, and communities. Depending on whether the Council's proposed action allocates shares (either for PSC or for target species), these objectives may be relevant.

Both the Magnuson Stevens Act and the Gulf FMP contain a number of potentially relevant management objectives for this action. Foremost, both sources of management objectives provide that PSC reductions should be achieved to the extent practicable. The Council's management objectives suggests that these bycatch reductions should be pursued. Both sources also prescribe that management should achieve optimum yield, meaning that the action should yield the greatest National benefit. Further direction is provided that the optimum yield be based on maximum sustainable yield reduced to address economic, social, and ecological factors. Efficiency is also a prominent consideration under both the Magnuson Stevens Act national standards and Gulf FMP management objectives. Both efficiency and cost minimization are considerations; however, these considerations must be balanced against other objectives, including social and community considerations.

The Gulf FMP objectives suggest that specific management measures be considered, including geographic and seasonal limitations and catch share and community-based management programs. If the Council elects to consider a catch share (or limited access privilege) program, a number of more specific considerations are relevant. Harvest histories, investments in and dependence on the fishery, harvesting and processing employment, and sustained participation of small owner-operated vessels and dependent communities must all be considered. The program must promote safety, and social and economic benefits, as well as reduce capacity in any fishery that is found to be overcapacity.

Given the breadth of potential considerations, the Council could advance its action substantially by defining its purpose. Doing so will aid by focusing its discussions on relevant issues and factors that can shape its alternatives.

4 Possible management programs

A variety of different management tools or programs have been suggested to provide fishery participants with the ability to address PSC reductions. In some cases, these management measures may aid participants in adapting to reductions in the available PSC. In some cases, the measures may create incentives for participants to reduce PSC usage or PSC rates. These incentives may arise when limits are constraining or when limits are not constraining. The discussion of measures in this section examines each of these possible attributes, as well as other effects of the management measures. The discussion also examines some of the legal and policy barriers that may need to be overcome, should the Council wish to pursue the management measure. The discussion gives particular attention to the potential objectives for the Council's action identified in the preceding section.

Bycatch cooperatives (without share allocations)

As part of an earlier action to set Chinook PSC limits in the Gulf of Alaska pollock fisheries (Amendment 93), the Council considered the development of Chinook PSC cooperatives. Cooperatives would be intended to facilitate a coordinated effort among participants in the fisheries to avoid Chinook salmon. The Council evaluated an alternative where cooperative membership would be required for participation in the Gulf pollock fisheries. The alternative included options that would require at least one-quarter of the active participants in the pollock fishery for cooperative formation. If multiple cooperatives formed, those cooperatives would be required to have an intercooperative agreement, which would be used to ensure that the Chinook avoidance measures adopted by a cooperative would not disadvantage that cooperative's members relative to the members of other cooperatives.

The approach embodied in the cooperative structure is premised on two characteristics of Chinook avoidance efforts. First, information sharing is believed to be critical to Chinook avoidance. Participants in the fishery could share information concerning Chinook avoidance measures, as well as information concerning the timing and location of Chinook bycatch to allow scheduling of fishing activity to avoid Chinook. To form an effective cooperative for Chinook avoidance would require a substantial share of the participating vessels. Second, the incentive to avoid Chinook salmon could be reduced considerably, if Chinook avoidance is not mandated for each participant. Most Chinook avoidance measures are likely to reduce catch rates. For example, if a vessel delays fishing or moves from an area of relatively high Chinook catches, that vessel would lose fishing time relative to other vessels that might choose not to alter their fishing. A structure that allows for multiple cooperatives is believed to allow for more experimentation with Chinook avoidance measures. Consequently, the options defining a threshold for cooperative formation were low enough to allow multiple cooperatives to form. To maintain the incentive for experimentation, the alternative required that the cooperatives develop an intercooperative agreement. The intercooperative agreement would provide each cooperative with the opportunity to negotiate terms that would allow it to pursue Chinook avoidance measures without compromising its members' opportunity in the fishery.

In considering the alternative, NOAA Fisheries suggested that, given the mandatory cooperative membership, in the absence of specific approval of annual cooperative contracts and any penalties for violations of those contracts, NMFS' management authority over the fishery may not be adequately maintained. In essence, allowing cooperatives to define certain management measures and define and enforce penalties for failure to comply with those measures, without agency oversight could be considered a delegation of management authority in the fishery. Specifically, annual cooperative formation approval would require that NMFS review each contract and make an independent assessment of whether 1) the Chinook avoidance measures proposed are permitted measures (as defined by the cooperative alternative) and, 2) those measures serve the intended bycatch control purpose. Whether these fact-based assessments can be completed in a timely manner that allows a cooperative to be approved prior to the fishery opening is uncertain.

A second issue certain to arise is that cooperative penalties would need to be administered in a manner that provides an opportunity for a hearing to contest. Certain of these notice and hearing requirements would likely apply to most standdown and financial penalties. The effectiveness of a cooperative might depend on a system of penalties that are efficiently and predictably administered. For example, a penalty for failing to suspend fishing in a hotspot could be a standdown. Such a penalty may not be consistent with NMFS' system of penalties, adding substantial uncertainty concerning the consequences of failing to comply with a cooperative measure. In addition, imposition of the penalty could be delayed, as its imposition is likely to require compliance with NMFS administrative processes. These delays may make time sensitive penalties (such as standdowns) wholly ineffective. Monitoring by the cooperative might also need to comply with NMFS' standards for penalties to be enforceable. Whether the benefits of a cooperative program could be achieved, given these requirements is questionable.

Another solution was also discussed that would allow fishing outside of a cooperative. Under other cooperative programs created by the Council, eligible permit holders are able to participate in a fishery outside of a cooperative under an alternative management structure, such as individual fishing quotas or a limited access fishery. The Council elected not to develop such an alternative, as doing so would likely have required extensive analysis over the course of multiple meetings, which would have delay implementation of the Chinook PSC limit.

The specific requirements for fishing outside of a cooperative should balance that opportunity against the cooperative fishing opportunity in a manner that allows cooperatives to achieve their objective. Under this approach, a cooperative could be required to adopt certain measures, such as a system to share timely PSC information among members, limitations on fishing in identified hot spots, gear use and fishing

practice requirements, vessel performance rewards or penalties, and contract monitoring and administration requirements. Participants who chose not to join a cooperative would be permitted to fish, but would be subject to other rules intended to reduce PSC while retaining a reasonable fishing opportunity. The difficulty in the development of a non-cooperative fishing opportunity (in comparison to other cooperative programs) is the absence of allocations of harvest shares. In other programs, eligible vessels are permitted to fish their allocations either in a cooperative, as an IFQ, or by pooling the allocation with allocations of others in a limited access fishery. Although limited access participants confronted uncertainties from that type of management, the allocations defined the non-cooperative fishing opportunity. Without allocations, the Council must attempt to balance the fishing opportunity in a cooperative with the opportunity outside of a cooperative through other measures (such as standdowns or other effort or catch limits).

