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**Proceedings of the Cooperative State/Federal
Workshop on Regulatory Discards**

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Proceedings of the Cooperative State/Federal Workshop on Regulatory Discards

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Preface

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Executive Summary

In February 2001, the Atlantic States Marine Fisheries Commission (Commission), the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service convened a workshop to address the issue of regulatory discards in Atlantic coast fisheries. The goal of the workshop was to:

Identify and discuss potential methods to reduce the amount of regulatory discards taken and/or increase the utilization of the discards taken.

State, federal, industry, and university representatives from the U.S. Atlantic, Gulf, and Pacific coasts and Canada attended the workshop. Workshop participants viewed 14 presentations on a variety of topics, including methods currently used to reduce regulatory discards, and perspectives on discards from law enforcement, protected species, and recreational interests. Breakout groups were then tasked to develop general (neither species- nor gear-specific) recommendations on how to address regulatory discards relative to management strategies, gear technology, law enforcement, protected species, and monitoring and data collection. The five highest priority recommendations were identified and discussed in detail by workshop participants. These include:

1. Amend fishery management plans to focus on reducing overcapitalization, while protecting diversity in the fishery.
2. Minimize derby fishing while increasing utilization of existing bycatch.
3. Establish a national gear research program.
4. Implement harvest rewards for utilizing gear to reduce discards.
5. Involve industry in data collection and monitoring through study fleets and industry-based surveys.

Recommendations were kept general so that they are relevant to a broad range of species and gears along the Atlantic coast and other areas. The recommendations can be modified to address specific discard concerns in a given fishery, and applied in that fishery. The Commission will use these workshop recommendations as a starting point to address summer flounder discard concerns in 2001-2002.

Introduction

Fishery discards are a concern in virtually every commercial and recreational fishery. In the context of this report, discards are defined as those animals that are caught by commercial fishermen and recreational anglers that are returned to the water. Discards occur for a variety of reasons that can be grouped into two broad categories. Economic discards are those animals returned to the water due to their low quality or the absence of a market. The occurrence of economic discards is typically market driven. Regulatory discards are those animals, including protected species, that are returned to the water because of size limits, possession limits or prohibitions, closed seasons, etc. Regulatory discards are a direct result of fishery management agencies imposing fishing regulations.

The major concern with fishery discards is the high mortality associated with discarded animals and its affect on the population. The primary goal of fishery management is to provide optimal benefits to user groups and society while maintaining a sustainable resource level; however, discard mortality represents a loss to the fish stock with no resultant benefit to the industry or public. Minimizing discards and discard mortality would substantially increase the quality of our commercial and recreational fisheries, facilitate the effectiveness of management of exploited stocks, improve conservation of protected species, and assist fishery management agencies in attaining the objectives of fishery management.

In October 1998, the Management and Science Committee of the Atlantic States Marine Fisheries Commission was asked to address the issue of regulatory discards. Regulatory discards are an issue in almost all Commission managed species, and it was determined that this issue should be addressed in a comprehensive manner, rather than through individual agency actions. A steering committee was formed to plan and conduct a workshop with the following goal:

Identify and discuss potential methods to reduce the amount of regulatory discards taken and/or increase the utilization of the discards taken.

The workshop was held on February 6-7, 2001 in Baltimore, Maryland with joint sponsorship from the Atlantic States Marine Fisheries Commission (ASMFC), the National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS). The workshop was attended by 43 participants representing state and federal fisheries agencies, the U.S. Coast Guard, universities, and commercial and recreational fishing interests (See Appendix A). The majority of participants were from the east coast; however, several speakers and participants were invited from the Gulf and Pacific coasts and Canada to broaden perspective.

The format of the workshop included a series of presentations on current methods used to reduce discards around the U.S. and Canada, and perspectives on discards from law enforcement, protected species, and recreational interests (Appendix B). Presentations were followed by breakout group discussions on how to address regulatory discards with respect to the following topics:

& management strategies
& gear technology
& law enforcement

& protected species
& monitoring and data collection

Efforts were made to ensure that each of the issues would be addressed by at least one breakout group.

Workshop recommendations are grouped into three categories. Initially, breakout groups were tasked to discuss each topic and develop *general recommendations* to reduce discards relative to each topic. Breakout groups prioritized their general recommendations, and the top 2-4 recommendations from each breakout group were pooled and presented to all workshop participants as *priority recommendations*. From these, workshop participants determined the five overall *highest priority recommendations* for reducing regulatory discards on the Atlantic coast.

The remainder of the workshop focused on the *highest priority* and *priority* recommendations, and these discussions are presented in this report. *General recommendations* were not discussed at the workshop level (only at the breakout group level). Summaries of all breakout group discussions can be found in Appendix C. Note that all recommendations in all three categories are relevant to Atlantic coast fisheries and could be used to reduce discards under appropriate circumstances.

Recommendations presented in this report are intentionally general, and neither species- nor gear-specific. Recommendations could therefore be applied to fisheries under state, federal, or cooperative interjurisdictional management plans. The intent of the workshop was to develop broad recommendations that could be tailored to address specific discard concerns in any one of a wide range of fisheries. Recommendations presented in this report will be useful to reduce discards in Atlantic coast fisheries, but can also be modified for species and fisheries in other areas.

Workshop participants recognized that there is no “one size fits all” solution to fishery discards. Different species, or even different fisheries for the same species, may require multiple strategies for reducing discards. Many of the recommendations propose similar concepts, and strategies used to reduce discards may be most effective when used in combination.

Highest Priority Recommendations

1. *Amend fishery management plans to focus on reducing overcapitalization, while protecting diversity in the fishery*

Many of our fisheries are overcapitalized in terms of number of participants, fleet capacity, and overall effort. Excess capital was identified as a leading cause of regulatory discards. To counteract an overabundance of effort, managers impose harvest regulations, which lead to regulatory discards. When these regulations are not sufficient to meet management objectives, managers impose more regulations which further increases the potential for regulatory discards. Reducing participation and fleet capacity in a fishery would allow for the relaxation or removal of

various regulations, thereby reducing the potential for regulatory discards. Reducing capacity may also provide overfished stocks a better chance to recover.

There are many factors that must be considered to reduce fishery overcapitalization. Some of the issues identified include:

- & Managers and political officials may be reluctant to restrict participation if it could take away a person's livelihood. Likewise, industry is fearful of being forced out of business, not only from an employment and livelihood standpoint, but also because an industry with fewer participants would have less political influence.
- & Capital reduction programs typically remove the smaller, less efficient boats, leaving only highly efficient and productive large boats, which may or may not be the most practical or beneficial result. Fleet diversity must be considered when developing capital reduction programs. Steps should be taken to optimize fleet diversity in terms of vessel size, gear used, and other important divisions of fleet sector utilization while also minimizing bycatch rates, habitat destruction, and other concerns.
- & Capital reduction programs often remove only latent or marginal effort (vessels that retain a permit but have only minimal landings or do not participate in the fishery). In such cases, removing a significant number of permit holders may result in only a minimal reduction in effort.
- & Managers should encourage and facilitate capital reduction programs requested or initiated by industry.

Capital reduction programs other than vessel buy backs should be considered. "Use it or lose it" programs, in which license holders forfeit their license if a certain level of participation (minimum landings or effort) is not met, can be effective. However, such programs often result in increased effort as license holders with historically low effort or landings increase effort to retain their license. In such cases, it may be beneficial to establish other utilization criteria. Programs that revoke a user's license after the user reaches or exceeds an established number of regulatory violations (*e.g.* "three strikes and you're out") have been used successfully in some states and Canada. Individual quota (IFQ, ITQ) systems can also be effective at minimizing discards. In Maryland, summer flounder is managed through an Individual Fishing Quota (IFQ) system and has a minimal discard problem. Individual Transferrable Quota (ITQ) systems may also work, but would require legislative changes to implement.

Removing capital from a fishery will have individual, industry, and community level consequences. Economists, social scientists, and other relevant disciplines should be involved when developing capital reduction programs to ensure consequences are considered for all affected levels and to minimize negative impacts of the program.

There are still many unanswered questions and unknowns to reducing fishery capital. Funding and lack of data were briefly discussed as constraints to capital reduction. Participants also voiced concern over social, economic, and legal issues and consequences. It was suggested that a workshop be held to specifically address the issue of overcapitalization. Reference was made to

two reports. In a 1999 Report to Congress, the Federal Fisheries Investment Task Force (DOC, NMFS, 1999; available at www.nmfs.noaa.gov/sfa/ITF.html) reviewed U.S. fishing capacity and made recommendations on their findings. The New England Fishery Management Council has published a report titled “Final Report of the Ad-Hoc Capacity Committee” (NEFMC, 2000; available at www.nefmc.org) that investigates possible methods to reduce capacity in the New England groundfish fishery.

2. *Minimize derby fishing while increasing utilization of existing bycatch*

“Derby fishing” occurs, typically in quota managed fisheries, when fishermen try to catch as large a share of the quota as possible before others catch it and the quota is reached. Such practices are a major contributor to regulatory discards. The race to fish encourages fishermen to catch as much of the target species as possible, as quickly as possible, regardless of the overall catch composition, which may include prohibited catch of the target species (*e.g.* undersized animals), or non-target species which may be regulated by size, season, or possession limits. In addition, once a quota for a species has been reached, all subsequent catch of that species is a regulatory discard. Derby fishing was recognized as a consequence of overcapitalization, but can be dealt with independently.

Managers should consider strategies that minimize derby fishing. Allowing fishermen to be more deliberate in their actions would take away the incentive to race for fish, thereby reducing the amount of discards taken. It would also serve to improve safety, extend the fishing season and the availability of product, and stabilize market prices. Management strategies should be considered that provide fishermen sufficient opportunities to fish with respect to time, location, gear, and other individual qualifiers.

One possible method to achieve this objective is through individual quotas in single species fisheries (individual quotas are not applicable to multi-species fisheries). Individual fishing quotas (IFQs) are recommended over individual transferrable quotas (ITQs) because ITQs are banned in certain areas and would require legislative changes prior to adoption and implementation.

Managers should also consider strategies that convert discard numbers to harvest through increased utilization. This conversion could be accomplished by designating a portion of a quota for use as a non-targeted bycatch quota in other fisheries. Such a process would need to be carefully structured, such as through the permitting process or a bidding arrangement, to control participation. In addition, this harvest must be small enough and sufficiently regulated to prevent fishermen from targeting it. A portion of the proceeds from the sale of this allowable bycatch could be used to fund research, management, and/or law enforcement activities.

Another alternative is to require full retention of all catch or catch of certain species, as is done in certain fisheries in Canada and Alaska. This scenario creates an economic incentive for fishermen to develop and utilize gear and methods to better target the desired species and sizes. As with a quota set-aside system, proceeds from the sale of non-target species might be used to fund other activities that benefit fisheries resources and management.

These alternative management strategies will have social, economic, legal, and other implications that were not fully addressed during this workshop. Future discussions on these strategies should include representatives from the various disciplines of fisheries conservation and management.

3. *Establish a national gear research program*

Gear technology (conservation engineering) is widely recognized as an effective method to reduce capture and/or increase survivorship of non-targeted species or sizes. Workshop participants discussed several examples of improved gear technology that have been effective, including turtle excluder devices and several types of bycatch reduction devices (BRD), such as the Nordmore grate (shrimp), the Jones/Davis BRD (shrimp) and the raised footrope trawl (whiting). Gear technology research is being conducted by many individuals, agencies, and organizations throughout the U.S. and cooperatively with other nations. A cooperative national gear research program, administered through national and/or regional gear research laboratories, would benefit research activities by coordinating efforts, pooling resources, expanding the knowledge base, and improving communication of ideas.

The cooperative gear research program would be developed and maintained through state, federal, university, industry, and other interested partners. The goal of the program would be to develop and test new fishing gear technologies for such purposes as bycatch reduction, improved gear selectivity, and habitat conservation. Cooperative research efforts in Europe could serve as a model for efforts in the U.S. Such a program would require stable funding and could be fully funded or subsidized through a user fee.

Managers, scientists, and industry are all working to reduce discards, and a cooperative effort would improve the chances of reaching that goal. Designing, building, and field testing new or modified gears is expensive and time consuming. Pooling resources and coordinating efforts will allow for the procurement of high cost and advanced technology items, including large scale flume tanks, such as those currently used in Newfoundland, France, and Scotland. These new technologies can simplify and expedite the evaluation process and provide more accurate assessment of a gear's potential. A coordinated program would allow more rapid dissemination of research findings. Additionally, a large scale effort would be more publicly visible and may promote participation by industry and scientists.

Industry involvement would be an indispensable component to such a program. Industry knowledge of how a gear functions in the original state and after various modifications would be fundamental to developing new technology. This could be done through incentive programs.

Providing industry the opportunity to have literal buy-in would increase industry's interest in the program and promote their involvement in the research. This could be done, for example, by directing into the program proceeds from such things as a fuel tax, landings set asides, or an excise tax on gear.

4. *Implement harvest rewards for utilizing gear to reduce discards*

A common theme discussed throughout the workshop was encouraging fishermen to develop and

utilize “clean” gear on their own. Incentive-based programs would encourage ingenuity by rewarding fishermen who voluntarily use gears that minimize discards. Two possible incentive programs that were discussed are:

- & designating a portion of a quota to award to fishermen who use gear that is proven to reduce discards, and
- & exempting fishermen who use clean gear from some or all of the management regulations for that fishery, such as area or season closures.

Both of these methods provide economic incentives for using “clean” gear. The management exemption also provides an operational incentive. Both methods require some sort of enforceable monitoring and verification program to ensure that the proper gear is being used. On-board video systems and at-sea observer coverage were proposed. Temporal bounds should be set on these reward programs, since the improved gear technology may eventually become mandatory in the fishery.

5. Involve industry in data collection and monitoring through study fleets and industry-based surveys

Industry-assisted data collection could be useful to expand data collection efforts and fill gaps in current efforts. Involving industry in data collection will also help relieve industry’s concerns regarding the types and amounts of data used for stock assessments and management purposes. Two ways that industry can assist in the data collection process are through cooperative surveys for fisheries independent data and study fleets for commercial fisheries data. Such programs can provide increased data collection within the area targeted by the commercial fleet, as well as areas outside the targeted area. The data can be used to analyze spatial and temporal trends in discard rates, and that information can be used to develop management strategies that reduce discards, such as closing areas or seasons with high discard rates or banning gears with high discard rates. Increased data collection will also produce more data for stock assessment purposes, and reduce uncertainty of assessment results.

Canada has had considerable success with cooperative surveys implemented through joint agreements between managers and industry. Prior to implementation, a joint program agreement is developed that clearly outlines study protocols, each party’s responsibilities, time requirements, deadlines, etc. Funding for sampling is often provided by the industry. To facilitate implementation of these programs, many of the cooperating fleets become incorporated as a business.

Study fleets, where fishermen volunteer to provide more detailed catch and effort data than is required by law, were identified as a useful tool in collecting fishery dependent data. At-sea observer programs collect similar data, and could be used to validate industry reported data. Observer programs could also be used as an alternative to study fleets in some instances, such as with smaller industry sectors that do not have the personnel to collect the types and amount of necessary data on their own. There was general agreement, however, that existing observer

programs need to be strengthened and expanded (increased coverage) because they are not capable of collecting sufficient data at the current levels of coverage. Confidentiality of data collected through study fleets and observer programs must be maintained.

Study fleets and industry-assisted sampling programs are voluntary programs and therefore do not need to be enforced. Not only do they provide data on discards, but are also useful for collecting other important fishery and resource information. Moreover, the data collected are usually acceptable to both industry and managers. A brief “training” program may be necessary, however, to ensure proper data collection methods are being employed, and side by side comparisons of fishermen and research catches would be needed to standardize the data. One major drawback to these types of programs is that they require substantial outreach efforts and funding to implement.

There was also discussion about increased communication between scientists and industry. Outreach is a vital part to fisheries management, and outreach programs should be developed and implemented wherever possible. Relative to data collection, scientists and industry often disagree about the types and amounts of data that should be collected, from where the data should be collected, and the methods used to collect it. Many of these disparities could be reconciled with improved outreach and communication. In Canada, a “research society” of fishermen and scientists meets regularly to discuss strictly scientific issues and data needs; discussions on allocation and fishery management are prohibited. Similar discussions and other outreach activities would improve overall communication between scientists and industry specifically addressing concerns over data collection.

Priority Recommendations

The following recommendations were identified as priority recommendations by a breakout group, but were not considered to be highest priority recommendations by all workshop participants. These recommendations are presented by workgroup category, and order does not imply any ranked priority.

Data Collection and Monitoring

& Encourage states to develop sea-sampling programs in partnership with industry and federal agencies

At-sea sampling is the most effective way of collecting information on the type and amount of animals that are discarded at sea. Increasing the number of at-sea observer programs and overall observer coverage would be extremely beneficial in identifying how, when, and where discards occur, thereby allowing managers to develop management strategies that reduce the occurrence of discards.

Management agencies should work cooperatively with industry to improve coverage of existing observer programs and develop and implement programs where none exist. The Atlantic Coastal Cooperative Statistics Program (ACCSP), a coastwide initiative to improve fisheries data collection and data management, has developed specific guidelines for the development and implementation of at-sea observer programs. ACCSP standards for observer programs can be

found in ACCSP Technical Source Document IV (ACCSP 1998), ACCSP Technical Source Document V (ACCSP 2001), and the ACCSP Program Design document (ACCSP 1998).

Observer programs are very expensive to implement, and funding for such projects is very limited. Development efforts might focus on how to circumvent or alleviate the problem of limited funding.

& Implement electronic monitoring for all vessels

Electronic monitoring devices, such as vessel tracking systems, on-board video systems, and satellite systems should be employed across all fisheries where possible. These monitoring systems will provide improved information on when and where discards occur, and may reduce the need for fishermen to report their own data, thereby minimizing self reporting bias. The data from these programs can then be used to develop more appropriate management measures that reduce discards.

Industry historically has perceived these programs as a “Big Brother” type of invasion of privacy and has concerns regarding confidentiality of information; however, there are several benefits to electronic monitoring systems. Monitoring of vessel position may provide an extra safety measure during inclement weather. Sufficient monitoring may also reduce or eliminate the need for fishermen to report their activities. From a law enforcement perspective, electronic monitoring would be beneficial because compliance with these programs is easily enforceable. Mapping of fishing activity may help identify under- or over-utilized areas. These and other benefits of electronic monitoring systems should be emphasized through education and outreach efforts to industry. Funding sources for the monitoring equipment must be considered, especially for small scale fishing operations that may not have sufficient revenue to purchase the required equipment.

Gear Technology

& Improve the evaluation and approval process to test experimental gear designs

In many areas, before an experimental gear can be used in a fishery, it must undergo a time consuming permitting and/or approval process. This process is a disincentive for fishermen to develop new gear. Rather than creating an obstacle for industry to try new gear, managers should encourage industry to test experimental gears that may reduce the amount of discards caught. Several states, including Georgia and Alaska are taking steps to liberalize this process.

Many fishermen are willing to use experimental gear that may reduce discards, but are discouraged by the evaluation and approval process. The evaluation process should be streamlined to make it easier for fishermen to test new gears. Economic incentives (*e.g.* quota rewards) or regulatory incentives (*e.g.* allowing fishing in closed areas) should be considered to encourage the development of new gears. Economic benefits of cleaner gear should also be publicized to ease industry concerns that using experimental gear might put them at an economic disadvantage to fishermen using standard gear. Observer coverage should be considered for vessels using new gear to evaluate the benefits of the new gear.

Experimental fisheries are often proposed as a mechanism to circumvent management restrictions.

Such fisheries may provide the incentive necessary to spur innovation; however, successful implementation requires a well developed permitting process.

