Win-Win Bycatch Solutions

A Handbook For Collaboration

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Produced by the
National Fisheries Conservation Center

Brad Warren, Editor

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Preface

This handbook is meant as a tool for problem-solvers. It was prepared to provide guidance for participants in a day-long conference at FISH EXPO Seattle in December 1994 and for other people interested in the aim suggested by the title: *Win-Win Bycatch Solutions*.

The unintentional capture of non-target organisms has become a critical issue in world fisheries. Serious questions have been raised about impacts upon many species, including some endangered and protected marine animals. At the same time, efforts to address these problems have often bogged down in blame, rivalry, and inflammatory campaigns to banish fleets—sometimes in the face of impressive improvements in their bycatch performance. It has become clear that the parties involved must deal with the issue, and each other, before the damage to ecosystems and fishing communities becomes irreparable.

Our aim is to provide models, strategies and information to help stakeholders in the fisheries join forces to fashion their own bycatch solutions. The problems we face are complex enough to require a broadly inclusive approach. Fishing people, conservationists, fishery managers, scientists, foundations, and many others have a place at the table.

The National Fisheries Conservation Center

This handbook and conference represent the first efforts of the National Fisheries Conservation Center, a project of the Fisheries Management Foundation. This work grew from discussions with the owner and editors of *National Fisherman* , who sought a way to advance substantive problem-solving on bycatch issues. To help establish the Center, they generously provided seed-funding, office space, and—most importantly—a forum in the magazine and at FISH EXPO that has enabled us to dig hard into one of the most sensitive and difficult topics now facing the world's fisheries. A series of articles in the magazine during 1994 laid the intellectual groundwork for this project.

With the formation of the Center, we recruited a board of advisors, all respected scientists, conservationists and fishing leaders, from throughout North America. The Fisheries Management Foundation generously donated its services as fiscal agent.

About this handbook

In preparing this handbook we have had the opportunity to talk with and listen to all the sides and interests in the complex bycatch field. Our files now fill cubic yards of office space. But we won't pretend this is a comprehensive overview. We've had to leave a lot out. We've also focused more heavily on the West than on the East and Gulf coasts. Nonetheless, we have included articles on bycatch issues around the country, from harbor porpoises in New England to dolphins in the Pacific, groundfish in Alaska, and turtles in the Gulf of Mexico. The bycatches are different, the underlying issues are similar. The successful solutions—and there are some— have almost always resulted from people working together in a win-win framework.

In our survey of bycatch issues, we found an impressive array of efforts to devise solutions and to build stronger networks for cooperative problem-solving. One impediment to this process, however, was clearly the lack of access to interested people in other fields and regions. We decided to include in this handbook a directory to help people get in touch with each other.

The authors of this handbook are journalists, analysts, and consultants. Most of us

have been interested in marine conservation, fisheries policy and fisheries technology for many years. Our voices, and our viewpoints, are diverse. Several of the authors have been affiliated with organizations mentioned in this book. In a field as small as this, the price of knowledge is involvement. We welcome different viewpoints and would be glad to hear of approaches we have not covered.

Thanks

Thanks are due to scores of people for their help in bringing this handbook into existence. Among them, we want to express special gratitude to our advisory board (listed below) and to Martin Hall, Brad Matsen, and Thane Tienson. The Northwest Policy Center at the University of Washington provided early help to launch this project. We want to acknowledge the kind assistance of Guy Thornburgh at the Fisheries Management Foundation, which has embraced the National Fisheries Conservation Center as a project and provided a fiscal home. The staff of the Environmental Grantmakers Association and the Consultative Group on Biological Diversity provided early guidance; Craig Smith of Corporate Citizen offered a valuabe conceptual framework for problem-solving.

NFCC advisory board: Dr. Dayton L. Alverson and Mark Freeberg, Natural Resources Consultants; David Harrington and Duncan Amos, Georgia Sea Grant; Dr. Brock Bernstein, EcoAnalysis; Capt. R. Barry Fisher, Yankee Fisheries; Jim Fullilove, *National Fisherman*; Ken Hinman, National Coalition for Marine Conservation; Suzanne Iudicello, Center for Marine Conservation; Dr. James Joseph, Inter-American Tropical Tuna Commission; Dr. Jon Lien, Whale Research Group, Memorial University of Newfoundland; Mary Sue Lonnevik, Universal Plans; Mark Lundsten, Queen Anne Fisheries; Dr. Ellen Pikitch, Fisheries Research Institute, University of Washington; Paul Seaton, Alaska Marine Conservation Council; Tom Suryan, Skippers for Equitable Access.

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Win-Win Bycatch Solutions

An Introduction

By Brad Warren

A decade ago, bycatch was a word known to hardly anyone but fishermen. Some considered it merely extra fish. For others, who encountered different forms of bycatch, it was a nuisance: waste and extra work—especially to avoid protected species. They did what they could and kept fishing.

Those days are gone. Bycatch has swelled from obscurity to outrage. Since the late 1980s, impressions of wanton carnage at sea have triggered a series of powerful reactions: a United Nations ban on large high-seas driftnets, voter initiatives that vanquished a variety of fishing nets from inshore waters in several states (with more likely to follow), consumer boycotts and federal laws intended to halt dolphin kills in the eastern Pacific tuna fishery, and other dramatic steps. Some groups are pressing Congress to impose sweeping controls on bycatch and waste in major U.S. fisheries.

Reducing bycatch and waste has become a celebrated cause in marine conservation, and a dominant issue in fisheries around the world. Research and policy initiatives on the topic have proliferated as fisheries agencies, institutes, and fishermen seek ways to deal with bycatch—and its newfound retinue of political consequences.

This is not merely a reaction to outside pressure. For their own reasons, many within the often-insular fisheries community are keenly concerned about what fishing fleets catch, and often kill, "by mistake." The terms bycatch and waste have many definitions. But no matter how they are understood, these problems tap into powerful aspirations and agendas among people who catch, process, study and manage fish stocks. Many in the fleets see their livelihoods at stake.

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The new urgency over bycatch and waste is not mysterious. It arises from the same trend that underlies most environmental strife today: rapid growth in human population and technological powers. We now have the appetite and the tools to empty the ocean's larders of many species faster than they replenish themselves. That generates public anxiety and sharpens competition for resources—putting a premium on what fleets inadvertently catch.

An important step

In 1992 fishing leaders from throughout the United States gathered for a seminal conference, the National Industry Bycatch Workshop, in Newport, Oregon. The workshop was controversial even before it started, and not only because of its topic. Conservation groups were not invited because the organizers wanted an unguarded discussion. Some fishing groups complained that the workshop included too many trawlers. And afterward, momentum appeared to flag when a series of follow-up sessions and initiatives dried up because promised federal funding never appeared.

Nonetheless, the event marked a watershed in the history of bycatch

management. It was the first nationwide effort by U.S. fishermen to confront the problem—and seek substantive solutions—before it put more fleets out of business. For too long fishermen had been ducking, only occasionally taking part in local efforts to improve bycatch-reducing methods; most just hoped the storm would pass. In Newport, industry leaders agreed this would no longer work. Capt. R. Barry Fisher, a leader among trawlers in the North Pacific, offered a challenging credo: "Know the truth and tell it."

That would plainly require research. At the time, anyone seeking to tackle bycatch problems could find only piecemeal studies and anecdotes. A welter of questions remained unanswered. How serious are the world's and the nation's bycatch problems? Which ones are most acute? Are some types of fishing gear really "cleaner" than others? Have some countries, states, or fishing fleets developed solutions that can be emulated? What are the tools, institutions, and resources available to address bycatch problems?

The Newport workshop called for a worldwide study that would form a basis for action. With funding from government and industry organizations, four independent fisheries scientists from the United States and England were commissioned to do the work. The result, now complete, is a sobering and comprehensive book, *A Global Assessment of Bycatch and Discards* (FAO, 1994), by Dayton L. Alverson, Mark H. Freeberg, Steven A. Murawski, and J.G. Pope. (Two of the authors, Alverson and Freeberg, were subsequently recruited to the advisory board of the National Fisheries Conservation Center, which produced this handbook; so was Barry Fisher).

Even firm statements about population size, catch, and the effects of fishing on non-target species are, when unpacked, usually about as trustworthy as a bedtime story.

Uncertainty and high stakes

One of the most powerful lessons to emerge from that study concerns the tentative, even illusory, character of our "knowledge" about bycatch, discards, and population impacts. It's no small feat getting hard data from an ocean whose creatures don't raise their hands when you call attendance. Despite citing hundreds of earlier studies and records, the authors warn against letting statistics give the illusion of certainty; in fact, some of the data they cited have since been seriously challenged. Even firm statements about population size, catch, and the effects of fishing on non-target species are, when unpacked, usually about as trustworthy as a bedtime story.

But what else do we have? The intuition of experienced fishing people and a soup of imperfect statistics are our best tools for understanding our own effects upon the sea.

Right now the picture isn't pretty. Since 1980, the number of overexploited major fish resources has tripled; world fish harvests have increased roughly 50% (and appear to have peaked despite continued hard fishing). In 1990, an estimated 27 million metric tons, about one third of world catches, were tossed overboard, according to the FAO study; the study's authors note that this may be an underestimate.

The study describes a global problem that is simple only in its broad outlines. The world has overbuilt its fishing fleets. That excess has produced a Gordian tangle of bycatch, waste, strained fish stocks, and economic hardship among people who depend on this resource.

With so much competition for resources, it's no surprise that bycatch is jealously watched. There is less room for "mistakes" than

there was in the days when sail power and oars powered our fishing fleets.

Fishing groups see their harvests eroded by the inability of their own or other fleets to catch only what they can use. Conservationists and wildlife advocates see an inadvertent hazard to protected marine mammals, birds, turtles, and other species. And some scientists and fishery analysts worry about our tendency to focus on just one or two coveted fish or a species of "charismatic megafauna," such as dolphins. Unless we learn to manage the effects of fisheries on a broad spectrum of organisms, they note, we may be courting trouble—and unpredictable chains of consequences, both ecological and social.

Unless we learn to manage the effects of fisheries on a broad spectrum of organisms, we may be courting trouble—and unpredictable chains of consequences, both ecological and social.

The case for moderation

Given what is at stake, the impulse to take drastic action is understandable. It is rarely wise. The reasons lie in the unforeseen consequences.

An important model of drastic action is the U.S. response to dolphin mortalities in the Eastern Tropical Pacific. The wave of indignation that finally vanquished the U.S. tuna seine fleet took twenty years to reach full force, but when it came crashing down it set off aftershocks that are still reverberating through many fisheries. The consequences of U.S. dolphin-protection policies, both for dolphins and for people, have swung well beyond their intended compass. But they have not achieved their intended aims. By the early 1990s those policies had put thousands of people out of work, defaulted a major fishery to foreign fleets, exposed the United States to heavy liabilities under international trade law, and failed in their explicit purpose to halt the practice of catching tuna by wrapping nets around the dolphins they follow.

The early years of the fishery may have made this reaction inevitable. Purse seines were a new and powerful technology in tuna fishing, and fishermen in the San Diego–based fleet were ill-prepared for the

What is bycatch?

The easiest definition is: everything fishing people catch by mistake. What constitutes such a mistake, however, is a matter we define according to our own agendas. Without understanding those agendas, there is no way to sift wheat from chaff among bycatch problems.

Some hold real ecological importance. Others do not. Many are primarily disputes about the allocation of a public resource. Others are mainly moral questions, based upon a reverence for certain creatures and a conviction that they should not be killed.

Most of us frame our concerns about bycatch in terms of principles that sound simpler than they are. It is useful to distinguish between these principles, however.

- **Conservation.** Are we endangering populations we don't even mean to catch? Are we contributing to overfishing by catching the target species at an age or sex that should be allowed to reproduce and rebuild the stock?
- **Competition for resource.** Is my neighbor, who fishes for a different species, cutting into my catch by mistake? Or do I, who covet the fish he deliberately catches with different fishing gear, seize an opportunity to smear him, his gear, and his mother with bycatch allegations so I can take his fish?
- **Morality.** Is it wrong to catch, kill, or trouble certain creatures, (even if we don't threaten their population)?
- **Waste.** Are we using what we catch? Or is our catch of immature fish depriving us of the earnings and/or pleasure we might derive from waiting to snag them when they're bigger? ---B.W.

slaughter that occurred when they switched from hook-and-line gear to the big nets. For years they had been finding prime yellowfin tuna by setting their gear where they saw dolphins—capitalizing on the tuna's habit of swimming with the mammals, possibly toward shared prey.

The nets made a mess of this practice. During the 1960s, the death toll reached devastating proportions: it is estimated that U.S. tuna seiners killed several hundred thousand dolphins annually in the Eastern Tropical Pacific. The fleet gradually whittled down mortalities as skippers and crews learned to handle the nets better and invented techniques to release dolphins alive. But progress was slow and, even before the public learned of the problem, some tuna skippers were frankly worried about their unfortunate fish-finders.

In the late 1960s they sought help from federal fisheries biologists. The first scientific assessment of the problem blew up in their faces, however. Public indignation spurred Congress to enact the Marine Mammal Protection Act in 1972, and the emerging environmental movement made hay. In the tuna industry, activists had found an enemy worthy of a crusade: a fleet that seemed, to many, to embody life-destroying greed. It made little difference that tuna skippers, under continued pressure, learned to spare dolphins more effectively and eventually ratcheted mortalities down to a fraction of past levels. By the spring of 1994 a concerted campaign by environmental groups had initiated a series of boycotts, embargoes and, finally, an outright federal prohibition on encircling dolphins in nets.

An IATTC scientist checks tuna seine net for dolphin-protection features. Brad Warren photo.

This tightening regime of dolphin protections made it increasingly difficult—and finally impossible, most say—for the San Diego pioneers of the Eastern Tropical Pacific fishery to remain in it. Some owners sold their boats overseas; others fled to the western Pacific. Their departure opened a void in the rich tuna grounds on this side of the tropical Pacific; Mexico and other countries expanded their seine fleets and filled it. They still fish (albeit carefully) "on dolphins."

For better or worse, the triumph of dolphin-protection campaigns pushed the fishery beyond the reach of U.S. law. The country resorted to embargoes that, under international trade law, have been ruled illegal. As a result the United States could be held liable for economic damages to Mexico and several other nations for excluding millions of dollars worth of fish imports.

In circumstances such as these, the unintended consequences of our policies can overtake the intended results. Banning fisheries or fishing methods to reduce bycatch may "work" in some respects. But often these measures shift fishing pressure in unforeseen directions, producing new bycatch problems—or perpetuating old ones that are beyond our scrutiny and control. Some fisheries experts argue that U.S. dolphin-protection policies (especially the embargo affecting the eastern Pacific) have boosted demand for tuna from other tropical oceans where

Banning fisheries or fishing methods to reduce bycatch may "work" in some respects. But often these measures shift fishing pressure in unforeseen directions, producing new bycatch problems—or perpetuating old ones that are beyond our scrutiny and control.

dolphin mortalities are not as well regulated. The ban on encirclement of dolphins may also encourage the use of alternative fishing methods that rake up multitudes of juvenile tuna and increase bycatches of potentially vulnerable species: sharks, mahi mahi, wahoo, and others.

One unintended consequence of the tuna embargo has indirectly benefited dolphins, at least in the short term. Other nations that fish in the Eastern Tropical Pacific reacted furiously to what they viewed as a unilateral attempt to dictate how they catch tuna and save dolphins; many suspected an agenda to protect U.S. markets, not mammals. They set out to destroy the trade restriction by proving, through their own conservation efforts, that its underlying assumptions are false.

Mexico and other countries in the eastern Pacific fleet have achieved a standard of technical virtuosity in protecting sea mammals that few major fisheries in North America could meet today.

The embargo against these nations flowed from the legal contention that their dolphin-protection standards were not "comparable" to those required of the U.S. fleet. Mocking that notion, Mexico and other countries in the eastern Pacific fleet have achieved a standard of technical virtuosity in protecting sea mammals that few major fisheries in North America could meet today.

With scientific guidance and training from the Inter-American Tropical Tuna Commission (IATTC), their fleets release most dolphins alive and fish in ways designed to avoid harm to the mammals. Mortalities have plummeted. From 133,000 in 1986, the toll fell to 3,600 in 1993. That represents a fraction of one percent of the region's dolphin populations—approximately 10 million animals—which have been stable or growing for a decade. (James Joseph, the commission's director, serves as an advisor to the NFCC).

Still, events may snap back dangerously against such conservation gains, due to yet another after-effect of U.S. policies. By 1994, many in Latin America saw the continued U.S. refusal to lift the embargo as proof of suspicions that the nation was protecting something other than dolphins. Several countries were grumbling loudly about withdrawing from the international dolphin-conservation effort in the eastern Pacific. Some pessimists feared that the tuna commission itself might be scuttled.

This possibility illustrates a crucial point. An incautious crusade against bycatch and waste may temporarily overwhelm questions about the soundness of our actions. But every action has a reaction. When those questions resurface, they carry a freight of anger, distrust, and cynicism. The backlash can damage the institutions of science and governance that make sustainable fisheries possible.

The consequences may extend to other matters of sustainability and resource use as well. It is worth noting that leaders of the anti-environmental "Wise Use" movement have found some of their most credible ammunition in the "tuna-dolphin" issue. Their aims are not monolithic: some seem determined to roll back environmental law, while others favor milder reforms. Collectively, however, their influence can be expected to rise in the new Republican Congress.

What to do

The recommendations that follow represent a view that some readers will recognize: a first stab at several of these ideas appeared in *National Fisherman* magazine.

Years of association with this magazine, in its multiple role as chronicler, critic, and champion of commercial fisheries, have informed

our work. Years of listening hard to fishing people, conservationists, gear-makers, scientists, managers, and philanthropists have revealed a binding theme: we share a small ocean. Whether we just eat fish, or watch them like a barometer of ocean health, or make a living by catching them, the implication is plain. We must come to terms with each other, or we will never come to terms with the sea.

Here are a few blueprints to guide this work:

❑ **Start now.** The road toward sound, sustainable bycatch solutions can start anywhere, but the longer we wait the less likely we are to make the journey successfully.

❑ **Recognize common goals.** Fishing people and conservationists share important aims (usually including a thriving future for fisheries and oceans), but it's easy to lose sight of them when the differences emerge. Focusing on shared goals, instead of hardening into fixed positions, leaves more room to agree on ways to get there.

❑ **No force feeding.** To have a prayer, any solution must smell reasonable, both to those who are most directly affected—fishing people—and to conservationists, fisheries managers, and consumers. Otherwise they'll spit it out and send for the lawyers.

❑ **Heed those who aim to cure themselves.** Like any community, a fleet is more likely to swallow its own medicine than any pill thrust at it by bureaucrats, rival fishing groups, or conservationists. The consent of the governed is valuable: only those who fish can "clean up" fisheries. And fishing people know more than anyone else about what goes on between their gear, the rules and incentives imposed by government, and the creatures they encounter at sea.

❑ **Abandon blame.** Among fishing people, those who blame liberally are usually trying to tar their rivals and take their fish. Among environmental advocates, blame and confrontation are wearing out their usefulness in fisheries: they stifle open discourse, breed distrust, harden players into fixed and hostile positions, and obstruct problem solving.

❑ **Ditch the cookie cutters.** No solution is likely to apply to every fishery. The astonishing variety of fish and animal behavior guarantees this. So do variations in the human side of fishing. Access-based controls, which rely on vessel quotas or incentives to promote "clean fishing," are a promising if controversial approach in Alaska, where quotas limit the total removals of most species and observers already monitor many vessels. These ideas are a much longer shot in New England or the South.

❑ **Team up or bust.** Proposing and proving solutions is a job for working groups with diverse skills, interests, and resources: groups that business-management gurus now call "cross-functional teams." These should include experts in fishing technology, biology, management, and politics; they should also include a wide range of stakeholders in the fisheries. To create such teams, veterans from many contentious camps—commercial and sport fishermen, conservation groups, foundations, government, and academia—must check their weapons at the door.

❑ **Build problem-solving capacity.** Instead of sharing notes, fishermen fish, conservationists talk policy, and governments try to stay out of trouble. We need more skilled intermediaries who can cross the culture gaps and convene the players. Critically, we need to cultivate

Like any community, a fleet is more likely to swallow its own medicine than any pill thrust at it by bureaucrats, rival fishing groups, or conservationists.

more of this leadership within the fleets: that's where workable bycatch solutions are most likely to be hatched, and where they must be carried out.

A new problem-solving paradigm

Fortunately the resources for this kind of cooperative problem-solving tend to get better as social and environmental problems get worse. The best models of this process are mostly found in fields of endeavor unrelated to ocean resources; but they hold powerful lessons for fisheries conservation.

The "Third Sector"—a term encompassing nonprofit organizations and philanthropies—has proliferated during the last decade, growing to more than 400,000 organizations in the United States. A host of smart nonprofit initiatives now complement the roles of the other two sectors, government and business: they shore up society's weak links and improve the rough fit between commerce and nature. Community development, a marginal field a decade ago, has burgeoned into an economic force: Some 2,000 nonprofit organizations have funneled more than $6 billion into economic revitalization and low-income housing.

The people behind these efforts are bridge-builders. They bring together disparate players, identify common ground, and build on it. They cultivate leadership to enable communities to solve their own problems, instead of waiting for government to do the job in its own clumsy way. They are skilled administrators, able to create contracts and carry them out. And they bring in money that government can't provide.

There is a vital need for these skills in fisheries conservation, especially in dealing with bycatch problems. The money and time available to solve these problems is limited. Federal and state fisheries budgets, already strained, are likely to shrink. They are increasingly preoccupied with the resolution of conflicts among rival fishing groups, efforts to retire excess fishing capacity, and other chores that require government authority. But many bycatch problems are susceptible to non-government solutions, particularly where negotiations can settle most serious questions before government is asked to take action. In this field, other stakeholders may need to carry some of the burden that government has borne in the past.

Crabbers worry that other fleets inadvertently take their catch; their own discards are also large. Brad Matsen photo.

One important step is simply getting to know each other. Chip Collins, a Boston-based consultant to private foundations on fisheries problems in New England, has pointed out that lack of communi

cation between fisheries stakeholders is a major obstacle to solutions. When a challenge arises, people who can bring important resources to the job often don't know each other. This problem is also chronic in bycatch issues. Without sharing insights, fishing people, gear-makers, conservationists, scientists, and other stakeholders are unable to coordinate efforts to prevent harm to marine populations and fishing communities. Our response to the resulting crises is also compromised: less effective, more reactive, and more likely to trigger unforeseen consequences.

Too often, promising bycatch approaches that arise within the fleets die without a trial run. Few skippers have the capabilities for analysis, proof, and advocacy that are required to turn an isolated idea into a fleetwide solution. And while many science, advocacy, and conservation groups have the skills to fill that gap, few of them possess the first prerequisite: the trust of the fleets.

This is starting to change. Some scientific and advocacy organizations have begun to assume an intermediary role. They include consultants, Sea Grant agents, aquariums and bird observatories, a few university scientists, and others.

Conservation leaders could borrow strategies from scientists who have learned to work effectively across the culture gap with fishing people, and from professionals in "change" fields such as union organizing.

What conservation leaders can do

The policy staff of marine conservation groups could play an important role in this process if they developed better relations with fishing people. In many cases, they do not know fishing people well enough to work with them instead of against them. They have tended to fall back on the familiar tactic of pressuring government to provide solutions—often resorting to litigation, legislation, and media campaigns that criticize fishing practices. One unintended result, especially when the criticisms are based on inaccurate information, is to alienate members of the community they seek to change.

To do better, conservation leaders could borrow strategies from scientists who have learned to work effectively across the culture gap with fishing people, and from professionals in "change" fields such as union organizing.

❑ **Work hard at sea.** Fishing people respect scientists who come out and get wet, cold, dirty, tired, and seasick—and still keep working. They respect conservationists who do the same.

❑ **Listen well.** Fishing fleets have traditions. Mark Lundsten, an Alaska longline skipper and NFCC advisor, views these traditions as "long conversations" that date back for generations. They convey the accumulated wisdom of skippers and crew, just as the canons of literature convey the accumulated wisdom of authors through the centuries. "You don't interrupt," Lundsten says. "You learn how to participate."

❑ **Build on common ground.** The problems facing fisheries conservation are international in scale. Since countries and cultures have their own values, it is nearly impossible to craft and enforce conservation accords based on convictions that are not universally shared. Rushing for moral "high ground" means forsaking much wider shared ground. In the end, this approach provides a brittle and narrow foundation for a large and critically needed enterprise: global conservation of living marine resources.

Since countries and cultures have their own values, it is nearly impossible to craft and enforce conservation accords based on convictions that are not universally shared.

❑ **Hire with care.** A conservation organization's credibility among fishing people depends on consistent, respectful work by every

part of the organizaton. A factually sloppy fundraising letter from headquarters, especially if it subtly or directly targets a fishery as an "enemy," may discredit years of careful work by policy or field staff—even if they aren't responsible for the slam. An individual who shows contempt for different views and values will leave bridges burned years after he or she has left the organization.

❑ **Cultivate leaders inside fleets.** Experienced union organizers are adept practitioners of a principle that Machiavelli understood: profound change requires leadership from within the authority structure of a community. They learn which members of a workforce are well-respected, then patiently work to win their help before trying to recruit the whole workforce. Often, they cultivate new leadership skills in these key players—in effect, empowering them to redefine the conditions of their employment. Community organizers in the Industrial Areas Foundation and its affiliates use similar strategies to develop local leaders who can address a wide range of problems in their neighborhoods, from joblessness and housing to environmental concerns. This kind of organizing work is proven and effective. It is also rare in fisheries conservation.

What fisheries leaders can do

To stay in business—avoiding both political and biological calamities—fishing fleets will need leadership capacities that were not as important in the past. Most fishing people around the country have until recently enjoyed a degree of freedom and privacy. Nobody watched them. Nobody judged them. They liked it that way.

Rising pressure on fishery resources has brought new scrutiny and new players into the politics of fishery management. This places new demands on fishing leaders.

Rising pressure on fishery resources has brought new scrutiny and new players into the politics of fishery management. This places new demands on fishing leaders. Their capacity for coalition building, particularly with conservationists, is now critical to their survival. So is their ability to confront hard problems in bycatch and other conservation matters with a creative and open mind. Present-day fishing leaders can take several steps to meet this challenge:

❑ **Develop bycatch-reducing fishing methods.** Widespread alarms about bycatch and waste bring more constraints on fishing. To meet the new standards, "fishermen will have to lead the way in the development of improved or alternative ways of fishing," notes Martin Hall, chief scientist in the IATTC's dolphin conservation program. Some fishing industry groups already fund research and development efforts in this area, such as the Salmon Research Foundation, North Pacific trawlers reduce salmon bycatch.

❑ **Improve utilization of the catch.** Apart from prohibited species, the case for using more of the catch is strong. That way less gets discarded. Some fisheries leaders think even prohibited catch should be brought in and donated to food banks—which is what happens now to salmon caught by Alaska's major trawl fleets. It's worth exploring whether and how this might be done elsewhere without undermining basic conservation and management aims. In addition, new processing and marketing methods could put more wasted fish to use.