The complication arises from uncertainties and the likelihood that additional information will be developed concerning bycatch over time. If the Council anticipates certain bycatch efforts from cooperatives, it could adopt specific management measures that balance the cooperative fishing opportunity with the opportunity outside of the cooperative. Yet, bycatch measures and their effects on performance in the fishery are likely to change over time. For example, a cooperative may choose to have its members standdown when certain bycatch levels are reached. If bycatch rates fluctuate annually, the tendency to reach those limits and impose standdowns on members will change. In other words, measures intended to provide reasonable fishing opportunities for non-cooperative members are likely to constrain their catches more some years than others. More problematic is that the opportunity to fish may be greatest for these non-cooperative vessels in years of high bycatch. Assuming non-cooperative vessels fish during a portion of the cooperative's standdown (or in areas closed under the cooperative agreement), non-cooperative vessels will likely catch more of the available target species and use more of the available PSC. Clearly, if cooperative PSC avoidance measures change over time (in a manner that either allows the cooperative to fish more rapidly or slowly) the balance of fishing opportunities will change.

The previous action considered by the Council involved only Chinook PSC avoidance in the pollock fishery. If the Council elected to pursue bycatch reduction through a bycatch cooperative structure for this action, a system would need to be developed to address halibut and Chinook PSC in a variety of different target fisheries throughout the year. The development of both a reasonable cooperative structure and a reasonable non-cooperative fishing opportunity should be expected to be substantially more complex.

Whether a bycatch cooperative structure could be developed that would effectively minimize bycatch and provide for harvest of the optimum yield is not certain. Ineffective measures in the non-cooperative fishery could result in excessive PSC that result in an earlier closure. Effects on efficiency and costs would depend on the specific measures required of cooperatives and measures applicable to the non-cooperative fishery. Whether such a system could be successfully developed depends on whether measures that achieve PSC reductions can be defined for both cooperatives and the non-cooperative fishery, which provide reasonable fishing opportunities in to both segments, given the complexities and uncertainties concerning PSC rates in the various fisheries in the Gulf.

Bycatch quotas

A few different types of allowances could be considered bycatch quotas. First, and most directly, the establishment of allowances that create a specific exclusive, individual limit PSC would be considered a bycatch quota. Alternatively, these allowances could be annually allocated to vessels or to cooperatives. As a starting point, the potential of these allocations to address reductions in available PSC and to effect further PSC reductions should be considered. Although bycatch quotas are included in several

management programs that also allocate target species, no known programs allocate exclusively bycatch (or PSC) quotas.[5] Consequently, any consideration of the effects of these quotas is somewhat speculative. Bycatch quotas would be intended to provide a participant with an exclusive and limiting share of the available PSC. The participant could then choose what species to target, when, where, and how, to attain the greatest value of catch subject to the constraint of the bycatch quota. In the absence of constraining limits on target species, these allocations are likely to allow each participant to achieve the greatest value in the fishery, given a limited quantity of permitted PSC. In other words, as long as unlimited quantities of target species are available, bycatch quotas may effectively allow participants to respond to more constraining limits on PSC; however, if target species are limited, simple bycatch quotas alone (without target species allocations or other program attributes) are unlikely to aid participants in responding to those lower PSC limits. To attempt to address this shortcoming, one must understand the nature of the problem.

When target species are limiting, a participant with a bycatch quota will face a choice in determining a level of PSC avoidance. Knowing that the target species TAC will be constraining, the participant must decide whether rapidly harvesting the target species (and using more bycatch quota in the process) will increase the participant's share of the available target species sufficiently to justify forgoing future fishing because of the potentially constraining bycatch quota allocation. For example, in the Gulf, some participants may choose to fish Pacific cod only during the A season.[6] When deciding on fishing practices, these vessels will decide whether greater profits can be attained by fishing with a relatively high PSC rate to attain a greater share of the limited A season Pacific cod TAC or saving PSC by adopting fishing practices that will result in lower catches and transferring unused PSC to another participant for use later in the year. Vessels that fish later cod seasons will need to balance the value of more rapidly using their PSC to obtain a larger share of the A season Pacific cod TAC against lower A season Pacific cod catches and a greater quantity of PSC in later seasons. If A season Pacific cod generates relatively high profits in comparison to other seasonal and species targets, vessels are likely to be willing to use more PSC to obtain a greater share of the available A season Pacific cod. In other words, a race for fish (A season Pacific cod) may result despite the bycatch quotas. In this race, participants do not disregard PSC rates, but choose a PSC rate that sacrifices PSC quota at a rate that equalizes the difference between profit attained from the additional share of the A season Pacific cod and the profit derived from the use of PSC for harvest of less valuable species later.

To address this shortcoming, the Council could consider developing annual redistributions of bycatch quotas based on PSC performance. In the simple example described above, the Council could consider an annual adjustment to PSC allocations based on a vessel's performance in a fishery. So, a vessel that disregarded PSC rates in the first season to obtain a greater share of that season's Pacific cod would receive a smaller allocation of PSC in the following year. Whether such a program would function effectively would depend on the ability of the Council to fairly weight PSC performance, in a system that creates reasonable incentives for PSC avoidance. Improperly weighting performance may create incentives for participants to deploy fishing effort (or withhold effort) simply to manipulate competitors' PSC apportionments. While development of specific methods of apportioning PSC will be needed to assess these effects, the potential for a system to allow for these manipulations must be considered.

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[5] As noted in a previous discussion paper, the only known instance of bycatch quota allocations in the absence of target allocations is the allocation of dolphin allowances, as a part of efforts to reduce dolphin mortality in the Eastern Pacific tuna fisheries. In that program, a fleetwide limit on dolphin mortality is apportioned among vessels, with each receiving an equal share of the total limit. Each vessel fished subject to its individual non-transferable dolphin mortality limit, which required the vessel to suspend fishing for the season once it reached its limit. Although these dolphin limits are bycatch limits, they are limits of a different type from the limits on bycatch (e.g., marine mammals) than limits that might proposed by the Council to address halibut PSC or Chinook PSC.

[6] It should be noted that developing seasonal bycatch quotas may have a similar effect. If seasonal bycatch quotas are not binding (or are perceived as not binding), participants can be expected to race for a share of the available target catch with limited (or less) consideration for PSC rates.

Additional complexity will arise when considering the number of fisheries and sequence of seasons, whether and how interactions occur across fisheries and seasons will be a consideration for any reapportionment. Developing a system that creates reasonable incentives to avoid PSC at all times could be challenging. In addition, any reapportionment based on performance will pose some implementation challenges. NOAA Fisheries will need to develop a system for administering apportionments, which will necessarily require an application and appeals processes. These added burdens suggest that adjustments to apportionments should occur over a period of years, rather than annually.