The benefits of gear development programs become apparent when the cost of gear development is compared to the much greater costs, both social and economic, that discards and discard mortality have on industry, the resource, and society. In addition, the cost of prosecuting lawsuits in response to violations of regulations should be considered relative to the cost of gear development.

Law Enforcement

& Increase effectiveness of integrating enforcement into the management process

There is a need for stronger coordination between law enforcement officials, fishery managers, stock assessment biologists, and fishermen when developing regulations. Consideration for enforcement priorities and practices must begin early in the management process and continue throughout the process and FMP development. The resources necessary for effective enforcement (cost, personnel, time, etc.) must be considered for all managed species, including protected species, and for all sectors of a given fishery. Improved integration of law enforcement into the management process could minimize or eliminate regulatory violations that lead to increased discards.

Fishery management plans should include a section that outlines what enforcement measures are necessary to ensure that the objectives of the plan are met. This section should also describe in detail how these enforcement measures will be carried out. For example, in the sea scallop fishery, meat counts were required to make sure the FMP was effective, but law enforcement could not conduct meat counts on all vessels, so the industry was required to take the measurements themselves. Elaboration of enforcement measures to employ may make all enforcement activities more effective, including those for discards. Effective management will lessen the incentive for regulatory violations.

Managers should also work with law enforcement personnel to develop enforcement priorities. Resources allocated to law enforcement agencies to monitor and enforce fishing regulations are limited, and it is impossible for law enforcement to adequately monitor all fishing activities. Prioritizing the list of regulations for meeting management goals would allow law enforcement officials to allocate their resources more efficiently.

& Aligning law enforcement objectives with management objectives

Law enforcement officers are often the primary contact between fishery managers and fishermen. Unfortunately, they are not always made fully aware of the intent of the regulations they are enforcing. Communication between fishery managers and law enforcement personnel must be improved to ensure that the objectives of the regulations are fully understood. Enforcement activities that focus on achieving the management objectives will be more effective at enforcing compliance of regulations that address regulatory discards, and all regulations in general. Proper understanding of management objectives would also give law enforcement some flexibility in enforcement if the intent of the regulation is met but the regulation itself is broken (for example,

the distance between floats on a net is not as important as the net fishing cleanly).

Managers must also consider the enforceability of a regulation and balance that with the intent of the regulation. Regulations that are easy to enforce will improve the facilitate enforcement activities, which will discourage violation of all fishery regulations. The Commission's Law Enforcement Committee has developed a document entitled *Guidelines for Resource Managers on the Enforceability of Fishery Management Measures*" (ASMFC , 2000) The U.S. Coast Guard has developed a document entitled "Enforcement Guide for Fishery Managers" that outlines enforcement concerns and the enforceability of various management strategies. Managers should refer to these and other such documents when developing regulations to ensure implementation of appropriate regulations.

& Need to get industry buy-in to regulations

Managers should seek greater industry acceptance of management regulations. Most fishermen would be less likely to violate regulations if they believed the regulations were beneficial to the fishery. Simple, easy to follow regulations will encourage more compliance than those that are confusing or difficult to adhere to. Many regulations directly or indirectly affect the amount of discards taken, and increased compliance through industry buy-in would increase the affect of such regulations. In certain Canadian fisheries, the commercial fleet must draft their own conservation harvest plan. The fishery remains closed until the plan is reviewed and approved by managers. This method ensures that both industry and managers approve of the regulations.

& Consider single and multi agency "pulse tactics"

Short term, highly concentrated enforcement efforts focused on a single enforcement issue (e.g. sting operations) are often much more effective in the long run than distributing enforcement efforts over a wide variety of issues at the same time. These concentrated "scare tactics" tend to have high visibility within the community and discourage violators for a much longer period than the operation is in effect. Pulse tactics can be applied to all law enforcement concerns, but when used to enforce regulations intended to reduce discards (e.g. gear regulations and closed areas), such tactics will discourage illegal activities and result in reduced capture of discards. Agencies should consider coordinating these efforts with other enforcement agencies, thereby extending the pool of resources and making the effort more effective.

& Better follow through with legal process

Penalties associated with fishing violations are in many cases much too lenient. Violators often receive no more than a "slap on the wrist" which does not discourage them from breaking the rules again. In many cases, proceedings are so back logged that violators are never prosecuted, or prosecutors back down if the violator obtains legal counsel. Penalties for fisheries violations need to be imposed that reflect the seriousness of the offense, and prosecution must be more consistent and conspicuous to discourage illegal activities. Prosecutors and judges should be educated about the consequences of violating fishery management measures so that more appropriate penalties are delivered. If a fisherman is sufficiently concerned that they will be prosecuted and convicted, and if the ensuing penalty is steep enough, there is less chance that the fisherman will break any regulation, including those that address discard issues.

Management Strategies

& Encourage practices through education and outreach to decrease mortality of regulatory discards

Many management practices, including seasonal closures, quotas, and trip limits, contribute to the problem of regulatory discards. Establishing appropriate catch limits and seasonal and areal openings and closures, which are based on scientific evidence, will help reduce capture of discards. For example, seasons and areas could be established based on times and locations where at least 50% (or some other set percentage) of the total catch (including protected species) is of the target species. Managers should consider alternative management strategies that focus on reducing discards and the resultant mortality.

Fishermen should also be encouraged to adopt fishing practices that minimize discards. For example, shorter trawl times may reduce the number of animals that must be discarded during a tow and increase the probability that those animals survive. Fishermen should be made aware of the many economic, effort, and resource benefits to reducing their catch of discards.

& Encourage use of gear technology that decreases mortality of regulatory discards

Fishermen should be encouraged to use advanced gear technologies that minimize discard mortality. This could be done through incentive programs or by implementing management strategies that motivate fishermen to use clean gear. Industry, however, should not be required to develop these gears alone. Scientists must make a commitment to research gear technologies that reduce discards, and cooperative research programs between scientists and industry should be encouraged .

& Regulate operational technology to reduce discards

In many cases, decreasing the overall efficiency of fishing operations could be useful in decreasing discards. For example, limiting gear size or quantity would decrease overall catch per tow or catch per set and therefore reduce the number of discards taken. This does not mean that the gear selectivity should be compromised, which would result in catches that are less “clean.” Selectivity for target species and sizes should remain high while limiting the overall capture efficiency.

Protected Species

Presentations were given on marine mammal, sea turtle, and bird interactions with commercial and recreational fisheries, and other issues relative to protected species as regulatory discards, but protected species were discussed only briefly thereafter. Four general observations were made regarding protected species.

& Many of the recommendations developed during this workshop would decrease catch of protected species.

& Increased coverage of observer programs is necessary to more adequately document interactions with protected species;

& Fishery management planning should give full consideration of impacts to protected

species;

& The U.S. Coast Guard is developing an operations plan for protected species which can be viewed on the web at <http://www.uscg.mil/hq/g-o/g-opl/mle/OceanSteward.pdf>. This plan includes USCG responsibilities and courses of action relevant to protected species. The Coast Guard is expanding its staff base to address protected species issues.

Participants agreed that the issues surrounding marine protected species require much more attention than could be given to them during this workshop. It was suggested that a separate workshop be held that focuses specifically on fishery interactions with marine protected species. It was stressed, however, that protected species should receive more integration into fisheries management, and if possible, not be restricted to separate meetings.

Follow Up Activities

The Commission has secured funding to conduct follow up regulatory discards work in 2001, and additional funding will be sought for 2002. Future work will focus on tailoring the workshop recommendations to the specific needs of certain species managed by the Commission, including those managed cooperatively with the regional Fishery Management Councils. For a given species, meetings will be conducted to review the workshop recommendations, evaluate each recommendation's potential to reduce discards in that fishery, and outline strategy options for implementing these recommendations. Participation at these meetings will include representation from the species' Advisory Committee, Technical Committee, and Management Board, as well as social scientists, law enforcement, and other relevant expertise. Recommendations will be presented to the species Management Board for approval and implementation. Work will begin in 2001 to address regulatory discards of summer flounder.

One of the goals of the workshop was to discuss increased retention and/or utilization of discards. Presentations were made on a successful increased retention program used in Canada and an effective increased utilization program used in the Bering Sea and Gulf of Alaska groundfish fishery. Increased retention and utilization were discussed briefly in two of the breakout groups, but did not receive the attention they deserve overall. Workshop participants agreed that industry, scientists, and managers should focus their efforts on the elimination of discards; however, it was recognized that gears, fishing practices, and management efforts will never be 100% selective. Increased retention and utilization of fishery discards could be very effective and beneficial if used under the right circumstances, as seen in Canada and Alaska. Future work should consider increased retention and utilization methods as possible ways to reduce fishery discards. Participants suggested a workshop be conducted to address these topics. Participation should include scientists, managers, industry, social scientists, economists, law enforcement, and other relevant disciplines. Considerable support and representation should be sought from Alaska and Canada.

In addition to addressing increased utilization of discards, workshop participants identified several other areas that require additional work.

- & Reducing overcapitalization was identified as the highest priority recommendation for ways to reduce discards. It was recognized that this is a large and complicated endeavor and requires further investigation of appropriate capital reduction strategies and their consequences. A workshop specific to fisheries capital reduction was recommended.
- & Development of a national gear research program was the third highest recommended method to reduce discards. Such a large scale program requires extensive cooperation and coordination to develop and implement. Preliminary discussions with potential stakeholders and interested parties should be conducted to identify goals, objectives, priorities, development and implementation strategies, and other important issues.
- & Although many of the recommendations presented during the workshop can reduce discards of protected species, the issue of protected species discards requires more specific analysis than could be given to it during the workshop.

The Commission's Management and Science Committee has been made aware of these issues and will consider them in the future.

Appendix A

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Appendix B

Workshop Presentations

REGULATORY DISCARDS

An Overview

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Introduction

An alternate title for this presentation might be “Discards for Dummies,” where I count myself among the disadvantaged. In that vein I’m going to offer a few remarks which examine the dimensions of discarding, the “who, what, when, where and why” of regulatory discards, as well as the issue of accounting for discards.

My remarks are intentionally basic. It’s important to better understand the context of discarding (within an overall management system), and the reasons for fishers discarding before attempting to focus on general or specific solutions to the regulatory discard problem.

The workshop objectives are to “identify and discuss potential methods to reduce the amount of regulatory discards taken and/or increase utilization of discards taken.” To do this it will be necessary to learn more about the causes, incidence and impact of discarding. Additionally, we’ll need to look at the management systems that exist and the specific management controls that may either attempt to limit discarding, or counter-intuitively, may contribute to increased discarding.

Given this, my talk will attempt to inform you on the dimensions of discarding, to better understand why fishermen discard, and to begin to think about developing new approaches to discard management. An objective endpoint for the process we’re beginning today is the implementation of solutions that more effectively control regulatory discards.

The Discard Problem

Bycatch and discard control may be the single most vexing problem in fisheries management. There are the obvious issues of biological and economic waste. In addition, discarding contributes to fisheries mortality, and, often, this mortality is unobserved and may not be counted.

Examples of fisheries where both understanding and controlling discarding is crucial to management success abound. Dave Pierce, in the next overview presentation, will characterize some of the specific issues that managers currently face.

Discard management is complicated by the fact that, to managers, discard or bycatch controls may be secondary measures, with basic conservation measures the first priority. Unfortunately, as I’m sure is obvious, discarding is, in large part, a conservation issue and, as we will discuss, current management controls (or lack thereof) on discards may lead to failure to meet the fundamental conservation goal.

An aside worth mentioning is the dramatic change in exploitation rates that have occurred as a result of changes in fisheries management laws. In pre-Magnuson Stevens Fishery Conservation

Management Act/Atlantic Coastal Cooperative Fisheries Management Conservation Act days, fishing mortality rates approaching $F = 2$ were not uncommon. In terms of exploitation rate this means that roughly 80%, or 4 out of every 5 fish encountered by fishers, were removed from the water. Thus, when there were fish available, fishermen caught them. Under current management practices, exploitation rates in the range of 20% are the norm. This means that only 1 in 5 fish encountered can be harvested. So, 80% of the fish in the water are left there.

This circumstance leads to two problems. Unless effort is strictly and effectively controlled, fishers will tend to employ too much fishing power relative to the allowable catch. Overharvest and/or discarding result and managers will have to add additional control measures when, in fact, the problem is overcapacity.

Second, a perception problem is created. Fishers don't understand why, if there are lots of fish about, they can't be caught and landed. Expending effort to catch fish and then discarding them is completely counter to rational harvesting principles.

Context

Some simple facts are worth mentioning. Discards occur because this is an imperfect world. Fish are not always found in single species groups. Mixed species assemblages are more the norm. Likewise, fishing gear is not completely selective. Trawl, longline, or pot gear can catch species other than those targeted should such animals be in the area and vulnerable to that particular gear.

Fisheries management is not a simple task either. Most management decisions are complex and controversial. The decisions of managers are also allocative, either directly or indirectly, thus, a rule on bycatch or trip limits will have (intended and unintended) allocative impact. Managers therefore make decisions about regulating discards by using normative judgements, recognizing that there are no simple solutions.

One exception to this 'rule of tradeoffs' is the benefits to be gained by improvements in gear technology. If fishers can redesign gear to take only the target species and not the bycatch species, much discarding can be avoided. Thus, cleaner fishing through gear technology is a 'win-win' solution.

Defining discarding

Discards occur at sea. Often this is the result of management-imposed size limits on retained fish — either minimum size limits or maximum size limits or both (e.g. lobster management in Maine). There also can be direct controls on the amount of fish retained — trip limits or possession limits — where possession limits are maximum amounts that can be retained at any point in time and trip limits are retention maxima per fishing trip. The two are clearly related and can sometimes take the form of daily (or possession) limits multiplied by some average days at sea to produce an overall trip limit.

One more discarding at sea category should be mentioned — prohibited species catch or PSC. Classically, these are animals that can never be retained such as marine mammals or sea turtles, but, instead, must be returned to the sea as quickly as possible with a minimum of harm. It can be

the case that in addition to a simple no retention rule there is a bycatch quota specified for the prohibited species, e.g. PSC limits for crab, halibut, salmon and herring in the Alaskan groundfish fisheries, which, if attained, result in shutdown of the contributing directed fishery.

Fish are also discarded at the dock. Again, there are various reasons for this type of discard. Fish brought in may be less than the minimum size limit (perhaps due to an inability to sort the catch on board and discard at sea). Animals may be of the wrong sex (e.g., v-notched female lobsters) or, as above, they may be a generally prohibited species.

Discards can also occur during processing (beyond the normal waste associated with utilizing only part of the fish). Again the fish may be too small or too large to be processed on existing machinery. It's also possible that fish are not acceptable to the market because of quality concerns (e.g. poor color, parasite infestation, etc.). On rare occasions (as occurred in the Prince William Sound pink salmon fisheries some years ago) the market may not be willing to process additional fish, resulting in product being taken from the plant and dumped at sea. Finally, there is the problem of inshore processing on harvesting vessels such as the shucking of scallops while in the harbor.

In any case, discarding at the dock has all the same problems relevant to discarding at sea plus the additional concern related to disposal of product in an onshore or nearshore environment.

Given this background, let's also distinguish between regulatory discards and operational discards. Formally, regulatory discards are those animals discarded because, according to current regulations, they cannot be retained. Trip limits and size limits, discussed above, are two examples of regulatory discards. We've used examples from commercial fisheries in the preceding discussion, but it's clear that minimum (and maximum, e.g., in striped bass) size limits are common in recreational fishery regulations as well. Similarly, possession limits, commonly called 'bag limits,' are often used to control recreational harvest.

Operational discards are those that occur because of a mismatch of what the fisher intended to catch and what can be landed. The catch may be too large for the net, for the existing hold space, of poor quality, not profitable, and so forth, and may be discarded by the fishermen while conducting normal fishing operations.

This leads us to yet another dimension of discards — economic discards. From this perspective, it simply does not make economic sense for the fisherman to land a portion of the catch. It may not be worthwhile to spend increased time handling and sorting the catch, removing hooks, etc.. In thinking about economic discards, it's important to note that the costs of discard will vary not only with the fishery and the type of operation but whether the discarding is occurring at sea or onshore.

Clearly there are conservation benefits to not discarding but those benefits may accrue to someone other than the person who is discarding, making it questionable from an individual fisher's cost-benefit perspective whether it is worth retaining and landing fish which may not produce an adequate return.

It's also the case that discard regulations are usually unpopular and often difficult to comply with. Thus, there may be some discarding behavior simply because one wishes to make a point or, in the opposite sense, because one is concerned about potential violations.

Finally, and most directly, there is the simple fact that every fisher must make an economic decision as to whether it is worthwhile to land the catch just taken on board. The issue is simply whether, on a per animal basis, it is profitable to do so.

Fishermen seek to maximize dollars per fish handled and, simultaneously, to run the most efficient (in the least cost sense) operation possible.

Beyond the straightforward notion of maximizing profit, fishers must contend with dynamic markets for fisheries products. Here the landings of others may impact the price paid for fish landed. The preferences of consumers for a particular size fish, type of product and so forth is dynamic as well, causing regulations which may have been appropriate at the beginning of the season to become inappropriate, inefficient, or unprofitable later in the year.

Finally, there are some non-economic issues that influence discarding practices. It may be traditional to discard a species (e.g., until recently, spiny dogfish). It may be the practice of a port to land particular species, discarding other species which may be marketable in another port. More generally, specific types of discarding may be institutionalized in a region's fisheries where fishing practices are passed from generation to generation.

The moral issue and the manager

Discarding causes a moral dilemma for fishers, not only because most fishers feel that is wrong to waste fish but also that they could get caught retaining fish which should be discarded.

At the same time, the manager is also trying to minimize biological and economic waste, to maximize compliance and, overall, to create a situation that maximizes stock productivity.

Beyond the size and possession limits mentioned above, managers must choose among various classes of controls including output controls such as trip limits and input controls such as limits on hours or days fished, gear deployed, etc. Managers must also decide whether to employ whatever set of controls are chosen to a particular fishery, a set of fisheries, a gear group, and so forth.

The problem managers face is a difficult one, complicated by the fact that they are not only trying to control discards and waste but also directed harvests, perhaps overall effort, and agreed upon allocations (perhaps by region, season and/or gear type). It is not surprising then that management failures are common and that system inefficiencies are created by incompatible regulations and management objectives.

We should note that management failures are endemic and not related to the failure of discard management per se. Nevertheless, the inability to control discards or the adoption of regulations which force discarding are one such source of failure.

Just as discarding has many dimensions, management failure has similar partitions. Overcapitalization or overcapacity — too many boats chasing too few fish — is one classic symptom. More generally, failure to rationalize a fishery (i.e., match regulations to economic incentives, natural scales of operation, and so forth) often contributes to overcapacity and discarding. It's also often the case that regulations, be they discard regulations or more general rules, are not adequately enforced or are specified in a way that makes it difficult or impossible to enforce. Finally, it may be that data necessary to judge the effectiveness of regulations are not being collected or that necessary information can not be reliably or efficiently collected.

Accounting for discards

I'd like to spend a couple of minutes discussing the accounting problem. Obviously, to manage discards, or at the very least to estimate total fishing mortality, we must account for discards. We can do this by observing fishing operations at sea. The use of observers is costly and simply not practical for every vessel irrespective of size, days away from port, etc. More specifically, in the northeast region, funding for observers is quite limited.

We can ask the fishermen to report discards and, in the northeast, do so with a requirement to fill out Vessel Trip Reports (VTR). The amount discarded is a field on these self-reporting forms but information is often not provided or may be of questionable value if the fisher wishes to under- (or perhaps over-) report the amount actually discarded at sea. More generally, it is common to have fishers fill out logbooks that provide information on discards, prohibited species discards, sea bird interactions, and so forth. Again, there remains the question of the accuracy of such an enumeration.