❑ **Cultivate conservation in the fleet.** Taking the helm on this issue from within the fishing fleets is the best way to keep strangers and governments from seizing the initiative. To stay in charge requires

staying on top of the issue.

❑ **Welcome the newcomers.** Nothing sharpens the unease of conservationists like the cold shoulder they often get in fisheries gatherings. This visibly increases acrimony. Most of the newcomers (only a few are veterans here) mean well, even when they lack the grace and knowledge of old hands in the fleet. Most show up because they share the common aim of keeping oceans and fisheries in good shape. And they can be valuable allies in other ways, as several environmental groups have shown by standing up for the IATTC's successful dolphin-conservation program (under attack by groups that want a ban on all encirclement of the mammals).

❑ **Restructure fishing associations.** These days most of them are chronically anemic, underfunded, and short on human resources. Burnout is endemic. Where catches are declining (West Coast salmon, for example), landings-based dues structures have collapsed. In some areas old fish-grabbing missions are lapsing, replaced by conservation challenges: avoid bird entanglement, protect habitat, prevent stock collapse, reduce excess fishing capacity. The future of some organizations (and fleets) may depend on revamping their agendas, securing nonprofit status, and raising philanthropic funds explicitly to support resource conservation purposes.

The future of some organizations (and fleets) may depend on revamping their agendas, securing nonprofit status, and raising philanthropic funds explicitly to support resource conservation purposes.

For some of these steps, a few good models have begun to appear. The Pacific Coast Federation of Fishermen's Associations (PCFFA), in Sausalito, Calif., has cultivated conservation-minded fishing leaders for years. The organization's quarterback for habitat issues, Nat Bingham, for instance, has become adept at building common ground with a wide variety of land-owning and timber communities whose activities affect salmon.

The Institute for Fisheries Resources, an offshoot of PCFFA based in Eugene, Oregon, is also a promising example. Glen Spain, an attorney and fisheries specialist, has created the IFR as a conservation organization, not a trade association, and has begun to build ties between fishing and conservation groups on shared concerns, including habitat and bycatch issues.

Elsewhere, three models for such teamwork focus directly on bycatch issues:

1) The Harbor Porpoise Working Group, in New England, has provided a forum for conservationists, fishery managers, and fishermen to find common ground. This process laid the groundwork that enabled nonprofit scientific groups and a private foundation recently to break a deadlock between fishermen and the National Marine Fisheries Service over research methods for determining whether a net-mounted "pinger" can reliably warn porpoises away from gillnets.

2) Negotiations on the Marine Mammal Protection Act brought together conservation and fishing leaders from across the country to forge a common agenda for amendments in 1988 and 1993. Partici-

North Pacific longliners hope a new quota system will curb their bycatch. Brad Matsen photo.

pants on both sides say this effort helped take the panic out of their relations and, despite some rough spots, provided the framework for nearly all the changes Congress wrote into the law during 1993. The Keystone Center, in Colorado, provided a skilled facilitator to guide the negotiations in 1993, enabling participants to stay on topic and avoid needless conflict.

3) Cooperative efforts by fishermen, federal fishery managers, and conservation groups in California during the mid-1980s sharply reduced entanglement of whales and birds in gillnets. One conservation leader, the Point Reyes Bird Observatory's Burr Heneman, was impressed with advances made in this process; he later aided the gillnetters in their unsuccessful fight against a voter initiative to ban them. That initiative campaign, which portrayed gillnets as destructive and indiscriminate gear, was promoted by recreational fishing groups.

What private foundations can do

Collaboration between fishing people, conservationists, and private foundations can accelerate progress toward durable bycatch solutions and fill important gaps in our capacity to deal with these problems. In this area, private-sector donors have an influential, if indirect, role to play.

Foundations and other non-government funders cannot replace government as a primary source of support for bycatch-related research. Nor can they take the lead in initiatives that rightly belong in the hands of those whose livelihoods and professional missions are at stake. But they can maximize the effect of their contributions in several ways:

❑ **Eschew bombthrowers.** They have done what they usefully can. Now that the problems they have highlighted are on the table, the time has passed for groups that rely heavily on attack strategies rather than fostering cooperation. The reactive aftermath of past confrontations is still with us. The reverberations of those events will continue to impede progress toward sustainable bycatch and fisheries management regimes for years to come. New groups will continue to pursue these strategies, but their missions will often veil a deeper agenda to grab fish. These attacks breed cynicism and resistance, not real solutions.

Now that the problems they have highlighted are on the table, the time has passed for groups that rely heavily on attack strategies rather than fostering cooperation.

❑ **Back diplomats.** Much depends on conservation leaders who commit to a long-term, consistent presence in the nitty-gritty work of fisheries management. Only by consistently showing up and openly talking with fishing people can they rebuild the trust they need in the fleets.

❑ **Build capacity.** Nothing can substitute for leadership development and organizational strength among fishing people. Programs to cultivate conservation-minded leaders, ideally including some who are well respected in their fleets, could usefully knit together fishing and conservation groups, highlighting common aims. ❑


Brad Matsen
photo

North Pacific

Three Roads to Bycatch Control

The ferment of the North Pacific

By Krys Holmes

The North Pacific Fishery Management Council has fielded a number of bycatch proposals in the past few years. Each one has called the fishing community toward a deeper understanding of the implications of commercial fishing—what it means to our oceans, to our economy, to our values. Bycatch occurs for a number of different reasons, but the biggest reason is you can't separate one strand of the food web from everything else. Drop some gear in the water, and you're going to harvest a lot of life.

In the late 1980s a controversy ignited over pollock roe stripping: the practice of fishing just to keep the lucrative eggs, or roe. This meant discarding the carcasses of female pollock, and all the males. The uproar forced the industry to consider waste as an ethical and social problem as well as a biological and economic one. The concept of bycatch was hooked to the concept of full utilization—the imperative to use what you kill—and in the major Alaska fisheries the two have been entwined ever since.

The bycatch problem has generated a clutch of solutions. Three of them, however, involve particularly far-reaching change. Individual Fishing Quotas, Harvest Priority, and the Full Retention/Full Utilization program.

Individual fishing quotas

One approach is to eliminate the open-access race for fish that drives every participant to haste and waste. An Individual Fishing Quota (IFQ) system would eliminate the race for fish, it's generally agreed, by parceling out individual catch limits to each vessel, based on its historic activity in the fishery. Under an IFQ system, fishermen must own quota shares to fish, and those quota shares determine the percentage of the total allowable catch that each fisherman may harvest each year. The shares could be bought and sold, with limitations. Each shareholder would have most of the year, about eight months, to fish his or her quota.

Theoretically, a vessel owner would have to own quota shares for each species harvested during a fishing outing, both target and bycatch species: skippers would be required to deliver the whole works, discarding nothing. The economics of the IFQ system and the more relaxed

fishing pace (right now, some halibut fisheries are down to 24-hour derby-style openers) presumably would encourage fishermen to fish more selectively and figure out how to make money from every single fish they catch.

An IFQ program is slated to begin for the halibut and blackcod fisheries off Alaska in 1995, but a more comprehensive IFQ plan for the big-volume groundfish fleets has choked on its own politics.

Harvest priority

The Harvest Priority (HP) program, submitted to the Council in November 1993 by the Alaska Marine Conservation Council, would reward and punish vessels according to their bycatch performance: those who meet prescribed bycatch and discard standards would win more fishing opportunity, while those who fail would get less.

Under this program, the North Pacific Council would set the standards for each fishery and each gear group (trawlers, longliners, etc.), stipulating a maximum bycatch level and a standard ratio of bycatch species to target species for each haul.

The HP program would set up bycatch and discard standards for each fishery, and would also track the ratio of prohibited species to other kinds of bycatch.

The total catch limit of each fishery with an HP program would be divided into two fishing periods. The first period (the "qualifying" period) would be open to all participants, and the second would be a reward fishery, open only to vessels that met the bycatch standards during the regular season or during the previous year. Each year, the standards could be ratcheted down to encourage the fleet to continually decrease discards. During the qualifying season, on-board observers would verify all vessels' bycatch rates, at least on vessels that wanted to participate in the reward fishery. Since an observer can't count every single fish, the fleetwide average would be applied to all unobserved harvests.

The AMCC's Harvest Priority proposal is under review at the North Pacific Council and National Marine Fisheries Service. The Council will bring it back to the table for consideration sometime in 1995.

Why fish goes over the side

Fishermen discard fish for a number of reasons. Here are three of the big ones:

- **Prohibited species.** Sometimes fish are discarded because they are prohibited species. Halibut are a prohibited species in any North Pacific trawl fishery, for example, so trawlers are prohibited from retaining them on board.
- **No market.** Sometimes fish are discarded because there's no market for them, and processors won't buy them. Arrowtooth flounder, which share the sea bottom with sole and other species, are commonly discarded in the flatfish fisheries for this reason.
- **Wrong size.** Sometimes fish are discarded because they are too small. Halibut fishermen, for example, have to throw back any halibut under 32", and pollock trawlers frequently discard pollock that are too small to go through the filleting equipment. —K. H.

Full retention/full utilization

The Full Retention/Full Utilization (FR/FU) program, proposed to the Council by the State of Alaska, approaches bycatch and discards from a very different point of view. If FR/FU were adopted, fishermen would have to keep and land all the groundfish they caught, with a few exceptions. The only fish that could be discarded would be of several classes: those for which no total catch limit is set because they're not desirable fish; and

A Tangle of Questions

It seems simple, at first, to design an incentive program that rewards fishermen for decreasing bycatch, and that ratchets down acceptable bycatch levels each year until the problem is solved. But the two proposals under consideration—Harvest Priority and Full Retention/Full Utilization—like all the proposals before them, raise a tangle of questions.

The Harvest Priority program would reward fishermen mightily for meeting or beating a stipulated set of industry standards. But which fisheries should be included in the HP program? How should the total catch limit of each species be apportioned between the two seasons and among all the different fisheries that take that species? How would bycatch be measured aboard catcher vessels that don't even bring their catch on board, but instead transfer the full end of the trawl to a mothership for processing at sea? And how can the program be designed to compensate for uncertainties in our knowledge? Until a technology is developed for measuring every single fish that comes aboard a boat, fishery managers have to use a combination of data gathered by on-board observers and data extrapolated from observers' information. Could any fishing company legally be excluded from the reward fishery based on extrapolated data? Vessel incentive programs have crumbled under this problem alone.

At what point would the increased costs of total observer coverage (and no single on-board observer could possibly sort and document every haul) destroy any incentive to participate in the reward program? The Magnuson Act requires that managers conserve marine resources, and that they manage each fishery to return the greatest benefit to the nation. If a program decreases bycatch but becomes too expensive to enforce or to comply with, does it benefit the nation?

The Harvest Priority proposal suffers an additional handicap. It was proposed by a conservation group, and its prime champions are not in the mainstream trawl or longline fleets. Building consensus out on the grounds could be difficult if the proposal doesn't win the help of these fishermen in crafting it into a workable program.

The FR/FU program is a simple concept, but it requires that the industry think hard about what full utilization really means. It also would require that we reorganize our ideas about some fisheries—salmon and halibut, for example. Should trawlers be allowed—or required—to land the salmon and halibut they catch? Rather than creating an incentive to decrease bycatch of these species, critics say the program would simply hand over a portion of those fisheries to non-traditional gear groups. Is this fair to the coastal communities that depend on salmon? How valuable to the nation is our traditional way of conducting our fisheries?

The concept of "full retention" would have to be defined, and perhaps those definitions would be different for a catcher vessel, a factory ship, a mothership, a shore plant. How should arrowtooth flounder or other underdeveloped fisheries be treated? Should fishermen be required to retain, and processors to process, species for which there isn't a ready market? What constitutes a "product for human consumption"? And what if nobody wants to buy that product?

The warp and weft of bycatch issues tangle the community of seafood producers, conservationists, and scientists in the many meanings of stewardship. What is the ideal bycatch level? How can a program that reduces bycatch but ignores other kinds of waste (fuel, labor, and so on) hope to return the maximum benefit to the nation? How should the value of one fish to a target fishery be compared to the value of that same fish as a bycatch species? Each question leads back to one main question: How, on this Pacific edge of the richest biomass on the globe, are we to live? ---K. H.

other species that have a catch limit but are under exploited.

The FR/FU program would also require some percentage of the total catch (50, 70, or 90% are suggested) to be processed for human consumption. This means, for example, that 50% of the gross mix of catch delivered to processors would have to go into food products, not that 50% of each fish must end up in edibles.

The FR/FU program would change fishing rules in a radical way. It would tell fishermen, "If you're going to catch it, you have to use it." It

would tell processors, "If you want desirable species delivered to your plant, you'll have to figure out a way to use the under-utilized species as well." The program would put a regulatory end to discards, would effectively erase the line between target catch and bycatch, and would challenge fishermen and processors to be creative, both in avoiding undesirable species and in making use of the fish that are landed. In those fisheries where bycatch can exceed target catch, this program might redefine the fishery altogether.

The halibut/blackcod tangle

The halibut/blackcod IFQ program for the waters off Alaska addresses two major bycatch problems: halibut bycatch in the blackcod fishery, and demersal shelf (bottom dwellers on the continental shelf) rockfish in the halibut fishery. Under the IFQ program, vessel owners will have to own halibut quota shares to retain halibut and can only throw halibut back after their IFQ is fulfilled. Most blackcod IFQ holders also have halibut IFQs anyway, which simply means that longliners won't have to discard as much halibut as they do under open access.

Halibut fishermen, likewise, would be required to retain Pacific cod and demersal shelf rockfish until the catch limit for those species is taken. (They can keep rockfish now, under open access, but few want to spend hold space on rockfish during a 24-hour halibut opener, so a lot of rockfish get discarded in the open access halibut fishery.) Since these are all longline fisheries, the fleet would be taking its own fish as bycatch, which means there are built-in incentives to practice careful fishing and tender handling. ❑

The "Bycatch Zone"

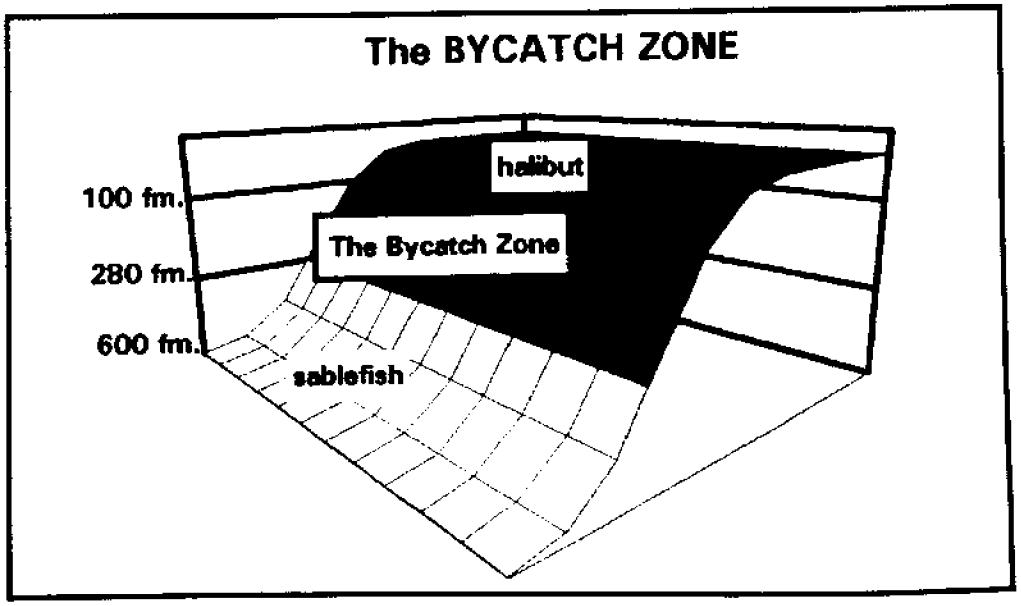
Alaska longliners hope for a way out

By Brad Warren

This illustration shows what its creator, longline skipper and fisheries graduate student Dean Adams, calls the "bycatch zone:" the depth range where North Pacific hook-and-line fleets chasing sablefish (blackcod) inadvertently haul up most halibut. The critical area is the upper flank of what fishermen often call "the edge," where the continental shelf drops into deep water. The edge separates the comparatively shallow water (less than 100 fathoms), where halibut tend to concentrate, from the depths where sablefish lurk. On the shallow end of this steep underwater hillside the two species mix it up, and longliners dangling baited hooks meant for blackcod often catch tons of halibut. In 1994, sablefish longliners racked up a halibut bycatch of around 9 million lbs. Fortunately the fish are tough, and most of them survive being hooked, yanked free and returned to the sea. But the dead add up: about 1.3 million lbs. of perfectly good fish (dressed and headed weight).

Standard regulations have long required blackcod fishermen to throw the halibut overboard, dead or alive. This measure is meant to prevent them from profiting — and thus slyly targeting — on halibut. This prized species is already fully exploited in its own directed fishery. However vital its aims, this policy creates huge amounts of waste. Both species are caught with the same gear, and many boats fish for both — participating in two separate fisheries, in each of which they toss out the fish they aren't supposed to be catching at the time. In effect, today's bycatch could be tomorrow's legal catch, but the law is plain: over the side with it.

It gets worse. These longline fisheries have become so crowded in



The Bycatch Zone: charting where fish bite helps fishermen to reduce halibut bycatch. Diagram by Dean Adams

recent years that many blackcod fishermen say it's difficult to stay out of the bycatch zone. The burgeoning fleet size has prompted government fisheries managers to restrict fishing time to only a few days a year for halibut, and only a few weeks for blackcod. The result, in both fisheries, is a mad scramble to catch fish before the short season ends. This is dangerous to skippers and crew (*Storm blowing? Tough luck: fish or go broke.*), bad for their earnings (*You want a higher price? Fine. Find a buyer whose freezers aren't plugged.*), and an obstacle to their efforts to trim halibut bycatch and discards (*Sorry, Charlie...I'm in a hurry. Next time don't bite the hook.*).

Skeptics also fear widespread cheating and loss of public control over the resource. But proponents reckon the quotas will shrink the fleet sharply, moderate the race for fish, and give fishermen a chance to avoid a lot of bycatch.

Many fishermen have embraced a controversial solution which, if it survives a legal challenge, will transform these fisheries in 1995. The new regime institutes Individual Fishing Quotas (IFQs). Under this system each quota holder gets a fixed share of the year's allowable harvest of blackcod and/or halibut, depending upon his or her catch history in past years. Not everyone welcomes this prospect, largely because not everyone gets as big a piece of the pie as they would like. Skeptics also fear widespread cheating and loss of public control over the resource. But proponents reckon the quotas will shrink the fleet sharply, moderate the race for fish, and give fishermen a chance to avoid a lot of bycatch.

The hopeful scenario behind these predictions goes like this:

- ❑ Fewer boats. IFQ systems typically provoke a wave of consolidation: successful fishermen buy up quota shares from others.
- ❑ No more short seasons. Since quota owners can catch their share whenever they want to, many will spread it out over months to maximize the price they earn.
- ❑ Less mandatory waste. Fishermen will be allowed, and even encouraged, to combine their blackcod and halibut fisheries. Those who own quota for both will be required to retain both kinds of fish until they have caught their predetermined share.
- ❑ Less crowding-induced halibut bycatch. Free from the madding horde of boats, skippers targeting blackcod alone will be able to avoid the "bycatch zone." They managed to avoid halibut almost completely until 1985; then (partly due to hard times in other fisheries) the fleet swelled, the gounds crew cramped, and bycatch climbed as boats shifted into shallower water.

Whether this scenario plays out as hoped is a matter of sharp interest throughout the North Pacific. Skeptics and enthusiasts within the fisheries and conservation communities are watching closely to see what happens. ❑

Bycatch Guidance

Practical book written for Alaska longline fishermen

By BobTkacz

Janet Smoker's *Fishermen's Guide to Catch and Bycatch*, written in a practical notebook form, shows longliners where and how to avoid bycatch. It includes week-by-week data on past seasons, showing halibut bycatch levels compared with sablefish and Greenland turbot harvest in the Gulf of Alaska and Bering Sea.

A former National Marine Fisheries Service groundfish manager, Smoker compiled the *Fishermen's Guide* with a 1993 federal Saltonstall-Kennedy grant of $37,500. Now an independent consultant specializing in bycatch reduction, Smoker works through her Juneau, home-based company, Fisheries Information Service.

She hatched the plan as a way to help fishermen take advantage of bycatch-avoidance opportunities under the new individual fishing quota system, scheduled to take effect for sablefish (also called blackcod) and halibut in 1995. The species that has prompted most bycatch concern is halibut, which is often caught incidentally by longliners seeking sablefish and turbot. "One of the things that was in my mind is that when the sablefish season gets extended because of the quota system, fishermen will have the ability to fish outside of the traditional time frames that they were used to," Smoker said shortly after receiving the grant.

The halibut fleet has long demanded that others curb bycatch of their target species. Brad Matsen photo.

The *Fishermen's Guide* shows in simple charts and graphs the harvest level of the two target species and of halibut in one half by one degree squares.

Starting with the vast Norpac database containing all National Marine Fisheries Service observer reports on the hook-and-line fishery, Smoker completed the bycatch notebook in spring, 1994. Trawler groups had prepared a similar directory years before, and Smoker applied longline data to the same plan.

"It's a time/area mapping of volume," that divides the Gulf of Alaska and Bering Sea into segments based on International North Pacific Fisheries Commission statistical areas, Smoker explained.

A typical page in the guide for the Gulf of Alaska is covered with graphs for specific areas measuring the harvest of a target species and of halibut at four categories of depth (under 250 meters, 251-500, 501-750, and below 750). The bycatch of halibut compared to the catch of sablefish is graphed on a kilogram per hook basis for each week of the season if enough data is available, if not it is depicted by month.

The results are sometimes striking, offering harvesters a simple way to avoid high bycatch.

For sablefish in the Prince William Sound area in Week 14 of the 1993 season, for example, halibut bycatch under 250 meters (137 fathoms) was greater than .5 kilograms per hook, while the catch of sablefish was only .2 kilograms/hook. The result was much the same in the 251 to 500 meter range (137-273 fathoms), but at 501 to 750 meters (274-410 fathoms) bycatch dropped to less than .1 kilo per hook and sablefish harvest was almost (see Dean Adams' graph, p. 17).

Some of the high bycatch is probably the result of fishermen setting their hooks in an available area just because better spots have already been taken. Smoker believes some of the high bycatch may also have been due to halibut "prospecting" (searching for good halibut fishing grounds).

Results over time for other weeks, areas, and depths are less dramatic, but all are simple to read. Applied over the entire season, the guide can help a black cod harvester plan a season.

"I don't come out and say here's where you should be fishing. You have to sit down and study it," Smoker notes. To make the book easy to use, she compiled it in loose-leaf form. That way a skipper can keep, or copy, the pages in his or her particular fishing grounds without being bothered to page through data for the opposite end of the Gulf.

The *Guide* is free. Original copies are still available from Smoker as long as she's got grant money left for reproduction.

What she doesn't know is how much use the *Fishermen's Guide* got in its first season of availability. Smoker distributed the book to about 50 fishing groups, state and federal agencies, and some individuals. "I haven't heard back from too many fishermen yet," Smoker said. She plans to update the guide annually as new observer data is available and is considering a survey to begin a measure of its usefulness. ❑

Some of the high bycatch is probably the result of fishermen setting their hooks in an available area just because better spots have already been taken.

Proof, Allocation are Hurdles for Bycatch Innovators

Three gear-based approaches in Alaska

By Bob Tkacz

Inventor promotes low-bycatch scallop harvester

Ken Kirkman Jr.'s patented scallop dredge is an idea whose time, depending on whom one asks, can't yet afford to come. Dubbed the "Seafood Harvester," Kirkman's 12-foot-wide rig weighs just 650 pounds, according to data he submitted for his U.S. patent. Instead of weight, it uses a diving plane, like an airplane wing flap angled for a descent, to hold it on the sea floor.

The rig rides a set of short skids along the bottom, and a rail running between the skids holds a row of short tines that rake scallops that are large enough up and into the net. The result is a dredge that Kirkman says is virtually free of bycatch, or bycatch mortality, and does far less damage to the sea bottom than conventional scallop gear.

He hopes to get his invention approved by the State of Alaska so he can market or lease it for widespread use. But the inventor and the state are at odds on several points about this plan. The state says before the gear can be approved it must be proven. That, in turn, means Kirkman must hire an observer to scrutinize what the device catches, a step he contends is too costly.

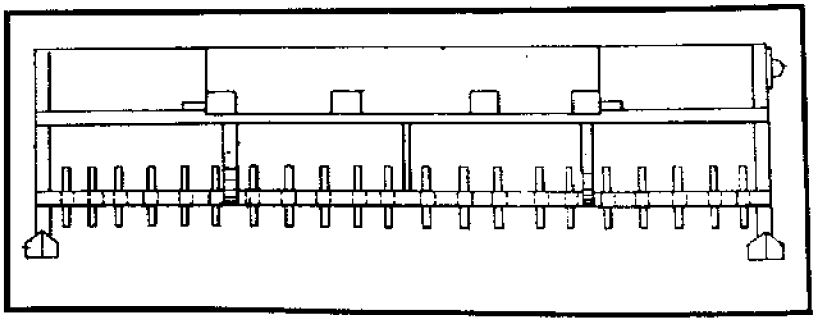
Kirkman says he catches no more than three dungeness crab per hour while fishing the Seafood Harvester, and those can be returned to the water alive.

In the meantime, he's been authorized to fish with the gear on his own, without an observer.

Data from the Woods Hole Oceanographic Institute, in Massachusetts, says a traditional New Bedford-type dredge kills one pound of shellfish for every pound caught, with most of the mortality caused by its crushing weight of 4,000 pounds or more. Because the Seafood Harvester is so much lighter, it can be hauled by a smaller boat than is needed to haul a New England dredge, and can be used by both small and large boats with greater fuel efficiency.

Kirkman, now working as a certified electrician in Juneau while lining up financing for a new boat, says he catches no more than three dungeness crab per hour while fishing the Seafood Harvester, and those can be returned to the water alive.

He developed his dredge by researching equipment used around the world and watching the operation of traditional rigs while crewing on Alaskan vessels.