An alternative may be to provide for incentive plan agreements (similar to those created by the Bering Sea pollock fisheries). In that program, cooperatives that form incentive plan agreements that create incentives for Chinook PSC avoidance at all times are subject to a higher PSC limit. In considering this alternative, it should be noted that Bering Sea pollock cooperatives are formed to receive an allocation of Bering Sea pollock. Whether such a structure of multiple cooperatives could be used to create incentives to avoid halibut PSC in several target fisheries over several seasons without exclusive target allocations is questionable. Under such a structure, if multiple incentive plans are permitted, it is possible that cooperatives will each have an incentive to maintain the minimum necessary measures to improve members' catch in the most profitable target fisheries.

As should be apparent, a variety of incentives arising under bycatch quotas could affect the ability (or tendency) of the fleet to achieve optimum yield. In other words, the potential of participants to adjust effort to attain individual profits could lead to fish being unharvested because of relatively higher PSC usage. Whether optimum yield would be affected would depend on the structure of incentives for PSC savings in any reallocation. In addition, the management program should consider efficiencies and costs and should accommodate variations in fishery resources and catches (both within and across the different fisheries). Depending on the program's structure, potential effects on the distribution of catches across communities and time may also be relevant, as changes in these distributions are likely to affect employment in processing and support businesses.

Development of a system of bycatch quotas will require that the Council follow the process for the development of limited access privileges. Any such program would need to promote safety, conservation and management, and provide social and economic benefits. Any allocation of limited access privileges would need to be "fair and equitable" and would need to consider of a number of factors including current and historical participation and dependence on the fishery, as well as effects on communities, crews, and entry to the fishery. Distribution of these quotas could be determined based on a variety of criteria. For example, each LLP license holder in the Gulf could be 1) apportioned the same number of allowances each year; 2) apportioned a number of allowances based on the vessel's historical PSC usage; or 3) apportioned a number of allowances based on the vessel's history in each fishery that uses PSC (with the apportionment based on the relative PSC rates in those fisheries. Rules governing or prohibiting transferability would need to be considered, as well as limits on share use and holdings. Social and economic effects of the program on communities would also be a consideration.

Any system of bycatch quotas would also require consideration of modifications to monitoring. In trawl fisheries, the Council has typically required 100 percent observer coverage on catcher vessels and 200 percent observer coverage on catcher processors that participate in catch share programs. Under the revised observer program (which is scheduled to be implemented next year) observer coverage in the longline halibut and sablefish program could vary with operation type and vessel length. Depending on the timing of any action and progress relative to the development of electronic monitoring and its potential provide adequate management information, it may be possible to consider the use of electronic monitoring for some participants. Considerations of whether those levels of coverage are adequate for a different program would be needed, if the Council elects to advance a system of bycatch quotas.

Multispecies catch shares

As an alternative to bycatch quotas, it has been suggested that a multispecies catch share (i.e., rationalization) program might provide participants with improved incentives for PSC reductions. These programs are identified in the Council's Gulf FMP for consideration and adoption (as appropriate) for accelerating the Council's precautionary, adaptive management approach. Under such a program, important target species and PSC species could be allocated with all allocations binding. In other words, once a participant has fully used an allocation, the participant would not be permitted to fish. Individual or cooperative allocations could be used; however, the program development should consider the potential for improved bycatch performance that might be possible by communication and coordination under cooperative structures.

A multispecies catch share program might be preferred, as a vessel that has exclusive allocations of both target species and PSC will have no need to race to protect its share of the catch of target species. In addition, as long as PSC has a known potential to constrain harvests of a target species at the end of the year, reductions in PSC usage will have value. Under Amendment 80, this value is derived from both harvests of allocated target species (e.g., yellowfin sole and Pacific cod), as well as unallocated target species (e.g., Kamchatka flounder and Alaska plaice). In Gulf fisheries, a program that includes target allocations of Pacific cod and rex sole, as well as halibut PSC, could be effective at creating an incentive for maintaining low PSC rates, provided that either one of the target allocations is not binding (prior to a halibut limit being reached) or other desirable target species (such as shallow water flatfish) are available for harvest with any PSC remaining after the two target allocations are fully harvested.

Although such a program provides a clear incentive for participants to reduce PSC rates, it may not provide incentives for reducing total PSC usage. Specifically, as long as valuable targets remain available (whether allocated or not), participants may have an incentive to reduce PSC rates but also use all available PSC.[7] A further consideration is that PSC avoidance may be minimal, at times when a PSC limit is perceived as unlikely to be constraining. For example, the analysis of Gulf Chinook PSC limits for the pollock fishery suggests that historical PSC rates may not result in those limits constraining in years of low PSC rates. If those limits are apportioned among individuals or cooperatives under a catch share program, it is possible that in years of low Chinook PSC, vessels may give little consideration to Chinook PSC avoidance, particularly if no other target species are available that require the use of available PSC apportionments. It may be possible to incorporate some elements into the program to address these issues. For example, in the Bering Sea pollock fishery, cooperatives receive a higher Chinook PSC limit by joining an incentive plan agreement that includes provisions that create an incentive for reducing PSC at all times. The larger apportionment creates an incentive for vessels to enter an incentive plan agreement; however, plan members must meet a performance standard that is lower than the larger apportionment in 5 of 7 years to continue to have access to the larger apportionment. The Council could consider developing a system of incentives to ensure that participants have incentives to avoid PSC regardless of whether limits are likely to be constraining. Multispecies catch share programs tend to achieve production efficiency and cost minimization goals; yet, to achieve broader economic efficiency and optimum yield goals (which include social and distributive considerations) require more careful program designs. These aspects of the program might be best considered in the context of the Magnuson Stevens Act's provisions on limited access privilege programs, which apply to catch share programs.

Provisions governing the development of limited access privilege programs, together with the complexity of issues likely to arise, may be substantial challenges. As noted previously, the program must promote safety, fishery conservation and management, and social and economic benefits, and must reduce capacity in any fishery that is found to be overcapacity. Any allocation under such a program must be fair and

[7] Some participants may argue that full use of PSC is appropriate, if limits are reduced as is currently under consideration.

equitable considering both current and historical harvests, and must consider harvesting and processing employment, investments and dependence on the fishery, and current and historical participation of fishing communities. These broad considerations would require that the Council consider not only the direct effects of the distribution of shares under the program, but also the effects of the share distribution on the distribution of landings.[8] The program should also provide for the sustained participation of small owner operator vessels and dependent communities, as well as the interests of captains and crew. A policy on share transfers must be developed, along with provisions that prevent excessive consolidation of harvesting and processing and geographic consolidation in the fishery. Lastly, an appropriate monitoring program would need to be developed for the program.