It's also true that discard accounting can be very important in setting an allowable directed harvest (quota or TAC). For example, in the scup fishery in the northeast, an estimate of total discard mortality is subtracted from the biologically appropriate harvest amount and a TAC established net of discards. Less directly, managers may have to set the TAC lower than they might otherwise desire to account for unreported or mis-reported discard mortality.

Assessing discard mortality is also crucial in fishery stock assessments where those assessments must account for all sources of mortality in describing the state of the stock. Many stock assessments in the northeast are greatly handicapped by insufficient information on discards and discard mortality.

In mentioning discard mortality versus discards let me introduce another important aside. It is discard mortality that matters. Thus, if an animal is discarded but survives, discarding is not an issue. Unfortunately, beyond all the difficulties mentioned in monitoring and assessing the total amount of discards there is almost no information on the survivability of discarded animals.

Obviously, if we can reduce the discard mortality rate, we can reduce the discard problem.

New approaches and technology

There are some new relatively untested approaches that may improve our ability to monitor discards. One initiative under active development in the region are 'study fleets, a subset of the vessels in a fishery who volunteer (perhaps with compensation) to participate in special data

collection programs. Among these data would be information on discards and perhaps discard mortality.

Both the New England and Mid-Atlantic councils have also recently adopted research set-aside programs. Essentially, such programs reserve a certain portion of the TAC for bona-fide research projects (where the set aside is used to offset the cost of the research, directly or indirectly). The scope of the program is more general than discard research per se but such directed discard research can be easily accommodated within the proposal and grant generating/award cycle.

Vessel monitoring systems are also in place in the region. The VMS is a 'black box' that regularly transmits the vessel's position to a monitoring agency. VMS's are required in the general category scallop fishery and are in use in a number of vessels in the northeast groundfish fishery. The boxes are passive in the sense described above but can be used in an active data entry mode (they have a keypad) to transmit information on bycatch, discard and the like.

For example, in the recent exemption program which allowed scallop vessels into previously closed areas and for which a yellowtail flounder bycatch limit was established, onboard observers used the VMS to transmit daily yellowtail bycatch reports which were then expanded to the whole fleet and used to track attainment of the bycatch limit.

Trip limits

I'd like to say a few more things about a specific type of discard control mentioned above — trip limits. Trip limits are in widespread use in managing the region's fisheries. The reasons for this are several. In an output controlled or quota fishery, trip limits are a way to spread out the catch over the year. This can provide for a more orderly fishery, prevent market gluts and provide opportunities for different areas to harvest the species at different times of the year. More generally, trip limits are used across the board because there exists excess effort in the fisheries and managers have chosen the 'throttle control' of trip limits.

Trip limits contribute greatly to discards, discard mortality and discard management problems, however. From a conservation point of view there is the issue of survivability of discarded fish. There is also the issue of biological and economic waste mentioned earlier. There is the issue of regulated inefficiency mentioned above where it is simply uneconomic to ask a fisherman to land 200 pounds of fish when he routinely encounters 2,000 pounds in a tow. Trip limits have a very unattractive positive feedback mechanism (in the absence of effective controls on capacity). As the stock increases, fishers catch fish more quickly, that is, in greater abundance per unit of effort. With output controlled at some 20% of the total stock, most of the fish are vulnerable to mortality from discards. As the stock increases the trip limits decrease, the discard problem worsens, and so forth.

As trip limits for different species come into play they interact in an unplanned and often unforeseen way in multi-species fisheries. It will only be by chance (or some perfect forecasting) that a fisher will encounter a set of species in exactly the appropriate mix implied by interacting species trip limits.

Finally, in a declining fishery, or in a mixed species fishery where stocks are at very different points in a recovery cycle, it will be nearly impossible to appropriately control the various species' total mortality using trip limits. In fact, the more disparate the recovery trends, the more inefficient trip limits will be.

Thus, from both a manager's and fisher's perspective, trip limits are very unattractive. One direction for the future therefore is to design systems that are less reliant on trip limits as a means of controlling total mortality.

Reducing Discards

Regulatory Fixes

Having spent most of my allotted time talking about the complications involved in defining and managing discards, let me focus on some ways we might begin to reduce discards.

First, in terms of conventional management and the management tools mentioned earlier, we need to ensure that minimum size regulations match gear selectivity characteristics. We can do this to some extent with hook configuration or hook size in a set line fishery and fairly effectively with mesh size controls in trawl and gill net fisheries. Here, a possible management target might be that 50% of the fish of minimum size encountered are not retained by the gear (LD50). Obviously, this needs to be a dynamic measure; as the existing age structure of the population varies (or if managers are trying to effect a certain age structure), gear regulations will have to be modified.

Recognizing that fisheries vary by area, by season and by gear used, it may also be useful to provide area or time specific catch limits, or time specific area closures to reduce potential wasteful discard. Solutions of this nature, however, depend on detailed temporal and spatial information on discard practices - information which often is not available.

We also need to think more about enforcement efficiency when establishing regulations. If a new measure is not enforceable the measure may prove completely ineffective. If, at the same time, we do not have adequate knowledge of discard practices and, worse, assume 100% effectiveness of measures in place, we are laying the groundwork for management failure.

Since accurate and timely reporting is so crucial to effective discard management we must do a better job in designing reporting systems which are simple, are incentive-based and which use the most efficient and effective technology. This implies some redesign of current data collection systems and, more importantly, education or outreach efforts so that fishers will understand both the need for new data collection systems and how to properly report the necessary information.

I mentioned incentive-based management. It is critical that managers recognize the economics of discarding both on a trip and, overall, in a fishery. Likewise, it is crucial that we better understand what I'll call the sociology of discarding — traditional practices, community standards and the general (and fishing) public's desire to reduce waste. Said differently, unless we design management solutions that dovetail with the economics and culture of a fishing trip, we will fail.

There are some direct approaches to controlling discards. One, used on the east coast of Canada, is to not allow discards at all. All fish must be landed, weighed, certified, etc. Another approach, employed in the pollock fisheries in Alaska, is to require full utilization of caught product. In this context, full utilization means complete processing of a fish (fillet, mince, surimi, meal) so as to avoid waste.

Finally, to mention gear technology again, we need to actively promote gear research and to design methods which transfer the results of any positive results to fishery management practices and regulations.

Summary

In closing let me reiterate a few key points. It is important to understand that fishers discard products for rational reasons. Their behavior depends on a number of things including economics, the mix of management regulations, the likelihood of getting caught, and traditional or customary fishing practices.

Second, there is a 'right' or appropriate level of discarding. No fishery is perfectly selective. Managers must develop better data collection systems to estimate discard levels (and discard mortality) more accurately. We must do experiments to ascertain what the 'natural' mix of species might be in a fishery by area and by time of year.

In short, we need holistic management solutions - those that are enforceable, can be monitored, can be understood, and that utilize the best available technologies.

Most importantly, we need to develop incentive-based controls; systems where it is in the fisher's best interest to discard the minimal amount of fish. To do this, we'll need to open a dialog with the industry to find mutually acceptable solutions and, at the same time, we'll need to solve the overcapacity problem.

REGULATORY DISCARDS

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Attitudes

My role is to describe the situation, i.e., to: (1) describe attitudes about regulatory discards; (2) provide reasons for our having to address regulatory discards; and (3) note methods now being used to minimize regulatory discarding in fisheries managed by ASMFC and by New England and Mid-Atlantic Fishery Management Councils.

Regulatory Discards are the bane of our existence. They plague us like never before. By us I mean fisheries managers and scientists. Being a voting member of ASMFC Management Boards for scup, sea bass, summer flounder, and dogfish, I'm especially sensitive to the problem created by regulatory discards.

Being a voting member of the New England Fishery Management Council and having to deal with extremely challenging groundfish management such as for cod, haddock, and yellowtail flounder, my sensitivity has been heightened to a very lofty level.

Furthermore, being a DMF Deputy Director - one who has crafted many a state water's management strategy and drafted many regulations over the last 20 years or so, I'm well aware that I'm a culprit, I've caused many a regulatory discard.

But now more than ever I suspect we all share an awareness that ASMFC and the Councils have got to make real progress on this regulatory discard issue to improve our credibility and increase prospects for our meeting our management goals and objectives. We need the sweet smell of success. This is one reason for this workshop.

So, what's our attitude? How do managers, fishermen, and scientists view regulatory discards?

Managers

- (1) Necessary evil to rebuild stocks (to dramatically reduce landings, there will be discards when stocks respond)
- (2) Embarrassment (decisions made with awareness of likely consequences)
- (3) Belief problem can be minimized (somewhere there's a solution)
- (4) Standard for judging managerial skills and success
- (5) Turn a blind eye or denial (cannot be as bad as fishermen say)
- (6) Fishermen's fault (can avoid if they want to)
- (7) Acrimony between states (e.g., fluke allocation)

Commercial fishermen

- (1) Plague on their house
- (2) Moral dilemma (unethical; bring them in; don't throw away)
- (3) Income foregone

- (4) Managers' folly (victims of managers' incompetence)
- (5) Heinous obligation (10,000 lbs. over the side in a trip!)
- (6) Justification for scofflaw behavior
- (7) Frustration (no one's listening or believing)
- (8) Convert to landings (use them don't lose them)
- (9) Won't report amount (data will hurt fishermen). Double-edged sword. Damned if they do tell and damned if they don't.
- (10) Worsens fishermen's distrust of science and scientists

Scientists

- (1) Must be included in assessments (can be major part of F)
- (2) Frustration with lack of data (little to no monitoring)
- (3) Logbook data suspect
- (4) Less fishermen cooperation (sea samplers go away)
- (5) More fishermen cooperation (prove them right)
- (6) Extremely difficult to estimate amounts discarded (assumptions necessary)
- (7) Forces increased reliance on bottom trawl survey data (wrecks VPA and prevents precise projections)

Reasons

Why be concerned? Where's the necessity?

- (1) SFA National Standard Guideline. New NS requires "conservation and management measures shall, to the extent practicable minimize bycatch..."

Not a plan or amendment is written without there having to be some discussion and analyses.

- (2) Needed for stock size and quota projections.

Let's look at fluke. Commercial discard estimates are required. There are likely to be regulatory discards caused by minimum size and trip limit regulations. Note how in 1999 discards increased from 400 to 1,500 metric tons (900,000 lbs. to 3.3 million lbs.) Huge increase!

Scientists have assumed similar amounts of discard in 2000 and for 2001 and 2002 projections. They are all guesses, however. Nevertheless, some approximations are needed regardless of how uncertain. We need estimates of stock size. We need to break our annual target F into landings and discards. By subtracting discards we get allowable landings – our quotas.

I'm sure we all wonder how high fluke regulatory discards will rise. Fluke spawning stock biomass is rising, but quotas need to be kept relatively low translating into low trip limits set by states and prolonged commercial fisheries closures. Low fluke quotas and low trip limits when fluke are on the grounds being fished for other species means fluke regulatory discards – possibly very large numbers.

(3) Setting of trip limits

Just recently at the last ASMFC Sea Bass Board meeting, we discussed appropriate limits for black sea bass commercial fisheries by quarter of the year.

Quarter 1 2001	9,000 lbs.	75%	4,500 lbs.
Quarter 2 2001	1,500 lbs.	50%	750 lbs.
Quarter 3 2001	1,000 lbs.	50%	500 lbs.
Quarter 4 2001	2,000 lbs.	50%	1,000 lbs.

We had just witnessed the 75% trigger pulled in January and the reduced limit of 4,500 lbs. Much debate ensued about the need to reduce the limits for the other quarters to prevent hitting the trigger early in the next quarters.

When a motion was made to reduce all the limits to 500 lbs. at the onset of each quarter, the response was: "Reducing the limit will result in regulatory discards because sea bass are a component of the mixed species trawl fishery in the mid-Atlantic." Lower the limit too much and that which would have been landed will be discarded.

This is an interesting contrast in views: Keep the fishery open as long as possible by keeping the limits relatively low. Don't lower the limit too much because we'll cause regulatory discards. Where's the balance? No one knows, in part because we're unable to monitor the fishery to determine the effects of our regulations.

(4) Ruin or slow rebuilding efforts (catch and F targets exceeded)

Cod

An excellent example is Gulf of Maine cod. The Council's Multispecies Monitoring Committee is quoted in its Nov. 2000 report: "Fishing mortality in 1999 for Gulf of Maine cod could not be estimated because the magnitude of discarding in 1999 could not be quantified. F is likely to be in the range of 0.29 (no discards) to 0.76 (2,500 mt discards) depending on the magnitude of discards. F on 2000 may be in same range."

Consider 2,500 mt (5.5 million lbs.). If regulatory discards are as high as 5.5 million, or even half, the Council's pressing problem of rebuilding GOM cod will worsen. Rebuilding efforts will be impacted drastically. Perhaps even ruined.

Why would regulatory discards be so high? Simple. Very large and prolonged closed areas in the GOM stockpile cod. When closures are lifted fishermen fish the area but are subject to a low possession limit (400 lbs.). Regulatory discards ensue. How many? Who knows!? As noted by the Monitoring Committee, "Continued reliance on restrictive trip limits without sufficient at-sea monitoring will create similar situations elsewhere." Of course, once we determine the extent of the discarding, then what's the solution?

Spiny Dogfish

Here's another excellent example. The analyses leading up to the Spiny Dogfish FMP of both Councils indicated that once the plan was in place a minimum of 10 million lbs. of regulatory discards would result annually. A bit of irony, the Plan established a bycatch quota of just 4 million lbs. Added onto these regulatory discards are large amounts of discards of dogfish taken as bycatch in other fisheries, such as groundfish, and we have an imposing dilemma.

Scup

The 31st SARC concluded: "Estimates of commercial fishery discards are not reliable because of the limited sample size and uncertainty as to the representative nature of the sea sampling data. Fishing mortality should be reduced substantially and immediately. Reduction in fishing mortality from discards will have the most impact on the stock, particularly considering the importance of the 1999 and all future good recruitment to rebuilding the stock (emphasis added)."

These discards have come about because of small-mesh fisheries. It can be argued that regulatory discards occur by omission. When managers fail to act to prevent discards, then the resulting discards are regulatory in nature. Setting this controversial assertion aside for a moment, managers are still faced with large amounts of regulatory discards as trip limits are reduced to prolong quotas.

The scup trip limit was just reduced to 1,000 lbs. (January 30). The limit was 10,000 lbs. Seventy-five (75%) of the January 1 through April 30 2001 quota was taken in one month! What will happen now from February through April – three months of offshore winter fishing? As fishermen pursue their 1,000 lbs. either as a directed catch or bycatch, regulatory discards likely will be large especially because there is a strong 1997 year class. There is also what appears to be an above average to strong 1999 year-class. We likely will have huge amounts of discards ironically enough caused by our efforts to cut landings and hold the fishery to a quota ostensibly set to keep exploitation to 33%.

Measures to reduce regulatory discards

What's been tried?

Fluke 15% set-aside

For fluke, a few years ago, ASMFC and the Council were able to justify a quota increase by using a regulatory-discard-reduction strategy. Increase the quota by reducing F through discard reduction.

Both adopted the 15% by-catch set-aside concept. Each state's quota was to be reduced by 15% as bycatch to be landed in other fisheries. In theory, instead of discarding that fluke once the directed fishery closed, the 15% set-aside allowed continued landings of bycatch. Has it worked? There's been no review to determine success or failure.

Closed Areas

Closed areas have been tried in New England. Starting in December 1994 three large areas of historic importance to groundfish spawning and juvenile production on Georges Bank and in

southern New England were closed year round to any gear capable of retaining groundfish (trawls, scallop dredges, gillnets and hook fishing).

Scalloping was included in this closure because of groundfish bycatch particularly flounders. If the areas hadn't been closed then scallopers would have been in the areas and bycatch and forced discarding would have ensued if scallopers were subjected to a trip limit as part of the overall Council effort to keep flounder catches within target TACs.

The Nantucket Lightship Area in Amendment #5 to the Groundfish Plan originally was intended to minimize potential bycatch and mortality of large concentrations of small yellowtail. In a sense this was a preemptive move to reduce the potential for regulatory discards, although at the time "regulatory discards" was not part of our vocabulary.

Although not a closed area per se, the gear regulated areas in southern New England and Mid-Atlantic are intended to reduce discards of scup in small mesh fisheries especially for squid. However, I argue that these areas have the potential to create huge amounts of regulatory discards because the area is open to fishing with mesh 4 1/2" or greater, not small-mesh. Because enforcement of the area is expected to be minimal if at all, small-mesh fishing can continue. Discards will result. Hence the GRA will create regulatory discards because regulations allow fishing with poor prospects for enforcement.

What's the significance? TAC – discards = TAL

Conservation engineering or gear technology

A strategy on which most fisheries managers and fishermen are hanging their hats is conservation engineering. Modify fishing nets to reduce regulatory discards. The alternative is to stop or severely restrict fishing opportunities.

Work has been done, and there have been some successes. DMF's raised footrope trawl allowing commercial fishermen to fish in Cape Cod Bay and lower Massachusetts Bay for whiting is a true success story. Flounder bycatch was dramatically reduced. If we didn't have the trawl there would be the closure preventing regulatory discards. No fishing = no bycatch and no discards.

DMF is working on another net modification with a Provincetown fisherman. How does a fishermen fish for flatfish while avoiding codfish? This question is important for the Gulf of Maine especially. In December last year a fisherman fishing north of Provincetown caught 20,000 lbs. of cod in a 30-minute tow. The trip limit was 400 lbs. Hell of a lot of regulatory discards! With a net modification, just 200 lbs. of cod were caught.

Squid nets can be redesigned to reduce scup bycatch and discard. Allowing a squid fishery has consequences. Squid is caught with small-mesh nets (e.g., 1 7/8" cod end) in federal waters. There is a very large bycatch problem. Scup is also caught in inshore waters in the spring. DMF is developing a net to reduce bycatch and discards.

Conclusion

In conclusion, regulatory discards must be prevented or at least significantly reduced. Otherwise, we'll:

- (1) Prolong fishermen's sacrifices (e.g., quotas kept low for longer time)
- (2) Require precautionary management approach to account for this major source uncertainty
- (3) Manage in ignorance. What's F? How do we set quotas for next year without knowing if we hit our F-target this year?
- (4) Continue embarrassment for fisheries managers
- (5) Produce even more scofflaws
- (6) Handicap fisheries scientists obligated to provide assessment advice and stock rebuilding projections.

These are very undesirable outcomes. Indeed, regulatory discards are the bane of our existence.

DISCARD REDUCTION THROUGH GEAR MODIFICATION

Michael Pol and H. Arnold Carr
Massachusetts Division of Marine Fisheries
Pocasset, MA

Conservation engineering, or gear technology, can be defined as discard reduction through gear modification. This presentation will first discuss the philosophy of our approach to gear solutions to discard reduction, then describe a six-step process, mention some challenges, and then conclude with a very brief video (approximately one minute) showing a brief glimpse of underwater video. Interwoven with this discussion is a case study, the raised footrope trawl used in the Provincetown and Gloucester whiting fishery.

Philosophy

The philosophy that we use to develop gear solutions has three tenets. First, we seek cooperation and teamwork with everyone. This teamwork allows us access to a greater pool of resources; the equipment that we use can be very expensive. It also allows us to share ideas and personnel. Fishermen, of course, are a primary source for us of both discard problems that need solving, and potential solutions to those problems. This photograph displays cooperation among a Federal (Henry Milliken), State (Michael Pol), and private non-profit organization (Gregg Morris).