Riding a set of short skids, the "Seafood Harvester" is held to the bottom by a diving plane angled for descent. Diagram by Kenneth G. Kirkman

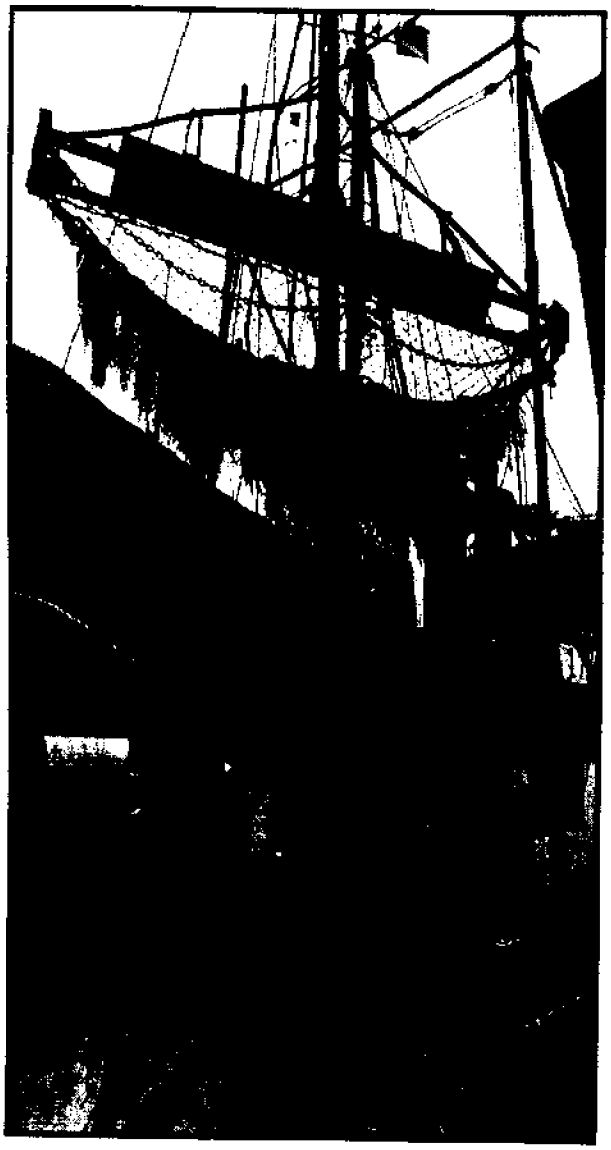
Kirkman says he used the Harvester for over seven years, and that it catches scallops. He claims hauls of up to 3,000 pounds per day off Yakutat in the Gulf of Alaska during the 1985-86 season. The 7" web in the net and detachable codend allow small scallops to fall out, increasing his meat yield per haul.

In 1990 Kirkman received a Canadian patent for his dredge. A U.S. patent followed in 1991. Yet the only two Seafood Harvester prototypes in existence are in storage. Also in waiting is an experimental fishing permit from the Alaska Department of Fish and Game (ADF&G). The gap between the gear and the paperwork is why the Seafood Harvester is not in Alaskan waters today. "I know they're fighting me. They have to be," Kirkman says of ADF&G.

Department officials say they've bent the rules for Kirkman, including bowing to pressure from state legislators to let him use his drag, but he won't do what's necessary to allow the Seafood Harvester to become legal gear open for use by anyone.

Kirkman complains he can't afford the $200 per day for an observer required by ADF&G for an experimental gear permit to observe his dredge in action. The certified observer's report would provide the data necessary for the department to support a regulatory amendment by the state Board of Fisheries to include the Seafood Harvester in the definition of a legal scallop dredge.

In a letter to the board last March, Kirkman says he received a state permit in 1985, and because he used it over seven years his dredge should no longer be viewed as experimental. "He mentioned that to us before and we just kind of ignore it. He's never had a permit to legally fish that gear," says Doug Meacum, ADF&G Southeast management biologist. "He's also said he's done this before and he's sold fish, but we've never seen any fish tickets."



The Seafood Harvester's lightweight design is said to reduce bycatch. Donn Liston photo.

State regulations require an observer on all scallop boats, but include provisions for vessels under 65 feet to receive exemptions, which are reviewed and granted on a case-by-case basis. "He has never really asked to do that. He has asked to be able to go wherever he wants to go and fish his gear," Meacum says.

Kirkman wants a permit to fish an area of southern Southeast Alaska along the British Columbia border that's never been open to scallopers. Dredging in virgin territory will let him prove his crab/undersized scallop bycatch is low. But Meacum says there won't be any fishing in areas that haven't had stock assessments, and the department has no funds for the field work. He also says Kirkman has been offered permits in existing scallop grounds off Yakutat and the District 16 area, offshore between Capes Fairweather and Spencer.

He can have an experimental permit, which requires an observer, if he wants to collect data to legalize his dredge, Meacum says. But Kirkman says he can't afford the observer cost anyway, and couldn't

pay the professional watcher while sitting in port waiting out bad weather in the stormy Yakutat/District 16 region.

Apparently in response to letters from a dozen legislators, Kirkman's case was elevated to the top of the department. Fish and Game Commissioner Carl Rosier approved a permit to allow Kirkman to fish commercially with his dredge without an observer. Without an observer, however, that still doesn't give him the proof to make the gear marketable.

That's the story as of early November, 1994. Meacum says the next step is up to Kirkman. Kirkman says he's looking for grant money to pay for an observer.

Pot innovator hopes for bycatch boost

Ed Wyman, president of Neptune Marine Products, reckons modified crab pots could do a lot to reduce the controversial halibut bycatch in Alaska's cod fishery. His company stands to see sales increase sharply if pots become a major harvesting method for cod and other groundfish.

The cod fishery is now dominated by trawlers, who fish hard on the bottom to catch this species. Because halibut live on the bottom too, they are hard to avoid. But trawlers are forbidden to keep them. That prohibition was instituted decades ago to protect influential longline fishermen who feared the newcomers with their big nets might compete for—or even ruin—the halibut stocks. Longliners have long fought to restrain the trawlers' halibut bycatch.

Lately, though, some fishermen and gear makers are betting that pots can provide a low-bycatch alternative for catching groundfish, possibly becoming a major contender in the scramble for cod and other species.

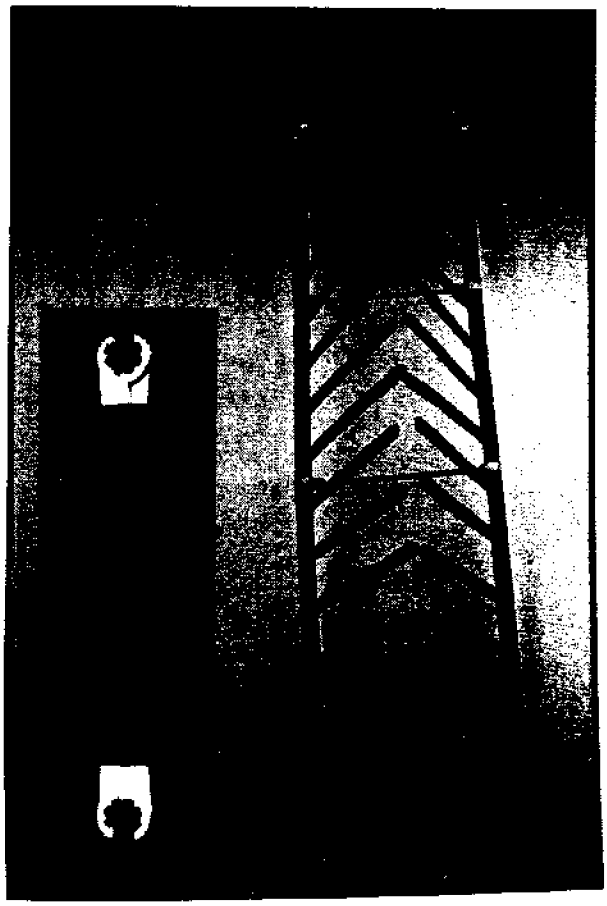
Two Neptune Marine innovations, the "Alaska cod trigger," and the "excluder" are already widely used in the small pot groundfish fleet, and some observers say they have made pots the cleanest gear in the Gulf of Alaska cod fishery.

A study of 1993 harvest data, completed by Pacific Associates consultants for the Alaska Department of Fish & Game, shows the ratio of cod caught to halibut bycatch and mortality, in metric tons. The ratio was 84:1 for deep sea and shoreside trawlers; 97:1 for shoreside and catcher/processor longliners; and, 4,112:1 for pots.

Wyman says cod pots are so clean because triggers and excluders keep large halibut out, and because they don't kill their catch. That allows the live release of any small halibut that get in.

Triggers are sets of long plastic fingers fitted around the entrance to a standard pot. Mounted pointing toward the interior of the pot at a slight angle, the fingers converge to keep fish that have entered the pot from swimming out.

Excluders are bars mounted vertically along the 35-inch length of the pot mouth to divide it into



On the left, triggers, with their long plastic fingers, keep caught fish from swimming back out of the pot. On the right, an excluder bar mounted over the mouth of the pot keeps out larger fish. Photo courtesy of Neptune Marine Products, Inc.

smaller openings. Wyman recommends use of three excluders leaving 9" x 9" entry ways.

Neptune, one of several competing firms, has been offering the pot modifiers for the past five years. Their current price in Alaska is $45 per pair of triggers, plus $1.05 each for excluders.

Pots are high-efficiency cod catchers, according to Wyman. "I've heard of catches of 600 to 700 pounds per pot, but a more realistic average, depending on where you put the pot, is 250 pounds," he says.

There's no limit on the number of pots that can be fished, but Wyman says "they fish fast;" they seem to stop fishing after about six hours soak time. "It seems like some signal goes out from caught fish that they're trapped" after six hours, Wyman says.

Neptune Marine recommends using 80 to 100 pots that are pulled two or three times a day. Using bait bags instead of standard plastic containers also has its advantages, he suggests. As fish in the pot tear at a bag of chopped herring, bits of bait float off creating a trail that draws new fish to the pot.

Wyman expects an increase in the groundfish pot fleet because of the shutdown of the Bering Sea crab fishery in 1994. Crabbers are looking for something else to catch. "With this king crab fishery being cancelled, we're getting a lot of orders," he said.

Skeptics wondered whether square mesh, for instance, would really stay open and release small fish under the extraordinary strains of heavy fishing in the Bering Sea, where 50 tons of fish might crowd into the codend on a single tow.

Trawl mesh changes, proven at last, may curb juvenile pollock bycatch

Some Alaska trawlers have long wanted to reduce the incidental catch and discard of juvenile pollock, their most important target species. The usual strategy for doing this is to increase the size or shape of mesh in the back of the trawl net (the codend). The idea is to find a mesh configuration that catches adult fish while letting immature ones wriggle free.

In the face of increasing criticism (and their own misgivings) about discarding millions of pounds of juvenile pollock, some trawlers have pressed the North Pacific Fishery Management Council to pass a regulation requiring the use of larger mesh and/or square mesh. Others, however, have resisted the idea, citing the cost of new codends and doubts about whether they could effectively release undersized fish while retaining adult fish. In general, square mesh is thought to retain its shape better than traditional diamond-shaped netting and thus to allow more small fish to escape.

The point of making it a regulation is to create a "level playing field:" otherwise, fishermen trying to reduce their impact on juvenile fish might see their efforts ruined by others who refuse to use the new webbing (since larger mesh usually slows down fishing).

But passing a regulation requires proof. Skeptics wondered whether square mesh, for instance, would really stay open and release small fish under the extraordinary strains of heavy fishing in the Bering Sea, where 50 tons of fish might crowd into the codend on a single tow.

Finally the council in September 1994 voted to recommend a regulation that would change the codend mesh. It would require installation of a single layer square mesh in the top of codends used to catch Pacific cod, pollock, and rock sole.

If approved by the Secretary of Commerce, the rule would set precise design requirements for the panels, with the size of the mesh

varying according to which species they are intended to catch.

The proof needed to convince the council came from an Alaska Fisheries Development Foundation project, funded by a $675,000 Saltonstall-Kennedy grant. Conducted by researchers from the University of Washington's Fisheries Research Institute, the project focused on the ability of square panels on a codend's top side to allow small pollock to escape from a tow without losing the larger fish.

The Bering Sea experiment using codends with 73 and 108 mm square mesh top panels in 1993 was halted on account of an problem. The four catcher boats could not find enough small fish to test smaller mesh sizes. "Nothing substantial enough to test" the nets, said Paula Cullenberg, AFDF project coordinator.

In 1994, 95 and 108 mm square meshes were used. In both expeditions the goal was to see what size allowed the highest escapement rate for pollock too small for commercial use. "We were able to demonstrate size selection by the various codends," said Dr. Daniel Erickson, UW project scientist. "The larger meshes retained fewer small fish. That in itself, with a high volume fishery, was surprising to some people--that you would be able to find selection at all."

Separating catch from bycatch on deck can be a costly, time-consuming task. A fisherman sorts through the catch. Brad Matsen photo.

The square mesh allowed small fish escapement best with low catch rates. "The effectiveness decreased as catch rates increased," Erickson added. Tows in 1994 produced individual hauls up to 79 metric tons, small for factory trawlers that can take as much as 200 mt. "Size selection typically was much better for vessels with lower horse power," the UW report to the North Pacific Council declared. Catcher vessels ranged in size from 26 to 65 meters, and from 980 to 4,000 horsepower engines.

The council report, prepared by principle researchers Ellen Pikitch and Chris Bublitz, indicated that 95 mm mesh was the most desirable because it allowed the least number of marketable-sized pollock to escape. Based on the *American Triumph*'s processing requirements for surimi production, 300 gram/35 centimeter fish were determined to be the minimum marketable size. The study showed that up to 75 percent of market-size fish could escape from the 108 mm mesh.

Still to be completed is the final element of the original project: a

study of the survival rate of pollock that escape from the square mesh panels. "If you're going to produce a net that releases a significant number of fish that you can no longer count, the obvious question is do the fish that get through the square net survive? If they don't survive, it's probably not good news that they're not being counted," said Cullenberg. ❑

Resources

Fisheries Information Services, 20007 Cohen Drive, Juneau, AK 99801, Phone/Fax (907) 789-5580, Contact: Janet Smoker. Former National Marine Fishery Service in-season fishery manager and data analyst. Smoker launched her own consulting company several years ago; specializes in bycatch reduction; recently completed the "Fisherman's Guide to Catch and Bycatch," a notebook-style time and area mapping of the Bering Sea and Gulf of Alaska. It lists harvest rates for sablefish and Greenland turbot and the accompanying bycatch of halibut for areas of one-half by one degree.

Kenneth G. Kirkman, PO Box 20423, Juneau, AK 99802, (907) 586-5693. Skipper, deckhand, welder, electrician, and creator of the "Seafood Harvester," a scallop dredge using a dive plane instead of weight to hold it to the sea floor. The dredge has not yet been approved by the Alaska Board of Fisheries as legal gear.

Neptune Marine Products, Inc., PO Box 17417, Seattle, WA 98107, 5330 Ballard Ave. NW, (206) 789-3790, (206) 789-1795. Contact: Edward Wyman, President. Commercial gear design and supply company founded by Robert Wyman, who continues to manage the outfit with his son, Edward; originated the "Alaska cod trigger" and excluders. The triggers are plastic devices mounted on gates of standard 7' x 7' king crab pots to allow their use for Pacific cod fishing, permitting fish to enter but not escape. Excluders divide the mouth of the gate into smaller openings to prevent entry by legal-size halibut. ❑

Rock Sole Fishery

One of the dirtiest, but slowly cleaning up

By Joel Gay

Roe fisheries are some of the "dirtiest" fisheries, wherever they occur, because the target is not the fish but their highly valued skeins of mature eggs. It doesn't pay to fill the hold with anything but roe-filled females, so most other fish, including males of the target species, are often discarded.

This is the case in the rock sole roe fishery in the Bering Sea. Nearly four metric tons of fish are thrown away for every ton of rock sole retained. Every winter about two dozen factory trawlers, fishing hard on the bottom, kill and discard 1 million pounds of juvenile halibut, more than 100,000 king crab and several million tanner crab, plus more rock sole than they keep.

Despite the waste, no one claims the fishery is wrecking the target stocks. Scientists calculated the exploitable biomass of rock sole at nearly 1.8 million metric tons for 1994, but fisheries managers set the catch limit at 63,750 tons (for an exploitation rate of less than 3.6%), primarily to restrain the waste of highly valued crab and halibut. That is a fraction of what the stock could sustain. In addition, explicit caps on the fleet's bycatch of crab and halibut usually shut down the rock sole fishery before it reaches its allowable catch.

Fishermen and managers would argue that the waste pays off. The rock sole roe season is among the most lucrative fishing seasons in the Bering Sea, bringing in some $25 million to $50 million in 1994 in six to eight weeks. As the overcapitalized Bering Sea trawl fleet searches for ways to pay bills, more vessels may join this fishery.

Some background

Two distinct problems threaten the viability of the rock sole fishery: bycatch and discards. But cleaning up the industry may prove difficult, because it is a hard-on-the-bottom trawl fishery and because fishing must occur in midwinter, when the roe is at peak value. Some believe the best hope for reducing bycatch and discards will come from the industry itself, by giving skippers the incentive and the flexibility to police themselves voluntarily on the grounds. Others say government intervention is necessary, through individual fishing quotas (IFQs), individual bycatch quotas, or perhaps requiring boats to keep everything they catch. But some environmental groups (and a few fishermen) contend the fishery is simply too dirty and shouldn't exist at all.

Though rock sole has long been fished in the Bering Sea, the roe season was closed to foreign vessels, according to former North Pacific Fishery Management Council (NPFMC) member Bob Alverson. The fishery was pioneered by Americans in the mid-1980s and now sees 18 to 25 vessels a year, mostly factory trawlers that catch, head and gut, and freeze the fish. Fishing starts on January 20 and ends in late February or early March, when roe quality starts to diminish or bycatch caps are reached.

Bycatch

As with most Bering Sea fisheries, bycatch rules the rock sole season. Although the fishery has drawn tremendous public scrutiny for its high bycatch and discard rate—Alverson calls it "an embarrassment to the industry"—the companies that fish for rock sole roe say they are sensitive to the problems and are actively working on solutions.

Last year, said one skipper who asked to remain anonymous, the fleet found high crab bycatch and too many male rock sole in one area and decided—on the grounds, over the radio—to leave those grounds for 10 days. When they returned, bycatch rates were down to acceptable levels, he said.

Later in the season the skippers began to talk about the mesh size of their codends and agreed to try a larger mesh size in hopes of reducing the catch and discard of unwanted rock sole, primarily males. They eventually convinced the NPFMC to increase the mesh size of top panels to six inches. Now they are asking for certain grounds to be closed due to high crab catches.

"We're making progress voluntarily," the skipper said, "because we realize there's a problem." They also know that without such actions, "somebody would want to shut us out."

To help each other identify bycatch "hot spots" on the grounds, the fleet has agreed to pool its catch and observer information daily in the next winter fishery. Federally mandated onboard observers have long provided the same information to National Marine Fisheries Service (NMFS), but the agency takes weeks to scrutinize it and report back the results to the fleet. The new system, bypassing the agency, will come back within days, the skipper said, giving the fleet the data it needs to reduce its bycatch and discards on the grounds.

Old or bad information is not only useless, it can be harmful to the fishery, said a representative of one company with several vessels that fish rock sole. For example, because of a foul-up within the NMFS computer system last year, the red king crab bycatch continued too long and far exceeded the 120,000-animal cap. "If the government doesn't tell people to stop fishing, they don't stop fishing," the representative said. "Fishermen get blamed for that excessive bycatch, but the government has a responsibility to adhere to the caps and quotas."

A popular argument against IFQs is that even if boats had all year to fish for, say, pacific cod, boats would still have to race to catch their quota before the bycatch caps were hit.

Solutions

As in all fisheries, there are dirtier and cleaner boats. The newly-instituted NMFS policy of making public the names of vessels and their bycatch rates will help reduce bycatch, according to several industry representatives. But peer pressure alone won't clean up the fishery, one representative said, and companies with multiple boats need to rein in skippers who can't fish clean.

Though most company reps said they believe fishermen's efforts to clean up the fishery are working, one said the government could do more to spur industry. The Vessel Incentive Program (which is meant to impose harsh penalties for excessive bycatch of certain species) has been effective, he said, but the lag time—two or three years between violation and punishment—is too long. His company would like individual bycatch quotas in the North Pacific. "When you run out, you quit fishing," he said.

American Factory Trawler Association, (AFTA) too, applauds the

There has been little faith in gear modification in the past, because the modifications were done without considering fish behavior. Those efforts "were doomed to failure."

fishermen's efforts to clean up their fishery, said Executive Director Joe Blum. "But all those measures would have been unnecessary if we had IFQs." A popular argument against IFQs is that even if boats had all year to fish for, say, pacific cod, boats would still have to race to catch their quota before the bycatch caps were hit. AFTA suggests that a combination of IFQs plus individual bycatch quotas (IBQs) would give fishermen the time plus the financial incentive to fish cleanly. "You need IFQs to stop the race for fish, and the bycatch quotas to stop the race for bycatch," Blum said.

As AFTA envisions it, such a system could also be used to reduce bycatch levels, Blum said. A boat or company that fished cleanly could sell or lease its unused IBQs, but each sale would lower that quota by 10 percent.

An IFQ/IBQ system might work well in the future, said Scott Highleyman, Executive Director of the Alaska Marine Conservation Council (AMCC). But rather than base quota shares on the current high bycatch levels, those levels should be cut first, he said.

Harvest Priority

To achieve that, AMCC proposes a harvest priority system. It would split each fishery's total allowable catch (TAC) into an early and a late season. The first season would be open to all; the second season open only to those who achieved specific low bycatch rates. "It would drive the dirty guys out of it," Highleyman said. "Nobody knows how clean these fisheries can be because no one's tried it before."

Fishermen should find their own ways out of the bycatch dilemma, he said, because government regulations have done little to reduce overall bycatch and discards levels. Fishermen simply use their creativity to find ways around the regulations, Highleyman said.

Gear Modification

Chris Bublitz, program coordinator at the Fishery Industrial Technology Center in Kodiak, is another who believes cleaner fishing is possible. There has been little faith in gear modification in the past, he said, because the modifications were done without considering fish behavior. Those efforts "were doomed to failure," Bublitz said.

Bublitz studied fish behavior for eight years and applied his findings to trawl gear modification. In one experiment, conducted during a pacific cod opening, he cut halibut bycatch 41 percent while reducing the target species, Pacific cod, less than 6 percent. In another fishery, his modification reduced the catch of undersized pollock by 73 percent. "If you use the correct approach, you can modify gear and be successful," he said.

Bublitz believes it may be possible to reduce halibut mortality in flatfish trawling, and that pot gear might be used successfully for flatfish, but said well-planned experiments are required in each case.

Another modification that holds potential for decreasing halibut bycatch mortality is grid sorting. Fishermen found that putting a metal grate over the hold openings slowed the process of dumping a codend, allowing the deck crew to sort through the catch and pitch halibut overboard in better condition. Bob Trumble, the International Pacific Halibut Commission biologist along on the trip, said he believed halibut mortality might eventually be cut by 50 percent.

To help each other identify bycatch "hot spots" on the grounds, the fleet has agreed to pool its catch and observer information daily in the next winter fishery. Federally mandated onboard observers have long provided the same information to National Marine Fisheries Service (NMFS), but the agency takes weeks to scrutinize it and report back the results to the fleet.

Nobody knows if similar savings are possible in the rock sole fishery. The target species was roundfish in last year's experiments, and the halibut, which averaged about four pounds, were fairly easy to spot on deck, Trumble said. In the rock sole fishery, average halibut size is 2.3 pounds, and when mixed with a deckful of one-pound flatfish, he said, the deck crew will have to be more watchful.

Still, he is hopeful that grid sorting might eventually be applied to flatfish fisheries. It will take additional experiments to know for sure, he said. "I'm very confident that if you give fishermen the incentive, they'll find good ways to solve their problems. I've always been impressed with how innovative they are. They come up with ideas us biologists would never think of."

Crab Bycatch

The best way out of the crab bycatch abyss may be to restrict the fishing grounds. In 1993 the rock sole fleet killed 225,000 king crab, plus 440,000 bairdi, and 2.4 million opilio crab. In 1994, the king crab catch hit 340,000. That bycatch has always been a sore point for crabbers, but the issue exploded this year when the State of Alaska closed the Bristol Bay red king crab fishery due to inadequate numbers of female crab on the grounds. And the bairdi quota fell by more than 50 percent because biologists were afraid to set the bairdi fleet loose on red king crab grounds.

In response, the crab industry has asked the North Pacific Fishery Management Council to close all waters east of 163 degrees west longitude—basically all of Bristol Bay—to trawling. The flatfish fisheries would be among those hit hardest by the closure. The council met by teleconference in mid-November to consider an emergency rulemaking.

The rock sole fleet has also suggested closing parts of Bristol Bay, but only certain hot spots. They want the flexibility to move into an area, and if crab bycatch is too high, they will move on, they say. It remains to be seen whether the council will give them that leeway. ❑

Rock Sole Bycatch Resources

Alaska Marine Conservation Council, PO Box 101145, Anchorage, AK 99510 (907) 277-5357, Fax (907) 277-5975. Contact: Scott Highleyman, Executive Director

American Factory Trawler Association, 4039 21st Ave. West, Suite 400, Seattle, WA 98199, (206) 285-3739, Fax (206) 285-1841. Contact: Joe Blum, Executive Director; John Gauvin, economist. Supports a combined program of individual fishing quotas (IFQs) and individual bycatch quotas (IBQs) to reduce bycatch and discards in North Pacific fisheries.

Arctic Alaska Fisheries Corporation, PO Box 79021, Seattle, WA 98119, (206) 298-3445, Fax (206) 281-8052. Contact: Laure Jensen, Assistant Director of Government Affairs. Company has several vessels fishing rocksole; argues for industry incentives and regulatory flexibility as means to reduce bycatch and discards.

Fishery Industrial Technology Center, 900 Trident Way, Kodiak, AK 99615, (907) 486-1500, Fax (907) 486-1540. Contact: Chris Bublitz, Program Coordinator. Branch of the University of Alaska (Fairbanks) School of Fisheries and Ocean Science. Has successfully modified trawl gear to decrease bycatch of unwanted species and unwanted target fish in roundfish fisheries; would like to expand its work into flatfish; also interested in exploring the use of pot gear in flatfish fisheries.

International Pacific Halibut Commission, PO Box 95009, Seattle, WA 98145, (206) 634-1838, Fax (206) 632-2983. Contact: Bob Trumble, staff biologist. The IPHC has experimented with on-deck sorting to reduce halibut bycatch aboard trawl vessels in roundfish fisheries; interested in potential applications in flatfish fisheries.

North Pacific Fishing Inc., 4039 21st Ave. West, Suite 201, Seattle, WA 98199, (206) 283-1137, Fax (206) 281-8681. Contact: Bob Gudmundson, Manager, Fishery Management and Compliance. Company is among pioneers of rocksole roe fishery; supports industry incentives and regulatory flexibility to reduce bycatch and discards.

Naming Names

NMFS Lists Bycatch Rate, Boat by Boat

By Joel Gay

For years certain sectors of the North Pacific fishing industry have wanted National Marine Fisheries Service to publish vessel names along with those vessels' bycatch rates. This year they got their wish.

The drive to push NMFS into "naming names" gained momentum last winter when the Salmon Research Foundation proposed a new chinook salmon bycatch strategy. The foundation wanted to charge vessels $20 for each chinook they landed, planning to use the money to research ways of reducing salmon bycatch. But they needed vessel names, and they needed detailed information—haul by haul—about where the bycatch occurred.

"We had been resistant to (provide that information) in the past," said NMFS's Alaska Operations Chief Sue Salveson, out of fear it would cause competitive harm. "But we were strongly encouraged by the industry to provide bycatch information so they could take proactive steps toward dealing with the bycatch problem."

NMFS did not develop the new regulations alone, Salveson said. "This was a negotiated process to determine how far we could go. They didn't want everything released."