Fixed closures

The Council has a history of relying on area closures to address bycatch issues. The Gulf FMP specifically identifies area closures as an appropriate tool for bycatch control. Among area closures advanced by the Council are the recently adopted an areas closed to protect *C. bairdi* off Kodiak. The trawl closures to protect king crab off Kodiak show further variety of closures used by the Council. Some area closures are year round, in areas of relatively high king crab abundance; others, in areas of lower abundance, are seasonal; and another set of closures are periodic, only during specific recruitment events. The Council has also used trigger closures. In the Bering Sea, the Council identified Chinook Salmon Savings Areas, some of which closed only after a Chinook PSC threshold was reached. These areas were identified as areas with relatively high PSC rates, closure of which might mitigate PSC in years of high Chinook PSC. Similar area closures have been applied to protect crab in the Bering Sea.

The Council could consider fixed closures as a part of any measures to address bycatch. Areas with high PSC rates (either halibut or Chinook) that also have high target rates may appeal in a race for fish with no individual accountability for PSC. These areas may provide a competitive advantage to vessels that are willing to disregard PSC rates. If such areas can be identified and closed, it may be possible to prevent vessels from using these areas to gain an advantage in the fisheries. In considering whether closures might be an appropriate, the Council should consider whether areas of high PSC rates can be identified and whether closures of those areas will provide for reasonable PSC reductions and the efficient prosecution of the fishery. Closures could be annual, seasonal, or triggered by a PSC threshold being reached, depending on the PSC rates in the fishery. In considering whether to use closures to manage PSC, the Council should consider the degree to which those closures will reduce PSC.

A few limitations of fixed closures should considered, if the Council wishes to advance an action establishing closures. Although closures may reduce PSC rates, they are unlikely to reduce the total amount of PSC used in the fishery or create incentives for PSC reduction. In addition, if areas of high PSC are variable, fixed closures may not effectively reduce PSC rates. Costs effects may also be a consideration. Any additional operating costs arising from closures should be balanced against their effectiveness in reducing PSC rates. If the closures can effectively and efficiently reduce PSC rates (allowing for more target catches in the fishery), fixed closures may increase total catch and improve returns from the fishery. As with some other measures, however, fixed closures do little to reduce overall PSC and do not create individual or vessel level incentives for PSC avoidance.

[8] The Council should also consider any effects across the different sectors. While many of these disruptions may be avoided by the recent Pacific cod split, some disruptions may arise to the extent that redistribution of landings has spillover effects on different gear types or creates either competition for or gaps in landings that might be detrimental to other sectors or processors.

Rolling hotspot closures

Studies of the effects of a system of rolling hotspot closures implemented in the Bering Sea pollock fishery have suggested that that system has effectively reduced Chinook PSC in that fishery. A similar system could be considered for the Gulf fisheries. The rolling hotspot program uses weekly Chinook PSC information to identify hotspots (or areas of relatively high PSC rates). Cooperatives are closed out of these hotspot areas, with the size and term of the closure applicable to a cooperative based on the PSC performance of vessels in that cooperative. By scaling the closure to PSC performance, cooperatives have an incentive to maintain lower PSC rates to gain access to a larger portion of the fishing grounds.

An instrumental aspect of the Bering Sea program is administration of the closures through cooperatives (and an intercooperative agreement). As initially adopted, the program was an elective program that, if adopted by a cooperative, provided an exemption from the closures of the Chinook Salmon Savings Areas. As an incentive to avoid the more wide sweeping and imprecise closures of the Chinook Savings Areas, the cooperative would agree to implement an information sharing system to identify hotspots and monitor and enforce compliance with the program.[9] Cooperative administration is critical to the program, as it avoids several administrative requirements that would arise from NOAA Fisheries administration. In essence, the flexibility of rolling hotspot closures requires cooperative administration. As discussed previously, a system of cooperative administration could be developed as a part of either a mandatory bycatch cooperative program or a catch share program. Since these two management systems are discussed above, only the aspects relevant to a rolling hotspot closure system are discussed here.

To develop a bycatch cooperative program for implementation of a rolling hotspot system, the Council would need to identify an alternative system of fixed closures that would be the alternative to the cooperative administered hotspot closures. If a system of defined fixed area closures were to be developed, it may be possible to include a rolling hotspot component in the program. The development of a catch share program (either bycatch quotas or target and bycatch quotas) will require the Council to undertake all of the considerations prescribed under the Magnuson Stevens Act for a limited access privilege program. In considering whether to include a rolling hotspot component as a part of another program, the Council should consider that target allocations in a catch share program secure target catches, thereby improving the incentive for greater experimentation in the rolling hotspot program, which ultimately may contribute to its success. In a bycatch cooperative program (without any allocations or with only bycatch allocations), participants will have an incentive to structure their hotspot closure program to ensure that target catches are not sacrificed by PSC closures.

5 Conclusion

As the Council has undertaken efforts to reduce Chinook and halibut PSC in the Gulf of Alaska fisheries, participants in those fisheries have suggested that the current management is an impediment to achieving those reductions without substantial cost to participants. This paper identifies possible objectives that may be advanced should the Council elect to advance an action to provide Gulf participants with additional management tools to aid in their compliance with PSC reductions. In addition, the paper briefly reviews a variety of management measures that could be considered with particular attention to their potential for meeting possible Council objectives. The Council could consider development of objectives, as well as general management measures that it might wish to consider to address PSC reductions in the Gulf. The Council could also consider identifying a process for further defining alternatives, if it elects to advance an action.

[9] Currently, rolling hotspots are incorporated into the incentive plan agreements, as most participants believe they effectively address Chinook PSC and create vessel level incentives for Chinook avoidance; however, rolling hotspots are no longer required by regulation.

Appendix – Summary of management programs affecting PSC use

Introduction

This appendix summarizes several management programs implemented in Alaska that include components that affect participants' use of prohibited species catch. The summaries give particular attention to regulatory reductions in PSC limits and incentives affecting participants use of PSC, including incentives that arise even when the PSC limit is unlikely to constrain the fishery.

The following programs will be addressed:

- Cooperative Management of Non-AFA Trawl Cather Processors under Amendment 80 to the BSAI Groundfish Program
- Cooperative Management of Rockfish in the Central Gulf of Alaska
- Voluntary Rolling Hot Spot Closures in the Pollock Fisheries of the BSAI
- Incentive Plan Agreements in the Management of Chinook Salmon Bycatch in the Bering Sea Pollock Fishery

Cooperatives of Bering Sea and Aleutian Islands non-AFA trawl catcher processors under Amendment 80

Amendment 80 was implemented in 2008 and creates a limited access privilege program to facilitate the formation of harvesting cooperatives by vessels in the Bering Sea and Aleutian Islands non-American Fisheries Act trawl catcher/processor sector. Under Amendment 80, the sector receives a large majority of the total allowable catches of Atka mackerel, Pacific ocean perch, flathead sole, Pacific cod, rock sole, and yellowfin sole, based on its historical dependence on those species. In addition, the sector receives limiting apportionments of the available halibut, red king crab, *C. opilio*, and *C. bairdi* PSC, based on historical usage rates in the target fisheries.,.