The second aspect of our philosophy is to understand the behavior of the species of concern. Underwater cameras are our primary means of understanding behavior of fish, especially while they are being captured by fishing gear. The diagram on this slide was developed by Chris Glass of the Manomet Center for Conservation Sciences after examining videotape of squid being pursued by a trawl net. He realized that loligo squid swim in front of the net, and gradually rise in the net before turning, and swimming back to the codend. He then used this behavior to develop a separator trawl to separate scup from squid, after also observing that squid stayed low in trawl nets.

The third aspect of our philosophy is to consider the entire fish capture system. By this phrase, we mean that we cast a wide net when considering possible solutions to a discard problem. The fish capture process is usually more complicated than we think, and gear scientists should think broadly when looking for solutions.

Process

We have divided the process of developing a gear modification into six steps: define the problem, develop modification(s), conduct step-by-step testing, validate the gear modification, disseminate it, and then continue monitoring the modified gear.

Carefully defining a problem is just good science. This step is important. For example, the discard of scup in squid/scup fishery is a substantial problem; we would never consider that the same gear modification would work in Nantucket Sound, a small-boat, small-net, shallow-water fishery, and in the Mid-Atlantic, a big-boat, big-net, deep-water fishery. It was easy to define the problem in the whiting fishery; this small-mesh fishery was closed in 1995 due to unacceptably high bycatch of regulated species, particularly flatfish and lobsters.

The next step is to develop the gear modification. We draw on our wide network for ideas: the fishing industry; Europe - which tends to be ahead of us; Canada; the West and Gulf Coasts. Of course, we also consult the scientific and grey literature. Ideas come from the field as fishermen try to solve discard problems by modifying their gear. And of course just good, hard work, and deep thought about the problem. Here also, we can consider the entire fish capture system. Regulations tend to use mechanical means of removing fish from a net. For example, mesh size and shape, and grids and grates, are often used to regulate trawl nets. But literally the entire net has aspects that can be modified to exploit a behavior: large mesh bands in the extension, removing webbing on the top of the net, altering the headrope, the footrope, and so on. The raised footrope trawl arose out of some preliminary work done with a separator trawl that showed a separation between whiting, which ended up in the top cod end, and flatfish and lobster, which showed up in the lower codend. It was a natural step to the raised footrope, although the origin of this modification is unclear. It may have come from the Gulf Coast and through Europe. The raised footrope trawl has a chain sweep attached to the footrope, so that the mouth of the net is raised about 18 inches off the bottom, theoretically allowing flatfish and lobster to pass underneath the mouth of the net. The chain sweep rides behind the footrope so it does not kick up fish in front of the net.

Once a gear modification has been chosen, a scientific, statistically-defensible, testing procedure must be developed. This design may involve alteration of hooks on a longline, or setting four different gillnets in the same location at the same time. Testing usually is conducted on one vessel, where the net may be tinkered with, and then, if successful, the testing is expanded to two or more vessels, because of boat effects where the gear performs differently on different vessels. Eventually, the gear should be tested fleet-wide. In the whiting fishery, the raised footrope trawl was tested and modified on one vessel in 1995. In 1996, the entire fleet used the raised footrope trawl more for the economics of maintaining the fishery rather than a scientific testing of the net. Careful testing of the net was conducted on six vessels in 1997, and demonstrated an 85% reduction in bycatch of regulated species. In 1998-1999, intensive monitoring of the fleet continued through observer coverage and self-reporting by fishermen of tow-by-tow catch and bycatch to determine if the fleet met the five-percent-bycatch standard.

Validation means collecting direct evidence that the gear modification is performing in the manner theorized, such as flatfish passing under a net, or scup swimming out of a large-mesh band. Our primary means to do this validation is to use video cameras, or to use other sensing equipment. Another method of validation is to use a scale model of net in a flume tank. The net can be adjusted and tinkered with in the flume tank. For unusual modifications, it can also show that the net can actually be fished. And, fish can be brought into an aquarium or raceway and exposed to fishing gear.

This validation can also be important when disseminating the modification. Some people can accept abstractions such as catch numbers, but many people need some more concrete proof that a gear works. The flume tank and video footage were helpful when convincing fishermen of the effectiveness of the raised footrope trawl. In general, our preference is to have fishermen be persuaded of the effectiveness of a gear modification and adopt it voluntarily. Of course,

requiring use of a gear is also possible. Due to the nature of Federal regulations, the raised footrope trawl was formally adopted as an exempted gear through Framework 35 in 2000.

The next step, the last step in the process of discard reduction through gear modification, is to continue development of the gear. In the whiting fishery, continued development has led to the removal of the sweep chain so that just the drop chains are left. This net has a lower likelihood of becoming entangled with ghost lobster gear, which increased bycatch rates in the raised footrope trawl. One boat has successfully adopted this net. Continued development is necessary to react to change in the fish community. One might expect that the abundance and average size of the bycatch species now being avoided to increase. Also, the raised footrope trawl was developed at a time of low cod abundance; it was never intended to avoid cod. We are currently working on net modifications that avoid cod as the cod population increases. And finally, we hear from fishermen and law enforcement about the difficulties of being in compliance or enforcing gear regulations, and we hear about loopholes in the regulations.

Challenges

The difficulties of enforcing complicated regulations leads me into the challenges involved in developing gear that reduces discards. The regulations for the raised footrope are complex and difficult to enforce. We have begun discussions with law enforcement personnel about using a “clean catch” standard. The boarding officer would use the relative lack of discard in a haul to determine if a boat was in compliance. A clean catch is what we are all interested in; we couldn’t care if a net was out of compliance as long as it is fishing cleanly. We also face the problem of crisis management. Calls for nets that avoid one species or another often arise after strong restrictions are placed on it. However, gear development requires time; it took five years for the raised footrope trawl to be developed. That amount of time highlights our most limited resource.

The Present and The Future

When I consider the present and future of conservation engineering, I see improved communications with all sectors of the fishing industry, as evidenced by meetings like this one. The awareness of gear solutions has increased, and currently there is plenty of money available for research. There is no shortage of problems; some have been solved, and some are solvable. But it has become clear that discard reduction through gear modification has become one tool that management can use.

AN OVERVIEW OF THE ATLANTIC COASTAL COOPERATIVE STATISTICS PROGRAM

Jim Music
Georgia Department of Natural Resources
Brunswick, GA

The Atlantic Coastal Cooperative Statistics Program (ACCSP) is a cooperative state-federal marine and coastal fisheries data collection program. It consists of 23 partner agencies from Maine to Florida. Its purpose is to obtain accurate fisheries release/discard data for state and federal programs that support: The Magnuson-Stevens Act, Atlantic Coastal Fisheries Cooperative Management Act, the Marine Mammal Protection Act, the Endangered Species Act, the Migratory Bird Treaty Act, and the Atlantic Striped Bass Conservation Act. It was initiated in 1995 and was charged with improving fishery data collection along the Atlantic seaboard. The program's design was approved in December 1998 after two years of development.

The overall goal of the ACCSP program is to cooperatively collect, manage, and disseminate fishery statistical data and information for the conservation and management of fishery resources of the Atlantic coast, and to support the development and operation of a national data collection and data management program. The data collection program is coast wide and covers all vessels leaving and landing from east coast ports; including commercial, recreational and for-Hire. It is designed to collect both quantitative data (from at-sea observer coverage and fishermen logbooks) and qualitative data (from stranding networks and port sampling).

In 1997, the Atlantic States Marine Fisheries Commission (ASMFC) sponsored a Bycatch Workshop to address new mandates to minimize bycatch; discuss address concerns over limited bycatch data for use in statistical analyses and stock assessments; and to formulate recommendations for minimizing bycatch. Those workshop recommendations were incorporated into the new ACCSP design. The current Regulatory Discards Workshop is charged with discussing methods of reducing "Regulatory Discards" and to suggest specific methods as to how to increase the use of those discards taken in the Atlantic coast fisheries.

Benefits

Implementation of the ACCSP will have a number of advantages to all participating partners and the public as well. Specific benefits include:

- Standardized data protocol and collection methodology which would in turn make data easier to handle and process;
- Pooled/combined data availability will allow more timely use of data and alert managers when quotas are reached;
- Standardized reporting forms with standard templates for both fishermen and dealers to fill out for reporting requirements;
- Standardized data elements which would be the same for all fisheries being sampled;
- Standardized data codes and formats;
- Target sampling levels set annually to ensure coverage;
- An annual prioritization process for funding initiatives for at-sea coverage;

- Data collected will be available within 45 days after the month for which it was collected;
- An annual prioritization process for coverage;
- All data will be stored in a centralized data management system;
- Improved turnaround time through standardized protocol;
- Allow managers to identify and evaluate gear and fishing practices that minimize interactions, releases, and discards;
- Real time values for landings, take, discards, etc. for use in determining annual fishing mortality, quota takes, etc.
- It will be set up in a user friendly internet-based access system which will allow fishermen and dealers to utilize summary data;
- It will maintain the standards of confidentiality much the same as that under the existing Cooperative Statistics Program;
- Commercial fisheries data will be collected as a consensus rather than a sample; and finally,
- It will allow all partners access to the data for specific fishery management use;
- Improve contributions to regional councils and Commissions through better understanding of the amount of releases and discards;
- It can be used to provide fishermen with fishing opportunities without impacting the objective fishery management plans for species that are fully exploited; and
- It provides the base for a long-term database for at-sea observer coverage.

Specific uses for the ACCSP include:

- It can and will be used to assess abundance of marine resources for use by the National Marine Fisheries Service, the Atlantic States Marine Fisheries Commission, and the Regional Councils;
- The data can be used to provide a verification tool for logbook reporting;
- It provides all state and federal agencies with a template for setting up At-Sea Observer Programs; and
- It sets up a centralized training and certification program with a list of “Certified” At-sea Observers.

As noted by the previous speakers, there is a strong need for information that this “Regulatory Discards” workshop will address during the next two days. Hopefully, we will be able to provide some solutions as to how best to solve the problems associated with bycatch and discards. The ACCSP will be that primary data center for all participating partners to be able to obtain accurate fisheries release/discard data needed for state and federal management programs that support the Magnuson-Stevens Act, Atlantic Coast Fisheries Conservation and Management Act, Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and the Atlantic Striped Bass Conservation Act.

ENFORCEABILITY OF FISHERY MANAGEMENT MEASURES

Lieutenant Edward J. Marohn
Coast Guard Liaison to
NOAA Fisheries Office for Law Enforcement
U.S. Coast Guard
Washington, D.C.

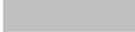
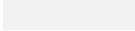
Abstract

Often times fisheries regulations are developed with little recognition of how those regulations are to be enforced. To help fishery managers better understand the enforcement aspect, the U.S. Coast Guard in a project similar to one jointly completed with the Atlantic States Marine Fisheries Commission Law Enforcement Committee developed guidelines on the enforceability of 16 fishery management measures. These guidelines address the enforceability of the regulation, not necessarily the merits of the regulation. Similarly, the guidelines did not address safety, economics or biology considerations. While those items need to be considered, these guidelines allow the manager to understand the enforcement issues associated with a particular management measure.

Enforcement resources are finite and limited. For example, approximately 15% of the US Coast Guard's operating expenses are allocated to fisheries enforcement; the remainder is allocated to search and rescue operations, environmental protection, marine safety, and other law enforcement missions. Normally, each additional fishery management plan or regulation does not come with a new enforcement asset; enforcement of a new regulation often is done reducing the level of enforcement devoted to existing regulations. Therefore, to be effective, it is important that regulations are easily enforceable. These guidelines provide a matrix to rapidly identify how enforceable a management measure is by at-sea cutter patrols, aircraft patrols, and dockside enforcement. In addition to the matrix, a narrative section describes the advantages and disadvantages of each management measure, and provides recommendations on how to write a regulation so it can be effectively enforced.

	At-Sea Ship	At-Sea Air	Dockside
Permits	9.090909091	4.727272727	9.272727273
Closed Seasons	8.909090909	5.181818182	7.6
Vessel Monitoring Systems	8.8	7.444444444	5.8
Closed Areas	8.454545455	8.636363636	1.5
Prohibited Species	8	0.636363636	8.818181818
Bycatch Reduction by Prohibiting Retention	7.727272727	0.363636364	8.363636364
Gear Restrictions	7.636363636	3.181818182	3.636363636
Size Restrictions	7.363636364	0.090909091	8.272727273
Days at Sea	6	4.727272727	5.4
Logbooks	5.4	0.2	8.2
Trip Limits	5.363636364	0.181818182	7.636363636
Bycatch Reduction by Limiting Amount/Percent Onboard	5.363636364	0.181818182	6.545454545
ITQs/IFQs	4.909090909	1.3	8
Annual Quotas	4.363636364	0.909090909	8.2
Limited Drag or Soak Times	2.571428571	1	1.125
Bycatch Reduction by Limiting Amount/Percent Landed	1.9	0.181818182	6.818181818

KEY

	Reasonable
	Possible with some difficulty
	Impractical

**SHORT TERM HOOKING MORTALITY OF SUMMER FLOUNDER
IN NEW YORK, VIRGINIA, AND NORTH CAROLINA**

Mark Malchoff
Lake Champlain Sea Grant
Plattsburg State University
Plattsburg, NY 12901

Short-Term Hooking Mortality of Summer
Flounder
in New York, Virginia, and North Carolina

**Mark Malchoff, NYSG, Riverhead
Jeff Gearhart, NCDNR, DMF, Morehead City
Jon Lucy, VSGMAS, VIMS, Gloucester Point**

- Some of what I cover this morning is based on some work that Jeff Gearhart, Jon Lucy and I have done on summer flounder in the late 90's in North Carolina, Virginia and New York

Objectives:

- **Better estimate short term mortality following catch and release angling**
- **Model mortality as a function of:**
 - hook style and/or size
 - hook wound site
 - fish size
 - water temperature
 - other variables

Hook Styles and Sizes

2/0 Sproat



2/0 Wide Gap

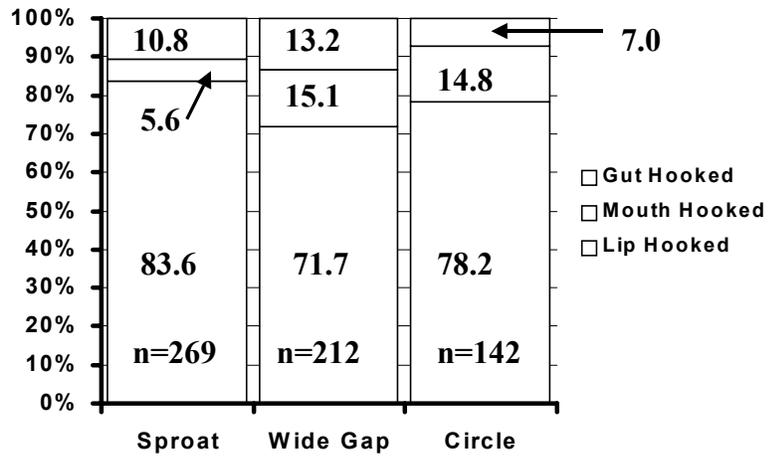


4/0 Circle



Hook Type vs. Wound Location

Pearson Chi-square = 0.002



Overall Summer Flounder Mortality

	NY	VA	NC	All
Mortality	14.7	6.9	5.3	9.9
95%CI	7.0-21.7	1.6-14.0	0.0-12.1	7.4-11.9
Sample	N=247	N=189	N=187	N=623

NY, VA, NC Logit Model and Output p1

Cond= Constant+Hklocation+Hktype+Bleeding+ Lgthin+Temp

Log Likelihood of constants only model= LL(0)= -184.209

2*[LL(N)-LL(0)]= 121.999 with 7 df Chi-sq p-value = 0.00

McFadden's Rho-Squared= 0.331

NY, VA, NC Logit Model and Output p2

Parameter	p-values			
	NY	VA	NC	All
Constant	0.12	0.00	0.07	0.00
Gut (relative to jaw)	0.00	0.00	0.00	0.00
Mouth (rel. to jaw)	0.02	0.00	0.97	0.01
Circle (rel. to sproat)	0.07	nd	nd	0.07
Wide Gap (rel. to sproat)	0.78	0.97	nd	0.77

NY, VA, NC Logit Model and Output p3

Parameter	p-values			
	NY	VA	NC	All
Circle (relative to wide gap)	0.20	nd	0.38	0.30
Bleeding	0.01	0.03	0.55	0.00
Length in Inches	0.13	0.03	0.86	0.08
Water temperature	0.17	0.06	0.11	0.11

Summary

- Overall 72-hr post-release mortality was 9.9% w/95% CI of 7.4 to 11.9%
- Occurrence of “gut hooking” was significantly influence by hook type
- Reduced hookup rate w/ circle hooks?
- But
- Overall release mortality may not be significantly influence by hook size/style
- Fish length may influence incidence of gut hooking

National Symposium
on
Catch and Release
in
Marine Recreational Fisheries



December 5-8, 1999

Virginia Beach Resort Hotel & Conference Center
Virginia Beach, Virginia

***Goal: Reduce amount of regulatory discards
and/or increase utilization of discards taken***

Recreational Issues

↗ **Does “catch and release (c&r)” by anglers fit into a discussion of regulatory discards?**

↗ **What’s the definition of “c&r”**
regulatory vs. voluntary
- under the size limit
- over the bag limit
- out of season

- **Does “catch and release (c&r)” by anglers fit into a discussion of regulatory discards?**

Perhaps. The term regulatory discards usually applies to dead fish which cannot legally be brought to the dock. The image that comes to mind with c&r is that of live fish being returned to the water. Clearly some percent of those fish released alive die as a result of stress or hook wounding, so from it might be argued that its this percentage (i.e. hooking mortality) that belongs in this discussion. In a few minutes I’ll address those percentages, and what sorts of things influence them. I believe the Magnuson-Stevens Act as amended by SFA excludes c&r programs from the definition of bycatch or discard. However, for our purposes it’s probably best to assume a goal of reducing hooking mortality, not the practice of catch and release.

- **What’s the definition of “c&r”**
 - **regulatory vs. voluntary**
 - **under the size limit**
 - **over the bag limit**
 - **out of season**

This question of definition has yet to be settled, and obviously impacts our discussion here over the next two days. Lots of conservation minded interests are striving for greater adoption of voluntary c&r, and I would hope that such activity does not fall under the heading of regulatory discard.

Recreational Issues (continued)

↗ **How big is the problem?**

↗ **What sorts of variables influence mortality?**

↗ **What about sub-lethal (population level) effects?**

↗ **Any identifiable trends?**

- **How big is the problem?**

“In 1997, nearly 17 million anglers made 68 million marine fishing trips to the Atlantic, Gulf, and Pacific coasts. The estimated marine recreational finfish catch was 366 million fish, more than 50% of which was released alive.”

If 10 to 20% of the live releases are succumbing as function of angling, we've got a problem big enough to warrant some attention in the stock assessment process.

- **What sorts of variables influence mortality?**

Some of the variable that have been investigated include: depth at capture, hook type and/or size, number of hook points, absence of hook barbs, and bait vs. artificial lures, playing time, salinity levels, etc. Other studies have looked blood chemistry variables, location of hook wounds, degree of bleeding, etc.