The final regulations were published last May, though it took several months to work out glitches in the computer system. By September, the bycatch data was ushered into the public realm.

Raw observer data that lists the fishery, the vessel name, and its prohibited species catch is available 10 days to two weeks after the catch occurs, Salveson said. NMFS has not yet verified the data, however.

That information can be downloaded from the NMFS Bulletin Board. To log on, call (907) 586-7259. Under the "Bycatch" menu are three files. The "TXT" file is a short explanation of the program. The other two files contain the bycatch rates and vessel names. Those who can access dBASE files are urged to use the "DBF" file, because dBASE was used to write the program. The "ASC" file is an ASCII file available to all other users. For Bulletin Board assistance, contact Tim Beede at (907) 586-7228.

Also available by request, but not through the Bulletin Board, is haul-by-haul information. It includes not only vessel name and prohibited species bycatch rate but also the time of day, latitude and longitude and depth of the haul, plus water temperature. Call NMFS at (907) 586-7228 to place a request. ❑

West Coast

Mass Marking

Identification of salmon can help separate hatchery from wild stocks

By John Grissim

Background

For years fisheries managers and conservationists have sought a practical means of easily distinguishing hatchery-bred salmon from wild, or naturally spawning, stock. This would allow steps to be taken to prevent harvesting (or over-harvesting) of wild stocks whose survival may be endangered. One widely discussed system of identification is the mass marking of young hatchery salmon before their release into the wild so that fishermen could easily identify them on the fishing grounds and thus select them for harvest. In principle the idea could have a revolutionary impact on fisheries management, creating so-called selective fisheries. But the concept has its skeptics in the commercial fishing and fisheries management communities.

What is it?

Mass marking is a process of making a visible mark on large numbers of young hatchery salmon by clipping off a portion of the adipose fin (the fin on the back). The adipose clip has been used for a decade in the Columbia River basin to mark all hatchery-reared steelhead that have been implanted with a stainless steel coded wire tag (CWT) one millimeter long that carries identifying information. Mass marking provides a means of easily distinguishing hatchery stock from wild stocks within a mixed-stock fishery. In principle, allowing only the harvest of hatchery fish (or a selective fishery) ensures better escapement of wild stocks that are declining and threatened.

What fisheries and regions would it impact?

Coho and chinook salmon fisheries in the coastal waters of the Pacific northwest, "coastwide," from Alaska, through British Columbia south to northern California.

Is mass marking on the scale being proposed technically feasible?

Yes, but no machines or methodologies are on line yet. With 200 million young hatchery salmon in the Columbia River alone, clipping the adipose fin by hand would take 27,000 person-days. However, Northwest Marine Technology, Inc., a Washington state company that has pioneered implant techniques, is prepared, if the funding becomes

available, to develop an automated mechanical system to accomplish this task. The design under consideration involves moving hatchery fish through a system of tanks and troughs, using water current and light to orient them physically so that their adipose fins can be clipped using lasers, water jets, or mechanical clippers. The company estimates that about 20 of these robotic systems installed coastwide could probably handle the task.

How effective does it promise to be?

In principle, very effective. But while it holds great promise, it's not a panacea to a complex biological issue involving many fishery management problems such as maintaining genetic diversity, disease prevention, habitat protection and restoration, even water quality.

Whom will it help?

Mass marking could help the trollers, especially in northern California, who are currently prohibited from fishing north coast waters. With the creation of a selective salmon fishery, they could be given limited access to harvest hatchery stock, or be allowed to fish both stocks for a limited time. Improved fishery management could give resource managers a chance to design fisheries around marked fish and allow both recreational and commercial fishers to harvest more hatchery stock.

Whom will it hurt?

Many believe, if done correctly, no one. But some fisheries specialists say that releasing millions of hatchery stock with clipped fins (rendering them indistinguishable from those with CWT implants) will seriously compromise the entire CWT sampling program by making it almost impossible to identify CWT specimens easily.

Tribal fishermen, gillnetters, purse seiners, and reef fishermen could also lose, because they employ harvesting methods that don't allow for the unharmed release of captured wild stock. Tribal fishermen also worry about a re-allocation imbalance, fearing that sports fishermen would be free to take greater numbers of hatchery stock while the tribes would not.

Proponents counter that if gillnetters were assigned times and harvest areas close to the hatcheries (so called terminal fisheries), the bycatch of wild stocks could be greatly limited. Elsewhere, on the Klamath River, for example, gillnetting could be replaced by a weir system that would allow the identification and release of wild stocks.

Mass marking could transform salmon fishing. Brad Matsen photo.

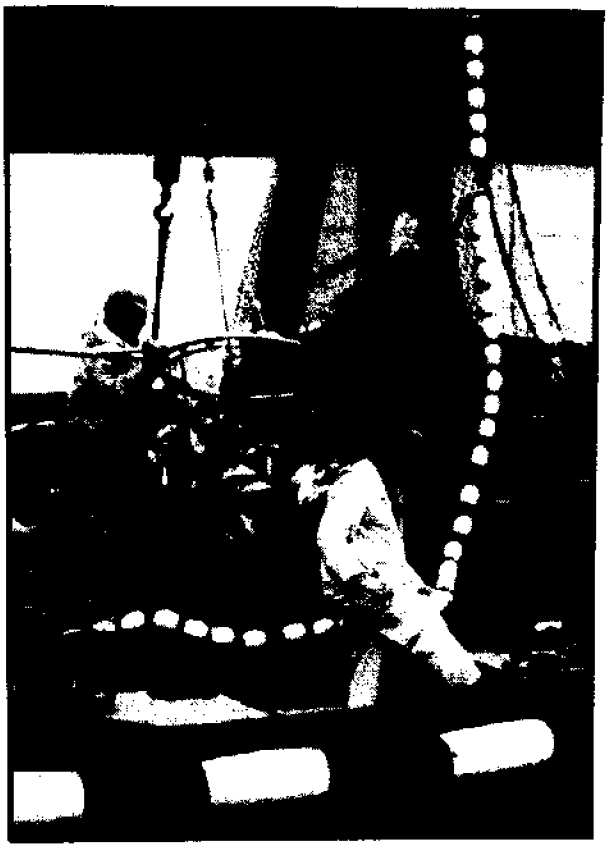
What are the other concerns?

❑ **Computer modeling nightmare.** Some fisheries specialists suggest that, from a management perspective, the current computer-generated models being used to test the program's feasibility (for example, multiple, mixed, and selective fisheries) are already a nightmare, and that developing new models to make possible coherent management decisions

will be an even more formidable undertaking.

❑ **Hooking mortality**. Hook-and-line fishermen (trollers) worry they'll be given reduced quotas because of the perceived high rate of hooking mortality. The figure often used in the past is around 20 percent (compared to 7% for recreational fishing), but there have been no studies conducted since the advent of mooching (shallow-water salmon fishing with a fixed rod that depends on the movement of the boat or water to jiggle the bait) and the mandatory use of barbless hooks. If studies are conducted, they could show that the smaller barbless hooks preferred for mooching may actually result in a greater hooking mortality. In any case, trollers argue the old data are no good and that for years they've been releasing undersized coho with excellent results. Lastly, many trollers seriously doubt that under actual fishing conditions (for example, viewing a fish from the vessel's stern in roiling waters) a clipped adipose fin would be visible until after a fish was gaffed and on board.

❑ **Quota reallocations.** Other commercial groups worry that some fisheries managers who have opposed them may use the mass marking program as an excuse to reduce their quotas and gear groups—seiners, trollers, gillnetters—under the guise of prudent reallocation.



Seiners brail salmon from net. With mass marking, wild stocks could be returned easily to the water. Brad Matsen photo.

How much will it cost?

Hard to say. One estimate is $3 million - $4 million alone just to expand Coho marking coastwide. Marking Chinook hatchery stock would be an additional expense. Millions more may be required over time to fully implement the program (including tracking and sampling). Some critics privately argue the program would be prohibitively expensive and a waste of taxpayers' money.

Who will pay for it?

State and Federal general revenues are currently being used. But if fisheries mitigation hatcheries such as those of the Bonneville Power Administration adopt the program, eventually rate payers could see a few cents extra per month on their bills to cover the cost.

Is a mass marking program inevitable?

Yes, in some form. Both critics and proponents seem in agreement that if the fishing community and fisheries resource managers don't adopt mass marking voluntarily, the political momentum of the many interest groups supporting the idea (notably, sportsfishing groups) will ensure its implementation.

What can we expect in the future?

Congress has voted funds in the Commerce Department's appropriation directing the National Marine Fisheries Service to conduct a pilot study. Washington State fisheries will spend $900,000 of that appropriation to mass mark spring 1995 hatchery coho that would be harvested in

Many trollers seriously doubt that under actual fishing conditions (for example, viewing a fish from the vessel's stern in roiling waters) that a clipped adipose fin would be visible until after a fish was gaffed and on board.

1997 in Georgia Strait and Puget Sound. Additional programs, in Oregon and California, for example, will be incrementally added depending on the results of planned studies and technology development.

Virtually all the players are actively addressing the issue with studies or planned workshops. An assessment of selective fisheries by the Pacific Salmon Commission is nearing completion. The Pacific States Marine Fisheries Commission will present the results of a study at workshops in Oregon and California. A joint US-Canada assessment will be available in early 1995. ❑

To catch or not to catch: Fishing selectively for salmon

Selective fishing in the salmon fishery is a tricky business. It is also increasingly necessary, now that some salmon populations are in critical condition. Because of the frequent mixing of stocks, both in open waters and in rivers, fishermen and biologists are exploring ways to target on abundant fish while minimizing impacts on waning populations. Listed below are several methods of selective salmon fishing, some proven, some under exploration.

❑ **Barbless Hooks.** In fishing methods using hooks and lines, salmon of non-target species and juvenile salmon often die when fishermen try to release them back to the water. According to Judy Graham, executive director of the Washington Trollers Association, barbless hooks do less damage to the fish and make it easier for fishermen to release them without having to bring them on deck where extensive damage often occurs. Trollers in her organization have been using barbless hooks voluntarily since the mid-1980s.

❑ **Different Lures.** Steve Spleen of the Washington Trollers Association also sees gear modifications as helpful in reducing coho bycatch. Staying a jump ahead of regulators, trollers have been using lures that don't attract coho salmon while fishing for chinook. "We're trying to avoid catching coho by using fewer flashers (coho-attractive lures)," says Spleen. "We can get kings (chinook) by using the large plug lures that coho ignore."

❑ **Decreases in Set Time.** Net-based fisheries are also making changes to improve the survival rate of the non-target salmon they catch. Don Stuart, Executive Director of Salmon for Washington, tracks efforts to reduce bycatch of weak-run salmonids. "Driftnetters on the Columbia have cut the time that their nets are in the water to 20 to 30 minutes, which raises the survival rate on released fish," he says. Salmon held too long in nets will suffocate.

❑ **Mesh Size Increases.** Altering the mesh size in a net can help separate catch from bycatch where size is a crucial difference between the two species. Stuart says of required mesh size alterations. "For gillnetters who are focusing on chum, the coho catch is minimal, since coho are smaller than chum and can just slip through the mesh. Purse seiners have also been effective at sorting out and releasing live coho from the chum fishery." Unfortunately, mesh size changes cannot be used for sockeye salmon fisheries that threaten weakened coho stocks, because sockeye and coho are too close in size.

❑ **Weedlines.** Some British Columbia gillnetters have made some interesting gear modifications to avoid catch from weakened steelhead runs. Those changes include "weedlines," which drop the top edge of gillnets to a level in the water column that allows them to avoid steelhead. Greg Taylor, Chair of the North Coast Advisory Board, a nonprofit organization representing north coast commercial fisheries, has been involved in several experiments to test bycatch-reducing strategies. According to Taylor, the work with weedlines began in the late 1980s, when a commercial fisherman commented on how steelhead tended to gather at the top of the water column. Experiments were run with gillnets that were dropped to four feet below the surface. At this depth, steelhead catch was reduced by 60-70%. However, catches of the target species, sockeye and pink salmon, were also reduced—by up to 30%.

❑ **Wetboxes.** As a part of the B.C. weedline experiment, captured steelhead were brought on board and revived in wetboxes. Taylor describes wetboxes, "Every gillnetter had to keep steelhead in a tank about 30" to 40" long, with a darkened lid and plumbed with fresh-water (to circulate fresh water past fish gills). They had remarkable success in reviving those beasts. They were tagging the released steelhead, and saw them making it up the river," Taylor says. Tagged fish were caught upriver by sport anglers and reported to the Department of Fisheries and Oceans (DFO).

Preventing steelhead bycatch upriver is more complicated than in the ocean fisheries. A fish might be caught and released from several different nets at different locations in the river, decreasing its chances of survival. To avoid this, the DFO experimented with a barge carrying a large, onboard revival tank for the steelhead, where they would be held for one to four days during the fishery. Taylor says the barge released 320 steelhead in 1992 and 270 steelhead in 1993. The agency discontinued the program, however, since the barge cost about $130,000 each year, and the success rate was estimated at only a 5% reduction in catch of steelhead.

❑ **Industry Organization.** In Washington State, commercial fishermen have gone to great lengths to protect weakened salmon stocks. Salmon for Washington, the Puget Sound Gillnetters Association, and the Purse Seine Vessel Owners Association have joined together to create a set of "Best Fishing Practices," which has the support of the Washington State Department of Fish & Wildlife. In addition to some of the bycatch reduction methods mentioned above, "Best Fishing Practices" advocates educational efforts to save weakened salmon stocks. Experienced fishermen are asked to educate younger fleet members about the best methods to reduce the catch of non-target salmon, and all fishermen are encouraged to use positive peer pressure to improve adherence to bycatch-reducing fishing practices. The groups behind "Best Fishing Practices" have also joined together to support research on reducing bycatch of non-target species and the survival rate of fish that are caught and released.

---Yvonne DeReynier and Gerry Hadden

Mass-Marking Resources

National Marine Fisheries Service, Northwest Regional Office, NOAA, NMFS, F/NWO, 7600 Sand Point Way NE, BIN C15700 Bldg. 1, Seattle, WA 98115. Contact: Bill Robinson, Fisheries Management Division, (206) 526-6140. NMFS regional office is involved in technical issues in fisheries management, including mass marking, selective fisheries, and associated data collection and interpretation.

Northwest Marine Technology, Inc., PO Box 427 Ben Nevis Road, Shaw Island, WA 98286. Contact: Guy Thornburgh, General Manager, (206) 468-3375; fax (206) 468-3844. Northwest Marine Technology pioneered the development and adoption of the coded wire tagging (CWT) system, now used worldwide. Firm works closely with management agencies, sells and rents CWT equipment, including sample detectors, handheld wand detectors, and tagging equipment. Latest products include tiny CWT implants with binary numbering, and florescent elastomer visible implants. Currently designing prototype machinery for use in mass marking. Company owners created Fisheries Management Foundation, which acts as nonprofit home to NFCC.

Pacific States Marine Fisheries Commission, 45 S.E. 82ND Drive, Suite 100, Gladstone, OR 97027-2522, (503) 650-5400; fax (503) 650-5426. Contact: Randy Fisher, Dave Hanson. Commission comprises two representatives from each of five Pacific states (Idaho, Oregon, Alaska, Washington, and California). Coordinates research, monitoring, and other programs to promote conservation, development, and improved fisheries management; closely involved in the mass-marking issue; planning informational workshops for commercial fishing community (and other interested parties) in early 1995 in Portland and San Francisco, the latter to coincide with the Pacific Fishery Management Council's March meeting during the week of March 6th.

The Pacific Fishery Management Council, 200 SW 1st. Avenue, Suite 420, Portland, OR 97201, (503) 326-6352. Contact: Lawrence Six, Director. Primary authority for regulating fisheries in federal waters off California, Oregon, Washington. Members include government, academic, and private sectors, and fisheries user groups. This is the place the accumulated technical wisdom meets politics. The PFMC will play key role in how mass marking and other tools for selectivity are applied in salmon fisheries.

The Pacific Salmon Commission, 600-1155 Robson Street, Vancouver, B.C. V6E1B5 Canada, U.S. Chair: John Clark, Canadian Chair: Ian Todd. Contact: John Clair, Alaska Dept. of Fish & Game, PO Box 240020, Douglas, AK 99824, (907) 465-4256. Established by treaty in1985; oversees US-Canada treaty on salmon. Mission to ensure prudent management and harvesting of salmon stocks. Recently conducted a full assessment of selective fisheries (limited to coho stock); results due in a series of workshops on West Coast.

Northwest Indian Fisheries Commission, 6730 Martin Way East, Olympia, WA 98506. Contact: Terry Wright, (206) 438-1180. Oversees management, resource monitoring, and research activities for tribal fisheries; staff has closely monitored mass-marking issue, with special attention to the potential effect on tribal fisheries.

Pacific Coast Federation of Fishermen's Associations, P.O. box 989, Fort Cronkite, Sausalito, CA 94965, (415) 332-5080; fax (415) 331-2722. Contact: Zeke Grader. Represents 24 fishermen's associations along the U.S. Pacific coast. An important lobby for commercial fishing, leading advocate for habitat protection

(salmon and other species); active in most legislative and policy issues affecting the economic welfare of West Coast commercial fisheries. Supports mass marking as a salmon management strategy.

Learning From Other Fleets

Hoping to avoid trouble, Oregon's shrimp fishery takes preventive measures on bycatch

By Charles Summers

"We don't have a serious bycatch problem," says Bob Hannah, a biologist who works on shrimp issues for the Oregon Department of Fish & Wildlife. "Given the mix of bycatch species, we may never have a serious problem. Certainly in comparison to the Gulf of Mexico and Northeastern fisheries, ours is a very clean fishery."

But lessons from bycatch troubles in other shrimp fleets have not been lost on Oregon. An informal coalition of fishermen, net makers, and state agency biologists is working to develop methods for reducing bycatch on the West Coast. By acting before the issue becomes controversial, they hope to avoid regulation.

Netmakers like Bob Driscoll and George McMurrick, both of Astoria, Oregon, have taken the lead in developing excluders to eliminate unwanted fish species from shrimpers' nets without reducing their marketable catch or costing them time and hassle. Hannah and fellow biologist Steve Jones have received $149,000 in Saltonstall-Kennedy funds through the National Marine Fisheries Service to conduct studies of alternative bycatch reduction methods using underwater video cameras and comparison tests with double-rigged (two nets towed side-by-side) shrimp trawls. (See sidebar).

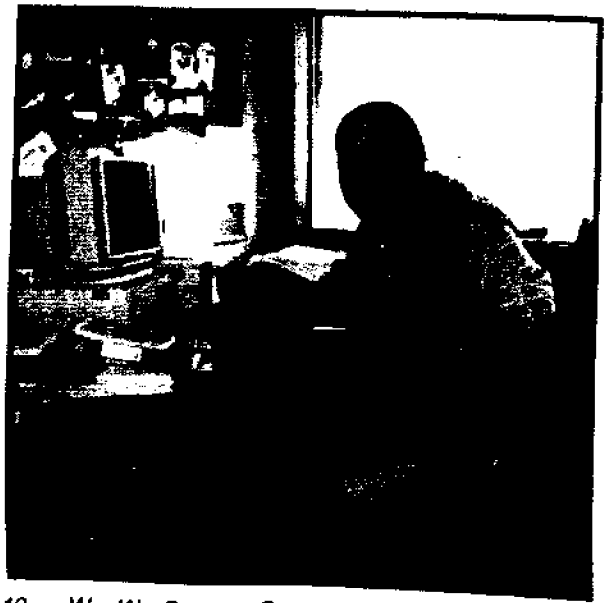
The Fishery

"On this coast," says Peter Leipzig, Executive Director of the Fishermen's Marketing Association in Eureka, "we don't have a turtle problem or any endangered species issues. It's more of an economic problem of how much time you want to spend sorting fish, or a social problem of catching the fish that somebody else may be trying to catch. We have the luxury out here to tinker and experiment with different arrangements and setups, as opposed to the Gulf where National Marine Fisheries stepped in and said 'this is the device you are going to use.'"

Both Washington and Oregon have already instituted limited entry policies and California has a moratorium on new permits. An estimated 300 shrimp trawlers operate along the West Coast.Some have permits to fish shrimp, as well as groundfish, in more than one state. Although the fishery stretches from Southern Washington to Northern California, the bulk of the fishery is centered in Oregon.

"It's a deep water fishery in 60 to 125 fathoms," explains Joe Easley, Administrator of the Oregon Trawl Commission, an organization representing Oregon shrimp and groundfish trawlers, "generally pursued by double-rigged shrimp trawlers. The product they're producing is cocktail shrimp, which is machine cooked and peeled. For that reason it has to come in pretty clean."

Bob Hannah (pictured below) and Steve Jones, biologists with the Oregon Department of Fish and Wildlife have taken a special interest in shrimp bycatch and obtained grant money for research on different types of excluders. Charles Summers photo.



"Most fishermen hate waste," says Hannah. "It really goes against their grain. But, when you don't have a market for a fish and you're out there to make a living shrimping, that stuff goes over the side."

Although *bycatch* is often used synonymously with *incidental* catch, Easley argues that a distinction should be made. "If it's legal for the fisherman to catch and sell it, it isn't bycatch," he asserts. "It's part of his mix that is producing income. If he has to throw it back over the side (because it is a protected species), or if there is no market for it, that's bycatch."

Southern Oregon and California tend to be very clean fishing areas with virtually no incidental catch, while further north fishermen intermittently encounter non-marketable species such as dog sharks, smelt, small rockfish, flatfish, sablefish, and recent increases in hake. Protected species occasionally caught but illegal to land include crab, sole, and halibut. Not only does sorting and discarding these fish take time, but large numbers of fish packed in the codend can damage the shrimp.

"Most fishermen hate waste," says Hannah. "It really goes against their grain. But, when you don't have a market for a fish and you're out there to make a living shrimping, that stuff goes over the side."

On the other hand, incidental catches of saleable fish are more than welcome. For example, yellowtail rockfish (often called greens or greenies) help to pay a fisherman's ice and fuel bills. Those of marketable size may be retained within trip limits of 1,500 pounds per day; however, a federal regulation further restrains shrimp fishermen to 6,000 pounds every two weeks. Unlike bycatch limits in some other fisheries, so far these rules haven't shut down shrimpers before they've taken the allowable total harvest of shrimp. However, if these limits are ever reduced to a point below what shrimp fishermen normally catch,

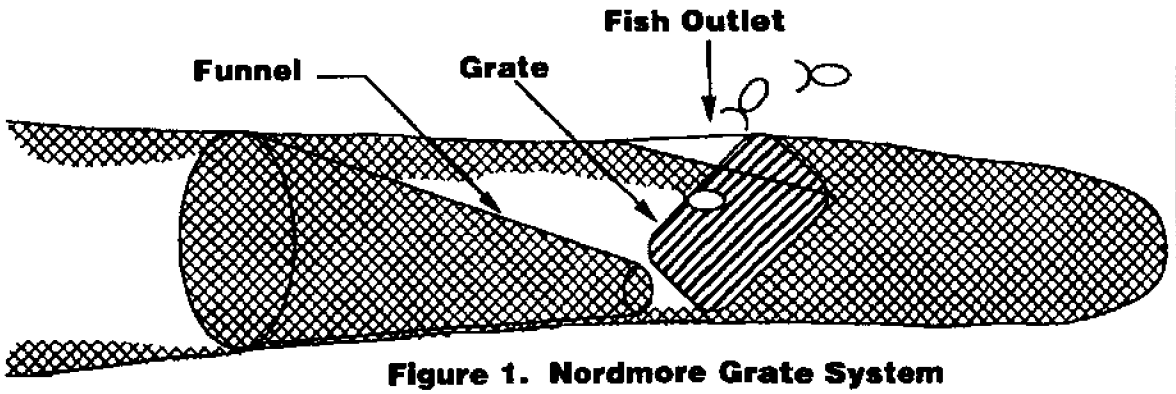


Figure 1. Nordmore Grate System

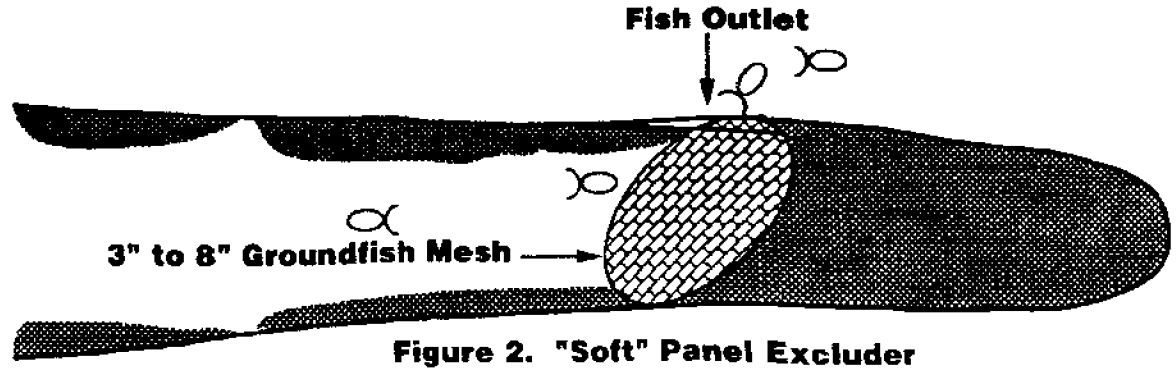


Figure 2. "Soft" Panel Excluder

Courtesy of Oregon Department of Fish and Wildlife

"The advantage is that it can be easily opened or closed," says McMurrick. "When you're in the greenies, you leave it open and catch them. When you're in the hake or dog sharks, you close it."

the fishermen might lose a lot of fishing opportunity, and the incidental catch of rockfish could become another bycatch issue.

In the West Coast shrimp fishery, bycatch management is complicated by several factors:

❑ Geographic variation. There is virtually no incidental catch in some regions and varying amounts in others.

❑ Uncertain definition. What's bycatch? Some incidental catch is unmarketable and thrown overboard, while other species are kept and sold.

❑ Fear. Fishermen haven't wanted to talk much about bycatch problems, worrying that government might force mandatory (and probably costly and cumbersome) measures on them.

❑ Uncertain standards. How much bycatch is too much? How much is acceptable?The quantity of finfish destroyed by West Coast shrimp fishermen is considered minor compared to that of some groundfish and shrimp fisheries. It has not been targeted as a major bycatch problem by government, environmental groups or other fishermen—who in many regions clamor to reduce bycatch when it affects their target species.

Experiment tests finfish excluders on West Coast shrimp fleet

"Fishermen know they want an excluder when there's no commercially viable bycatch and they're having trouble with hake," says Oregon fish biologist Bob Hannah. "But they don't have information on how much shrimp they would lose if they routinely use an excluder. They don't have any information on how well the excluder is going to work with hake or with Dover sole, or if it will help with dogfish, or if there will be gilling problems with yellowtail rockfish. Plus, nobody has done any work on these excluders in a double-rig situation, which is handled very differently from single riggers. So we proposed to do a rigorous scientific assessment of the Nordmore Grate and the 5" and 8" soft panels to provide that information to the fleet."