The program allows eligible vessels to form cooperatives or fish in a limited access fishery. Exclusive allocations of each groundfish species and PSC apportionment are made annually to each cooperative based on the histories of its member vessels. Similarly, allocations of those species are made to the limited access fishery based on the histories of vessels that choose not to join a cooperative. Harvests of each cooperative are made under the terms of the cooperative's agreement. Cooperatives (typically through a manager) oversee harvests of the allocations to ensure that no limits are exceeded. To optimize harvests and revenues of members, a cooperative is free to internally manage harvests of its allocations by member vessels and trade allocations with other cooperatives. Vessels that choose not to join a cooperative are eligible to fish in the Amendment 80 limited access fishery, but must compete in a race for fish for a share of available harvests (using the available PSC) with other Amendment 80 vessels that chose not to join a cooperative. An limited access fishery operated in the first two years of the program, but since 2010 all participants opted to join one of two cooperatives that have formed.

Although Amendment 80 allocates the sector its most important target species, historically the sector's members have targeted (and harvested) a number of other species (such as arrowtooth and Kamchatka flounder, Alaska plaice, Greenland turbot, and Northern Rockfish). Harvests of these species by an Amendment 80 vessel is permitted under the program, provided the vessel has not exceeded any applicable allocation. In addition, harvests of any allocated species and any PSC made while targeting these unallocated species is counted toward the cooperative or limited access allocation applicable to the vessel.

Two reductions in halibut PSC are prescribed by Amendment 80. The first reduction is made by reducing the amount of halibut PSC apportioned to the sector by 250 metric tons from historical usage.[10] This reduction was phased in from 2008 to 2012, in 50 mt increments, starting from a 2,525 mt apportionment to the Amendment 80 sector in 2008. The second reduction is achieved through a reduction of inseasons rollovers to the Amendment 80 sector. Currently, 875 mt of halibut PSC are apportioned to trawl limited access fisheries in the Bering Sea and Aleutian Islands (i.e., non-Amendment 80 fisheries). Under the Amendment 80, NMFS is authorized to rollover halibut and crab PSC (as well as AM80 species) apportionments from this limited access trawl fishery to cooperatives in the Amendment 80 sector, if it appears the trawl limited access fishery will not use those apportionments. Rollovers of halibut PSC are reduced by 5 percent, with that reduction remaining unavailable (or in the water). [11]

One of the benefits of Amendment 80 is that it creates incentives for cooperatives to optimize the value of their harvests from a limiting PSC apportionment. This incentive materializes because each cooperative receives exclusive allocations of target species and PSC, which allow it to determine how best to use those allocations over the entire year.

In a race-for-fish, a vessel cannot be assured that sequential plans for targeting on a species by species basis will not be thwarted by the actions of other vessels. Thus, each vessel will tend to maximize net revenues by harvesting the highest value target available at any given point in time. In these circumstances, less regard may be given to PSC rates, particularly if PSC avoidance reduces catch rates of a target species that is likely to close as a result of either a constraining TAC or a constraining PSC limit.

An example is useful for illustrating the difference in incentives. Consider a limited access fishery for Pacific cod in which the available TAC is always fully harvested. The fishery uses PSC, but never reaches the available PSC limit. If a vessel is able to increase its catch rate noticeably by adopting a fishing practice that uses slightly more PSC, the vessel is likely to adopt that practice. Now consider that the unused PSC from this Pacific cod fishery is available to support a later Pacific fishery that typically closes based on full usage of available PSC (including any PSC rolled over from the prior season). In the absence of any fleet agreement, an individual vessel operator remains likely to adopt a fishing practice with a relatively high Pacific cod catch rate and PSC rate in the first season to secure a larger share of the available first season Pacific cod, despite an interest in having more catch in the second season. This incentive to disregard PSC rates arises because the vessel must share all of its first season PSC savings with vessels that elect to fish in the second season.[12]

If instead a cooperative receives an exclusive allocation of Pacific cod and PSC, a vessel may choose to adopt fishing practices that reduce PSC usage, provided that PSC savings provides a later benefit. Continuing with the example, the vessel operator that receives an exclusive allocation of Pacific cod and PSC will choose to adopt fishing practices to reduce PSC early in the year, as long as the cost of those efforts is less than the additional profits from the Pacific cod catch that may be made with the PSC savings. These incentives for PSC savings apply generally across all the allocated species and appear to have affect PSC usage in the fisheries (see
Table 1). These reductions may be moderated somewhat, as the Amendment 80 fleet was already putting substantial efforts into reducing PSC rates prior to implementation of Amendment 80.

[10] Of this 250 mt reduction, 200 mt remains in the water, while 50 mt was shifted to CDQ fisheries, beginning in 2010. This results in an overall reduction in halibut PSC available to the trawl sector in the Bering Sea and Aleutian Islands from 3,675 mt (originally adopted in 1999) to 3,475 in 2009 and thereafter.

[11] Similar reductions are not built in to rollovers for other AM80 species or for crab PSC.

[12] It should be noted that a similar incentive may arise if the PSC limit is binding, but the Pacific cod TAC is not. In that case, a vessel may be able to increase its seasonal catch by disregarding PSC rates, if PSC avoidance reduces catch rates for target species. Although the catch rates, PSC rates, and number of participating vessels will affect the incentives, generally speaking, PSC avoidance will only be adopted, if it is agreed to by a large enough portion of the fleet that vessels that do not adopt PSC avoidance have a small negligible effect on the distribution of catches.

The incentives for PSC savings may also apply to unallocated species. For example, a vessel may be expected to reduce PSC usage in the Pacific cod fishery to allow it to catch additional arrowtooth flounder, provided the cost of the PSC savings is less than the net revenues realized from the arrowtooth flounder catch. Unallocated species include northern rockfish, Greenland turbot, Alaska plaice, or arrowtooth flounder. The ability to target these unallocated species can be seen as an incentive to reduce PSC while fishing for Amendment 80 allocated species. If a vessel is able to reduce their PSC in the allocated fisheries, then they could have some PSC to use in these unallocated fisheries.

While harvest decisions in the fishery are complicated, as catch rates, PSC rates, and fish quality and price vary throughout the year, the incentive for PSC reductions arising out of the constraining PSC allocation and available catches of marketable species remains. Discussions with Amendment 80 participants have revealed that at least some are not using complex mathematical models to plan out their fishing year to maximize net revenues while staying with the constraints of their target species and PSC apportionments. It is also clear that while not all operators are using these types of models, most, if not all, are trying to determine how to get the most revenue out of their limited resources without concern about whether other operators will negatively affect their own initiatives.