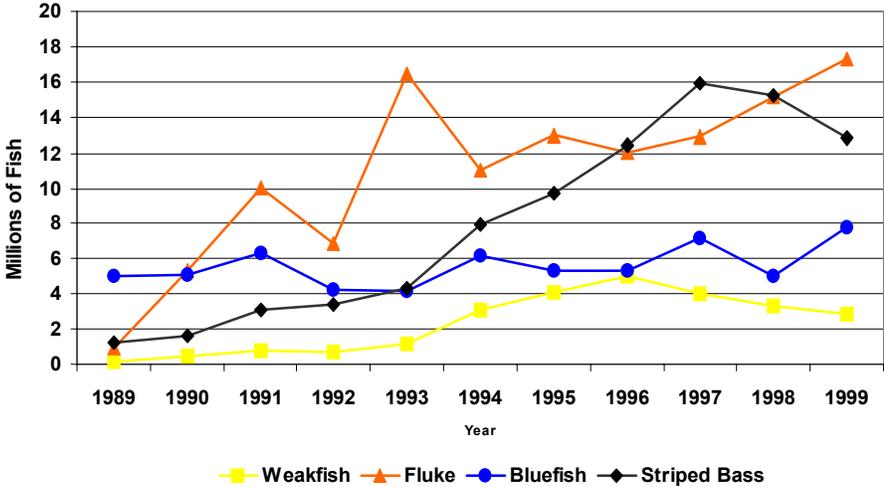
In a few minutes I'll briefly discuss some examples of this work, for those that may not be familiar with some recent effort.

- **What about sub-lethal (population level) effects?**

In 1992, Pankhurst and Sharples reported hooking related stress may impair reproductive development in snapper. Physiological studies by Tufts et al, and Skomal and Chase have investigated blood chemistry changes in salmon, sharks, and tuna. Effects appear to be short term. Stockwell and Diodati, however reported reduced growth in striped bass as a function of catch and release angling.

- **Any identifiable trends?** Next slide suggests there are

MRFSS B2 TRENDS



Personal communication from the NMFS, Fisheries Statistics and Economics Division, Silver Spring, MD

National C&R Symposium Sessions

Biological Research Results

- **Hook designs**
 - circle hooks – salmon, halibut, billfish, tuna, flounder fisheries. Single vs. treble – seatrout, red drum
- **Hook wound analysis**
 - tuna, flounder
- **Venting**
 - grouper/snapper fisheries
- **Sub lethal effects**
 - striped bass
- **Data from innovative tagging**
 - highly migratory

- Hook Designs

- **Circle Hooks**

Several presentations at the symposium dealt with hook designs. Four presenters reported reduced mortality when circle hooks were compared to more conventional designs. Last November Trumble, et.al, published reported reduced mortality in the pacific halibut longline fishery when circle were employed, and this has obvious relevance for recreational fisheries.

- **Single vs. treble**

In the most entertaining presentation, Jim Duffy reported no significant difference in mortality between single hook caught seatrout and red drum vs. those caught on treble hooks, in an elegantly designed study involving over 600 fish.

- **Venting**

Both marine and freshwater studies suggest that venting can effectively allow fish to return to depth following overinflation of swimbladders. However, the educational needs associated with these methods seem daunting to me, and long-term effects of venting remain poorly studied

- **Sub lethal effects**

Already mentioned the studies by Skomal and Chase, and Stockwell and Diodati.

- **Innovative tagging**

Graves reported at least 8 of 9 blue marlin survived at least 5 days following c&r. However expensive and limited by sample size, telemetry studies hold great promise for the future estimation of post-release survival. Freshwater investigators have also used newer technologies to investigate sub-lethal effects in smallmouth and largemouth bass

National C&R Symposium Sessions (cont'd)

- **Human Dimensions session**
 - C&r behavior in highly pelagic fisheries
 - Attitudes of European fishers
 - Attitudes among native peoples
- **Stock Assessment, C&R mortality, and FMP's**
 - Striped bass, summer flounder, H. migratory examples

- Much of the symposium involved the human dimensions issues associated with c&r and I'll not try to summarize it here. Suffice it to say that there is a growing literature that explores why people voluntarily release fish, and what variables (i.e. club membership, years spent saltwater fishing, etc.) can be identified that helps predict an anglers attitudes and behavior relative to catch and release.
- Additional presentations focused on the importance of hooking mortality studies for use in the stock assessment process

Symposium Consensus Building Summary

Research Agenda

- **Major Priorities**
 - **Need additional release mortality studies**
 - **C&R Outreach – How can we best disseminate?**
 - **Long term effect of C&R on populations?**
 - **How to incorporate C&R research in SAW/SARC?**

Symposium Consensus Building Summary (cont'd)

Education Agenda

- **Major Priorities**
 - **Develop an overall media/communication strategy for C&R**
 - **Form Angler/Industry/Government educ./outreach strategies**
 - **How define C&R?**
 - **Need different types of messages for different types of anglers**

Concluding Observations

- **Although many studies have recently investigated ways to understand and reduce hooking mortality and sub-lethal effects, much research needs to be done (i.e. benefits of circle hooks, stress in pelagic fisheries)**
- **May need to consider innovative regs when dealing with minimum size issues**
- **New regs should not generate a disincentive to participate in voluntary catch and release programs**

100% RETENTION - THE MOVE TO MANDATORY LEGISLATION

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Background

- Fisheries Act 1868
 - Legal authority to control and manage fisheries
 - Amended 40 times
 - Last amendment 1993
 - Amendment 93.3 Mandatory Landings
-
- In Canada we have decided not to allow regulated discards, but rather have moved toward the mandatory landing of all groundfish. What I have done is tried to document the events that led us toward that type of regulation and how the implementation of that legislation has worked, what the industry reaction was and some comments on the success or failure of the legislation, where we are now and where we are going vis a vis this problem

Reasons for discarding

- Pre ITQ
 - quota use
 - trip limits
 - bycatch
 - minimum size
 - CHP
- Post ITQ
 - Small ITQ's
 - mismatched quota ratios
 - cancellation of 3:2:1
 - DMP now can't easily land illegally
 - can't purchase

- Even though 3:2:1 didn't really work because fishers tended to still convert to most lucrative species it was still thought to reduce dumping however it results in quotas being exceeded for one species rather than balancing out as one might hope based on actual catch

History

- Major expansion of the fishery since extension of jurisdiction (1977)
- Completed limited entry licensing (1979)
- Introduced detailed management plans
- Since 1981 increased regulation by DFO to control effort and contain growth in capacity

- With the creation of the 200 mile zone Canada was in a position to enforce anti discarding provisions in both the domestic and foreign fisheries.
- At that time the majority of fishers were able to discard as they pleased, but refused to incriminate themselves by recording the discards in their log books. There was wholesale dumping of small fish (even though no minimum fish size) and dumping of any unwanted species. If fish weren't dumped they were put through fish grinders to hide the evidence.
- A landmark decision by a Nova Scotia provincial judge in an illegal discarding case determined that the captain was in fact selectively culling his catch quite distinct from wholesale dumping and acquitted the captain.
- From that point on DFO enforcement staff had difficulties in categorising any release of fish based on this decision

History

- Quota management for all stocks , regulations permitted 3,300 lb trip limit in excess of quota for <65' fleets
 - 130mm mesh size used and standardised
 - sector management over-capacity first identified (inshore fleet)

- Sector management allowed regions to manage without accounting for potential influx from other regions. Inshore fleets were restricted to 3 zones Gulf, SF and Newfoundland
- Sector quotas divided into present categories <65, 65-100, >100. Prior to that quotas were for all vessels <125' or all MG.
- Increased competition between fleets lead to a need to establish shares and recognized that gear and size differences gave a competitive advantage.
- The over-capacity exacerbated the discard problem as more vessels tried to harvest fish now under quota.
- Larger mesh introduced to avoid capture of small fish often discarded even though no min fish size

Intro of EA

- EA's introduced in 1982 (trial)
- Restructuring in 1983 after financial collapse
- Resulted in more discarding
- Didn't want to record practice for fear it would be taken from quotas

- From an enforcement perspective the introduction of EA's or company quotas and the restructuring of these companies led to more discard problems. Companies did not want to hold massive inventories, which gave rise to their problems in the first place so they started the concept of shopping lists in order to meet market request but not hold excessive inventory. Captains felt obliged to dump excess amounts or face unpleasant consequences on shore.
- A quote from that time " If I land it my company will suspend me if I dump it I am in trouble with DFO.
- Captains did not record discards as it represented quota that they didn't want to use at that time and they didn't want it deducted from the quota.
- So both market and quota considerations led to increased discarding

History

- 1986 (revised regulations introduced)
 - Zero quota rather than bycatch permitted (FG <45 ft retained 3300 lb trip limit)
 - trip limits and licence conditions
 - Over-capacity resulted in early closures, increased use of trip limits and seasonal quotas to spread quotas

- Region could close quota to 0 rather than the 3300lb or 10% permitted, prior to the change. It was eliminated for all fleets with the exception of FG<45' -(thought not to impact stocks, small inshore vessels)
- Trip limits were introduced through licence conditions and again added to the discard problem. In general limitations on a trip basis of the amount landed caused dumping and highgrading and bycatch regulations also added to the problem if vessel caught more than allowed bycatch of a particular species the excess would be dumped
- Capacity 4 X what was required to catch quotas , tensions arose between fleet sectors

History

- 1987
 - Closure of haddock nursery area (4VW)
 - Licence moratorium introduced to remove inactive capacity (not successful)
 - 50% TAC rule introduced to cushion drastic quota drops
 - Seasonal and trip limits continued

- Haddock closure put in place to reduce the catch of small haddock as it was discarded or entered into a black market for fillets from unreported catch.
- 2X capacity necessary to catch quotas was never really addressed and the small number of licences removed under the moratorium were reactivated
- the 50% rule meant that the fishing mortality in the coming year would be set at a value half way between what it was currently to where you want to be . In this case $F_{0.1}$ This was another attempt to provide more quota and avoid discarding

History

- 1988
 - excess capacity lead to earlier closures, segregation of quotas <65'
 - extensive use of trip limits continued
 - reports of dumping and discarding and high-grading more prevalent
 - continued requests for more quota

- The province introduced a minimum fish size of 16" which again caused more discards as fishers could not sell fish below that size.
- Over this period of time quotas especially for haddock were declining as capacity continued to increase. Market demand remained high.

History

- 1989
- offshore EA program made permanent
 - To reduce dumping and discarding inshore MG move to combined trip limits for CHP(4X5)
 - MG <65' fishery closed June
 - Hache Task Force report initiated

- Company imposed trip limits continued in the offshore fleet.
- Foreign fleet misreported species (i.e. trash fish) rather than discarding excessive amounts.
- The CHP concept was developed as a means of providing an alternative to forced discarding at sea by the MG inshore fleet. Fishers could take a combined trip limit of 30,000 rather than 10,000 each. Only lasted one year as fishers abused system by discarding large amounts of pollock to increase amount of haddock permitted.
- Quotas were caught quickly and things came to a crisis in June when the fishery was closed. Caused plant closures layoffs and general hardship.
- Minister wanted the causes examined and corrective actions recommended

Task Force Findings

- Over-capacity a major problem especially with inshore sectors e.g. MG<65
 - Over-fishing, mis-reporting, discarding major problems
 - Monitoring and enforcement not satisfactory
 - Credibility of DFO eroded
-
- Throughout the task force consultations industry emphasised the fact that catch statistics were worthless for various reasons including dumping and discarding of fish at sea and misreporting of fish landed, including misreporting by area and species .

Task Force

- Identified 2 major trends as we moved into 1990's
 - declining stocks ,
 - excess capacity
- proposed a restructuring of the inshore fleets
- 30 recommendations

Task Force Recommendations

- Monitoring
- Conservation
- Enforcement
- Fleet Management

- Monitoring
 - requirement for records to be kept in support of comprehensive monitoring system
 - Modify the Regions catch monitoring program
- Conservation
 - Spawning closures , minimum fish size, increased mesh size
- Enforcement
 - Fisheries Act Amendments to increase fines and range of penalties
 - impose suspensions and cancellations of licences, develop guidelines and appeal process
- Fleet management
 - restructure fleets, develop administrative systems in support, handline control mechanism

Post Task Force

- Task force report accepted by Cabinet
- ITQs , introduced January 1 1991
- Dockside monitoring introduced (accurate timely landings DFO funded for ITQ)
- 3:2:1: exchange policy introduced (reduce high-grading etc)

- Fundamental requirements, arm's length, hails from sea, verification of weights and entry into DFO catch effort system.
- 3:2:1 policy adopted to again try to deal with the dumping and discard issue. Was seen as a very creative positive step that involved :
- Prior to landing fisher hail that he has overrun given 3 choices to rectify within 30 days
- transfer from another licence holder, charge overrun against his remaining quota in another species for equal value or surrender the overrun to the crown no profit
- there was thought to be no incentive to dump under this approach

Changes to regulations

- AFR amended Jan 1991 to reflect 17” minimum size for CHP and 31.8” for halibut
- Increased mesh size introduced 140 sq and 155 diamond, changed July to 130 and 145
- New data requirements logbooks etc
- Fines increased , sanctions introduced

- As a result of the Hache Task Force the following regulatory amendments were enacted and the Fisheries Act also amended to prohibit possession of fish contrary to the regs. Success was mixed due in part to not applying zero tolerance Strict application of Min fish size required individuals to discard fish less than 17” so in reality a legal requirement . Even with mesh selectivity could catch 30% small. No regs on hook size.
- Mesh- industry complained about loss of large of market sized fish, when reduced to 130 favourable response from industry even though catch rates were lower they caught mostly market size fish and didn’t have to cull small fish out of catch
- Redfish mesh increased to 90mm and grate introduced in shrimp & silver hake to reduce bycatch

Stock collapse

- Moratorium on Northern cod June 1992
 - FRCC introduced in December 1992 (gives formal recommendations to Minister re TAC, conservation measures, research etc.
 - 4VW cod fisheries placed under moratoria July 1993
-
- Midseason adjustments for cod and pollock in 4X were also announced as part of FRCC (rebuilding strategy) .
 - Other recommendations dealt with by-catch tolerances which they recommended be as close to zero as possible

Introduction of mandatory landings

- 1993 announcement of Groundfish Plan the Minister emphasized (FRCC report)
- The strict adherence to F0.1 strategy
 - mandatory landings and related changes to regs
- Reduction of mortality on small fish
 - small fish protocol introduced

- Up until this point it was still technically legal for fish to be discarded due to min fish size and bycatch regs.
- With the collapse of cod stocks a number of conservation measures were introduced to ensure that quotas were not exceed and all fish caught were landed , counted against quotas and used in the stock assessment process

New measures

- Discarding of any groundfish prohibited, i.e. mandatory to land all groundfish 93.3
- Minimum fish size 17 “reg. revoked
- Ability to regulate bycatches revoked (contravene mandatory landings)
- Hook size increased

- In order for the mandatory landing provision to work it was necessary to also remove the minimum fish size regulations and the regulations pertaining to regulated bycatch provisions . If a fleet couldn't stay within its prescribed bycatch limits the fishery can be closed.
- Compliance with the Fisheries Act and regulations was made a part of every licence , then violation of the Act or the regulations resulted in a violation of the licence condition

“Dammed if you Do”

- Prior, used excuse that DFO legislation forced fishers to discard (couldn't keep prohibited species i.e. less than min size or excess of regulated trip limits)
- Legislation changed to remove DFO as the excuse for discarding

- Basically the previous legislation allowed industry the excuse that we were forcing them to discard. With the introduction of mandatory landings this excuse was no longer available
- Fisher either landed above trip limit or dumped, both illegal, no legal way to deal with catching too much fish
- Publicity -dumping of small fish, ITQ fleet unable to match quota (transfers, donate to crown 3:2: 1: all tried to remedy situation)

Other measures

- CHP's
 - Gear limitations specified
 - Bycatch limits and small fish size & protocols
 - Catch monitoring & test fishing (closures by test area)
 - Seasons
 - Spawning , juvenile closures

- CHP's were required for all groundfish fisheries. They had to address how a fleet was going to deal with such things as prevention of discards and mandatory landing procedures, include measures to account for small fish , detection of discards, quota deductions, proper species mix etc.
- The CHP was a new way of doing business that essentially imposed fleet sanctions rather than individual charge offences. Under the CHP (developed and agreed to by all fleets prior to fishing the fishery could be closed to all if one or a few were detected dumping fish or in others ways in violation of their condition
- Operating guidelines developed for the various fleets imposed sanctions for exceeding quotas 1 for 1 , 2 for 1 etc. From next year quota

Other measures

- Small fish protocol
 - min fish size removed, replaced with land it all regulation
 - SFP a policy as such not chargeable (impacts fleet)
 - 15% fish by count <17” Area Closed
 - Relates to area covered and amount of fish
 - Repeated problems can lead to long term closure (RDG)

- The small fish protocol was developed to deal with the removal of the min. size and the introduction of mandatory landings.
- Essentially the Scotian Shelf is divided into a number of test areas and these areas can be closed to a fleet sector when the number of undersized fish reaches or exceeds 15% of the catch. The closures were a min of 10 days in duration and required a test fishery to reopen (industry cost)
- Initially fleets were required to test open areas where prior to opening a minimum of 5 sets or 2000 lb of fish had to be sampled. The same procedure applied after closure to effect an opening

Post 1993

- 3:2:1: policy cancelled (industry abuse, transfers or forfeiture to crown permitted)
- Sanctions introduced to deal with violations
- Square mesh mandatory for offshore (>65') in 4X no diamond equivalent

- licence suspension, quota reductions
- overrun policy implemented for ITQ (operational guidelines)
- forfeiture was also removed by 1994 because of industry abuse

Since

- No DFO enforced trip limits
- 3300 lb trip limit removed for FG <45' strict adherence to quota
- halibut <32" must be returned to the water by all fleets (licence condition)
- discarding of dogfish, skate and sculpins permitted by licence condition

- In 1995 DFO would no longer enforce trip limits for the FG fleets as it contravened the mandatory landing legislation. Industry has since implemented industry trip limits and a sanction policy that requires that the overage be landed and some penalty imposed on industry I.e. no fishing for 1-2 weeks depending on size of overrun.
- Studies indicated that a large number of juvenile <32" halibut survive if returned to the water.

Current

- Fleet rationalisation
 - ITQ , EA or Community Quotas (FG<45)
- DMP extended to all fleets
- observer and at sea surveillance increased
- Move toward co-management IFMP's
 - self regulation, JPA's, Code of Conduct
 - conservation, shared stewardship,PA

Did it Work

- A qualified Yes
- Discarding still exists but thought to be minimal relative to earlier years
- Discard index may be used in future, currently pilots underway to determine feasibility
- Public opinion on side

- Difficult to quantify but much lower due to mesh size and implementation of SFP
- Motivational change ITQ/EaA allows fisher to optimize profit rather than volume, fewer boats easier to transfer quota
- Mind set: Code of Conduct
- If large amounts detected, closures implemented, more observer coverage at their cost

ENDANGERED SPECIES ACT REQUIREMENTS

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Congress enacted the Endangered Species Act (ESA) of 1973 based on the finding that various species have been rendered extinct while others are threatened with extinction as a consequence of economic growth and development untempered by adequate concern and conservation. Congress found that these species are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people. Thus, Congress enacted the ESA for the purpose of providing a means to conserve and protect endangered and threatened species and their ecosystems.

The ESA is a strong statute which prohibits the take of endangered species within the United States territory and high seas. The definition of 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect and includes incidental capture in fisheries. Exceptions to the strict take prohibition are provided in sections 7 and 10.

Section 7 requires all federal agencies to conserve listed species and to use their authority to further the purposes of the Act. Each federal agency must, in consultation with and with the assistance of the Secretary of Commerce or Secretary of Interior ensure that their actions (authorized, funded, or carried out) are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of critical habitat. In the case of federally managed commercial fisheries, NMFS - as the Federal agency - must seek section 7 consultation on its fisheries management plans. Given that NMFS has been delegated ESA authority from the Secretary of Commerce for most listed marine species, NMFS consults with itself (i.e. the Office of Sustainable Fisheries seeks consultation with the Office of Protected Resources).