During the first phase conducted in early October, Craig Rose from the National Marine Fisheries Service Resource Assessment and Conservation Engineering (RACE) Division accompanied Hannah and fellow biologist Steve Jones with underwater video equipment for a week aboard a chartered shrimp boat. Scott McMullin's *Prospector* out of Astoria was chosen for the tests and equipped with a Nordmore Grate and two soft excluders supplied by netmaker George McMurrick.

The double-rigged setup was a good platform for testing an excluder on one side against an open net on the other, but they had difficulty positioning the camera properly at 70 fathoms. They also discovered the Nordmore Grates were installed at the wrong angle and had to change them.

"But that's what the trip was about," says Hannah, "calibrating the gear. On a couple of tows we saw shrimp going right through the Nordmore grate real well and fish going up. But we were surprised to see the 5" meshes were more closed on the soft panel that we had thought, and a tremendous amount of water flow was coming out of the exit hole. We actually aimed the camera down the excluder and saw a good number of shrimp coming out that way—too many. But I've shown the video tape to McMurrick, and he's already working on modifications to solve that problem."

Continued on next page

Dog shark exits funnel sewn into the net, hits the Nordmore Grate, and swims up and out the hole in the top. Charles Summers photo of ODF&W underwater video.

Bycatch solutions

However, the concern for increased numbers of hake, the influx of Gulf fishermen already familiar with turtle-excluding devices (TEDs), and a general sense of concern for the industry prompted fishermen and netmakers to investigate the use of excluders. They knew about the Nordmore Grate, which had already been successful and made mandatory in Norwegian and Northeastern American shrimp fisheries. A mesh funnel sewn into the "intermediate," the middle section of the net, directs the catch toward the bottom of a rigid panel of metal or hard plastic, which is positioned in front of the codend. This grating allows

Excluder tests (continued)

Using information from the video, Hannah and Jones will fine tune the excluders to their designed operating specifications before testing them next year. "I think we're going to learn which devices interfere with fishing the least—don't clog, flip over, or cause a lost tow, and which ones perform best in excluding fish. We're going to put in some selectivity curves to look at the size ranges that are excluded as compared to the size ranges that aren't. Basically, we'll search for what fishermen can use to improve excluders and look at other ways to reduce bycatch."

If time and money permit, Hannah hopes to test 3" mesh excluders and Bob Driscoll's "fish-eye" device—simply a hole too far forward in the codend for shrimp to escape but easily found by finfish—which has been very successful in the prawn fishery. "We're also planning to submit another proposal to look specifically at the effects of different foot ropes on bycatch," he says. "There is some controversy among fishermen as to whether tickler or roller gear fishes cleaner. We want to fish them head-to-head and see which one catches more shrimp and which one fishes cleaner. It's another example of trying to provide some information to the fishery, solve the controversy, and get people moving in a good direction."

McMullin thinks this shift in focus may lead to a better method than the separator panels tested so far. "I still have doubts that you're going to find a perfect, faultless excluder—there's going to be a trade-off. But I urged the scientists on the boat to let us take the same video camera and put it on the mouth of the trawl at the foot rope. Let fishermen see what's really going on there, and maybe we'd have some fresh ideas on ways to handle it."

Regardless of what the best solution turns out to be or who develops it, McMurrick believes the project can only serve to benefit fishermen in their efforts to prevent unnecessary government regulation. "It's not like a bunch of scientists out there on a boat who don't have a clue," he says. "Bob is working with a good fisherman. And the more data that is gathered, the more informed fishermen will be when they get interviewed and go to council meetings. They can say 'here's what we've been doing, and we know what we're talking about.' That's going to be the best ammunition to keep the fisheries council from making a mistake." ---C. S.

A hake is prevented from entering the cod-end by a "soft" excluder panel and forced up to the fish outlet hole in the top of the net. Charles Summers photo of ODF&W underwater video.

shrimp to pass through narrow slots and deflects unwanted species upward and out a hole at the top of the net. But many West Coast shrimp fishermen have rejected the Nordmore grate on the grounds that it is too cumbersome to install and remove, it can twist and foul the nets in double-rig operations, the additional drag requires more power and fuel, and the lack of flexibility creates problems when rolling the net on a reel.

"We want to work in partnership with the fishermen to make this a model fishery," confirms Hannah. "Not by regulation, but by information, because information is powerful to fishermen."

As an alternative, McMurrick says a former Gulf fisherman nicknamed "Wicho" first gave him the idea of making a "soft" excluding panel by sewing a piece of mesh across the opening of the codend at about a 45-degree angle. He calls his product the "Wicho Tongue" and has sold them to about 30 fishermen for $250 a piece, complete with the promise of free upgrades as ways are found to make them more effective.

"The advantage is that it can be easily opened or closed," says McMurrick. "When you're in the greenies, you leave it open and catch them. When you're in the hake or dog sharks, you close it."

Driscoll, a nearby competitor, sells a similar excluder in mesh sizes varying from 3" to 8". "If it's too big, the fish go through it," he says, "and if it's too small, the shrimp don't go through it. The effectiveness of these separating devices depends a great deal upon the operator, and as far as the optimum size is concerned, your guess is as good as mine."

To illustrate Driscoll's point, McMurrick has a Westport, Washington, customer who swears by 8" mesh, while two others think 5" mesh is best—one positions the excluder at a very flat angle, the other much steeper. An Astoria fisherman also asked him to replace a 5" excluder with 3" mesh because he'd heard one of Driscoll's customers had done so well with the smaller opening. However, it didn't work for him, and he was back the following week for the 5".

Ronnie Rucker operates out of South Bend, Washington, and has been using Driscoll's soft panel excluders consistently for two years. "The main reason I use them," he says, "is because of the large volume of hake. I was making 45 minute to 1-hour tows and have so much hake I couldn't get it up, so I would lose everything."

Netmaker George McMurrick (left) and his son Tim display a 5" mesh excluder sewn in the intermediate section of a shrimp trawl. Charles Summers photo.

Rucker also experimented by leaving one panel open and the other closed to see how much shrimp he was losing with the excluder. After a series of comparison tests, he concluded his nets were catching the same amount of shrimp either way. On the other hand, another fisherman tried an excluder for two trips and took it off, claiming he lost 75% of his shrimp.

Excluder pros and cons

McMurrick admits some fishermen get less shrimp with excluders, but they don't have to

sort the catch and can have their nets back in the water much quicker. Furthermore, one fisherman told him excluders would eliminate his need for a $20,000 separating machine, while Driscoll believes an excluder can cut costs by reducing the required number of crew.

"On the other hand, if we were required to use excluders," observes Astoria fisherman Scott McMullin, "we'd be faced with the loss on an on-going basis, even in areas where there is absolutely no need for excluders. So, shrimpers are real leery of having this forced on us, and I think rightly so."

Nick Rusinovich, who used one of Driscoll's 3" panels for the first time this year and thinks it's great, expresses another concern widely shared among shrimp fishermen. "I'm fearful that the excluder might be used against us," he says, "so that we can't retain our incidental catch of bottom fish, which is a fair part of our gross income."

Bob Discroll (right), Astoria area netmaker, shows his "fish-eye" excluder which allows finfish to escape from the cod-end. The excluding device has proven very effective in prawn nets, but may not work as well with pink shrimp. Charles Summers photo.

The complaints from Gulf of Mexico fishermen forced to use turtle excluders have convinced Oregon shrimpers that they want no part of a similar regulation, but Hannah doesn't foresee that kind of problem. "We don't have any intention at this point of making fish excluders mandatory," he explains. "For one reason, we don't have one that's proven to be really efficient, considering how people fish with double riggers. For another, we don't have a pressing conservation problem. But we're getting a lot of voluntary use of these things, and whenever they're in use, they save a lot of stuff. So, I think we can make the fishery an even cleaner fishery without forcing anything down anybody's throat."

Furthermore, any mandatory restriction would have to be part of a consistent, tri-state policy, according to Hannah. However, he notes that Oregon is the only one maintaining an active shrimp fishery management office, and any mandatory fish excluder regulation would require agreement with no longer existing entities in the other states.

"We don't have any intention at this point of making fish excluders mandatory," says Hannah.

Oregon's goal is to continue encouraging voluntary bycatch reduction by providing the industry with scientifically gathered data on excluders and their relative effectiveness. "We want to work in partnership with the fishermen to make this a model fishery," confirms Hannah. "Not by regulation, but by information, because information is powerful to fishermen. They don't want to waste anything out there, but they have to make a living. We're just trying to add some tools to their tool chest." ❑

Shrimp Bycatch Resources

Net Makers

Driscoll Nets, Box 326, Warrenton, OR 97146 (503) 738-9296. Contact: Bob Driscoll. Innovative netmaker providing U. S. and Canadian fishermen with all types of nets and net materials for bottom fish, shrimp, prawns, etc. Has installed 3" to 8" mesh shrimp excluder panels in two dozen boats, as well as "fish-eye" excluders in prawn nets.

Astoria Net Shop, 181 S. W. 5th, Astoria, OR 97103, (800) 832-5701. Contact: George McMurrick. Builds shrimp nets, bottom trawls, prawn nets, beam trawls, and salmon nets. One of the pioneers of soft panel excluders and involved in the Oregon Department of Fisheries and Wildlife's field tests of shrimp exluders.

Yarda's Nets, 4709 Boat Basin Dr., Charleston, OR, 97420 (503) 888-6475. Contact: Hjortur (Yarda) Sveinbjornsson. Master net maker supplying trawl nets and materials to Southern Oregon and Northern Californa fisherman. Has built 8" soft panel excluders for about six boats.

Pfister Nets, P. O. Box 548, South Beach, OR, (503) 867-8234. Contact: Tom Pfister. Veteran fisherman and net maker. Collaborated with Bob Driscoll and built first excluder for Newport fishermen. Outfitted approximately 25 boats.

Shrimp Fishermen

Phillip Carley, 142 SE Norman St., Newport, OR 97365, (503) 265-3584

Vern Clower, 1602 B St., Eureka, CA 95501, (707) 445-5789

Scott McMullin, 790 Harrison, Astoria, OR 97103, (206) 325-1415

Ronnie Rucker, Box 836, South Bend, WA 98586, (206) 875-6641

Nick Rusinovich, Rt. 3, Box 325, Astoria, OR 97103, (503) 325-1143

Ray Toste, P. O. Box 299, Grayland, WA 98547, (206) 267-4308

Fishermen's Groups

Fishermen's Marketing Association, 320 2nd St., Suite 2B, Eureka, CA 95501, (707) 442-3789, Fax: (707) 442-9166. Contact: Peter Leipzig. The FMA represents 150 groundfish and shrimp fishermen from Bellingham, WA to San Pedro, CA.

Oregon Trawl Commission, P. O. Box 569, Astoria, OR, 97103, (503) 325-3384. Contact: Joe Easley. Represents all Oregon shrimp and groundfish trawlers.

Government Agencies

Oregon Fish and Wildlife, Marine Science Drive, Newport, OR 97365, (503) 867-4741, Fax: (503) 867-0311. Contact: Bob Hannah or Steve Jones. Marine biologists actively involved in obtaining and using research grants to learn more about shrimp excluders and their relative effectiveness.

National Marine Fisheries Service Resource Assessment and Conservation Engineering (RACE) Division, 7600 Sand Point Way N E Blg.#4 Bin C 15700, Seattle, WA 98115, (206) 526-4128. Contact: Craig Rose. In addition to underwater camera work with the Oregon Fisheries and Wildlife bycatch research, he has done extensive similar research for Alaska fisheries, especially in regard to the by-catch of halibut.

Fisheries Research & Development

Pacific Fisheries R & D Ltd., 140 6660 Graybar Road, Richmond, B. C. V6W 1H9, (604) 270-6387, Fax: (604) 270-2527. Contact: Ron DeSilva. Has been involved in testing and underwater video research of a flexible grid excluder for use in Canada's West Coast shrimp fishery, and has conducted similar research on halibut excluders in collaboration with Craig Rose.

Dolphin Protection

A skipper's inventions are an "extraordinary contribution"

By Mick Kronman

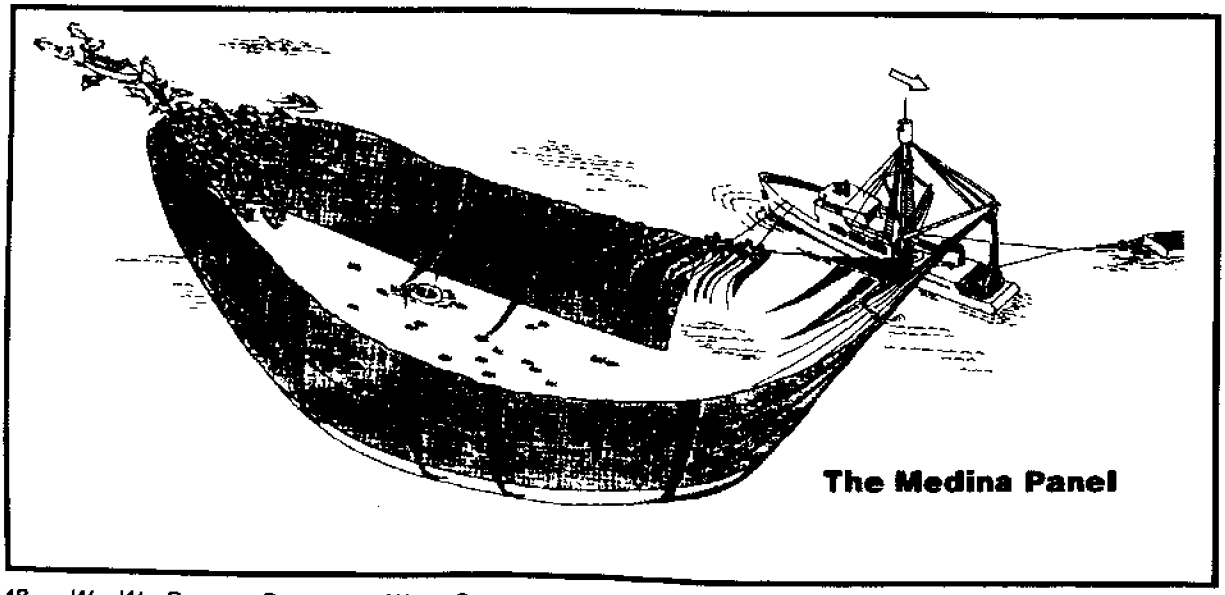
In 1945, when 21-year-old Harold Medina first took the helm of his father's tuna boat, little did he know that someday his technical innovations would help steer the fleet through a stormy dolphin-bycatch crisis.

Today Medina is off the ocean but still inventing ways to reduce dolphin deaths. He hopes continued progress in dolphin conservation will one day enable U.S. seiners to return to the grounds they pioneered 30 years ago: the yellowfin-rich waters of the Eastern Tropical Pacific (ETP).

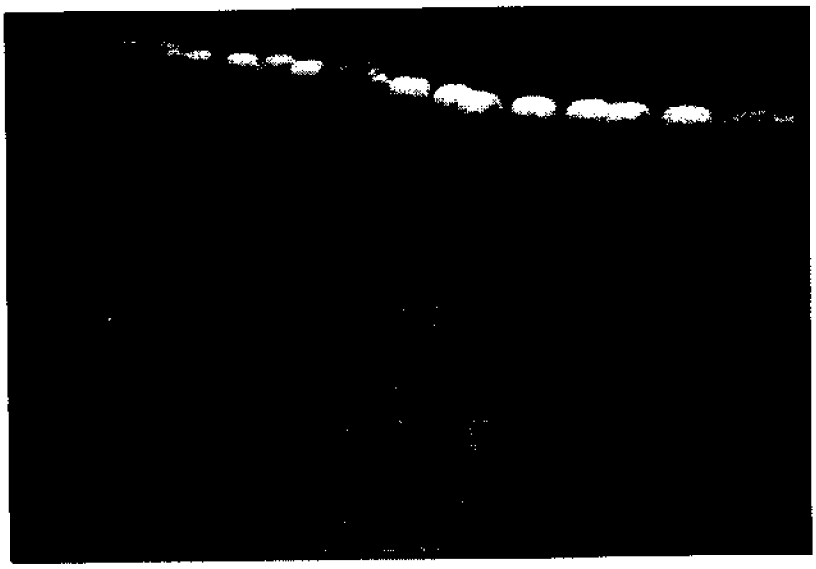
Since 1990, "dolphin-safe" policies have driven the U.S. fleet out of these waters, where prime adult tuna closely follow groups of dolphins. Some of the boats have moved into the western Pacific, some have gone out of business. Foreign vessels, mainly from Mexico and other Latin American nations, have moved into the void left by the U.S. fishermen. Beyond the reach of strict U.S. laws, the international fleet has been able to keep fishing while skippers hone their skill in dolphin protection. Medina and other California captains are credited with inventing most of the techniques and tools that enable this fleet to avoid damage to dolphin populations.

"Bycatch problems started when the fleet converted from pole-and-line to purse seine nets in the late 50s," Medina recalls. "That's when skippers began setting on schools of porpoise to catch the tuna beneath them. It was more productive than bait fishing, but many dolphins died."

Harold Carey, former head of the American Tunaboat Association (ATA), remembers those days, when up to 50 dolphins perished in a single set. "We hated killing them, especially since they guided us to the fish," he laments. "Besides, porpoise mortalities meant lost fishing time."



Backdown procedure with the Medina Panel allows dolphins to escape over the top of the net. Drawing courtesy of the Inter-American Tropical Tuna Commission.



Underwater photo of new panel modification. Attaches to the existing Medina Panel in the backdown channel. Photo taken during net trial prior to actual fishing trip. Photo courtesy of Inter-American Tropical Tuna Commission.

Adds Augie Felando, another former ATA chief, "No skipper liked catching dolphins, but crews were just learning how to use purse seines, and they were unskilled in dolphin-release techniques."

One important step came in 1960, when Anton Meizitich, skipper of a small San Pedro purse seiner, introduced a technique that allowed dolphins to escape a fully-pursed net.

"Anton developed the 'backdown procedure'. Everything followed from that," Felando says. The backdown, he explains, works like this: After a seine net is wrapped around a school of tuna (and the porpoise above them), half the net is pulled aboard and cinched off. The skipper then reverses the boat's main engine and backs up. This distends the net into an elliptical shape—like that of a thumb—parallel to the vessel. As the boat tugs on the gear, water flowing through the mesh sinks the corkline on the "thumbnail" (apex) end of the net slightly, allowing dolphins to escape. Tuna, meanwhile, remain captured deep in the net.

In 1961, another tuna skipper, Manuel Neves, demonstrated the backdown technique to his crew, and it soon became standard procedure throughout the fleet, based mostly in San Diego.

"The backdown reduced dolphin deaths, but we were still killing too many," Medina says. "That's when I noticed that dolphins fleeing the net often snagged their snouts in the 4.25" webbing just beneath the corkline. I suggested we change to 2" webbing in that part of the net, to prevent entanglement and create a slide the animals could swim over to escape."

"Medina's contribution was extraordinary," says Martin Hall. "He paid for the experiement himself, seeking no grants, patents, or awards. He simply wanted to do what was best for dolphins and for the tuna industry."

In 1971 Medina tested his theory, which proved successful. "After my experiment, we called a meeting with several skippers, five of whom then tried it themselves," he says. "Soon, many captains were using it."

"Harold's contribution was extraordinary," notes Martín Hall, chief scientist for the Inter-American Tropical Tuna Commission, a multinational body that moniters the fishery and coordinates efforts to conserve dolphins and the tuna resource in the ETP. "He paid for the experiment himself, seeking no grants, patents, or awards. And when it worked, he freely shared with others the exact design and method for constructing the panel. He had no interest in personal gain, and no claim to his discoveries. He simply wanted to do what was best for dolphins and for the tuna industry," says Hall.

By 1973, 60% of the 132-boat U.S. tuna fleet employed the so-called Medina Panel, and dolphin mortalities dropped to 15 per set. (Eventually, following exhaustive tests, the federal government required mesh size in the panel to be reduced to 1.25".)

"Further bycatch reductions were then achieved by education, plus

fine-tuning of the backdown procedure and Medina Panel," notes the IATTC's Hall. By 1977, he says, dolphin deaths dwindled to three per set.

Critics of the tuna fleet weren't satisfied, and neither was Medina. "In 1980 I tried something new—a different way of hanging corks in the apex of the net, where dolphins escape during backdown," he explains. "I designed a method of attaching corks with a loop to the part of the net taking most of the strain. This way, instead of sitting in tight bunches, the corks folded over like hinges, allowing dolphins to escape more easily."

Today, the entire Mexican tuna fleet—the largest in the ETP—employs both the Medina Panel and the Medina double-corkline. And dolphin deaths in the 10-million-square-mile region have dwindled to .5 per set. "Many Mexican tuna fishermen, some of whom are two generations younger than Harold Medina, revere him for his technical advances and sharing of knowledge," says Martín Hall.

"Even today," adds Harold Carey, "Harold enjoys such standing in the industry that when he offers an idea, everyone listens. They know he's brilliant—an engineer in fisherman's clothes."

Indeed, Medina is still drumming up ways to reduce dolphin deaths in the ETP. "We've had no major technological breakthroughs in the past 10 years—we've concentrated mostly on education and gear refinements—but recently we began experiments with a new dolphin-saving device," notes Martín Hall. "Again the idea came from Harold Medina."

"I was considering ways to escort dolphins out of the net when it occurred to me we could sew a canvas panel into the apex of the backdown channel, about a foot below the corkline. It would lay against the webbing like a solid panel during backdown, keeping the net open ("canopies" and collapses in the net are primary ways dolphins become trapped and drown). It would also force the corkline down and—with the help of up-welling water—help usher dolphins over the net."

Finding an audience for Medina's latest creation wasn't difficult. "We liked Harold's idea because it was plausible and inexpensive," says Dave Bratten, an IATTC senior scientist. "So we went to a sailmaker and had him construct a prototype with rip-stop nylon, like the material raincoats are made from."

Last August, scientists tested the nylon panel aboard the boat of an eager Mexican skipper. "We can't claim success yet, but initial trials were encouraging," Bratten says (among other things, researchers learned that dolphins shy away from some colors but not others, like black). "With fine tuning and persistence, it might work."

If it does, Medina will again have helped reduce mammal bycatch in the 300,000 ton-per-year ETP tuna fishery.

"He's the kind of person who's capable of that," says Hall. "He knows every aspect of the fishing operation—the mast, the speedboat, the helm, the engine room. Intuitively, he understands how a net will react to the forces of wind, water, and waves. To 'see' all this without complicated equations and graphs is, like the man himself, remarkable." ❑

"Even today," says Harold Carey, "Harold (Medina) enjoys such standing in the industry that when he offers an idea, everyone listens. They know he's brilliant—an engineer in fisherman's clothes."

Harold Medina preparing the panel for installation into the test vessel's net. Photo Courtesy of Inter-American Tropical Tuna Commission.

Gulf/ South Atlantic

From TEDs To BRDs

Gulf and South Atlantic shrimp fishermen shift bycatch focus

By David Krapf

In the Gulf of Mexico and South Atlantic shrimp fisheries, federal and state officials are trying to avoid a repeat of the acrimonious battle that resulted over the implementation of turtle excluder devices (TEDs) a few years ago. Officials have been moving slowly on bycatch, encouraging participation and making sure shrimpers in these two regions are informed. For their part, the industry has been working with the scientific and management community to develop bycatch reduction devices (BRD).

Though progress has been made in BRD research and development, shrimpers are wary of anything that will further reduce their catch and income. The industry is worried that conservationists and recreational interests will push to close shrimping areas and seasons if fish populations do not rebound. This could lead to pressure to increase bycatch reduction rates (percentage of fish released). It could also lead to more complicated and expensive BRD requirements.

Some background

"There has to be some kind of limited entry," says Ken Hinman of the National Coalition for Marine Conservation. "Bring the fleet more into line with what the resource can produce."

Concern about bycatch in the shrimp fishery began to gather steam in the 1970s. Several groups, including conservationists, recreational fishermen, and the government, stepped up scrutiny of the shrimp fishery. Sea turtle bycatch was targeted first and led to TED requirements for shrimpers. Now it's finfish bycatch and BRD requirements.

Conservationists say bycatch is one of the Gulf shrimp fishery's biggest problems, in part caused by the fishery's open access that has led to overcapacity and overcapitalization. Having fewer shrimpers, they say, would lead to reduced bycatch.

"There has to be some kind of limited entry," says Ken Hinman of the National Coalition for Marine Conservation. "Bring the fleet more into line with what the resource can produce."

Bob Jones of the Southeastern Fisheries Association says the conservation groups are just using bycatch as a membership tool. "A couple of conservation groups are credible, but most are not good," he says. "Most just want to beef up their organizations and don't practice what they preach. They are horrible."

The world's shrimpers were cited as the top bycatch offenders in *A Global Assessment of Fisheries Bycatch and Discards*, a major report

published by the U.N. Food and Agriculture Organization. The U.S. Southeast was ranked ninth, with 8 kg. of discard per 1 kg. of target catch. Gulf shrimpers were fifth at 10.3 to 1. A recent National Marine Fisheries Service (NMFS) estimate put Gulf finfish bycatch at about 1 billion lbs. a year. This includes 34 million juvenile red snapper, the Gulf's biggest bycatch problem. In the South Atlantic, the targeted finfish for reduction is weakfish.

But a recent study from the Gulf & South Atlantic Fisheries Development Foundation indicates that bycatch-to-catch ratios in the shrimp fishery may be greatly exaggerated. Ratios of 10 lbs. of fish to 1 lb. of shrimp are often reported by conservation groups. However, the Gulf Foundation's study of over 2,500 commercial shrimp-trawl tows in Southeast waters revealed a ratio of 3 to 4 lbs. of fish to 1 lb. of shrimp. In May 1994 NMFS estimated the Gulf ratio at 3.5 to 1. Some biologists say there's not really a red snapper problem in the Gulf and its population has been increasing.

Another indication that bycatch may be declining are reports that fish donations to food banks from shrimpers appear to be down in south Texas. "Skippers used to give sacks of fish to poor people," says Gary

Turtle trouble: Disbelief, conflict and improvement

Reducing the take of turtles in shrimp trawling has been one of the most contentious problems in American fisheries. From the start, the issue has sparked an attitude of mutual incredulity: fishermen have found it hard to believe that they kill many turtles; scientists and conservationists have found it hard to believe anyone could doubt their data.

Such basic differences over what constitutes a fact permeate this issue. Shrimpers say they scarcely ever see turtles, much less catch and drown them. Scientists say there are so many shrimp trawlers that, cumulatively, their millions of hours towing nets are enough to make even rare encounters add up. In 1990 a National Academy of Science study concluded that shrimp trawling in the southeastern U.S. and the Gulf of Mexico is "the major cause of mortality associated with human activities." The toll, according to the study: as many as 50,000 loggerhead turtles and 5,000 Kemp's ridley turtles drowned annually. All five species of sea turtle that occur in U.S. waters are listed as endangered or threatened.