Table 1. Metric tons of halibut PSC per metric ton of goundfish by target prior to and after amendment 80

	Pre-Amendment 80		Under Amendment 80	
Target	2005	2006	2010	2011
Pacific cod	0.020	0.020	0.007	0.003
Flathead sole	0.011	0.016	0.008	0.009
Rock sole	0.020	0.018	0.013	0.007
Yellowfin sole	0.007	0.004	0.007	0.006
Source: NMFS catch accounting.				

Cooperatives in the Rockfish fishery in the Central Gulf of Alaska

Following a U.S. Congressional directive, in 2005, the adopted the rockfish pilot program, a share-based management program under which a large portion of the available catches of Central Gulf of Alaska target rockfish species are apportioned as exclusive shares to cooperatives, based on the catch history of the members of each cooperative. Although originally subject to a sunset of 2 years, the 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act extended the term of the program to 5 years. Prior to the 5 year term, a revised rockfish program replacing the rockfish pilot program was designed and implemented.

The Central Gulf of Alaska rockfish pilot program was developed by the Council based on a congressional directive. The program was developed as a cooperative management program in which qualified participants received allocations of three rockfish species in the Central Gulf of Alaska: Pacific ocean perch, northern rockfish, and pelagic shelf rockfish. Allocations under the pilot program were divided between the catcher vessel sector and the catcher processor sector, based on historical catches of the participants in these respective sectors. In addition, each sector was allocated important incidental catch species (i.e., sablefish, Pacific cod, and shortraker and rougheye rockfish and thornyheads) based on the historical harvests of the sector. Two exceptions are that Pacific cod is not allocated to catcher processors and shortraker and rougheye rockfish is not allocated to catcher vessel cooperatives, but are instead managed under reduced MRAs. Those historical allocations were believed to be overly constraining suggesting that the fishery could be more effectively prosecuted under reduced MRAs.
Under the program, participants in each sector were allowed to either fish as part of a cooperative or in a competitive, limited access fishery. Each cooperative received allocations of target rockfish, secondary species, and Pacific halibut PSC from the sector's allocation based on the target rockfish catch histories of

its members. Cooperatives managed and coordinated fishing of their allocations. All allocations to a cooperative are constraining, so a cooperative must manage and monitor members' catch of target rockfish, allocated secondary species, and halibut PSC, to ensure that it is able to fully harvest (but not overharvest) its allocations.

Under the pilot program, the catch of cooperatives is not only limited by primary and secondary species allocations, but also by allocations of halibut PSC. Halibut allocations under the pilot program were based on historic catch of halibut in the rockfish fishery. In addition, to create an additional incentive for halibut savings in the rockfish fishery and to provide for greater prosecution of late season fisheries, unused halibut PSC apportioned to rockfish cooperatives was made available in the last season halibut apportionment in November, after the rockfish fisheries closed. Halibut usage in the rockfish fishery declined to less than half of historical levels under the pilot program. Cooperatives are reported to have had agreements to increase incentives for halibut PSC reductions, in part, to maximize the amount of halibut available for late season fisheries.

In redefining halibut PSC apportionments under the new program, the Council saw the opportunity to realize halibut savings while maintaining the incentive to limit halibut PSC use in the fishery. To achieve this goal, under the rockfish program, halibut PSC allocations are based on 87.5% of the historic catch of halibut in the rockfish fishery. In addition, 55% of any halibut PSC that has remained unutilized by November 15 will be added to the last seasonal apportionment of halibut PSC for trawl gear, while the remaining 45% will remain unavailable.

As demonstrated in the rockfish pilot program, the allocation of halibut PSC provided incentives for participants to conserve their halibut PSC. Exclusive allocations allowed vessels to move from areas of high halibut catch without risking loss of catch in the fishery. These exclusive allocations, together with cooperative oversight, resulted in increased communication among rockfish participants concerning catch rates, improving information concerning areas of high halibut incidental catch in the fleet and preventing repeated high halibut mortality among vessels exploring fishing grounds. In addition, several vessels began employing new pelagic gear that limited bottom contact and halibut incidental catch. Participants in the rockfish program reported that a primary motivation for these changes in gear types was the constraining halibut allocations, which could jeopardize cooperative catches in the event that halibut bycatch exceeds allocations. The rollover to fisheries late in the year ensured that these incentives continued, despite it being apparent that the halibut PSC apportionments would not constrain the fishery.

Voluntary rolling hot spot closures in the Bering Sea pollock fishery

The voluntary rolling hot spot closure program was developed to address an issue identified by the fishery participants with the preceding closure area management (the Chinook Salmons Savings Areas). In the mid-1990s, year round accounting of Chinook PSC and a system of Chinook Salmon Savings Areas (which are large area closures) were implemented. Savings areas were identified as areas of historical high Chinook PSC. If Chinook PSC in the Bering Sea pollock fishery reaches a threshold of 29,000 fish, these areas were closed to pollock fishing.

In 2004, information from the fleet suggested that the savings areas were not achieving their purpose, as PSC rates inside the areas appeared to be higher than PSC rates outside the areas. To address this problem, the Council developed an alternative, more flexible, management structure, the voluntary rolling hotspot program. Implemented in 2006, vessels that participated in an intercooperative agreement establishing a system of rolling hotspot closures are exempted from regulatory closures of the Chinook Salmon Savings Areas.[13] The rolling hotspot exemption is intended to increase the ability of pollock

[13] The fleet started the rolling hotspot program in 2002, but the regulatory structure establishing the exemption was not implemented until 2006 (through an exempted fishing permit) and in 2008 through an FMP amendment.

fishery participants to minimize salmon bycatch by giving them more flexibility to move effort from areas with recently observed high PSC to areas of recently observed low PSC (rather than follow the more rigid closures of the Chinook salmon savings area management).

The rolling hotspot closures are administered by cooperatives through a private contractor who monitors Chinook PSC. Cooperatives are assigned to different tiers based on their PSC rates (in comparison to a base rate). Tiers with lower bycatch rate are permitted access to a broad range of fishing grounds. Tier assignments are updated weekly, creating an ongoing incentive for PSC avoidance. Reports on Chinook salmon bycatch indicate that the rolling hotspot program has reduced Chinook salmon PSC. Studies of fishing under the exempted fishing permit generally concluded that Chinook PSC were reduced between 50 percent and 70 percent as a result of the closures. In addition, the relatively flexible structure of the program allowed participants to update the system as they gained experience. For example, closure areas were expanded and some areas were closed seasonally. Also, base rates were allowed to fluctuate to accommodate changes in PSC rates.