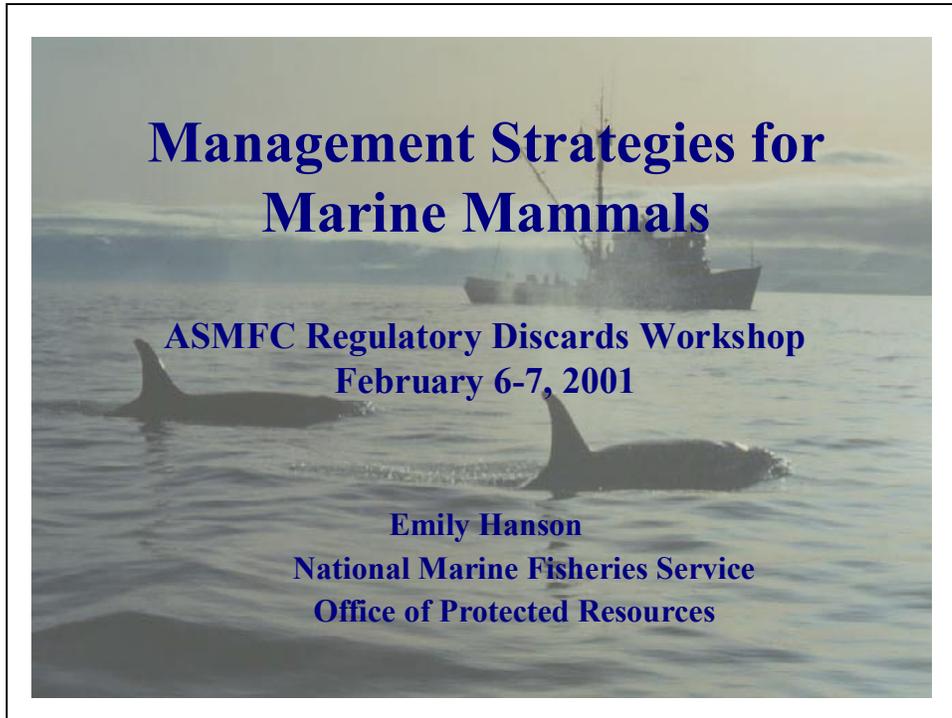
Section 7 consultations on federal actions that occur in areas where listed species or critical habitat are affected by such action either result in an informal or formal consultation. Informal consultations result when the proposed action is not adverse whereas formal consultations are conducted when the action likely has an adverse affect on listed species or critical habitat. The section 7 consultation process is a cooperative process in which NMFS works with the action agency to identify the best available commercial and scientific data, effects of the proposed action, as well as changes that may be incorporated to reduce or minimize the effects. The section 7 formal consultation process results in a Biological Opinion which sets forth NMFS' opinion on the likely effects the proposed action will have given the status of the species/critical habitat, the environmental baseline, and the cumulative effects that the species/critical habitat may experience. The Biological Opinion includes a conclusion of whether or not the proposed action is likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat. If there is a conclusion of jeopardy, the federal agency, with assistance from NMFS, must identify a Reasonable and Prudent Alternative to the proposed action before an incidental take statement can be issued. An incidental take statement may only be issued after NMFS has determined that the proposed action, or the Reasonable and Prudent

Alternative, and the resultant incidental take will not jeopardize the listed species or adversely modify critical habitat. The incidental take statement specifies the amount or extent of such incidental take, those reasonable and prudent measures deemed necessary or appropriate to minimize such impact, and the terms and conditions (including monitoring and reporting) with which the federal agency or applicant must apply. Incidental take statements are not for the purpose of allocating take; they identify expected levels of take and presume that the agency will take action to minimize impacts before these levels are reached.

Section 10 provides for the issuance of incidental take permits for non-federal proposed actions such as state managed fisheries. The permit includes a conservation plan to ensure that the proposed action will meet the section 7 jeopardy standard, prescribes measures to minimize and mitigate impacts of the take, provides adequate funding for implementing the plan, and provides a monitoring program to evaluate the plan. The issuance of a section 10 permit constitutes a federal action; therefore, NMFS must also consult under section 7.

MANAGEMENT STRATEGIES FOR MARINE MAMMALS

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The Old Management Regime

- Marine mammal management prior to 1994
 - Goal: prevent the depletion of marine mammals and maintain populations as functioning elements of their ecosystems
 - Assess if a population is “depleted”
 - A depleted stock is below its Optimal Sustainable Population (OSP) size...
 - ... the number of animals which will result in the maximum productivity of the population or the species... [MMPA, Sec. 3(9)]*
 - Data limitations made assessment difficult
 - Only 21 stocks assessed

The Current Management Regime

- 1994 amendments to the MMPA
 - Same goal
 - Focus on human-caused mortality, esp. bycatch
 - Potential Biological Removal (PBR) level
 - Use the abundance estimate to set a mortality threshold
 - When mortality > PBR → management
 - In 1995, 112 stocks assessed out of 153 total
 - Zero mortality rate goal (ZMRG)
 - More conservative
 - Goal: reduce bycatch to insignificant levels

Potential Biological Removal (PBR)

“The maximum number of animals, excluding natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population” [MMPA, Sec. 3(20)]

PBR Calculations

- Product of:
 - The minimum population estimate (N_{\min})
 - One-half the maximum theoretical or estimated net productivity rate of the stock
 - A recovery factor between 0.1 and 1.0

- At OSP

$$PBR_{\text{OSP}} = N_{\min} \times \frac{1}{2} R_{\max} \times 1.0$$

- Unknown, depleted, or threatened

$$PBR_{\text{U,D,T}} = N_{\min} \times \frac{1}{2} R_{\max} \times 0.5$$

- Endangered

$$PBR_{\text{END}} = N_{\min} \times \frac{1}{2} R_{\max} \times 0.1$$

Current Status

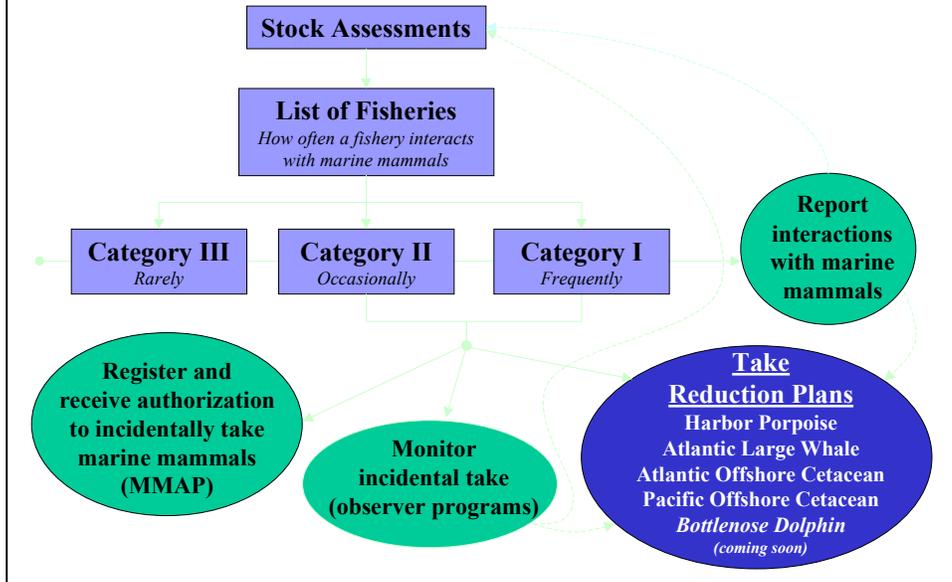
- 144 stocks of marine mammals under NMFS jurisdiction
- 39 designated as strategic
 - 22 endangered (in danger of extinction)
 - 2 threatened (in danger of becoming endangered)
 - 3 depleted (stock is below its OSP)
 - 12 “others” (human-caused mortality > PBR)

Stock Designations

Species	Stock	S	E	T	D
Atlantic white-sided dolphin	Western North Atlantic	yes			
Beluga whale	Cook Inlet	yes			yes
Blue whale	CA/OR/WA	yes	yes		
	Hawaii	yes	yes		
	Western North Atlantic	yes	yes		
Bottlenose dolphin	Gulf of Mexico, bay/sound/estuarine	yes			
	Western North Atlantic, coastal	yes			yes
Bowhead whale	Western Arctic	yes	yes		
Common dolphin	Western North Atlantic	yes			
Cuvier's beaked whale	Western North Atlantic	yes			
False killer whale	Hawaii	yes			
Fin whale	CA/OR/WA	yes	yes		
	Hawaii	yes	yes		
	Northeast Pacific	yes	yes		
	Western North Atlantic	yes	yes		
Guadalupe fur seal	Mexico to California	yes		yes	
Harbor porpoise	Central California	yes			
	Gulf of Maine/Bay of Fundy	yes			
Humpback whale	CA/OR/WA	yes	yes		
	Central North Pacific	yes	yes		
	Gulf of Maine	yes	yes		
	Western North Pacific	yes	yes		
Mesoplodon beaked whale	Western North Atlantic	yes			
Monk seal	Hawaii	yes			
North Atlantic right whale	Western North Atlantic	yes	yes		
Northern fur seal	North Pacific	yes			yes
Northern right whale	North Pacific	yes	yes		
Pilot whale, long-finned	Western North Atlantic	yes			
Pilot whale, short-finned	Northern Gulf of Mexico	yes			
	Western North Atlantic	yes			
Sei whale	CA/OR/WA	yes	yes		
	Nova Scotia	yes	yes		
	CA/OR/WA	yes	yes		
Sperm whale	Eastern North Pacific	yes	yes		
	Hawaii	yes	yes		
	North Atlantic	yes	yes		
	Northern Gulf of Mexico	yes	yes		
Steller sea lion	Eastern U.S.	yes		yes	
	Western U.S.	yes	yes		

Marine Mammal/Commercial Fisheries Interactions

“Commercial fisheries shall reduce incidental mortality and serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate...”



List of Fisheries (LOF)

- Prioritizes and identifies fisheries according to the degree of mortality and serious injury that occurs incidental to commercial fishing
- Two-tiered, stock specific approach
 - Tier 1: relationship between marine mammal mortality/serious injuries and all fisheries
 - If...total mortality/serious injury across all fisheries < 10 % PBR
 - Then...all fisheries Category III
 - Else...go to tier 2
 - Tier 2: relationship between marine mammal mortality/serious injury and a specific fishery
 - Category I: mortality/serious injury > 50% PBR
 - Category II: 50% PBR > mortality/serious injury > 1% PBR
 - Category III: mortality/serious injury < 1% PBR

LOF and Take Reduction Plans

- Category III fisheries are considered to have a negligible impact on marine mammals
- Focus attention on Category I and II fisheries
- Atlantic Category I fisheries (current and *proposed*)
 - Northeast sink gillnet ➡ ALWTRP, HPTRP
 - *U.S. Mid-Atlantic coastal gillnet* ➡ HPTRP, BDTRP
 - Atlantic Ocean, Caribbean, Gulf of Mexico pelagic longline ➡ AOCTRP
 - Gulf of Maine, U.S. Mid-Atlantic lobster trap/pot ➡ ALWTRP
 - *Atlantic squid, mackerel, butterfish trawl* ➡ observed

Category II fisheries

- Atlantic Category II fisheries (current and *proposed*)
 - *North Carolina inshore gillnet* ➡ BDTRP
 - Northeast anchored pelagic gillnet
 - *Northeast drift gillnet*
 - *Southeast Atlantic gillnet* ➡ BDTRP
 - Southeastern U.S. shark gillnet ➡ ALWTRP, BDTRP
 - Atlantic herring mid-water trawl (including pair trawl)
 - *Atlantic blue crab trap/pot* ➡ BDTRP
 - *Northeast trap/pot*
 - Mid-Atlantic haul/beach seine ➡ BDTRP
 - *North Carolina long haul seine* ➡ BDTRP
 - North Carolina roe mullet stop net ➡ BDTRP
 - *Mid-Atlantic pound net* ➡ BDTRP

Atlantic Large Whale Take Reduction Plan (ALWTRP)

- Established to reduce incidental take of large whales, focusing on right whales
 - South Atlantic shark gillnet fishery
 - Gulf of Maine, U.S. Mid-Atlantic lobster trap/pot fisheries
 - Mid-Atlantic coastal gillnet fishery
 - Northeast sink gillnet fishery
- Time-area closures of right whale critical habitat
- Gear modifications/prohibitions
- Disentanglement network
- Gear research
- Outreach
- PBR for right whales is 0, need to eliminate all human-caused mortality and serious injury

Harbor Porpoise Take Reduction Plan (HPTRP)

- Established to reduce the incidental take of harbor porpoise
 - Northeast sink gillnet fishery
 - Mid-Atlantic coastal gillnet fishery
- Time-area closures
- Pinger requirements (Gulf of Maine)
- Gear modifications/prohibitions (Mid-Atlantic)
- Take of harbor porpoise (378 in 1999) is below the PBR (747), some due to fishery management actions
- Issues of concern: enforcement of pinger requirements, poor observer coverage in Mid-Atlantic, experimental fishery to test reflective gillnet and other pingers, changes in fishery management

BIRD BYCATCH

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The new U. S. Fish and Wildlife Service's Waterbird Bycatch Policy states:

- The Migratory Bird Treaty Act (MBTA) of 1918 ... legally mandates the protection and conservation of migratory birds
- Substantial numbers of waterbirds are killed annually in fisheries making waterbird bycatch a serious conservation issue and a violation of the underlying tenants of the MBTA.
- The goal of the U.S. Fish and Wildlife Service is the elimination of waterbird bycatch in fisheries.
- The Service will actively expand partnerships...to meet this goal.

The U.S. Fish and Wildlife Service has been involved in bycatch of birds since the early 1980's when it assessed the bycatch of birds two major fisheries: the high seas squid and salmon gillnet fishery and the Japanese high seas salmon mothership fishery that deployed gillnets and killed hundreds of thousands of birds each year. During the 6 weeks that the Japanese high seas salmon mothership fishery was in the U.S. EEZ in the western Aleutian Islands it was estimated to kill 96,000 and 251,000 birds in the two years it was studied. Both fisheries were eliminated in the 1980's because of both marine mammal and seabird bycatch.

There are over 70 species of waterbirds, mostly seabirds and waterfowl that are susceptible to being caught in various fishing gear. Generally most birds are caught in two types of fishing gear: longlines and gillnets.

Since the goal of this workshop is to find ways to reduce bycatch, I will center on two examples of how fishers have been able reduce bird bycatch; one for longlines in the Pacific and one for gillnets in Puget Sound, Washington.

Gillnets

Gillnets catch a large variety of diving ducks, loons, grebes, and seabirds throughout the East Coast, the Gulf of Mexico, in freshwater lakes, along many rivers, and along the West Coast.

Several thousand common murres and rhinoceros auklets were being killed each year during the salmon drift gillnet fishing season in Puget Sound. A study was conducted to test ways to reduce bird bycatch recommended by the fishers. Three findings are applicable to most gillnet fisheries.

The study found that by placing 1.8 meter (10%) of white twine mesh in the top of the 18 meter monofilament gillnet, bird bycatch was reduced by 45 percent while salmon catch was only

reduced by 15 percent. In contrast a white twine panel of 4.6 meters of an 18 meter net (20%) reduced bird bycatch by 50 percent but, also reduced salmon catch by 60 percent. Acoustic alerts were also tested and while they reduced bird bycatch by 42 percent and salmon catch by only 15 percent, they were found to attract harbor seals which fed on the salmon caught in the nets and exposed the seals to the risk of being caught themselves.

The Puget Sound study also found that salmon were caught throughout the day in relatively equal numbers, while auklets were caught primarily at dawn and murrelets were caught at a higher rate at both dawn and dusk.

They also found different catch rates of birds and fish over the five week season. In weeks one through three most of the salmon and auklets were caught. In the last two weeks of the season less than 2 percent of the salmon were caught and 70 percent of the murrelets were caught. This demonstrated that bird bycatch might be reduced if fish abundance were monitored and openings were scheduled for when fish were most abundant, reducing the time the nets would be catching a marginal number of target fish and substantial numbers of birds.

In 1997 the Puget Sound fishery implemented the white twine panel in the top 1.8 meters of the nets, eliminated the dawn fishing, and adopted a policy to fish when fish are abundant in order to reduce bird bycatch. Other recommendations that were not immediately implemented pending an evaluation of the effectiveness of the actions taken were:

- To implement reduction methods in Tribal and Canadian fisheries
- To monitor bird distribution and abundance so that fisheries can be closed if large numbers of birds move into an area and become vulnerable to nets; and
- To Identify traditional bird concentration areas and close those areas to fishing when birds are present

Longlines

Longline fisheries have been a problem in the Pacific for many years as there are many species of seabirds that feed at or near the surface. Generally, birds are caught in longline fisheries as they try to feed on the bait as the hooks are being deployed or retrieved. Northern gannets are the major species of diving bird on the Atlantic coast susceptible to longline fisheries, but in Florida and the Gulf other seabirds may be vulnerable.

Many studies have been conducted primarily in the South Pacific where large numbers of albatross and petrels are killed in longline fisheries each year. The longline fisheries are a major problem in the Pacific especially for albatrosses. The short-tailed albatross is an endangered species and longline fishing boats in Alaska larger than 65 feet must implement 2-3 measures in order to reduce bycatch. The fishing industry is required to fund and carry an observer on all vessels over 65 feet and the fishery is closed if two short-tailed albatrosses are killed in two years. Captains and lead fishers are required to take training and the fishing industry has responded in a responsible fashion to eliminate bird bycatch.

Much research on bird deterrents has been conducted and is being implemented in many longline fisheries. The basic concept is to keep the birds away from the hooks during deployment and retrieval.

The most common deterrent for longlines is called the tori line, which consists of a line towed above the longline with dangling pieces of plastic strips that keeps the birds from flying under them.

Some of the other methods of keeping birds away from hooks include:

- Towing a buoy behind the ship attracts birds to it and away from the hooks
- Setting through a large tube to get the hooks below the water level and out of the diving range of the birds
- Weighted lines deployed with minimal tension
- Weighted hooks so they do not float
- Thaw bait so it does not float
- Use straight shank hooks
- Dyeing squid bait blue
- Setting and retrieving lines at night
- Retrieving and deploying lines on the opposite side of the ship as offal is being discharged
- Not retrieving and deploying gear when offal is being discharged.
- Removing hooks from birds with care
- Releasing birds alive
- Not leave the hooks in discarded offal or bycatch

In a 1997 survey of the ASMFC States, all states reported from 1 to 45 species of fish are caught in gillnets. Gillnets are not allowed in Florida waters, but fish are landed from non-state waters in Florida. Nine states reported longline fisheries. Only five of the state's fisheries biologists believed they had a bird bycatch problem. I would suggest if they have gillnets in their waters then birds are probably being caught. Whether that is viewed as a "problem" is subjective.

Data from 1994 to 1996 from the National Marine Fisheries Service NE observer program shows bird bycatch occurs in most states from North Carolina through Maine. In North Carolina through Long Island Sound most birds are caught during winter and spring migration. From Long Island through Maine some birds are caught in winter fisheries but, many more birds, especially shearwaters, are caught during summer fisheries.

Knowing the temporal and spatial distribution and abundance of birds and fisheries allows us to identify areas where bycatch is likely to occur. For example, in the Chesapeake Bay large flocks of diving ducks move into the low salinity waters of the western shore rivers of Virginia and the Potomac River during early spring migration. This movement coincides with early shad and perch gillnet fishing. I would predict that large numbers of diving ducks could be caught in these gillnets.