Mortalities have fallen dramatically since then. For that gain, conservationists credit a federal regulation that began requiring shrimpers to use Turtle Excluder Devices (TEDs) in 1990. Fishermen had fought that rule for years, because the early devices, designed by the government, were bulky, potentially hazardous to deck crews, and let some shrimp escape from the net. By their lights, it seemed a lot of trouble to solve a problem that even conscientious, conservation-minded shrimpers considered overblown. But in the end most accepted the use of TEDs as a cost of doing business. Some set to work improving the devices.

By now, fishermen and gear specialists in several universities and the National Marine Fisheries Service have developed TEDs that work reasonably well: they free the reptiles efficiently, keep most of the shrimp, and don't endanger crews. They are used from North Carolina to Texas. They also eliminate a lot of unwanted fish from the nets.

Trouble flared again in Texas in 1994, when hundreds of dead turtles washed ashore at times and places that appeared to implicate shrimp trawling. Authorities speculated that a few shrimpers were defying the law, either refusing to use TEDs or fastening them shut so the reptiles could not escape. Whatever the case, several environmental groups filed lawsuits to force NMFS to crack down harder on the fleet. Earth Island Institute sought a court injunction to prohibit shrimping until the government could establish that the fishery won't jeopardize the turtles. —B. W.

The question is how to solve the bycatch problem without severely hampering this valuable fishery. As Dave Harrington of University of Georgia Sea Grant puts it, the key elements in the bycatch solution are "finfish reduction, shrimp retention, simple gear, and establishing industry involvement."

Graham of Texas A&M Sea Grant. "From reports I'm getting, there are now complaints they don't give the fish away."

Huge economic impact

Shrimpers have a reason for concern. The shrimp fishery is one of the country's most valuable. Among U.S. fisheries, shrimp are usually first or second in value and among the top 10 in volume. The Gulf and South Atlantic typically account for over 80% of the U.S. shrimp industry's landings and more than 90% of its value.

The $400 million Gulf shrimp fishery accounts for about 75% of all U.S. shrimp landings and 80% of its value. The South Atlantic's total landings and value are just a fraction of the Gulf's. For the January-September 1992 period, total Gulf landings were over 95 million lbs. compared to the South Atlantic's 11.8 million lbs. The South Atlantic's total value is usually around $40 million.

The question is how to solve the bycatch problem without severely hampering this valuable fishery. As Dave Harrington of University of Georgia Sea Grant puts it, the key elements in the bycatch solution are "finfish reduction, shrimp retention, simple gear, and establishing industry involvement." A simple, efficient, and inexpensive BRD that will enable the shrimp fishery to reduce bycatch by 50% is the Gulf of Mexico Fishery Management Council's goal. The objective is to reduce unwanted bycatch while allowing recovery of reef fish, mackerel and groundfish stocks without adversely effecting the Gulf shrimp fishery.

Gulf shrimpers will resist any measures that will significantly reduce their catch and add to their recent economic woes. They have been taking numerous hits in recent years due to adverse weather, regulations, and increased costs. Gulf landings have been dropping every year since 1990, and the 1994 take will be worse than 1993's dismal 125 million lbs.

One way to avoid another TEDs-type conflict is to follow North Carolina's lead. The state gave its shrimpers plenty of latitude in developing BRDs. As a result, fishermen were more receptive to the devices, especially after they realized they worked. In the Gulf and South Atlantic, all of the TEDs currently in use and some of the best-engineered BRDs are based on designs from shrimpers.

Although conservation groups feel BRD requirements should have been in place by now, most are satisfied with how the research and development has progressed. "Everyone is being given the opportunity to be part of the solution," says Suzanne Iudicello of the Center for Marine Conservation.

"It proves what can happen when there's a cooperative approach," says Jerry Schill, executive director of the North Carolina Fisheries Association. "It's the direct opposite of what happened with TEDs."

"The North Carolina plan gave fishermen maximum flexibility to develop FEDs (finfish excluder devices)," says Bob Mahood, executive director of the South Atlantic Fishery Management Council. "Nothing was forced on them."

Snapper targeted

In 1990, the Gulf Council also expressed its intention to reduce the bycatch mortality of juvenile red snapper by 50% by 1993. The three-year delay was to allow the development of methodology in cooperative studies with industry. The moratorium was then extended to 1994. In a 1991 amendment to the Gulf Reef Fish Fishery Management Plan, the Gulf Council adopted a proposal to reduce red snapper bycatch in shrimp trawls by 50% in 1994, through mandatory use of BRDs.

reductions in shrimp fishery effort, area or season closures, or a combination of all three.

Harrington warns that if these mandatory reductions in bycatch do not lead to population rebounds by a prescribed year, then harsher measures may be imposed on shrimpers.

Adding to shrimpers woes has been the perception among recreational fishermen that their catches will improve if shrimp bycatch was reduced. Also, conservationists don't want any more delays in BRD implementation. "We've been concerned and heard things coming out of the Gulf that they want to extend the exemption (moratorium) on bycatch," says National Coalition for Marine Conservation's Hinman. "I think for the Gulf Council to drag their feet on this would be a big mistake."

Hinman says he gets the feeling that Gulf shrimpers are resistant to the BRDs. "They've been supportive of research, but you could look at it as stalling for time."

Bycatch Research Program

A program to study the effects of bycatch in the shrimp fisheries of the Gulf and South Atlantic and develop methods to reduce bycatch was mandated by a 1990 amendment to the Magnuson Act. Since 1992, the Gulf Foundation has conducted a shrimp fishery bycatch reduction program to address this mandate.

The cooperative four-year program places industry observers aboard fishing vessels to accumulate bycatch characterization data (what's being caught) and conduct BRD evaluation and testing. The program involves commercial shrimp vessels in the Gulf and South Atlantic, coordinated through Texas A&M and University of Georgia Sea Grant. The program has six contracted observers—four in the Gulf and two in the South Atlantic. As of Nov. 1, 1994, the Foundation had logged an estimated 950 sea days in conjunction with the observer program.

In the Gulf, the Texas Shrimp Association has been working closely with NMFS and the Foundation on bycatch characterization research and BRD testing. Cooperation has reportedly been good.

Although conservation groups feel BRD requirements should have been in place by now, most are satisfied with how the research and development has progressed. "Everyone is being given the opportunity to be part of the solution," says Suzanne Iudicello of the Center for Marine Conservation. "Rolling up the sleeves is more important than pointing fingers. Maybe it's not happening as fast as we like, but I think, overall, the notion that you put your best minds and technology together" is working in the shrimp fishery.

Says Hinman, "The possibility of a technological fix is a lot better [in the shrimp fishery] than a lot of other fisheries. What's positive is the potential to do something to solve the bycatch problem without substantially changing the way shrimpers fish."

There is room for improvement, however. Dr. Steven Branstetter, the Foundation's bycatch research program director, says more involvement is necessary. "One drawback, on the fisherman level, is they need a lot better education on where we are. We are obviously not reaching a large number of vessels. We need better outreach and must get these BRDs on more boats."

Branstetter says a large portion of the shrimpers don't even know

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the program exists. "A more intensive effort to reach down at that level is needed."

Since 1990, NMFS has evaluated 82 BRD designs from commercial fishermen, net shops, gear technicians, and engineers. And, according to testing data, several have met the 50% target with minimal shrimp loss.

Gear must meet three criteria before it will be approved: it must reduce bycatch by 50%, shrimp retention must be at least 97%, and it must not increase overall gear cost by more than 10%. The two BRDs with the best potential for reducing juvenile red snapper mortality in the Gulf are the extended funnel design and the top-position fisheye.

To help meet the 50% target, many are pushing for a bycatch reduction credit for TEDs. Georgia and South Carolina are giving the industry a 23% credit for TEDs. Harrington says it would be a "great disservice" to the fishing industry not to the recognize the finfish exclusion rates of TEDs—how each can be modified to increase or decrease such rates—and allow an exclusion credit for TEDs. "It would be an even greater disservice not to let the general public know of this contribution."

As for the process, both councils expect to spend all of 1995 on the bycatch amendments to their shrimp fishery management plans. Implementation of BRD requirements is expected in 1996. ❑

New England

A Promising Collaboration

Teamwork enables test of device for warning porpoises away from gillnets

Fishermen, scientists, conservationists, foundations, and the National Marine Fisheries Service (NMFS) are working together to solve one of New England's most glaring bycatch problems: the entanglement of harbor porpoise in Gulf of Maine groundfish gillnets. This fall, they launched an extensive $550,000 experiment to document the effectiveness of outfitting sink gillnets with acoustic "pingers."

These alarms are supposed to warn harbor porpoise to stay clear of gillnets. The pingers emit a beeper-like sound similar to the one that goes off when a truck backs up.

By Susan Pollack

Background

For a decade, scientists have documented a significant incidental take of harbor porpoise, a small marine mammal, in Gulf of Maine gillnets. In 1990, the kill was estimated at 2,900 animals. Gillnetters have since cut this bycatch in half, but it still exceeds the limit (2 percent of the population) that, in the absence of definitive research, NMFS considers acceptable for cetaceans.

The Marine Mammal Protection Act calls for reducing bycatch to levels "approaching zero." At press time, NMFS was considering a petition to have the harbor porpoise listed as a threatened species. Meanwhile, gillnetters say that new fishing restrictions aimed at cutting down marine mammal interaction with Gulf of Maine gillnets threaten their livelihoods. To make matters worse, from Florida to California gillnetters have come under increasing fire; rival sportfishing activists, who covet their catch, have found it easy to portray them as the embodiment of destructive fishing practices.

"Either we reduce our harbor porpoise bycatch, or we'll be forced out of business," says Ted Ames, Maine Gillnetters Association.

Gillnetters in New England reckoned they had better prove otherwise. Ted Ames, president of the Maine Gillnetters Association, says he and other fishermen saw little choice: "Either we reduce our harbor porpoise bycatch, or we'll be forced out of business." With this in mind, Ames approached the National Fish and Wildlife Foundation for funding to put pingers on every Maine gillnet.

Ames's initial discussions with Whit Fosburgh, the Foundation's director of fisheries, was one strand of this fall's unique collaborative venture. The venture also arose out of discussions among Maine, Massachusetts, and New Hampshire gillnetters, and from the work of

the Harbor Porpoise Working Group, which comprises fishermen, scientists, conservationists, and representatives of NMFS and the New England Fishery Management Council.

Pingers arrive on the scene

New England gillnetters did not need to be convinced that pingers are effective. They had seen the devices used during fall 1992, and fall 1993, at Jeffreys Ledge in the Gulf of Maine. Those two years, the pinger's inventor, Jon Lien of Newfoundland's Memorial University, volunteered his time working on a shoestring experiment with four New Hampshire gillnetters. (Lien originally invented the pinger to keep whales away from Newfoundland cod traps.)

The challenge was convincing NMFS that the pingers worked, since the federal agency, with its responsibility to enforce the Marine Mammal Protection Act, needed proof that they could be a viable substitute for proven measures such as fishing closures. Explains the Fish and Wildlife Foundation's Fosburgh, "Unless NMFS bought off on the pingers, we were wasting time and money." The trouble was, Lien's two New England experiments were considered statistically insignificant because the sample size was so small. In addition, NMFS found fault with the design of one of the experiments.

To complicate matters, one of the best-known early experiments with a pinger-like device was a dismal failure. In the 1970s the device was used to scare away seals from salmon nets in the Pacific Northwest. But it did just the opposite. "It acted like a dinner bell," according to mammalogist Scott Kraus of the New England Aquarium. Kraus is the coordinator of this fall's collaborative pinger experiment. Like Fosburgh, Kraus has also served as a buffer between fishermen and NMFS. As outsiders, the two men have helped make possible a venture that might not otherwise have gotten off the ground because of mistrust between fishermen and the government.

"Fishermen are doing stuff for us (that) they wouldn't do for NMFS," admits Kraus. "We're in a relatively good position with regard to both sides to get this experiment done, and to make sure the results are as clean as possible so they stand on their own."

Kraus and two other scientists, Dr. Andrew Solow and Andrew Read of the Woods Hole Oceanographic Institution, will collect and analyze all data. NMFS signed off on the design of the experiment. The experiment's investigative team includes Eric Anderson, president of the New Hampshire Commercial Fishermen's Association, Rollie Barnaby of the University of New Hampshire Cooperative Extension Service, both of whom were active in the earlier work with Lien. Also involved is Dr. Ken Baldwin of the University of New Hampshire's Department of Engineering.

"Fishermen are doing stuff for us (that) they wouldn't do for NMFS," says Scott Kraus, New England Aquarium. "We're in a relatively good position with regard to both sides to get this experiment done, and to make sure the results are as clean as possible so they stand on their own."

The experiment

The Fish and Wildlife Foundation has allocated $250,000 for the experiment; the money comes from some $30 million in federal economic assistance to New England's hard-pressed fishing industry. Over $100,000 of the grant goes toward the purchase of pingers. In addition to compensating researchers, the grant covers a $1,000 fuel allowance to each of the 15 boats participating in the pinger experiment. NMFS has contributed another $300,000 to cover the costs of 100 percent

observer coverage on the 15 boats. Coverage is provided by the Manomet Observatory. Dave Potter is the NMFS project liaison.

The experiment uses what is known as a double-blind approach, meaning that neither fishermen nor observers know which nets are alarmed with active pingers and which ones have dummies. This at first proved a sticking point, says the Wildlife Foundation's Jerry Clark. "The industry immediately said 'you don't trust us,' and NMFS was saying this was the way things were done." After the fishing industry agreed to the double-blind approach, there were other hurdles to overcome concerning the size and placement of nets. NMFS wanted the nets laid out in a grid, like New York City streets, Kraus recalls. Fishermen strenuously objected. In the end, fishermen were allowed to place the nets where they chose, but they agreed to space them all the same distance apart. They also agreed to use groupings of twelve 300-foot-long nets hooked together—what fishermen call 12-net strings. The pingers are attached in mesh lobster bait bags to the headropes of each net. The pingers themselves are housed in white PVC pipe two inches in diameter and four inches long.

Hope for the future

For industry leader Eric Anderson, this fall's experiment represents the culmination of several years of persistent efforts to get pingers accepted fleetwide in New England. Ever since he first heard about pingers from Rollie Barnaby at a Harbour Porpoise Working Group meeting and tried them out himself as a participant in Lien's experiment, Anderson has promoted use of this gear to reduce marine mammal bycatch.

From October 15 through December 15, Anderson's boat and the 14 others in the experiment planned to set pingered nets and have their catches monitored at Jeffrey's Ledge, a popular gillnetting ground. The experiment takes place during the height of the fall cod and pollock gillnetting season, which is also the period when incidental takes of harbor porpoise have been heaviest.

Anderson is already convinced of the effectiveness of pingers, but he says this year's experiment could prove once and for all that pingers are "doing what they are supposed to do." Since gillnets "are the most common fishing gear in the world, the success of this experiment has worldwide implications," says Anderson. The problem of marine mammal bycatch is not unique to New England, Anderson adds. "It happens all over the world. To gillnetters everywhere, this experiment is a ray of hope." ❑

New England Groundfish Discards

A familiar problem goes critical as stocks dwindle

By Susan Pollack

Like fishermen elsewhere, New England groundfishermen have thrown away millions of dollars of potential profits because of high discards of undersized fish. Lately, this troubling economic waste has become a conservation issue as well. High discards of juvenile cod, haddock, and yellowtail flounder, often before they have spawned, have lessened the opportunities for re-building depleted groundfish stocks, according to Steven Murawski, head of the National Marine Fisheries Service's population dynamics branch.

The 1987 year class of southern New England yellowtail flounder is a case in point. The landed value of the catch was estimated at $31 million. Scientists estimate that trawlers discarded up to 60 percent of what they caught that year. Another $52 million worth of fish could have come out of the 1987 year class had it been husbanded more carefully. What's more, says Murawski, "a lot of yellowtail were caught before they had spawned even once; it was doubly wasteful."

The Gulf of Maine's strong 1987 year class of cod was also subjected to significant discards, particularly at Jeffrey's Ledge and Stellwagon Bank. The dockside value was approximately $90 million. It would have been double that if not for discards, calculates Murawski. Discards also took a toll on the last strong year classes of haddock, in 1975 and 1978.

Bycatch of undersized target species is much more of a problem in the trawl fishery than in the gillnet fishery. Gillnets tend to be more "size selective" than trawls, catching fish much closer to target size.

The trawl fishery generates the bulk of the New England groundfish haul—about 80 percent. To reduce the waste of undersized target species further, scientists and fishery managers are now looking at such things as readjusting the relation between minimum fish and mesh size. For example, in the yellowtail flounder fishery, scientists have recommended dropping the minimum fish size from 13" to 12" and requiring the use of 5 1/2" or 6" diamond mesh, since diamond mesh allows for better escapement of undersized flatfish than does square mesh.

The discard problem is not new to the New England groundfish fishery. It has existed for over 60 years. The difference is that back in 1930, the spawning stock biomass was large enough to sustain high levels of discards, while now "the population is so low that every fish is important," says Murawski. ❑

Watching the Pot

Industry efforts keep New England lobster population healthy

By Gerald Hadden

Fishermen and conservation groups have locked horns in many areas, but the New England lobster industry isn't one of them. This fishery offers an important lesson in how fishermen, given time and the right circumstances, can resolve their own sustainability problems.

Decades ago, long before powerful environmental organizations came on the scene, far-sighted lobstermen recognized the need to curb their juvenile catch, or else face dwindling stocks in the future. One spur to action was a long period during the 1940s when stocks dwindled dramatically from overfishing.

The key to their success was the development and installation of escape hatches for the lobster traps, which allows young lobsters to come and go at will while retaining the adults. Lobstermen themselves are credited with inventing and perfecting the devices. Used voluntarily throughout the industry since the 1950s, escape hatches became mandatory fifteen years ago under federal regulations.

Inshore fishermen's organizations, such as the Maine Lobstermen's Association (MLA), played a key role in making escape hatches mandatory by arguing their case to the New England Fisheries Council. According to Pat White, a long-time lobsterman and executive director of the MLA, the inshore industry began reforming itself entirely on its own. Lobstermen, he says, have never had conflicts with the environmental community. In fact, the MLA and other industry organizations have on their own initiative made efforts to open lines of communication with many conservation organizations.

Currently they are in contact with the Conservation Law Foundation, keeping that organization informed on the work they are doing to sustain stocks by reducing fishing, or "effort," in the region. The CLF is impressed. Ellie Dorsey, staff scientist at the CLF, says she first heard from the lobstermen around the time her organization was going after New England's groundfishermen. "They called us up just to let us know what a great job they were doing in protecting their own stocks," she said. "Though we didn't have any plans whatsoever to come down on the lobster industry, it made a lot of sense for them to open up these lines of communication. We're not doing any specific work with them at the moment, but we sympathize with many of their issues, and at least we're in touch. There is a sense of openness."

The inshore industry began reforming itself entirely on its own.

In other bridge-building efforts, lobstermen have worked with Maine Audubon in support of the Clean Water Act, and have helped to make "V-notching" of pregnant females a federal law. In V-notching, a small V is cut into the right back flipper of pregnant lobsters to alert other fisherman to return them to the water if recaught. White estimates that there are now between 8 and 10 million V-notched "eggers" in New England waters.

About five years ago, Maine fisherman successfully fought to make mandatory on all lobster traps at least one standard escape hatch and one

biodegradable vent. In 1993 they were successful. These bio-vents disintegrate in anywhere from three to eight months, depending on the time of year they're set. When the vents break down, the traps open automatically, allowing captured animals to escape. This is particularly useful with "ghost traps," or traps that have been lost on the bottom but continue to attract and hold lobsters.

There is one problem with the escape hatches. Because they are designed to ensure that sublegal-sized lobsters can get out, some adults escape as well. Because of this White estimates he loses about 5% of his harvest each year. But it's well worth it, for several reasons. Most importantly, letting the young lobsters grow to maturity ensures a stable brood stock for future generations. More practically, a trap full of juveniles means less room for full-grown lobsters. And if the juveniles can't escape on their own, lobstermen must throw them back by hand from the deck, a time-consuming practice that can potentially harm the lobsters. Though federal legislation now requires only one escape vent and one bio-vent on every trap, lobstermen like Pat White are using at least three or four.

David Cousens, president of the Maine Lobstermen's Association, also has several escape vents on his traps. His believes the more juveniles he can feed – and let go – the better.After all, they're only going to get bigger. Besides, he explains, because lobsters are solitary creatures, adults are less likely to enter a crowded trap full of juveniles – even when there's plenty of bait. Allowing the young ones to leave makes room for the adults, ultimately increasing the legitimate take.

"Everyone wins," says Dave Cousens, Maine Lobstermen's Association. We're catching more lobsters than ever, and the brood stock is secure."

The industry's self-motivated conservation efforts continue today. They're pushing the New England Fisheries Council for stricter size limits on lobsters, and for the federal limit on traps allowed in the water to be reduced from 1,800 to below 1,000 per fisherman. The Massachussetts Lobsterman's Association is also pressing to limit the number of traps each fisherman can set.

So far, lobster conservation has been only informally monitored. New England lobstermen are not required to keep records on how many lobsters are caught, or on how many traps are in the water. But lobsters appear to be more abundant today than at any other time in recent history, says White.

The industry has been able to maintain steady harvests year in and year out. At the same time, by actively reaching out to the environmental community, lobstermen have avoided misunderstandings and confrontations. "Everyone wins," says Cousens. "We're catching more lobsters than ever, and the brood stock is secure." ❑

A Bycatch Success Story

Nordmore grate cuts New England shrimpers' fish bycatch

By Susan Pollack

The Nordmore grate, a finfish excluder device, is one of the few virtually unqualified successes in the field of bycatch reduction. The grate has reduced Gulf of Maine shrimpers' finfish bycatches by 95% without significantly reducing shrimp catches, according to the National Marine Fisheries Service's fisheries engineering group. This is critical at a time when severely depleted New England groundfish stocks are on the verge of collapse.

Originally developed in Norway, the Nordmore grate consists of a rigid panel of parallel bars constructed out of either aluminum or hard plastic (polyethylene). Working in conjunction with a mesh funnel, the grate prevents anything too large from passing into the codend.

Current regulations mandate that the bars be spaced no more than one inch apart. This filters out millions of pounds of small flounders, cod, and haddock while *Pandalus borealis*, the small shrimp found in northern waters, enter the codend relatively unimpeded. Northern shrimp fishermen have been required to use the grate since April, 1992.

Like many of his colleagues, Maine fisherman Charles Saunders, president of the Maine Fishermen's Cooperative Association, was at first skeptical of the Nordmore grate. Today Saunders and most other shrimpers support the device, with some reservations. "I think it's a good thing," says Saunders. "Everybody's working with it. We see the wisdom of using it."

Because many shrimpers also fish groundfish, they recognize that by using the grate "we're saving our future," says Saunders. "Instead of stressing or killing the future of our groundfish fishery," shrimpers are allowing groundfish to escape and grow, he says.

Saunders took part in NMFS's original 1990 and 1991 sea trials with the Nordmore grate. He found that even small changes in the positioning of the funnel and grate cut down on the loss of shrimp. But he says, fishermen are still losing some shrimp, a view that is widely held in the fishing industry.

"Instead of stressing or killing the future of our groundfish fishery," shrimpers are allowing groundfish to escape and grow, says Maine fisherman Charles Saunders.

Some fishermen, like Bob Tetrault of Portland, Maine, another participant in the sea trials, also report that the grate seems to filter out the largest shrimp, causing their catch to consist of mostly smaller, and less valuable, shrimp. Even so, Tetrault supports the Nordmore grate. Apart from its conservation benefits, the grate produces better quality shrimp, since they're not crushed by groundfish, he says. Concerning the loss of shrimp, Tetrault is philosophic. As long as everyone else must use the grate, and sacrifice a certain percentage of the catch, he says he has "no problem. It's a level playing field."

John Kenney, Al Blott, and V.E. Volk of the NMFS fisheries engineering group conducted the sea trials at the request of the New England Fishery Management Council. Arthur Odlin, a council member and retired fisherman, heard about the use of the grate in Canada and urged that it be brought to New England. Both Canadian and Norwegian

studies found a 5% reduction in shrimp catch with the grate, but the NMFS study found no reduction, reports Kenney.

Meanwhile, hydrodynamic work done on the grate by Joe DeAlteris, a University of Rhode Island gear specialist, reveals that an adjustment in the width of the bars could result in greater shrimp retention. Since the water carries the shrimp with it, increasing water flow through the grate into the codend could result in greater retention of shrimp, says DeAlteris.

Since the maximum one-inch spacing between the bars is fixed by law, one way to increase water flowing through the grate is to reduce the diameter of the bars themselves, says DeAlteris. Reducing the bars from their current half-inch diameter to even a quarter of an inch would allow a greater amount of water to pass through the grate rather than pass out over the top of the net.

In order to keep the grate stiff and strong, a reduction in the diameter of the bars would require creating additional reinforcements in the grate. It might also be possible to construct the grate out of stainless steel, which is stronger than either the aluminum or polyethylene used today.

Making the grate work in New England has required work from a lot of players. The fisheries service, conservation engineers, the regional fishery council, fishermen, and the Atlantic States Marine Fisheries Commission, which regulates Northern shrimp, have all been involved.

Although the conservation community was not directly involved in bringing the Nordmore grate to New England, groups like the Conservation Law Foundation of New England support the concept of making gear more selective, says Eleanor Dorsey, CLF's fisheries scientist. CLF has been actively involved in conserving New England groundfish and is "very pleased to see the success of the grate," says Dorsey. ❑

Funding Sources

Funding for Fisheries Bycatch Initiatives

By Gerald Hadden

As fishermen, scientists and conservationists search for new methods to reduce bycatch, the question of how to finance their efforts inevitably arises. To date, funding for such initiatives has come largely from the federal government, particularly the National Marine Fisheries Service. However, competition for federal funds has become stiffer and the deficit is bearing down on nearly all federal programs. At the same time, fisheries problems have grown more acute, further outstripping the federal government's capacity to respond. Fisheries initiatives now require alternative or supplemental support.

These are largely unchartered waters, but the need to enter them is genuine. This section of the handbook presents a brief overview of potential funding sources and how to approach them.

The essential steps are easier said than done: develop sound ideas, present them professionally, and show that they have real-world benefits. It also helps to show funders that an idea enjoys broad support among the often contentious fishing, scientific and conservation communities. Coalition-building, a good idea anyway, brings more clout to the funding table. For example, fishermen who can team up with the scientific community, which already has the personnel to collect and process data, and the experience of working with grants, will have a greater chance of convincing a funder that their efforts will produce accurate, measurable results.

Saltonstall-Kennedy Funds

The Saltonstall-Kennedy Act provides for a portion of the duties on imported seafoods, corals, and pearls to be allocated for fisheries research grants. The money is appropriated annually by Congress, and the grants budget ranges from about $7 to 10 million. It is distributed through the National Marine Fisheries Service in the Department of Commerce. Proposals are accepted from individual citizens, nonprofits, state agencies, universities, and other groups interested in fisheries initiatives. Historically, most of the S-K support has gone to the five regional fisheries foundations, but in recent years this trend has stopped, in part because all but two of these foundations have for various reasons disappeared, and because competition for the limited funds has grown fierce.