Incentive plan agreements

Despite the success of the rolling hotspots in reducing PSC rates, the relatively high amount of Chinook PSC in 2007 prompted the Council to take additional action to address Chinook PSC. The result is a management program that establishes Chinook salmon PSC limits intended to create incentives for Chinook salmon avoidance at all PSC rates. The program achieves this end by allowing cooperatives that agree to participate in an incentive plan agreement to fish under a higher Chinook salmon PSC limit. These incentive plan agreements are required to create incentives for avoidance of Chinook regardless of the amount or rate of Chinook PSC. The program also includes a performance standard requiring participants in incentive plan agreements to meet a lower threshold of Chinook PSC usage in 3 of every 7 years. The performance standard is intended to ensure that incentive plan members typically maintain relatively low PSC levels, accessing the higher apportionment only sporadically, in years of unusually high PSC.

To create incentives for PSC avoidance two of the current incentive plan agreements modify future Chinook PSC apportionments among plan members based on their previous years' PSC usage.[14] Under this structure, even if PSC rates are low in a year (and PSC limits are not binding) a plan member has an incentive to maintain low PSC to receive a larger share of the plans apportionment as a contingency against possible higher PSC in future years. In addition, the all of the incentive plans include a hot spot closure system, which participants believe has effectively reduced PSC in the fishery. One agreement use a variation of the hotspot closures as its primary tool to create incentives for PSC avoidance. This system establishes area closures timed to avoid high PSC rates. Vessels with relatively high PSC rates are subject to greater restrictions, as they are prohibited from fishing in certain areas of reported high PSC.[15] In addition, certain areas of historical high PSC are either closed during specific times of the year or closed, if high PSC rates are present in the current year.

Since the Chinook limits, performance standard, and incentive plan agreement structure have only been in effect for a single season, it is difficult to assess their success. The first year of the program had relatively low Chinook PSC, but the management structure may only be partially responsible for the low PSC.

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[14] The two structures differ, but share the common these of relying on a vessel's past performance to determine its future allocations.

[15] Alternatively, systems under which NMFS makes PSC apportionments are based on fishery performance could be considered. As noted, agency administration of those apportionments adds a level of complexity due to procedural requirements. If agency administration is considered, changes in apportionments should likely occur less frequently than annually. Industry administration would allow considerably greater flexibility, including midseason adjustments to apportionments and inseason rewards and penalties.

Sources:

Bersch, F. Joseph III, Report to the North Pacific Fishery Management Council on the 2011Bering Sea Pollock Mothership Salmon Savings Incentive Plan, March 28, 2012.

Gruver, John, 2011 Inshore Salmon Savings Incentive Plan Annual Report, submitted to the North Pacific Fisheries Management Council, March 28, 2012.

Madsen, Stephanie and Karl Haflinger, Annual Report on Catcher Processor Chinook Salmon Bycatch Reduction Incentive Plan for 2011, April 1, 2012.

National Marine Fisheries Service (NMFS), Environmental Impact Statement/Regulatory Impact Review/Regulatory Flexibility Analysis of Bering Sea Chinook Salmon Bycatch Management (December 2009)

North Pacific Fishery Management Council (NPFMC), Discussion paper on GOA Chinook Salmon Bycatch – All trawl fisheries, December 2011.

NPFMC/NMFS, Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis for Proposed Amendment to the Fishery Management Plan for Groundfish of the Gulf of Alaska Area Closures for *Chinoecetes bairdi* Crab Protection in Gulf of Alaska Groundfish Fisheries, September 2010.

NPFMC/NMFS, Regulatory Impact Review/Environmental Assessment/Regulatory Flexibility Analysis for proposed Amendment 88 to the Gulf of Alaska Fishery Management Plan for Central Gulf of Alaska rockfish program, June 2010.

NPFMC/NMFS, Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis for the Allocation of Non-Pollock Groundfish and Development of a Cooperative Program for the Non-AFA Trawl Catcher Processor Sector, proposed Amendment 80 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area, May 7, 2006.

PUBLIC TESTIMONY SIGN-UP SHEET

Agenda Item: C-1(c) GOA Comprehensive Byc Am's

	NAME *(PLEASE PRINT)*	TESTIFYING ON BEHALF OF:
1	Shallun Bodenhamann (Pass)	Self / Commercial Fisherman
2	George Hutchins	Myself
3	Stephen Taufen	Groundswell (6 min pls.)
4	Bob Krueger	AK Whitefish Trawlers
5	Heather McCarty	Pacific Seafood Woodvale
6	Jeff Stephan	UFMA
7	Chuck McCallum	GOAC3
8	Theresa Peterson	AMCC
9	Julie Bonney	AGDB
10	TERRY HAINES	FISH HEADS
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NOTE to persons providing oral or written testimony to the Council: Section 307(1)(I) of the Magnuson-Stevens Fishery Conservation and Management Act prohibits any person " to knowingly and willfully submit to a Council, the Secretary, or the Governor of a State false information (including, but not limited to, false information regarding the capacity and extent to which a United State fish processor, on an annual basis, will process a portion of the optimum yield of a fishery that will be harvested by fishing vessels of the United States) regarding any matter that the Council, Secretary, or Governor is considering in the course of carrying out this Act.

Bycatch 'Wedges' In Policy Debate

Transitional Possibilities to Abate Human Effects on Ecosystems & Promote Sustainability in North Pacific Fisheries – Alaska

GOA GROUNDFISH PSC/ BYCATCH REDUCTION

Table 2.1. - *(source: PFMC)*
Bycatch Mitigation Toolbox

Harvest Levels
- ABC/OY (Optimum Yield)
- Trip Landing Limits
- Catch Limits
- Individual Quotas
- **Sector Allocations – if Economically Efficient to CONSUMERS**

Discard Caps (limits & prohibitions)

Gear Restrictions:

Trawl Mesh size
- Footrope diameter/length
- Net Height
- Codend mesh & dimensions
- Design: on-bottom or pelagic
- Bycatch reduction devices (BRDs)

Line Number of hooks
- Hook sizes
- Line length
- Retrieval requirements

Pot/Trap Number of pots
- Pot size
- Escape panel in net/pots
- Retrieval requirements

Other Setnets (gill and trummel nets)

Time/Area Restrictions
- Seasons
- Area Closures
- **Depth Closures**
- Marine Reserves

Capacity (number of participants)
- Permits/licenses/endorsements
- Limited entry

Capacity (Vessel Restrictions)
- Vessel size
- Engine Power
- Vessel Type

Monitoring/Reporting Requirements
- Permits/licenses
- Registrations
- Fish Tickets (commercial landings/ sales receipts)
- Vessel Logbooks
- **Surveys – incl. new Specified to evaluate measures of Tools**
- Punch cards/tags (recreational)
- Port sampling/on-shore observers
- **On-board observers**
- Vessel monitoring systems (VMS)
- **Onboard video recording devices**
- Enforcement – NOAA OLE+

LAPPs Not Adequate

TOTAL w/ TAKINGS LEVEL...

We can design and articulate bycatch reduction strategies using existing tools. Some of the most likely are trip and landing limits, trawl net design, BRDs, area and depth closures. These make up the "wedges" that can lead to reduction of PSC to acceptable levels...