Surveys in Delaware Bay in 1999 found almost 250,000 scoters wintering in the Bay. While gillnets were found primarily in the nearshore waters and most birds were primarily found offshore, a few gillnets were deployed in offshore waters and may pose a threat to the scoters.

Another effect of regulatory discards is the dumping of offal and bycatch from vessels. This dumping provides a good food supply for gulls. Populations of large gulls have increased dramatically because they are often able to feed on man's waste including opened dumps and offal. Large gulls are predators on many species of seabirds and ducks including terns, puffins, and black ducks. Thus, the dumping of bycatch and offal increases gull populations which requires gull management action to save birds that are preyed on by gulls.

METHODS TO REDUCE REGULATORY DISCARDS

Commander Michael B. Cerne
U.S. Coast Guard
Washington, D.C.

ABSTRACT

Introduction

Bycatch is a universal problem effecting all regions, fisheries, and gear types. Most bycatch issues can be categorized into three themes: (1) Discards are wasteful, (2) User group conflict, or (3) Protection of non-fish species. In the past decade, there has been a tremendous amount of attention on bycatch related issues by all three branches of government, industry, environmentalists, and even the international community. The Sustainable Fisheries Act, UN Code of Conduct for Responsible Fisheries, judicial rulings to protect turtles and sea lions, and several industry sponsored bycatch workshops are but a few examples. Despite all this attention and effort, bycatch problems persist in many U.S. fisheries; it is a problem that does not lend itself to easy solutions.

Reducing Discards

Below are measures employed to mitigate bycatch, with examples from North Pacific fisheries.

Effort Reduction	Based on simple principle that less effort equals less bycatch. Related measures include banning gear types with high bycatch rates and reducing fishing capacity, possibly using subsidies.
Time and Area Closures	A common, flexible practice. Can be based on season, gear, or fishery. This method is highly dependent on good science and spatial separation of target/non-target species.
Quotas	Programs range from simple to complex; can be imposed on a fleet, vessel, area, or individual trip. Prohibited Species Catch (PSC) limits, a Vessel Bycatch Allowance (VBA) proposal, and Standards for Directed Fishing are three examples representing each type of quota program. IFQs, while not a bycatch management tool, can effectively reduce bycatch and bycatch mortality by slowing down/cleaning up an olympic or derby fishery. However, IFQs can induce highgrading.
Incentives	Programs come in both positive and negative forms. Positive programs, such as Harvest Priority proposed by the AMCC, rewards those with low bycatch rates with a set aside TAC. Negative incentives have punitive measures for high bycatch, such as the Vessel Incentive Program. Quota and incentive programs require extensive observer coverage.
Market Based	Program to induce market forces to compel fishers to harvest in a sustainable manner. Standards, including bycatch standards, could be imposed for a product to qualify for an eco-label.
Conservation Engineering	The modification of fishing gear or methods to improve selectivity has wide-ranging application and seemingly endless possibilities. Highly reliant on science and technology. Examples exist in most every gear type. Modifying gear to exploit behavioral differences between the target and non-target species is an up and coming field. This approach must minimize target species loss to

	gain industry buy-in.
Utilization	Mandated retention/utilization programs aimed at minimizing waste; a controversial approach as some claim there is little conservation benefit. Alaska's Improved Retention/Improved Utilization program (IRIU) is a good example of such a program.
Prohibitions on Retention	Prohibits retention of certain fish based on size, sex, or species. Eliminates incentive to target such species, but minimal incentive to avoid to begin with.
Voluntary Methods	Industry has voluntarily implemented some innovative, very successful methods to reduce bycatch and discards that represent a variety of the above measures. Examples include: <ol style="list-style-type: none"> 1. Long line careful release program for halibut has reduced bycatch mortality. 2. Penalty box system during Joint Venture fisheries reduced bycatch of crab/halibut by 90%. 3. Food Bank donations of trawl caught salmon and halibut is now 2nd largest provider in U.S. 4. Real time bycatch reporting system, Sea State, has reduced bycatch, increased TAC. 5. Salmon Research Foundation; \$20 donated to bycatch research for each bycatch salmon.

Conclusion

Bycatch is a complex issue. It will likely take a combination of practices to mitigate bycatch problems in any individual fishery. Below are some rules of thumb for developing measures to reduce bycatch and discards:

1. Involve industry. Industry brings expertise to the table that scientists or resource managers may not have, and secondly, it obtains buy-in from the population most impacted by bycatch regulations.
2. Conservation engineering is a relatively new field with great potential.
3. Observers open up many options otherwise not available.
4. As with all resource management, good science plays a key role.
5. Consider the law enforcement implications of proposed measures. An unenforceable measure, or one that requires intensive law enforcement resources to monitor, is less likely to meet conservation objectives.

Appendix C
Breakout Group Summaries

Regulatory Discards Workshop
February 6-7, 2001
Group #1

Members

Doug Grout
Mike Pol
Jim Music
Jon Lucy
Glenn Ulrich

Kent Lind
Ian Workman
Philip Haring
Rudy Lukacovic
Laura Lee

Causes of Regulatory Discards

Majority feels that each of the following could potentially fall under each of the five topics

- Size limits & Bag limits
 - S** Concern that, in recreational fishery, fishers may go through a number of fish (hook and release) before catching fish of legal size
 - S** Commercial fishermen held to recreational size and bag limits - little chance of live release
- Value and Abundance
 - S** Inverse relationship between value and abundance
 - S** Need to put limits on most valuable species
 - S** In multi-species fisheries, can't catch one fish without catching another
 - S** Lack of selectivity in fishing gear/practices
- Paradoxes in Magnuson-Stevens Act
 - S** Requirement to rebuild over-fished fisheries by reducing fishing mortality rates while at the same time minimize discards (reduce by-catch)
 - S** Trip limits often cited as reason for discards but may actually be solution - allows fishermen to land something they are going to encounter but may not otherwise be able to land under reduced F targets
- Insufficient incentives
 - S** Fishermen may want to minimize discards but can't afford to do it
- Non-selective gear
 - S** Extending use of non-selective fishing gear into new or existing fisheries without fully determining the limitations of that fishery
- Fishing effort/power too high
- Different fish species don't recover at the same rate

- Economics
 - S** Limited access programs are a cause of regulatory discards - if don't have permit, have to discard potentially valuable species
 - S** More economically efficient to fish non-selectively (if you can get away with it)
- No take / Protected species status
 - S** Differences in statutes between regions (e.g. size limits different in state vs. federal waters)
- Inaccurate or insufficient stock assessment
 - S** Poor assessment (quality of data) may suggest stock is in poorer shape than it actually is which may lead to unnecessary management regulations and discards
- Insufficient enforcement resources
 - S** For example, restricting effectiveness of gear devices (liner use, marsh grass to block BRDs)
- High-grading (commercial and recreational)
 - S** Fishing tournaments
- Rolling/seasonal closures with trip limits
 - S** Efforts to restrict F lead to management measures which lead to regulatory discards
 - S** Allows fish to "bunch up" for several months and when open again, high densities and low trip limits lead to high discard rates
- Political process
 - S** Leads to compromises that result in higher discards
- Interaction of multiple management measures have unintended consequences
- Irrational fishing practices
 - S** Certain fishers would rather have big catch, even if it includes discards
- Catch and release (institutional encouragement of discards)
- Regional management that doesn't take into account regional differences in species composition/range/abundance/individual stocks

Gear Technology

Recommendations

The first two recommendations are in order of priority. Other recommendations are not prioritized.

1. Process solution

- Make it easier and provide incentives for gear solutions (specifically, incentives for fishermen - discussed example where demonstration of solution showed fishers how they could benefit, therefore they were more inclined to adopt new technology; some fishers are paid to test new gears and so are motivated financially to explore new gear technology)
- Make process more conducive to development of improved gear technology
- Particularly concerned with difficulties in federal process of permitting experimental and exempted fishery programs
- Note that Georgia (Gulf and S. Atlantic in general) is liberalizing the gear technology testing/permitting process
- Alaska does not seem to be as frustrated with the process
- Experimental fisheries are often proposed as a mechanism to circumvent management restrictions (necessary to have a legitimate permitting process but one that is more conducive to innovation)
- Cost of developing gear solutions should be compared to cost of discards (need to know cost of discards – discards should cost more) as a way of justifying gear development programs and also consider this cost of development to cost of lawsuits based on violations of state and federal regulations (cost of discarding very high)
- Incentives to use cleaner gear (eliminate regulatory barriers and demonstrate economic benefit to developing/using cleaner gear)
- System needs to be designed so there are incentives to improve gear technology to reduce by-catch
- Fishermen are looking for a way to do the right thing without costing too much (asking them to make too many sacrifices without reaping the benefits)
- Reduce process obstacles that prevent testing of experimental gear technology
- Likely to be accepted by management
- Use of vessel permits (or experimental contracts) for experimental fishing to allow access in prohibited or restricted areas
- Plenty of economic incentives - For example, in scallops exemption anyone could get in (with restrictions) and funding for observers came from % of TAC
- Potential conflicts with other species management (depends on process modifications employed to improve gear solutions)

2. Establish national gear research laboratory

- One key to this is to work with industry
- Ties to incentive program, have some fishermen who are creative and can be very helpful in developing new technology
- Important to involve industry - If include industry, would likely be accepted
- Should be accepted by managers
- Ideally have a national lab with regional offices
- Should all have flume tanks
- Common goals for different constituents
- Someway for industry to have a literal buy-in (i.e. fuel tax, landings set-aside, excise

- tax on gear)
- May have some opposition from environmental groups who would like to see elimination of fisheries
 - Cost savings through centralized operation of high-cost components such as flume tanks
 - Serves as a focal point for exchange of information and ideas among regions and internationally

Learning more about fish behavior

- Films are useful in allowing observation of fish behavior in relation to gear
- Understanding fish behavior is key to making gear solutions work

Need to be careful not to implement gear solution before fully fleshing them out

More specific implementation of Sustainable Fisheries Act with List of Fisheries

Region-wide gear research coordination

- May be some value to form more formal relationships to solve specific problems

Liberalizing some of permitting process

- Allow fishermen to more easily test gear/equipment because they are more aware of specific problems
- As of now, process is not conducive to allow industry to come up with ideas

Federal funding

- Allow provisions for funding so any entity (i.e. state, area) can properly evaluate gears (note: GA uses federal AFCMA funds for this)
- To properly evaluate, need observers in the field
- Expand observer program to incorporate experimental fisheries
- If there were more observers available, can get more

Education of industry

- Don't get enough information to industry relative to long-term benefits of gear technology
- Very poor PR in getting accurate information to the fishermen in a timely manner
- Videos are a good method for demonstrating benefits of gear technology
- Educate fishermen about the objectives of management regulations

Law Enforcement

Recommendations

The first two recommendations are in order of priority. Other recommendations are not prioritized.

1. Aligning law enforcement objectives with management objectives

- Give law enforcement some flexibility by educating them about the objectives of regulations (for example, distance between floats not as important as obtaining a clean catch)
- Clean catch may be more important than regulations (law enforcement responsible for enforcing regulations)
- Balancing enforceability of regulations (measurable and objective rules) with intent of the regulation (eg. Minimize bycatch)
- Improved communication between enforcement and councils
- Educate law enforcement officers about objectives of regulations - they are primary contact between managers and fishers and not always aware of what the regulations they enforce were designed to accomplish
- Coast guard making a good effort
- Law enforcement needs to be connected to management objectives
- Management needs to be aware of law enforcement concerns in terms of feasibility of enforcing regulations

2. Better follow through with legal process

- Need stronger penalties that will be imposed (not just on paper) on violation of by-catch rules
- When someone is ticketed and hires lawyer, feds may back down
- Educate judges of the importance of enforcement

Reduce need for law enforcement through incentives for compliance and achieving management goals

- Example: shrimp grate in New England, when fishers used it properly and made more money, others were likely to adopt technology
- More industry initiatives through voluntary programs (co-management, peer enforcement)
- Too long in command-and-control approach

Increased law enforcement presence to validate those that do obey the laws

Regulatory Discards Workshop
February 6-7, 2001
Group #2

Attendance:

Byron Young
Sam Martin
David Taylor
Susan Wigley
Scott Steinback
Doug Forsell

Bruce Knight
Dan Schick
Eleanor Bochenek
Anne Jackson
Harley Speir
Darren Benjamin

General Discussion on Causes of Discards

The group began with a general discussion of several of the topics identified for breakout group discussion. The discussion included identification of causes of discards and possible solutions.

Management*Causes*

- Insufficient data on bycatch - Baseline data are missing. We need better data on the amount of discards, their age structure, and their mortality rates. This is important for improving estimates of fishing mortality rates used in stock assessment.
- Use of variable, species specific mesh regulations - A single, larger uniform mesh size could potentially be used.
- Single species management strategies, particularly size limits and season/species restrictions.
- Management process - Agencies fail to recognize how regulations affect industry, or how fishermen will respond to management measures. We need to recognize behavior up front, and how this behavior will change in response to various regulations.
- Gear technology - We need more effort, funding, and research. There has already been quite a bit done on gear technology and mesh sizes, and this needs to continue. Limit net size. Match technology to fisheries situation. We need to better understand how to tune gear to catch/avoid certain species. We need to examine new gear designs.
- Insufficient real-time data - Using a vessel tracking system will help provide a feedback of observations. Examples of this include the scallop and yellowtail fisheries. Data on size, age, distribution, and mortality are essential.

The group discussed two alternative management options: landing everything versus having bycatch. The landing everything option is easier to obtain the necessary data. However, if all fish are being brought in, minimum size would be reduced and consequently the allowable catch would be brought down. In the Canadian fishery there are incentives to fish for larger fish by using bigger mesh. Closure of areas with small fish is common.

The group discussed the need to consider anecdotal information. To do so requires a standard data collection protocol. This would include fishermen input, additional fishery-independent data

(including cooperative surveys), and additional monitoring. A cooperative fisherman survey could be used to collect data on lengths, bycatch, tagging, and aging. Such a survey would be beneficial to scientists, fishermen, and managers.

Possible solutions

- Stop derby fishing and reduce over-capitalization. In the Maryland summer flounder fishery seven boats are authorized for the ocean trawl fishery. They have a gentleman's agreement to split the quota evenly between them. This fishery thus becomes self-regulating. But this approach may not work for a large fishery with many boats.
- Buy-back programs to limit entry into the fishery and prevent overcapitalization. The group discussed trade-offs between open access and limited entry management scenarios.
- Provide incentives to reduce bycatch. Provide TAC set-asides. A long-term benefit of reduced bycatch would be an increased individual harvest rate.
- Retain bycatch for research data. Should boats be paid for research catch?
- Even quotas through the year. The race for fish is a problem. Consider staggered openings.
- Initiate effort controls rather than quotas in order to limit fishing mortality.
- Give the fishermen some of the responsibility / self-control, through the use of IFQ's. IFQ's allow fishermen to focus efforts. Ownership rights to the resource have problems associated with them.

Enforcement

Issues

- Regulations are useless unless they are reasonable to enforce.
- Too few enforcement staff.
- Closed areas - There is an increasing need for vessel tracking systems. VTS is considered an invasion of privacy but it is still worthwhile. Closed areas can be valuable in keeping small fish protected. Real-time spatial information on the distribution of juvenile fish would be beneficial. We should consider using fishermen's data in conjunction with fisheries dependent and independent surveys. The problem is how much detail can we put into making areas large enough to avoid making a mistake. Management's reaction time is too slow.

Protected Species

- Nervous about a zero-take on potential interaction. The group discussed an example of Alaskan fishermen figuring out how to avoid bycatch of albatross. In this example, the captains were educated on the need to avoid albatross, and it was successful.
- Very inflexible rules.

Major issues

Based on the issues identified during the general discussion, the group identified the following as the major issues relating to discards. The first four are in order of priority. Subsequent issues are not prioritized. The group then discussed some possible solutions as time permitted.

Top four issues related to discards

1. Insufficient bycatch data for use in stock assessments and decision making

Fisheries data, especially data on bycatch and discards, are often either insufficient or not available in time to be incorporated into the decision making process. Better information needs to be collected on bycatch and discard mortality. The group recommended that increased collaboration with the industry is important for improving collection of bycatch data. Industry is willing to cooperate in the data collection process and industry collected data might be useful to fill in existing data gaps. Set-asides from quotas for research purposes could be used to fund this type of work. For example, \$15 million in 2001 and 2002 have been appropriated for this in a few fisheries. It was recognized that standardization would be very important when using industry data. This will include detailed planning, the development of strict protocols, and comparison tows.

Adequate and appropriate spatial coverage is also important in research sampling. Various viewpoints on sampling methodology held by industry and researchers need to be considered when discussing protocols for joint industry/research sampling. Alternative sampling strategies, such as those used in Gulf of Alaska crab surveys, should be considered. Examples of successful cooperation between industry and research include the scallop fishery on George's Bank, and the surf clam fishery.

The group also expressed concern over the timeliness of data. Steps should be taken to improve data management protocols to speed the turn around time of data used in management. The group agreed that real-time data collection using methods such as GPS, VMS, and wireless transfer of data is important for incorporating more timely data into the management process. Further, real-time data may enable managers to more rapidly assess and react to within-year emergency management needs.

Increasing funding for sea sampling, research, and study fleets are several possibilities to improve data collection. Sea sampling is expensive but very important. The use of study fleets would allow cooperative fishermen to report accurate data on discards. Industry surcharges would help

pay for this work, in a manner similar to the Wallop-Breaux funding for recreational fishing. However, sole responsibility of funding should not fall on the industry. Other funding solutions could come from fish buy-backs and sales, and from fines collected through fishing violations. One way to reduce costs may be to use industry resources.

Consideration should also be given to the use of anecdotal information into stock assessments and management. One important component would be to improve the system of on-board observers. It was recognized that anecdotal information must have a management capability in order to be useful. Some information is difficult to quantify or just not appropriate. Other information is fragmentary due to mixed cooperation from the industry. Improved industry cooperation and a consistent reporting system from all fishermen are important. Combining trip records and anecdotal information in real time would be helpful. It was noted that improved industry cooperation may come when fishermen begin to see how their anecdotal information is used in management. The result would be a positive feedback loop. Equally important to reporting of this information is having a structured system to verify the information. Still, integrating this information into management remains to be the fundamental question.

2. Quota management / small trip limits / derby fishing

Quota management, through the setting of TAC restrictions, sets up an economic incentive for derby fishing which contributes to excessive bycatch. Small daily limits also increase the potential for discarding. The group noted that the real issue is to prevent the catch of non-targeted or non-desirable species in the first place.

The group recommended alternative management measures to quotas. The use of period trip limits were a preferred alternative to daily trip limits because of the reduction of derby fishing.

The group also recommended eliminating discards by moving bycatch into limited harvest opportunities. To be effective, the allowable harvest must be small enough to prevent targeting of an otherwise non-targeted species. It was noted that if a species has high discard survivorship, an allowable bycatch harvest of this species could increase rather than decrease the fishing mortality of these species.

The group discussed eliminating daily trip quotas by using a one-size mesh restriction (e.g. a 6" bag), and requiring fishermen to keep what they catch. It was noted that there would need to be an overharvest trigger mechanism in order to be able to cap the seasonal harvest and prevent overharvest. It was further noted that this solution might provide fishermen with an economic incentive to discard bycatch, due to costs associated with processing, packing, and delivering bycatch to the market, coupled with low market prices on undesirable species. Enforceability of this option is difficult at sea, unless on-board observers or other monitoring methods are used. Having observers on every vessel is cost-prohibitive, especially for small-scale fishermen. Electric monitors invoke images of "big brother", and may not be realistic or appropriate.

Another suggestion was to utilize bycatch for other practical uses outside of the marketplace. An example of this includes contributing bycatch to science for biological sampling, medicinal

purposes, etc. Another example is to donate bycatch to food banks and other philanthropical venues.