There is widespread agreement within the fishing and scientific communities that getting S-K funding is a hard, uncertain prospect. That hurdle, and the memory of bureaucratic foul-ups that hurt some recipients in the past, have made many researchers shy of the program. Nonetheless, it is the backbone of federal support for nongovernment work in fisheries.

There is widespread agreement within the fishing and scientific communities that getting S-K funding is a hard, uncertain prospect.

Proposals should be concise, have a specific, focused program that will deliver good value for the money, and outline a clear vision of the real-world benefits of the research. Otherwise they probably will be turned down. Fishing people with ideas to propose can strengthen their hand by teaming up with university researchers; many have experience in working with grants and already have the personnel for grants administration and research.

Despite the hurdles, funding for bycatch initiatives does occur. In 1993 the Oregon Department of Fish and Wildlife received $149,000 in S-K money to run experiments using the Norwegian-developed Nordmore grate and three other excluder devices in the West Coast pink shrimp fishery (see Charles Summers' article, "Learning from other fleets"). S-K funds have also supported studies on methods of reducing groundfish trawl bycatch and improving survival of incidentally caught fish.

For information on applying for Saltonstall-Kennedy grants, contact the nearest regional office of the National Marine Fisheries Service.

Small Business Innovation Research Grants

SBIR grants are administered through the Department of Commerce and are available annually. The money represents a percentage of the 11 federal agencies' "extramural" research budgets—work done by outside organizations. SBIR grants were created when the department decided that some of the federal money that was going to nonprofit foundations should go directly to small businesses. Many felt small businesses had the most innovative ideas.

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These grants support a long list of topics, one of which is: "reducing or eliminating bycatch from net fisheries." Grants under this topic must be used to reduce mortality of bycatch, remove bycatch from gear, or avoid it altogether. There is about $10 million in the SBIR pool, but the money is allocated for a variety of different issues, and competition is intense. Nonetheless all ideas are welcome, according to the SBIR manager at the Department of Commerce in Maryland, Leon Laporte.

The program is complicated. The Fisheries Service will field proposals from anyone. Before responding to an initial proposal, however, they'll take the general idea behind the proposal and incorporate it into a list of topics published in their "solicitation." The solicitation then goes out to anyone who requests it (it's currently distributed to about 10,000 people and organizations). Once a number of proposals based on the general topics have been received back, NMFS then decides which, if any, are worth funding. In this way they can share a good idea with, and receive proposals from, a wider audience.

The grants run in two phases. Phase One is a six-month feasibility study; Phase Two runs for about two years and is devoted to prototype and development work. For the length of the grant NMFS provides oversight and technical assistance. For more information, contact Leon Laporte at the SBIR Program, Commerce Department, (301) 713-3565.

Institute funds technology transfer

Established in 1984, the National Coastal Resources Research and Development Institute supports projects that translate scientific and technological advances into environmentally responsible and socially compatible economic gain. It is particulary interested in fostering economic development in rural coastal communities where businesses are less able to support research and development. To date NCRI has funded 88 projects in 26 states. The institute is funded directly through the National Oceanographic and Atmospheric Administration.

The institute's budget for grants is about 1 million dollars a year. Typically it funds 25 projects per year in commercial fisheries, aquaculture and marine environmental technology. In fisheries the main focus has been on technology transfer to industry. The institute in late 1994 was considering a proposal for potgear modifications in Alaska.

NCRI does not fund research, but rather later-stage commercial applications of research. For example, in 1993 North Carolina Sea Grant conducted research on raising hybrid bass. NCRI then provided funding to local farmers to get a related commercial venture up and running. As a rule the institute likes to link up rural businesses with the academic world, which tends to be more knowledgeable about how grants work and can disseminate information to a wider audience. The institute is very open to new ideas. Additional information and complete guidelines are available. Contact: Steve Olsen, National Coastal Resources Research & Development Institute, P.O. Box 751, Portland, OR 97207, tel 503/725-5725 fax 503/725-5732.

Because foundations are generally understaffed and operate on tight budgets, nothing is more frustrating to them than spending their energy replying to proposals that are inappropriate or ineligible.

Private foundations: an overview

One possible source of funding comes from private-sector grantmakers. Though supporting fisheries initiatives directly is a new game for nearly all of the private foundations we surveyed, many of them are open to considering proposals—provided the proposals meet certain criteria.

At any foundation, a great deal of time is spent sifting through the piles of funding requests that arrive daily. Because foundations are generally understaffed and operate on tight budgets, nothing is more frustrating to them than spending their energy replying to proposals that are inappropriate or ineligible. In fact, so great is their apprehension about being flooded with errant requests that almost all of the foundations we contacted were reluctant to appear in a donor profile section that was to accompany this handbook. Therefore, rather than listing only the handful of foundations willing to be included—who might then receive an overwhelming load of applications—we've outlined some of the basic do's and don'ts in approaching funders and given suggestions as to how and where they can be located.

The private-sector environmental grantmaking world is a small one. Most of the players know each other. Many will only fund projects with which they are already familiar, making it very hard for neophytes to break in. Further, foundations do not fund individuals, or commercial ventures. Their support only goes to nonprofit organizations with 501(c)(3) status. Therefore, for many individuals, linking up in way with an existing nonprofit group may be the best bet for receiving support. The nonprofits can be direct offshoots of the fishing industry, such as the PCFFA's Institute for Fisheries Resources, or independent

For many individuals, linking up with an existing nonprofit group may be the best bet for receiving support.

conservation groups that are willing to work with fishermen.

Also keep in mind that in most cases foundations officers function, in effect, as fiduciaries. In other words, the money that program officers and director are working with does not belong to them. They are responsible to safeguard the foundation's assets and to use their grants in ways that will efficiently and effectively meet the foundation's overall goals. The decision on who receives funding usually rests in the hands of the board of directors, or directly with the founders. So while a program officer may sound very interested in your idea, understand that he or she is probably answerable to a higher authority and may be forced to turn you down despite his or her own enthusiasm.

Whatever the case, there is a certain protocol that must be followed when approaching a foundation for support. Proposals that don't fit foundation criteria will find their way back to the sender with regrets. Here are some basic tips in presenting your ideas properly and effectively:

❑ **Have a clear mission.** Proposals should state the goals as specifically as possible and describe how the funding will be used. Measurable and practical steps for reaching those goals should be explained.

In the case of bycatch reduction, how will your plan contribute to the larger issue of preserving a region's habitat and ecosystem or to global sustainability?

❑ **Tie the project to a broader strategy.** Most foundations want to see projects that reach beyond strictly local concerns, generating end products that won't expire when the grant money ends. In the case of bycatch reduction, how will your plan contribute to the larger issue of preserving a region's habitat and ecosystem or to global sustainability? Are you advancing a new model for change? Will anyone else use it? Can you show that others take your work seriously? Foundations like ideas that will have a positive ripple effect.

❑ **Don't "sell" the foundations.** If you find yourself having to "pitch" your ideas to a foundation, chances are they are not going to be interested. They know what their priorities are before you approach them, so it's best to present your ideas succinctly and let them respond. However, establishing the relevance of your proposal to a particular foundation's goals is important.

❑ **Do your homework.** This will save you, and the foundations, a lot of headaches. Sending a bycatch proposal to a foundation concerned mainly with health care and population control is a waste of time. Locate a foundation that appears to share your interests, then request a copy of its annual report and guidelines. This material contains valuable information on past support and on the requirements and deadlines you'll need to meet. For example, some foundation boards only meet quarterly to decide on proposals; others meet more often and have a larger window for receiving materials.

❑ **Keep it short.** Your initial query to a foundation, whether in writing or by phone, should get right to the point. Some don't want to see more than three or four pages initially. Within such limited space it's important to present your plans concisely.

❑ **Be professional.** It might sound obvious, but presentation is just as important as substance. Any proposal that is incomplete or messy (for example, handwritten on loose-leaf paper) will not get much attention. Be sure to type your proposal and polish it as much as possible before putting it in the mail. Not following directions given in the guidelines

will probably cut your proposal off at the knees.

❑ **Have patience.** Even for a well-designed project that fits a foundation's priorities, delay is a fact of life. Researching foundations, approaching them with your idea, and waiting for a reply can take months. Remember that they are receiving enormous numbers of requests and can only process them so fast—often only at certain times of the year.

For more information on private grantmakers, contact a local library for any directories they may have. Or call the Foundation Center in Washington, D.C., (202) 331-1400 for assistance.

One comprehensive reference tool worth looking at is the *Environmental Grantmaking Foundations* directory. It lists more than 400 donors and describes their priorities, examples of past grants and recipients, number of environmental grants made annually, percentage of grantmaking reserved for environmental purposes, average size of grants, and financial information. This book is published by the Environmental Data Research Institute, 1655 Elmwood Avenue, Suite 225, Rochester, NY 14620-3426, (716) 473-3090, Fax (716) 473-968.

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North Carolina sets up fisheries conservation fund

The North Carolina General Assembly in July allocated $1 million for initiatives aimed at enhancing the state's coastal fishery resources. The money, available as grants through the state Marine Fisheries Commission, is intended to help North Carolina's fishing and coastal communities develop their own solutions to fisheries problems. The program is modeled after the Saltonstall-Kennedy program, though administrators hope their plan will find a more direct channel into the communities than its federal counterpart. Funds are earmarked for projects in North Carolina in any of four categories: testing new, more efficient fishing gear, launching environmental pilot studies, researching industry trends, and other fisheries issues.

The program, the brainchild of Senator Marc Basnight, is intended to be renewed annually, provided the money is put to good use in the early rounds. North Carolina Sea Grant has been assisting the Division of Marine Fisheries in publicizing and promoting the program. In the fall of 1994 they held educational workshops for fishermen to spread word of the program and to help fishermen learn to present their ideas to the Commission. According to North Carolina Sea Grant's Jim Murray, one of the project's promoters, fishermen usually have good ideas, but they don't have much experience as proposal writers. But he's been impressed with the enthusiasm at the workshops. "Most of the people who showed up have already given these issues a lot of thought," he said. "Their ideas are sound." More than 100 fishermen attended five workshops held over one week in October.

The North Carolina Marine Fisheries Commission is also inviting proposals from diverse groups, including individual fishermen, groups of fishermen or fisheries companies, processors, state and local agencies, and universities. For grants awarded to fishermen directly, Sea Grant is encouraging recipients to take advantage of available technical assistance, especially in gathering and organizing research data. To facilitate the proposal process, Sea Grant is supplying workshop attend-

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ees with a list of the names of all the Marine Fisheries Directors in the state. Fishermen can contact their regional director for proposal-writing guidance. In turn, the directors can screen fishermen's ideas to avoid inadvertent duplication of projects.

The deadline to apply for the first round of grants is January 16, 1994. The money will be distributed evenly between the state's four main coastal regions. Grants are open to licensed NC fishermen only. For more information contact Maury Wolff, Grants Coordinator, P.O. Box 769, Moorehead City, NC 28557, (919) 726-7021.

Commodity commission would fund gillnet bycatch efforts

To support research on selective salmon fishing, the Puget Sound Gillnetters Association (PSGA) in 1994 petitioned Washington State to create a special commodity commission. Under a Washington state statute, this would allow the fleet to self-impose a tax on landed salmon. The revenue from the tax could be used either for marketing and promotion of the product or for research into ways of complying with environmental laws. In this case it translates into research on methods of fishing more selectively.

According to Don Stuart of Salmon for Washington, who helped the PSGA prepare its petition to create this funding mechanism, the tax could raise $100,000 to $120,000 annually. The money could provide bare-bones assistance with some of PSGA's bycatch initiatives—namely, paying for observers in their bird protection and black-mouth (chinook) salmon bycatch reduction efforts.

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The Washington Department of Agriculture allows the establishment of commodity commissions for any producers of agricultural products. The department acknowledges the gillnetters as producers and salmon as the product. Preliminary hearings on the proposal were expected in December 1994. Proponents hoped to win approval and have the Commission up and running by May 1, 1995.

Currently there are 23 such commissions in Washington. State officials have some concern that a glut of commissions would create an insurmountable workload for the Department of Agriculture, which must put a representative on each commission and deal with all of the required paperwork. Nevertheless, a commodity commission could enable the fleet to launch essential selective fishing programs. The idea may also offer a useful model for addressing bycatch issues in other fisheries.

For more information, contact the Puget Sound Gillnetters Association, (206) 252-6699. ❑

Resource Directory

This directory includes individuals and organizations whose knowledge and commitment are significant in bycatch issues. They represent sources of insight, leadership, scientific assessment, and influence. They include fishermen, gear makers, fisheries management groups and agencies, conservationists, scientists, and scholars. This listing does not pretend to be complete.

Directory sections were compiled by several authors; they have usually supplied commentary on the focus, interests, and biases of the people and groups listed. As with all opinions, these serve only as reference points. They should be taken as the opinion of the writer, not necessarily of the NFCC. A note on language::"politician" is used to indicate skill in public discourse, not electoral experience.

We've done our best to double check names, addresses, and phone numbers. But people do move, and organizations do fold. We welcome updates and will pass them on. Changes, corrections or additions may be sent to NFCC, Journal Publications, 4055 21st Ave. W., Seattle WA 98199.

North Pacific

Industry Groups and Individuals

Compiled by Krys Holmes

Alaska Crab Coalition, 3901 Leary Way NW, Ste 6, Seattle, WA 98107, (206) 547-7560. Fax (206) 547-0130. Contact: Arni Thompson. The big voice for crab fisheries in the North Pacific; coalition represents Seattle-based crab boats. A force behind shutting down trawl fisheries this fall in Bristol Bay red king crab areas; generally pushes to minimize king crab bycatch in groundfish fisheries. ACC actively participates in debates over crab management plans, seasons and regulations in the North Pacific Fishery Management Council and Alaska's Board of Fish. At times a keen alliance builder with conservation groups. A good resource for crab info; an important part of the coalition-building process.

Alaska Draggers Association, P.O. Box 991, Kodiak, AK 99615, (907) 486-3910. Fax (907) 486-6292. Contact: Al Burch. The Kodiak dragger fleet (including some pot fishermen) came back fighting, after the crab collapse of the late 1970s, for development of shore-based groundfish trawling. Wary of anti-trawl mentality; they're the ones who brought home the bacon to Southcentral Alaska. Working to protect their fisheries from the much larger factory trawlers; closely allied with Alaska Groundfish Data Bank. Burch also is a long-time director of Alaska Fisheries Development Foundation, has been on the North Pacific Fisheries Management Council's Advisory Panel; considered a dean of the Alaska drag fleet.

Alaska Groundfish Data Bank, P.O. Box 948, Kodiak, AK 99615, (907) 486-3033, Fax (907) 486-3461. Contact: Chris Blackburn. Chris Blackburn has her agenda--a fierce advocate of Kodiak-based groundfish trawl fleet—but she's always got solid

information, good numbers, and a well-thought program. Data-gatherer, advocate, hardball player for shore-based interests in the competition with at-sea processors and factory trawlers. Deeply involved in Council process; if you want Kodiak's support, start here. Suspicious of environmentalists and their numbers; doesn't necessarily take biologists' word for it either. Fierce opponent of IFQs; fought for "Inshore/Offshore," an allocation plan that reserves a share of the harvest for shorebased groups. Helping coordinate a 1995 bycatch conference.

American Factory Trawlers Association, 4039 21st Avenue W, Ste. 400, Seattle, WA 98199, (206) 285-5139, Fax (206) 285-1841. Contact: Joe Blum, John Gauvin, Jim Gilmore. AFTA can be a political powerhouse. Focusing this year on bycatch in the rock sole fishery, which has high discard rate; aim to increase retention of catch. Creating an information clearing house to fax hotspot data to vessels on the grounds; working for fleetwide voluntary closure of historically high bycatch areas. Also looking at what drives discards (regulations vs. economic gain) in each fishery. Strong advocates of an ITQ system for groundfish, including tradeable bycatch quotas.

AFTA is also looking into potential for visual monitoring equipment to assess catch volume more accurately and quickly than scales. Works with consultants, other industry groups, gear suppliers, and the scientific community. Tired of taking the rap for all the evils committed in the North Pacific. Industry-funded by 12 factory-trawler member companies. Will share technical information; staff is open to discussion and cooperation with other organizations.

Alaska Longline Fishermen's Association, P.O. Box 1229, Sitka, AK 99835, (907) 747-3400, Fax (907) 757-3462. Contact: Linda Behnken. This group of Alaska-based small longliners (under 60') pushed for ownership caps and minimum quota size in the IFQ program; has campaigned hard to evict trawlers from some rockfish areas. The main mouthpiece for small fixed-gear vessels; not always allied with other longline groups in Kodiak, Petersburg, etc. Often pitted against trawlers in the bycatch data wars; also working to improve data and reduce bycatch in its own fleet. Opposes proposals to let trawl boats keep halibut bycatch and donate it to food banks; also opposes IFQ proposals that would allow trawlers a bycatch quota for halibut. Sometimes contentious, can be a force for change. Director Linda Behnken sits on the North Pacific Council.

Bering Sea Fishermen's Association, 725 Christensen Dr., Anchorage, AK 99501, (907) 279-6519, Fax (907) 258-6688. Contact: Henry Mitchell. The voice for small-boat fishermen in coastal Western Alaska; helps Western Alaska communities fight for their share of the fisheries. Now monitoring salmon bycatch in CDQ fisheries. Scrappy public advocate surviving on less and less state funding. Active in local and federal politics and management process; conservation-oriented. BSFA is the authority on Western Alaska small-boat fisheries; also knowledgeable on interaction between coastal and high-seas fisheries and effects of management programs on coastal villages. Politically deft; not afraid of critics; tireless advocates for Western Alaska. Mitchell was a Council member until 1992; a primary architect of the Community Development Quota (CDQ) program (CDQs are set-asides of fish for Alaska Native communities); an early warrior against high-seas salmon interception and, later, salmon and herring bycatch by trawl fleet.

Deming Cowles, 1050 Thomas Jefferson St. NW, 6th Floor, Washington, D.C. 20007, (202) 333-1617, Fax (202) 342-5703. A D.C. lobbyist/attorney active in numerous North Pacific fisheries issues; strong on Western Alaska perspective; active in Magnuson Act reauthorization, Marine Mammal Protection Act, etc. Works with

several industry groups and Alaskan communities; good source of information about the politics and process on the federal level.

Deep Sea Fishermen's Union of the Pacific, 5215 Ballard Ave NW, Seattle, WA 98107, (206) 783-2922, Fax (206) 783-5811. Contact: John Bruce. The Union represents halibut crewman, primarily, and negotiates for them with owners; also works closely with Fishing Vessel Owners' Association (the owners' group) on mutual issues. Cooperated with FVOA in approaching the question of how the halibut/blackcod IFQ program should address crew members' eligibility. Bruce is chairman of the Advisory Panel to the North Pacific Council; has been involved and fairly influential in many fishery management issues.

Deep Sea Trawlers Association of British Columbia, Unit 2, 11771 Horseshoe Way, Richmond, B. C. V7A 4V4, (604) 275-6944, Fax (604) 275-6949. Contact: Doug March. Represents 53 trawl vessel owners (average 70', largest is 152'). Used to work often with trawlers in Alaska, Washington, and Oregon, until 200-mile limit established; not much contact since. Frequently cooperates with International Pacific Halibut Commission and Canada's Department of Fisheries and Oceans (DFO) conducting on-board research of harvest techniques and gear modifications designed to reduce halibut bycatch. Cooperative spirit is starting to lose steam, though, as issue becomes more contentious. Reluctant to help researchers collect information that will later be used against their own group; fear halibut bycatch caps. Want to be part of solution; very involved; constructive; the place to start in building B.C. trawl fleet consensus.

Fisheries Conservation Action Group, P.O. Box 135, Kodiak, AK 99615, (907) 486-3781, Fax (907) 486-2470. Contact: Linda Kozak. A coalition of about 15 fisheries associations (gear and processor associations, CDQ groups, etc.) formed to keep industry moving on the bycatch issue. Members convene at NPFMC meetings, chart progress of bycatch-related programs, sometimes testify as a group, urge Council to pursue bycatch measures. Coalition provides an opportunity for cooperation within the industry.

Fishing Vessel Owners Assoc., 232 West Wall Bldg., 4005 20th Ave W, Seattle, WA 98199-1290, (206) 284-4720, Fax (206) 283-3341. Contact: Bob Alverson. Alverson is former NPFMC member; currently chair of the committee analyzing Harvest Priority and Full Retention/Full Utilization proposals. Sharp, respected, fairly influential representative of Seattle-based longliners (mostly catcher boats; some freezer/longiners that target halibut, blackcod, gray cod). The FVOA has a long history; is one of the more reasonable, even-handed organizations. Alverson has championed a number of allocation and bycatch-reducing efforts that have survived the Council process and become policy.

Halibut Association of North America, P.O. Box 20717, Seattle, WA 98102, (206) 325-3413, Fax (206) 324-7590. Contact: Shari Gross. One of the few coastwide (U.S. and B.C.) industry groups. Hands-on group working effectively to generate good science, on-the-grounds experience reducing trawl bycatch of halibut. Goal: reduce bycatch by 50%. Helped IPHC study aboard trawlers testing grid-sorting techniques to reduce halibut mortality; Gross went aboard the *F/T Northern Glacier* to study handling/sorting techniques and help figure ways handling requirements can be written for trawlers of different configurations. Strong force for protection of halibut; work is based on good science, solid experience, and realistic goals; good depth of understanding of industry. Works often with other fixed-gear groups, IPHC, NMFS, Fisheries Conservation Action Group, Greenpeace, other organizations.

Ron Hegge, 2431 Seabring Circle, Anchorage, AK 99516, (907) 345-8212/8213. North Pacific Council member, longline fisherman. Known for rating reason over rhetoric. Supportive of IFQs for blackcod/halibut. Conservation-minded; an independent thinker; good source of information and ideas.

Kodiak Longline Vessel Owners Association, P.O. Box 135, Kodiak, AK 99615, (907) 486-3781, Fax (907) 486-2470. Contact: Linda Kozak. A group of 17 mid- to large-sized longliners and crab boats that fish the Gulf and Bering Sea. Active in Magnuson Act reauthorization hearings, pushing programs before the Council; an important gear group to consider when building consensus. Also can be helpful in gathering info about the fleet. KLVOA's primary focus is political/management; also gathering information for members. Some members also active in the Alaska Crab Coalition. Kozak is 1994 president of Fisheries Conservation Action Group.

LGL Research Associates, 4175 Tudor Centre Drive, Ste. 101, Anchorage AK 99508, (907) 562-3339, Fax (907) 562-7223. Contact: Steve Davis. LGL is involved in Geographic Information Systems/computer mapping research with potential application to fisheries: identifying bycatch hotspots, etc. Has conducted other fisheries-related research. Davis was deputy director of the North Pacific Fishery Management Council for ten years; works with the University of Alaska Anchorage observer training program; wrote a running column on bycatch issues for *Pacific Fishing* for a while. Contributes a grand historical knowledge of the industry. Was involved in fisheries management during development and Americanization of groundfish industry; very articulate. In a good position to lead/administer research work, coordinate interdisciplinary efforts, guide conferences. A valuable resource.

Rick Lauber, 321 Highland Dr., Juneau, AK 99801, (907) 586-6366, Fax (907) 463-5298. Consultant to Pacific Seafood Processors' Association and chairman of the North Pacific Fishery Management Council. Experienced, professional, usually a voice of reason on the Council. A good resource for information and consensus-building.

Natural Resources Consultants, 4055 21st Avenue W, Seattle, WA 98199, (206) 285-3480, Fax (206) 283-8263. Contact: Lee Alverson, Mark Freeburg, Steve Hughes. These guys are information on wheels. Private consultants; they've been researching the North Pacific fisheries for longer than most companies have been fishing. NRC has published a library of reports, analyses and studies, most available to the public. Authors of *Global Assessment of Fisheries Bycatch and Discards*, published this year by the Food and Agriculture Organization (FAO) of the United Nations, including comprehensive information on worldwide bycatch levels, different methods of reducing discards, a sectoral analysis of discards with case studies, impacts from ecological/biological/economic and socio-cultural perspectives, and an outline of the evolution of fish policy relating to bycatch and discards. (Available as FAO Fisheries Technical Paper #339, Viale Delle Terme di Caracalla, 00100 Rome, Italy.)

Also analyzed different technologies and methods for reducing bycatch in the Bering Sea and Gulf of Alaska fisheries. NRC works with private clients, foundations, agencies, industry groups, research organizations, universities, and individuals. Alverson, who briefly headed the predecessor to the National Marine Fisheries Service, is an influential figure in world fisheries science and policy, consulted by governments and entrepreneurs. He was a key convener of the National Industry Bycatch Workshop in 1992; senior advisor to NFCC; board member of the Fisheries Management Foundation.

North Pacific Fisheries Association, P.O. Box 796, Homer, AK, 99603, (907) 235-6359.

Contact: Drew Scalzi. The NPFA's membership is a cross-section of the local Homer-based fisheries: primarily fixed gear and pots; haven't been big players in management issues, but do contribute in a constructive way. Supportive of IFQ system for halibut/blackcod; wary of programs that would shut out or disadvantage the local small-boat fleet.

North Pacific Longline Association, 4209 21st Ave., Ste. 300, Seattle, WA 98199, (206) 282-4639, (206) 282-4684. Contact: Thom Smith. Association formed about 1991 for freezer longliners who primarily target cod; with a short history in the fishery, these boats hope to protect their future access. Proponent of allocating halibut bycatch so cod fishermen can stay active; wary of programs designed to shut groundfish fishermen out of the picture. Politically active, fairly effective.

Northwest Food Strategies, 600 Erickson Ave., Ste. 395, Bainbridge Island, WA 98110, (206) 842-3609, Fax (206) 842-5058. Contact: Tuck Donnelly. Donnelly, a former trawl fleet manager, has established the first program that picks up bycatch salmon from trawlers and distributes it to food banks. The future of this project is uncertain, but Donnelly continues to contribute a constructive voice to the question of how bycatch fish should be used. Reasonable, creative, conservation-minded; does a good job of reminding the North Pacific fisheries community that its primary service is feeding the nation.

Pacific Associates, 234 Gold Street, Juneau, AK 99801, (907) 586-3107, Fax (907) 586-1001. Contact: Larry Cotter. Fisheries consultant, manager of the Aleutian Pribilof Island Community Development Assoc. (CDQ group). Author of *Discards in the Groundfish Fisheries of the Bering Sea/Aleutian Islands and the Gulf of Alaska*, 1992 and 1993 (produced for State of Alaska); based on NMFS observer data, this report gives total groundfish and prohibited species discards by fishery, gear type, and area, compares retained and discarded species. Cotter served on the North Pacific Council 1986 to 1992; involved in development of several bycatch proposals including the first version of a Harvest Priority program (different from the current one); also various vessel incentive programs, vessel pools to help control bycatch, etc. His CDQ group also is working with Trident Seafoods on product development projects.

Pacific Seafood Processors Association, 4019 21st Ave W, Ste. 201, Seattle, WA 98199, (206) 281-1667, Fax (206) 283-2387. Contact: Vince Curry. A powerful organization of shore-based processors; deeply involved in Council and political process; pushed for "Inshore/Offshore," an allocation scheme that set aside fish for boats that delivered to shore-based processing plants; active in bycatch issues especially from the viewpoint of full utilization. Often allied with catcher-boat groups and coastal communities; usually pitted against factory trawl fleet. Focus is primarily political, legislative, and management-oriented. Funded by processor members; some data-gathering research relating to constituents' interests. Wary of fishery regulations that end up becoming allocations to at-sea operators; tough fighters for onshore interests.