WE JUST HAVE TO OPEN UP THE EXISTING TOOLBOX's DRAWERS & Make PRACTICABLE changes...

Yet an inescapable fact remains that the first and most effective measure is: to stop targeting of secondary species, especially when primary catch has already been attained... **Political roadblock to opening the drawers of best science tools.**

'Secondary Species'
Political Targeting = unacceptable
Can resolve by correcting legislation & Avoid by Implementing GAO recommendations

Incidental Bycatch – acceptable (When practicable)

Sustainable Harvest Levels
(w/ Goal of 100% retention)

Primary/Target Species GHL/ACL Acceptable Harvest level...

NPFMC: We need the SSC and AP to determine the possible wedges/drawers & their practicable magnitudes = capable of reducing overall bycatch..., and getting rid of the secondary species target profiteering on PSC...

Only if resources go to the highest-value uses will we have ECONOMIC EFFICIENCY

Voluntary / FREEDOM

Making the Most out of the Limited Resources we have...

Limited Bundle Of Fishery Resources

TAC

Why Not More Emphasis?

WHY?

USE A
Has a VALUE
Of $8.50/lb.
Restaurant Fillet Entre

USE B
Has a VALUE
Of $4.00/lb.
Frozen Blocks – Fish Sticks

USE C
Has a VALUE
Of $2.00/lb.
Ingredient in Protein Food

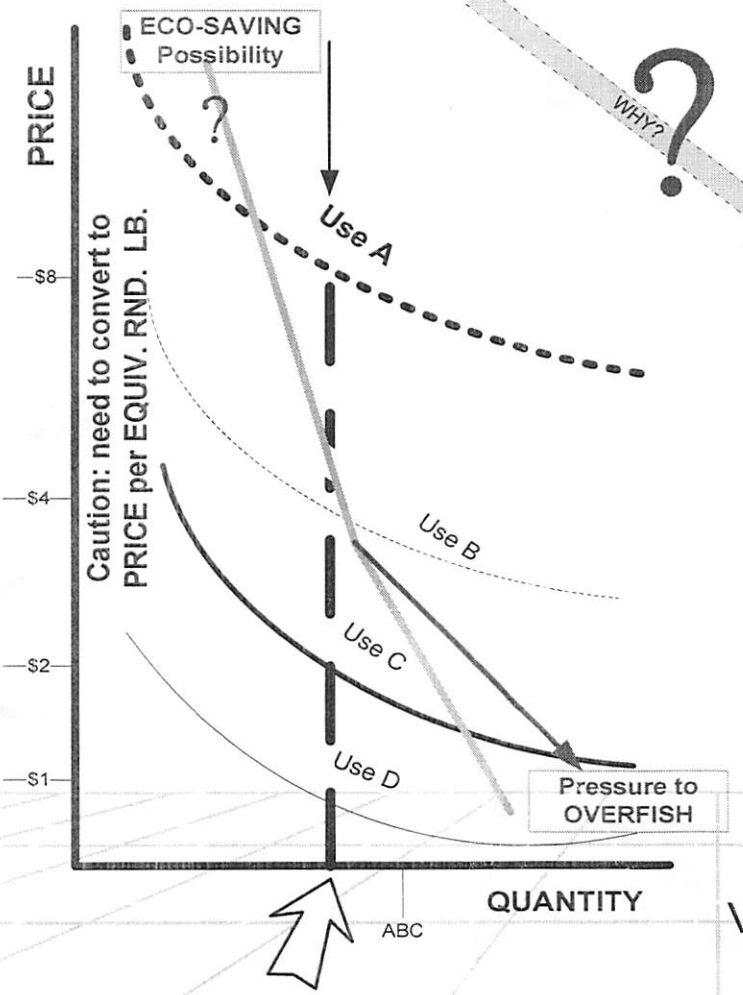
USE D
Has a VALUE
Of $0.90/lb.
Feedstock for Aquaculture

→ More Economically Efficient →

Route to MARKET FAILURE →

← Less Economically Efficient ←

Involuntary PRISONERS



TAC ~ A Vertical Supply Curve

OPTIMUM$_e$ YIELD
Maximize Net Nat'l. Benefit

Produce outputs that are worth more **to Consumers** – i.e. have the **HIGHEST VALUE** …
So that the Economic System Produces as much as it can.

Voluntary Market Interactions generate Socially Efficient Outcomes + maximize Utilities

Evaluative – i.e. the relationship between the value of the ends and means

STANDARD COST MODELS - PRODUCT ENGINEERING:

STANDARD COST SHEET -- FRESH/FROZEN FRUIT PRODUCTS

Sales Value: $.$$

COST ELEMENT:	DESCRIPTION	Std. % YIELD	QUANTITY REQUIRED	UNIT COST	SUBTOTAL	TOTAL COST PER 20 LB. CARTON
Variable Costs:						
Raw Material	Fruit Costs					
	Assessments (?)					
	Transportation (?)					
Total Raw Material						
By Product Credit:						
Total By Product Credit						
Net Raw Mat'l. Cost						
Packaging Material:	Box					
	Liners					
	Tote/Pallet					
	Labeling/Marking					
	Straping/Taping					
	Other Supplies					
Total Packaging Cost						
	Total Direct (Variable) Plant Costs {ex-labor}					
Direct Labor	S/T Equiv. Wages					
	Taxes & Benefits					
	Workers Compensation					
	Net Crew Travel/Medical					
Total Direct Labor						
Indirect Labor & Meal Costs	(Applied at Rate of)		Direct Labor X			
Total Labor Cost						
Cold Storage Handling						
Other:						
	Total Variable Plant Costs {incl. Labor}					$.$$
Overhead Cost Applied:						
Warehouse Overhead						
Cold Storage Overhead						
Corporate Burden (?)						
Total Overhead Cost						
Depreciation & Interest:						
Depreciation/Amortization						
Interest Costs						
	Total Throughput Costs					$.$$
	F.O.B _____		TOTAL PRODUCT COST		$.$$	$.$$
Average Hourly Rate			Unit		Net Income B/T	$.$$
Effective Date			Unit Cost			
Replaces Cost Sheet Dated			Case Quantity		Product Code	
Prepared by			Case Cost			
Revision No:_____						

COST ENGINEERING STUDIES & CORPORATE ACCOUNTING/BUDGETS

Can Compute a Cost for Acquisition of Fruit Inputs OR Value Back to Grower as a 'Net Transfer Price'

Orchard Costs (Standard Model) OR Commodity Market Acquisition Cost Information

Packaging, Supplies & Related Cost Studies

Labor Cost Studies & Wage/Benefit Analysis and Related...

Warehouse/Cold Storage Cost Engineering/Studies and Related...

Corporate Financial Accounting & Overhead Budgeting & Finance Costs...

Prep. By: StephenTaufen for NWCG/WSFC @ 10/12/97