The group did not come to a consensus on the topic of “menu fishing” as it relates to the use of different gears to fill multiple quotas on a single trip. While a single gear restriction would limit menu fishing and reduce bycatch, it is economically inefficient for some fishermen. The group also discussed the need to account for the sale of recreational harvest.

3. Size of fleet / overcapitalization

The group discussed how overcapitalization leads to competition, which leads to reporting problems and non-compliance. Coupled with this is the derby fishing effect, in which fisheries invest in methods to catch and process as much fish as is possible within an allotted time frame or TAC. This has a “tragedy of the commons” effect, and increases discards and non-reporting problems.

The group recommended limited-entry systems as a way to reduce overcapitalization, but noted that this was a complex issue and would need to be determined on a fishery-specific basis. Key questions remain. For example, should individuals or vessels be limited? North Carolina law prohibits limited entry management. In Rhode Island, individuals – not vessels – are licensed, which leads to individuals fishing for multiple species. When reducing the size of the fishery, how will it be determined which individuals/vessels can keep their licenses? A “use it or lose it” policy may result in increased usage, and increased discards. Further, the loss of little-used licenses will not significantly reduce discards. Another option would be to allow commercial fishermen, or those who rely on fishing as their primary source of income as opposed to “recreational” or “weekend” fishermen, priority access to a limited number of licenses. This option is complicated, however, by the definition of “commercial” fishermen.

Another solution would be to mandate inefficiencies through gear or technology restrictions. This would help to place fishermen on a “level playing field”, and reduce the need for excessive capital investments. Such restrictions, particularly if they result in increased fishing pressure (i.e. time spent fishing), could have negative consequences on protected species. Gear restrictions that promote inefficiencies should not exclude the use of exclusion devices and other technologies that are designed to reduce bycatch.

1. Variable mesh regulations / species-specific mesh regulations

The group recommends single-size mesh regulations in fisheries where possible, while recognizing that this mandated inefficiency may be especially restrictive in multi-species fisheries where multiple gear types/sizes are the standard.

Using a standard square mesh will reduce the bycatch of round fish species. A 6” square mesh size was suggested as the standard. Fishermen should then be allowed/required to keep all fish caught. For fisheries with a one-size mesh regulation, only nets with legal mesh size should be allowed on-board the vessel to aid in enforcement and compliance. It was noted that this regulation is already in place in some fisheries / areas. The group noted examples of fishermen

able to fill three fishing quotas on one trip by changing mesh sizes to fill each quota. Doing so, however, contributes to bycatch. It was further noted that a one-size restriction is not economically feasible for some fishermen because of the expense associated with the increased number of trips necessary to fish for more than one species. Some fishermen like the flexibility of exploring areas for fish and then using the appropriate-sized mesh to catch the species found. Others leave port with a target species in mind, and do not necessarily need multiple mesh sizes on board. It was argued that one-size mesh regulations will restrict fishermen from catching their quota all at once; stretching the catch further over time will help to keep prices up, reduce the work required to catch the fish while still providing the same income, and allow fishermen to use larger mesh and catch larger fish.

Mesh regulations must be species and area-specific. Use an on-board observer program and cooperative sampling to help ensure compliance with regulations.

The group recommends continued improvements in gear-escapement technology for non-target species. Examples include escape panels / grates on nets and devices to raise nets off the ocean floor.

Other issues related to discards

- **Single species management measures**

Management efforts should be coordinated for species commonly caught with the same gear or in the same areas. The group noted cases where uncoordinated seasonal restrictions contributed heavily to bycatch.

The group discussed the complications between “single-species”, “multi-species”, and “ecosystem” management. The current question is how to do multi-species or ecosystem management. The current method separates species assessments in a multi-species management, and can result in uncoordinated management. To address the discards issue, multi-species management needs to be approached in a whole new way. There is a need to know the population status of every species in a multi-species fishery, and this information needs to be incorporated into the decision-making process. Complicating this is what do if one species is in trouble while the other species is/are not. How does one manage to rebuild the stock of one species while still providing a fishery for the other species?

Provide economic incentives to enable the fishermen to figure out how to reduce the bycatch of uneconomical species.

- **Minimum size limits**

Bycatch, by definition, includes non-targeted species and/or small fish of targeted species.

Reducing size limits will reduce the bycatch of small targeted species. However, this will result in an increased fishing mortality and impact the population age structure, and other management measures will need to be put in place to try and compensate for this. Increased fishing mortality

on smaller fish will generate problems with spawning stock biomass. Further, an influx of small fish in the market will generate market price problems.

Minimum size limits must be coordinated with mesh size limits. The group noted that this was already the case in many fisheries.

Continue to improve fishing methods and gear technology in order to reduce bycatch of large fish in selected fisheries. The group noted such examples as the use of the “whiting grate” in the whiting fishery, and the use of turtle excluder devices (TEDs).

- **Management reaction time**
- **Seasons**
- **Stock recovery (plugging nets / catching smaller fish / catching whole schools)**
- **Lack of application of best technology (related to mesh / trawls)**

Regulatory Discards Workshop
February 6-7, 2001
Group #3

Bruce Halgren
Lance Stewart
Therese Conant
Bill Teehan
Brad Gentner
Chris Bonzek

Craig Shirey
Chris Glass
David Pierce
Jerry Schill
Jon Lucy
Lisa Kline

General Issue - explain why protected species are included as regulatory discards

Data Collection and Monitoring

Issues

- There is a lack of innovative funding sources for observer coverage.
- Data are not easily available as a product for fishermen.
- Electronic monitoring methods (i.e., video, GPS) are not used.
- Discard programs would provide an opportunity to collect other stock assessment data.
- Different types of discards are not split out in order to track effects over time (regulatory, economic).
- There is not coastwide trip ticket program or central data depository.
- Need to increase at-sea alternate platforms for fisheries not normally covered.
- Lack of social and economic data.
- Lack of continuous, permanent data collection programs.
- Observers have competing priorities.
- Need to increase observer efforts in order to verify anecdotal information.
- Fishermen should not be penalized for discarding (i.e., taking discards off quotas).
- Fishermen are not rewarded for data gathering.
- Need data on deck practices which could lead to increased mortality.
- Need to evaluate efficiency and survivability in relation to changes in deck practices.
- Need to consider ecological benefits of discards (biological carrying capacity).
- Need to monitor gear configuration information and changes in observer program.
- Need to monitor non-finfish discards (corals, algae, invertebrates) to monitor ecological changes.

Solutions

The first three recommendations are in order of priority. Other recommendations are not prioritized.

- 1. Implement electronic monitoring (i.e., vessel tracking systems, video, satellite) for all vessels.**

- Economically unfeasible for small vessels due to expense. Need alternate funding sources to assist in purchase of monitoring equipment. Can address safety issues (VTS). “Big brother” perception (social disadvantage).
- Accepted by industry since this may reduce or replace paperwork. Needs to be sold to industry.
- Accepted by managers.
- Enforceable.

2. Involve industry in data collection and monitoring through study fleets and industry based surveys.

- Feasible
- Accepted by industry and managers.
- Voluntary so does not need to be enforced.

3. Encourage states to develop sea-sampling programs in partnership with industry and federal agencies (should be consistent with ACCSP standards).

- Feasible but need additional funding.
- Accepted by industry and managers.
- Enforceable.

Reward fishermen for data gathering (harvest rewards: higher trip limits, paying for observers, use of high tech gear, industry work up biological samples, allow video taping on vessel).

- Feasible since fishermen are getting something out of it.
- Acceptable to industry since they are being rewarded.
- May be acceptable to managers - could potentially make at-sea research more expensive and may be impossible to implement; fishermen may not participate unless rewarded
- Enforceable.
- External effects: potential complaints from industry not involved, may be constitutional problems (fairness issues).

Develop a coastwide trip ticket program and a central data depository (implement the ACCSP). Increase at-sea alternate platforms for fisheries not normally covered.

- Feasible but need additional funding.
- Not fully accepted by industry - states with existing systems need to make changes and collect more detailed data (effort, value), fishermen logbook data (area fished) may not be accurate, too much information for fishermen to fill out.
- Managers have accepted.
- Can enforce reporting requirements.
- No external effects.

Encourage alternate platforms for collection of observer data (i.e., small vessels to observe vessels that cannot carry observers, observers transferred to another vessel during sampling period).

- More feasible than putting observers on all vessels.
- Industry acceptable, but would need legal authority.
- Accepted by managers.

Collect social and economic data (data regarding the impacts of regulatory discards).

- Feasible, but need additional funding.
- Accepted by industry and managers.
- Doesn't need to be enforced since this would be a survey.

Develop innovative funding sources for observer coverage.

- Accepted by industry and managers.

Develop cooperative sampling programs with industry (i.e., industry sampling programs).

- Feasible.
- Accepted by industry and managers.

Develop a property rights based system to fund observer programs.

- Not feasible now due to legal constraints on ITQs.
- Not fully accepted by industry or managers.
- Enforceable.

Prioritize fisheries for discard problems.

- Feasible.
- Accepted by managers.
- Does not need to be enforced.

Critique logbooks for collection of accurate discard information from fishermen.

- Feasible.
- Accepted by industry and managers.
- Does not need to be enforced.

Modify observer forms to include details on gear configuration and non-finish discards.

- Feasible.
- Accepted by industry and managers.
- Does not need to be enforced.

Encourage funding and personnel to evaluate existing data to identify discard problems in relation to gear configuration.

- Feasible.

- Accepted by industry and managers.
- Does not need to be enforced.

Management Strategies

Issues

- Regulatory discards may exceed quotas when set asides are used.
- Experimental permits are hard to get.
- Many regulations (i.e., size, area, trip limits, seasons, gear specifications, quotas) have the potential for causing regulatory discard problems.
- There is a lack of trust between industry and managers.
- Need to educate fishermen in handling practices to reduce mortality.
- Increased handling in hook and line fisheries may cause disease problems.
- Need to assess survivability of discards in relation to temperature, salinity, depth, and size effects.
- Multispecies management may create another set of issues.

Solutions

The first three recommendations are in order of priority. Other recommendations are not prioritized.

- 1. Implement harvest rewards for utilizing gear to reduce discards.**
- 2. Encourage practices to decrease mortality of regulatory discards (i.e., shorter trawl time).**
- 3. Encourage gear technology to decrease mortality of regulatory discards.**

Develop ITQ systems.

Develop marine protected areas to preserve juvenile and spawner abundances.

Implement 100% retention.

Allow discards to be landed and sold to food banks.

Allow discards to be landed and sold to fund data collection, stock assessment work, etc.

Use L10 or L25 in mesh assessments instead of L50.

Gear Technology

Issues

- Major discard problems have not been identified.

- Discards in hook and line fisheries has not been addressed.
- Rare events are not addressed.
- Fishermen have not bought into programs to address discards.
- Fishermen support is required.
- Fishermen have not been included as partners in programs.
- There is not enough education.
- Industry perception is a problem.
- There are no incentive programs (i.e., industry does not internalize costs).
- There are no positive incentive programs to re-gear.
- Fish behavior around trawls has not been examined.
- Lack of understanding of basic biology (i.e., habitat, behavior).
- Many gear types are non-selective in nature (i.e., large mesh gillnets).
- There has been little effort to make gears more selective.
- Little work has been conducted to improve static gear (traps, pound nets, etc).
- Gear technology research is expensive and needs to be long-term.
- Lack of expertise to address gear technology issues.
- Mechanisms are not available to certify improvements.
- Experimental fisheries permits are hard to get.
- Continuous modification and monitoring is required.
- There is no central depository of past and current work.
- Lack of conformity.
- There are few cooperative efforts between agencies.
- Caution against “one fix” to fix all problems (i.e., area, species specific solutions).

Law Enforcement

Issues

- Law enforcement personnel are not educated about regulations.
- Many regulations are not easily enforced and management strategies are complex.
- The easiest regulations to enforce may not be the most appropriate (innovative).
- Regulations are not very stable.
- Flexibility in regulations versus enforcement capability is not addressed.
- Need to reconcile enforcement and management strategies.
- Need to evaluate enforceability of management strategies (make difficult strategies easier to enforce).
- Law enforcement personnel are not included or consulted during the development of management strategies.
- Observers are not used as an enforcement tool.
- There are no incentives for self-enforcement.
- Need support of fishermen (i.e., peer enforcement).
- Recreational and commercial issues not balanced.
- Funding is not available for high-tech enforcement efforts (i.e., VTS, gear retrieval mechanisms).
- At-sea observer enforcement is expensive.

Protected Species

Issues

- There is no quantification of gear types where mortality occurs.
- Behavior and life history that causes interactions have not been identified.
- The effects of existing regulations on causing discard problems in other fisheries (i.e., displacement of effort) has not been quantified.
- The focus is on fisheries, not gear types.
- There are no plans to reduce encounters.
- Protected species are not considered early in the fishery management planning process.
- Thresholds are not identified.
- Expectations are not reasonable or rational.
- Recovery plans are not made available.
- Funding for data gathering (observer coverage) is limited.
- Reduction of takes does not rely heavily on gear technology.

Regulatory Discards Workshop
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Group #4

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Law Enforcement

In order to evaluate law enforcement measures, they had to be associated with certain management strategies. The following is a list of management strategies identified by the group

- Minimum mesh size
- Trip limits (with and without running clocks)
- Area closures
- Seasons
- Bag limits
- Minimum/maximum size (both commercial and recreational)
- Quotas (single and multispecies)
- Gear specifications
- Gear use restrictions (time of day, soak time)
- Days at sea
- ITQ (including coupons)
- Prohibited species
- 100% retention of catch
- Permits (by gear, species, or other)
- Vessel monitoring (tracking) system
- Observers
- Limited entry
- Landing window (time of day, location)
- Gear marking
- Video (on deck monitoring)
- Escape vents (fixed gear)
- Bycatch limits (by gear)
- Gear possession (net on board when H&L fishery, net stowage)
- Reporting requirements (logbooks, trip tickets)

Enforcement concerns

- General comment – Enforceability, etc. of many of the management strategies identified above are outlined in “Enforcement Guide for Fishery Managers” document
- Need better coordination between law enforcement and fishery managers and fishery stock assessment biologists to 1) set regulations, and 2) prioritize enforcement activities – Law enforcement needs to be involved from the very beginning of the management process and FMP development (early and often); this should also include the protected species groups
- Complexity of rules confound enforcement – hard when do boarding to review all regulations, perhaps have some sort of certification system; also difficult for USCG personnel to keep up with local regulations because personnel are transferred every few years
- Penalty and enforcement boarding must induce compliance (i.e. need more than just a slap on the wrist). If probability of being boarded is low and probability of being convicted is low, then there is little incentive to comply with regulations. (This is outside the scope of this workshop and group, but could publicize (news release, newsletters) effective enforcement operations (vessel seizure, catch seizure). Protected species groups have had success working with lawyers to develop appropriate penalty schedules.
- Need to have reporting cross checks to validate data – fisherman’s logbook vs. dealer reports (ACCSP)
- There needs to be a paper trail and standardized reporting, especially between state and federal fisheries (ACCSP)
- Need to ensure enforceability of the rules (eg trap tags)
- Be careful we don’t fall into micro management, which is not sustainable
- Overcapacity of fisheries
- Concern that there’s not enough law enforcement resources under the current enforcement/management system
- Not enough awareness of current enforcement activities.

Enforcement Recommendations

The first four recommendations are in order of priority. Other recommendations are prioritized as high (H), medium (M), and low (L) priority.

- 1. Amend fishery management plans to focus on reducing overcapitalization, while protecting diversity in the fishery, as main focus of plan**

- can be done while dealing with micro-management
 - simplifies regulations (reduces number)
 - much more enforceable (number of regs, LE resource allocation)
 - both commercial and recreational overcapitalization
 - social/economic concerns (forcing out small operations)
 - threat to industry, but depends on alternatives
 - managers would respond positively with concern for social/economic issues
- 2. Consider “pulse tactics” (single and multi agency) (eg sting operations) – short term enforcement efforts focused on problem area for particular issue – tend to have high visibility and a long term deterrent effect (much longer than operation around)**
- economically more feasible
 - applies to all LE concerns, not just regulatory discards
 - bycatch related issues include gear regs, closed areas, etc
 - need to prioritize issues to identify where this would be most beneficial
 - concern that it might solve one problem, but leaves enforcement gap in other areas
 - would be most effective if heavily publicized
- 3. Increase effectiveness of integration of enforcement into management process**
- Fishery managers should set enforcement priorities
 - FMPs should include an enforcement section that outlines what is needed to ensure compliance with the plan
- 4. Need to get industry buy-in to regulations – Canadian fisheries/fleets draft their own conservation harvest plans (CHP) in order to access a fishery (otherwise it remains closed)**
- currently being implemented with limited success
 - not sure how to make it better
 - how can advisory boards become more effective?
- (H) USCG must continue to work with NMFS on dissemination and education/implementation of “enforcement guide for fishery managers.” ASMFC has similar plan that should be distributed to member agencies, and GSMFC/PSMFC**
- (H/M) To the extent possible, management agencies should strive for consistency between jurisdictions (interstate, state-federal)**
- some cases not socially/economically feasible
 - industry/manager acceptance??
- (M) Resource managers and enforcement agencies need to engage legal system to educate and ensure that penalties are effective deterrents (not just cost of doing business)**
- outside scope of this workshop

- how much control do we have over this (protected species, Canada)
 - Canada conservation impact statements help set precedents in court
 - Perhaps get industry input into what is “reasonable” penalty for given violation
 - Need outreach towards industry to advertise strategy
 - Should consider fishermen and dealers
- (M) **Recommend that ASMFC LEC develop a module within ACCSP to address information sharing between jurisdictions for violators –consider a central data bank with offender information**
- question whether current technology would support this
 - raises legal concerns (confidential)
 - should consider a cooperative state/federal system
- (M) **Integrate multispecies plans with regulations where possible – eg mesh size for area, multispecies quotas, include dogfish/monkfish in groundfish plan**
- subcategory of complexity issue
- (M) **Focus law enforcement efforts on shore side industry (eg dealers).**
- Shore side industry has influence on how fishermen will operate. If dealers don’t buy it because they know its illegal (undersized, out of season, etc) then the fishermen will not catch it.
- (L) **Consider alternative enforcement, such as 1-800 numbers for public/industry to report violations**
- socially and econom feasible
 - industry accepts (but false reporting is concern)
 - managers accept
 - external effects (false reporting)
 - some agencies already have a program; agencies looking to implement
 - should seek guidance of those with program
- (L) **Consider fleet/sector/fishery sanctions (fleet is penalized because of one/few offender)**
- component of Canadian fishery management system
 - must have supporting management system to make this a viable option

Protected species

Issues

- Overcapacity
- Fishing practices
- Non-fishing activities (boat traffic, habitat)
- Involve diverse groups in management (fishermen, conservationists) – they aren’t the enemy we’ve made them out to be; many of them are credible with valid ideas

- Penalties need to fit the crime
- Quality of stock assessments
- Protected species recovery increase the chance of an interaction in a fishery (Marine mammal management compensates for this with the PBR approach)
- TRT approach is a good process – perhaps could expand to other protected species
- General – priorities in protection need to be balanced with stock status
- Species are not a concern until a group assigns some social value to them

Recommendations

- Better observer programs to document interactions
- Devote more time to protected species issue than is available during this workshop (perhaps another workshop)
- USCG developing an operations plan for protected species. ASMFC, industry, states will be asked for comments. Plan includes USCG responsibilities and courses of action relevant to protected species. USCG is expanding staff base to address these issues. Plan is available on USCG website under “Ocean Steward” document.