Peninsula Marketing Association, P.O. Box 248, Sandpoint, AK 99661, (907) 383-3600, Fax (907) 383-5618. Contact: Barbara Wilson. Wilson represents Alaska Peninsula communities (King Cove, Sand Point, the Aleutians East Borough) and their fishermen, mostly seiners who also use jigs, pots, and the occasional trawl gear. Active in battle over False Pass salmon fisheries (which intercept some fish bound for Western Alaska); source of information about salmon bycatch in groundfish fisheries, very concerned about protecting near-shore fisheries. Wary of environmentalists who frequently fail to understand the delicate balance communities

walk between conserving and living off of local resources. Usually at odds with factory trawlers; doesn't support Harvest Priority. Wilson is the new contact. Her predecessor, Beth Stewart, was involved with the Advisory Panel to the North Pacific Council and the National Bycatch Workshop Steering Committee.

Petersburg Vessel Owners Association, P.O. Box 232, Petersburg, AK 99833, (907) 772-9323, Fax (907) 772-9323. Contact: Kris Norosz. Gear group for southern Southeast longliners. Involved in Council process, collecting information from members. Wary of programs that will push local fishermen out of the picture; proponents of solutions to gear conflicts that give Southeast small boats a chance. A good way to get information out to fishermen in this area.

ProFish, International, 400 N 34th Street, Ste. 303, Seattle, WA 98103, (206) 632-6761, Fax (206) 632-6762. Contact: Wally Pereyra. Pereyra is a Ph.D. in fishery management, former biologist for National Marine Fisheries Service; now owns a factory trawling company active in Bering Sea and international fisheries. A voice for reason and good science on the North Pacific Council, contributing to the search for solutions that won't bankrupt the fleet. Consistent in his logic and rationality, well respected.

Queen Anne Fisheries, Inc., 1939 8th W, Seattle, WA 98119, (206) 284-9158, Fax (206) 282-6175. Contact: Mark Lundsten. Lundsten owns and operates the longliner *F/V Masonic*, and is on the Advisory Board of the NFCC. He was an architect of the blackcod and halibut IFQ program. Respected, smart, a great resource if you're building fleet consensus. Good for ideas, action, perspective, helpfulness. Conservation-minded and willing to talk, but wary of environmental crusades; interested in good science.

Salmon Research Foundation, 800 5th Ave., Ste. 131, Seattle, WA 98104, (206) 624-5950, Fax (206) 624-5469. Contact: Joe Sullivan. Industry group was created to track fleetwide reduction of salmon bycatch among trawl catcher boats in the Bering Sea, with a focus on individual (vessel) accountability rather than fleetwide time/area closures. Their 1994 projects include: Feedback program—worked with programmers to design software to track tow-by-tow bycatch levels and alert skippers of hotspots on the grounds; compiled processors' delivery data to help track bycatch levels and fax them to the fleet; held town-hall meetings with skippers to educate the fleet and facilitate better communications. Future work will focus on salmon stock identification to determine origin of the bycatch harvest.

SRF is funded by self-assessments paid by trawlers according to their bycatch levels ($20 per Chinook harvested; $5 per chum). Board includes fishermen, biologists, industry groups, Community Development Quota (CDQ) representatives.

Harold Spark, Box 267, Bethel, AK 99559, (907) 543-3409. Spark is a Western Alaskan fisheries consultant, part-time commercial fisherman, and member of the Advisory Panel to the North Pacific Council. Champion of salmon bycatch reduction, conservation issues important to local Natives; usually values environmental over economic concerns. Known as a bull-terrier for issues important to him and his Western Alaska region; definitely a force, sometimes extreme, but a stalwart fighter especially when he's the underdog.

United Catcher Boats, 1900 W Emerson, Ste 212, Seattle, WA 98199, (206) 282-2599, Fax 282-2414. Contact: Brent Paine, Dave Fraser. Shore-based and mothership-based trawlers, about 50 members, led by a reasonable director who was a former North Pacific Fishery Management Council (NPFMC) staff member and bycatch

point man. These are the smaller catcher boats; they want individual vessel incentives, favor IFQ system and programs that hold individuals accountable for clean fishing. Active in fishery management and policy processes, wary of the trawl-bashing trend; very active with Salmon Research Foundation, a trawl industry group to reduce salmon bycatch. UCB can provide information on the effect of fishing practices, workable gear modifications, policy development; willing to share information, give talks, and work with other groups or individuals. Funded by membership dues.

Fraser, UCB's president, is a trawler, former chairman of the Advisory Panel to the NPFMC. Has sponsored and developed several approaches to bycatch issues: First to propose individual bycatch accounts; helped develop "penalty box" concept for individual incentive program; strong advocate for IFQs. Works hard, is respected throughout the industry. A talented leader, good resource for consensus-building; definitely a contact point for trawl-related bycatch proposals.

Universal Plans, Inc., 2839 14th Street W, #401, Seattle, WA 98119, (206) 281-8643, Fax (206) 282-9824. Contact: Mary Sue Lonnevik. A gear designer who sees bycatch as one of the pivotal issues in the survival of the fisheries; decided to do what she could to research available information worldwide on bycatch prevention, gear modifications, fishing techniques. A good resource for international technical information on bycatch issues; can share international research. Lonnevik is primary organizer of the "Bycatch Reduction and Environmental Impact Workshop," scheduled for September 1995 in Seattle, WA, a conference focusing on gear modifications and fishing techniques to reduce bycatch. Also an advisor to NFCC.

Western Alaska Fisheries Development Association, 725 Christensen Dr., Anchorage, AK 99501, (907) 279-6519, Fax (907) 258-6688. Contact: Karl Ohls. An association of Western Alaska CDQ groups working to help assess and decrease bycatch among CDQ fishing companies catching groundfish in the Bering Sea. Now compiling documentation of the bycatch record (all bycatch species including halibut, herring, salmon, red king crab) of the CDQ fleet, correlating it to NMFS extrapolated bycatch data, and identifying problem areas and potential solutions. Cooperates with state and federal agencies, other industry groups, and communities of Western Alaska. Funded primarily by self-assessment paid by CDQ groups.

Yankee Fisheries, 6988 SW Abalone, South Beach, OR 97366, (503) 867-6143/265-9317, Fax (503) 265-4557. Contact: Barry Fisher. Fisher is a retired fisherman and guiding light to the seafood industry. He's an amazing source of information, ideas, perspective, energy, and good sense. He represents Midwater Trawlers Cooperative, was a co-sponsor of the National Industry Bycatch Workshop in 1992, and is an advisor to the NFCC; widely active in fisheries management and conservation problems. Helped draft legislation, design fishery management plans, and write Magnuson Act language; has advocated for numerous programs and plan amendments.

Research/Management/Government

Alaska Department of Fish & Game, P.O. Box 25526, Juneau AK 99802-5526, Commercial Fisheries Management & Development, (907) 465-6112, Fax (907) 465-2604. Contact: Earl Krygier. Manages all near-water fisheries and implements the commercial crab fisheries management program for near-shore and offshore waters off Alaska. Participant in the Council process; authors of the Full Retention/Full

Utilization proposal now before the Council. They publish bycatch/discard reports compiled from NMFS observer data, focusing on discards of target species. Current agenda: Protecting red king crab in Bering Sea from groundfish fisheries; setting bycatch caps for chum and chinook salmon in groundfish trawls. Also pushed for requiring trawlers to measure total catch weight, rather than just back-calculating from products produced; pushed for minimum mesh size for codends in Pacific cod, rock sole, and pollock fisheries. ADF&G Commissioner Carl Rosier sits on the North Pacific Council.

ADF&G beginning to chart data on marine mammal and seabird interaction and how high-seas fisheries affect them; also manage the state's subsistence fishing and hunting activities—a resource use extremely valuable to the people of Alaska. Primary objective is long-term maintenance of resources for continued use by Alaska residents.

Alaska Department of Fish & Game, International Fisheries, (907) 465-6135, Fax (907) 465-2014. Contact: Dave Benton. Benton is the state's point man on the North Pacific Anadromous Fish Commission, the international authority responsible for anadromous fish protection on the high seas. (Includes U.S., Russia, Canada, Japan, and other Pacific Rim countries.) He's also working on other international fisheries issues, such as agreements to control pollock fishing in waters outside national jurisdiction.

Alaska Fisheries Development Foundation, 508 W Second Ave., Ste. 212, Anchorage, AK 99501, (907) 276-7315, Fax (907) 271-3450. Contact: Chris Mitchell, Paula Cullenberg. One of the few funding institutions in the country skilled at identifying promising approaches to fisheries problems, including bycatch. AFDF administers federal research dollars and money from other donors to develop new technologies, seafood products, markets. Has sponsored trawl mesh tests to minimize undersized pollock catches; gear-related halibut bycatch tests. On 1995 agenda is study of survival of undersized pollock that slip through trawl mesh, if NMFS doesn't shut off Saltonstall-Kennedy funding first. Builds networks between people, companies, agencies, labs, equipment makers, and government.

Funded primarily by Saltonstall-Kennedy program, periodically by Alaska Science & Technology Foundation and other grantors. A 501(c)3 nonprofit, the foundation was created to serve as fiscal agent/administrator for fisheries related R&D. Also has capacity to administer projects for other donors. Board of directors includes North Pacific fishermen, processors, and two at-large members.

Department of Fisheries and Oceans, Offshore Division, 555 W Hastings St., Vancouver, BC V6B 5G3, (604) 666-9033, Fax (604) 666-8525. Contact: Bruce Turris, Barry Ackerman. Control central for groundfish management off British Columbia. Turris is overall groundfish coordinator, an architect of B.C.'s halibut Individual Transferable Quota (ITQ) program, and the man in charge of bycatch control measures in groundfish fisheries. Ackerman oversees the on-board observer program. Bycatch caps on trawl fisheries start phasing in next year. Turris oversees trawl and longline advisory groups put in place to keep industry involved in caps and other measures.

International Pacific Halibut Commission, P.O. Box 95009, Seattle, WA 98145-2009, (206) 634-1838, Fax (206) 632-2983. Contact: Steve Hoag, Bob Trumble. The halibut clearinghouse for the North Pacific. Sets policy for and oversees commercial, sport, and ceremonial halibut fisheries coastwide in both U.S. and Canadian waters. Has been writing fisheries management policy and conducting marine research in the North Pacific since the 1920s; every year conducts numerous

projects relating to habitat, biology, fish behavior, population dynamics, and bycatch-related issues. One recent project: grid-sorting to reduce halibut mortality on trawls.

IPHC scientists have worked closely with fishermen, management and enforcement agencies, and other scientists in the areas of underwater documentation of fish behavior, bycatch mortality levels in the different fisheries, gear modifications, analyzing observer data to help determine bycatch patterns and inter-species relationships, and helping fishermen improve the survival chances of halibut taken as bycatch.

The commission funds outside research too: supported pilot observer programs in waters off Alaska and BC; often works with university researchers; participate in studies conducted by many other agencies and organizations. Funded jointly by the U.S. and Canadian governments; dedicated to conserving Pacific halibut stocks and maintaining the health of halibut fisheries. Its management policies helped resurrect halibut stocks after collapse in the 1930s. The Commission itself has six members, three from each country. Annual reports, research papers, and scientific reports are available. Call for historical and current information, science, management policy, and perspective on halibut bycatch issues.

National Marine Fisheries Service, P.O. Box 21668, Juneau, AK 99802-1668, (907) 586-7228, Fax (907) 586-7131. Contact: Sally Bibb. Bibb, an economist in Alaska regional office, analyzes programs proposed or promulgated by North Pacific Fishery Management Council (counterpart to Joe Terry at NMFS in Seattle). Part of the team analyzing Harvest Priority and Full Retention/Full Utilization programs. Can give economic perspective on how programs would work, degree to which they'd be helpful; has access to mounds of information about Council-generated bycatch programs. Fair, intelligent, a real contributor.

National Marine Fisheries Service, Alaska Fisheries Science Center, 7600 Sand Point Way, Seattle, WA 98115-0070, (206) 526-4253, Fax (206) 526-6723. Contact: Joe Terry. Terry, an NMFS economist, plays an integral role in most of the analyses and implementation processes of fishery management proposals that go through the North Pacific Fishery Management Council. Deeply involved in limited entry program analyses and all bycatch proposals put forward by the Council. Wrote discussion papers on both Harvest Priority and Full Retention/Full Utilization proposals; one of the most important people involved in thinking out program proposals, figuring out how they'll be implemented. Solid background, an even voice; strong feelings about what works and what doesn't; bias toward rational management over politics. Fair and knowledgeable, a behind-the-scenes fount of information and understanding.

National Marine Fisheries Service, Alaska Fisheries Science Center, 7600 Sand Point Way, Seattle, WA 98115-0070, (206) 526-4253, Fax (206) 526-6723. Contact: Lew Queirolo. Queirolo, an NMFS economist, is very involved in proposal analyses; one of the team assigned to developing the Full Retention/Full Utilization program. A good resource for information, perspective, data.

NMFS National Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA 98115-0070, (206) 526-4045, Fax (206) 526-6615. Contact: Howard Braham (Director), Doug DeMasters (Arctic marine mammals), Tom Loughlin (Sub-Arctic marine mammals of Alaska), Rich Ferrero (NPFMC liaison), Bob DeLong (Washington/Oregon). Key source of the science that guides application of the Marine Mammal Protection Act. These folks used to run the high seas driftnet oversight program, and now focus on marine mammal stocks. Responsible for publishing

status assessment reports of marine mammals off both U.S. coasts and Alaska. They've studied 132 stocks of species that interact with a commercial fishery: each species report addresses bycatch. Succinct summaries of fishery/marine mammal interaction; available for public comment; final out in February 1995.

The center provides background science for managing marine mammals and monitoring interference by fishing activities; also tries to develop techniques for minimizing effects of interactions, learn from skippers successful in avoiding marine mammals. Identify time/area patterns to reduce problems for the fleet; studies marine mammal behavior around nets, (for example, use of acoustic pingers around salmon net pens to reduce predation by sea lions). DeMasters spent years on tuna/porpoise interactions in the 1980s.

Loughlin heads up work on Steller sea lions, harbor seals, and pinnipeds that interact with groundfish fisheries; studying prey availability, food habits, direct and indirect impacts of fishing activities on protected species. A fount of good information.

Ferrero is the marine mammal office's liaison with the North Pacific Fishery Management Council, providing scientific background to management decision makers. Three recently formed Scientific Review Groups (Atlantic, Pacific, Alaska) allow feedback from fishermen and conservationists; those boards also help smooth the often-uneasy information path among the fishing, scientific, and environmental communities. Copies of the Status Assessment Reports, analyzing marine mammal stocks and patterns of interaction with commercial fisheries, are available for review from Tom Eagle at NMFS Protected Resources Office, (301) 713-2322. Also, Nancy Daves, in the same office, publishes monthly newsletter summarizing major sections of the revised Marine Mammal Protection Act.

North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, AK 99510, (907) 271-2809, Fax (907) 271-2817. Contact: Clarence Pautzke, Chris Oliver, Dave Witherell. The policy board that oversees fisheries in the "federal" waters off Alaska: between three and 200 miles offshore. Council members are appointed from industry, fisheries agencies, and the public. The Council staff analyzes policy proposals, funds and gathers research on production, fleets, and socioeconomic aspects of fisheries. The staff, busy but helpful, is an ocean of information.

Anyone drafting a regulatory or policy proposal for bycatch issues in the U.S. North Pacific will end up at the Council's door; a plethora of bycatch-related proposals are now being analyzed. Staff is also a walking library of information about current and past fisheries management mechanisms, what's manageable, what's legal, and how management policies in the intertwining fisheries affect one another. Numerous reports available. The Council meets five times a year; puts out periodic newsletters.

Pacific Biological Station, Department of Fisheries and Oceans (DFO), Nanaimo, B. C. V9R 5K6, (604) 756-7176, Fax (604) 756-7053. Contact: Bruce Leaman. This is the primary fisheries research team in British Columbia for DFO, Canada's national fisheries agency. Works closely with the Halibut Commission (IPHC); also cooperates with industry and with trawl and longline working groups to tighten up data holes, test gear modifications and share information. Biggest bycatch concern in B. C. is halibut, though PBS also studies rockfish caught in other longline fisheries. Primary focus is gaining more physiological information about the fish. If you want good science about B.C. species interactions, this is a key resource. Leaman is Canada's scientific advisor to the International Pacific Halibut Commission; in charge of researching halibut bycatch and mortality in B. C. trawl fisheries.

Pacific States Marine Fisheries Commission, 45 Southeast 82nd Dr., Ste. 100, Gladstone, OR 97027, (503) 650-5400, Fax (503) 650-5426. Contacts: Dave Hanson, Randy Fisher. The PSMFC has a non-voting seat on the North Pacific Council. One of the regional commissions set up primarily as a center for fisheries data and statistics. The PSMFC publishes the PacFin reports (long tables of catch data, by species and fishery, used in management and research), funds some research projects; can provide good information about fisheries levels, interactions, etc. Staff was active in a series of meetings to identify shared goals of fishing and conservation groups for the recently reauthorized Marine Mammal Protection Act.

Senator Ted Stevens, U.S. Senate, Washington, D.C. 20510, (202) 224-3004, Fax (202) 224-2354. Contact: Trevor McCabe. Sen. Stevens is a senior member of the Commerce Committee and a key player in debate over reform and reauthorization of the Magnuson Act; co-sponsor of reauthorization bill that includes a Harvest Priority section with specific dates for meeting bycatch goals; would give allocation preference to vessels that demonstrate "clean" fishing. The bill would make harvest-priority an option in most fishing regions but mandatory in the North Pacific. Contact McCabe for more information about the Magnuson reauthorization process and status of related bills.

Clem Tillion, P.O. Box 6409, Halibut Cove, AK 99603, (907) 296-2207, Fax (907) 296-2203/2261. Tillion is fishery advisor to Alaska's Governor Hickel, pundit to the seafood industry, and an influential member of the North Pacific Fishery Management Council. He's a long-time Alaska fisherman and a force to be reckoned with in fishery management issues. A potent advocate for IFQs. Pro-Alaskan, pro-longline gear; not afraid to say what he thinks. Politically irrepressible, certain in his views. Highly respected (though not always popular) among allies and foes alike. Creative, radical, wise, tough.

University of Alaska, Fishery Industrial Technology Center, 900 Trident Way, Kodiak, AK 99615, (907) 486-1500, Fax (907) 486-1540. Contact: Chris Bublitz. The University of Alaska's fish R&D center. Conducts technology development, product development, quality and microbiological research projects. Bublitz is an authority on ways to decrease flatfish bycatch in trawl gear and to reduce catches of under-sized pollock; focus has been fish behavior in response to trawl gear, physiological studies to enhance fish/gear interactions, and tests to determine the effectiveness of trawl gear modifications.

FITC produces a lot of information on a small budget funded by various Saltonstall-Kennedy grants, Sea Grant programs, and foundation projects (gets very little funding from University itself). Staff of scientists works extensively with industry, other universities, Sea Grant, NMFS, and Alaska Fisheries Development Foundation.

Fisheries Research Institute, University of Washington School of Fisheries, WH-10, Seattle, WA 98195, (206) 543-4650, Fax (206) 685-7471. Contact: Ellen Pikitch, Dan Erickson. A major research group in the North Pacific and (with the School of Fisheries) a farm team for fisheries agencies around the world. Conducts field trials, analytical studies relating to fishing/handling practices, gear, management techniques, bycatch survival. Currently working with Alaska Fisheries Development Foundation and private companies to test different trawl mesh sizes and configurations to help undersized pollock escape while retaining pollock of processable size. Recently submitted a report to the North Pacific Council on this project.

An ongoing study with the Halibut Commission tracks bycatch halibut survival

Conservation Groups

Alaska Marine Conservation Council, Box 101145, Anchorage, AK 99510, (907) 277-5357, Fax (907) 277-5975, E-mail: amcc@igc.apc.org. Contact: Scott Highleyman. A statewide marine conservation group; bycatch is a top concern. Members are coastal residents, traditional conservationists, fishermen. Only recently formed, AMCC hit the ground running by authoring the Harvest Priority proposal (a plan that would allocate fish preferentially to vessels that demonstrate low bycatch), submitting it to the NPFMC, and campaigning hard for its approval. Has pushed to write bycatch standards into the Magnuson Act. Focus on reducing bycatch via fishermen's ingenuity, rather than punitive measures. Wary of ITQs that might lock in "dirty" fishing by assigning quotas based on catch history without reference to bycatch performance. Not allied with industry or research groups. Overriding goal is to get the Harvest Priority program passed, but some AMCC efforts reach wider: offshore oil development, trawling impacts on prey for marine mammals, etc. AMCC's president, Paul Seaton is an advisor to NFCC.

Greenpeace, 4649 Sunnyside Ave. N, Seattle WA 98103, (206) 632-4326, Fax (206) 632-6122. Contact: Penny Pagels (North Pacific); Cristina Mormorunni (West Coast). Pagels sits on the Advisory Panel to the North Pacific Fishery Management Council; strong voice for resource protection, sometimes at odds with industry, but perhaps not as often as one might think. A lead player in defining Greenpeace agenda in the North Pacific. Her stated goals: long-term sustainability of ecosystem, target species populations, and the seafood-producing community. "Today's bycatch might be tomorrow's target species," Pagels says; hence she seeks to minimize bycatch (rather than increasing utilization of it) and boost funding for food-web research.

Pagels active in Greenpeace efforts to promote Magnuson Act amendments to minimize bycatch, require more selective gear, and fund marine research. Pagels cooperates with gear groups, industry organizations, coastal communities, individuals, and other conservation groups; supports Alaska Marine Conservation Council's push for Harvest Priority program. A worldwide organization, Greenpeace can share research, scientific information, and contacts; but there are sharp variations in policy and character among staff in various regions. Some, like Pagels, hope to beat the "firebrand" rap, but also use media attention and public ire to call attention to problems. ❑

Northwest

Conservation Groups

Compiled by Gerald Hadden

Adopt-A-Beach, P.O. Box 21486, Seattle, WA 98111-3486, (206) 624-6013. Contact: Ken Pritchard, Executive Director. All-volunteer organization active since 1985; involved in dozens of projects along beaches, riverbanks, streams and marshes; keeps records of the count of dead birds that wash up on shores; does beach clean-up and various other chores; surveys streams and wetlands; provided observers to monitor bird entanglement in Puget Sound purse seine fishery during 1993.

Fisheries Management Foundation, P.O. 5427, Shaw Island, WA 98286, (206) 468-3375, Fax (206) 468-3844. Contact: Guy Thornburgh, General Manager. Foundation established in mid-1980s by owners of Northwest Marine Technology with specific purpose of improving management of ocean's living resources; seeks to educate managers, politicians, and general public on problems impeding rational use of ocean resources; efforts concentrated on publication and distribution of papers dealing with fisheries and fisheries management issues; reports disseminated widely to U.S. and international professional managers; in 1992 one of the supporters of the Newport bycatch workshop; initial supporter of Fishermen Interested in Saving Habitat (F.I.S.H.); board of directors has lain low for a couple of years, but interest in supporting sound bycatch initiatives has been rekindled; acting as fiscal agent for National Fisheries Conservation Center and for a 1995 national bycatch symposium in Seattle organized by Mary Sue Lonnevik.

Greenpeace, 4649 Sunnyside Avenue North, Seattle, WA 98103, (206) 632-4326, Fax (206) 632-6122. Contact: Cristina Mormorunni. An enthusiastic bridge-builder with background in fisheries management; working to create liaisons with NW fishing industry people; graduate of the UW School of Marine Affairs. She's of two worlds: partly a young go-getter trying to make a splash as a tough conservationist and partly a coalition-builder; bycatch is one pillar of Greenpeace's ocean ecology campaign; her focus is on Oregon fisheries; an opponent of ITQs, supporter of Harvest Priority; working with fishermen on reauthorization of Magnuson Act; in discussions with key players like Barry Fisher of Yankee Fisheries on search for common ground between conservationists and fishermen, recognizes fishermen's strong connection to environment and coastal communities; disputes perception that Greenpeace wants to shut down commercial fishing.

Elliott Norse, senior scientist, Center for Marine Conservation, 15806 NE 47th Ct., Redmond, WA 98052, (206) 883-8914. Gifted interpreter of science for the layperson; editor of 1993 book published by the Center for Marine Conservation *Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making.*

Research/Academic/Management

Alaska Fisheries Science Center, 7600 Sand Point Way NE, Seattle, WA 98115, (206) 526-4000. Contact: Bill Aron, Director. AFSC is arm of National Marine Fisheries Service responsible for all federal research in Bering Sea, Gulf of Alaska, much of West Coast; oversees observer programs and gear research, some done within agency, some contracted to universities and others. Goals: to monitor and understand bycatch, work within communities to minimize it. Aron, director since 1980; serves on scientific and statistical committee of North Pacific Fishery Management Council; has been strong voice for bycatch efforts within NMFS.

William T. Burke, University of Washington School of Law, JB-2, Seattle, WA 98105, (206) 543-2275. Authority in international marine law, both as scholar and crafter; knowledgeable on regulation of high seas fisheries and various domestic bycatch issues. Co-author of a major paper arguing that shutdown of high seas driftnetting sets unsustainable precedent (i.e., based on exaggerations of bycatch proportions, creating standards that could affect legal status of coastal fisheries).

Ray Hilborn, University of Washington, (206) 543-9026. Co-author of a groundbreaking recent paper on incorporating uncertainty into fisheries management—a bedrock issue in many bycatch problems.

Dan Huppert, School of Marine Affairs, University of Washington, (206) 543-0111. Economist well versed in bycatch issues and fisheries management; a co-convener of June 1994 symposium, Global Trends in Fisheries Management, at University of Washington.

Ed Melvin, Marine Advisory Services, North Sound Office, 1801 Roeder Ave., Ste. 128, Bellingham, WA 98225, (206) 650-1527. Has played key role helping Puget Sound Gillnetters Association deal with bird entanglement; knowledgeable on marine conservation and bycatch issues in many fisheries; astute grasp of hopes and fears of fishing groups with regard to bycatch.

Dr. Edward L. Miles, School of Marine Affairs, HF-20, University of Washington, Seattle, WA 98195, (206) 685-1837. A founding board member of Fisheries Management Foundation; authority on United Nations Law of the Sea, international fisheries law; knowledgeable on bycatch, has argued for requiring vessels to retain bycatch, keep it in good enough condition to eat, and then deliver it—all for free; views ban on high seas driftnetters as unsound, partly because U.S. "suppressed and distorted observer data that contradicted the U.S. position concerning the bycatch rates of the legitimate high seas pelagic fisheries of Japan, Korea, and Taiwan."

National Marine Fisheries Service, Resource Assessment and Conservation Division, 7600 Sand Point Way NE, Seattle, WA 98115, (206) 526-4176. Contact: Gary Stauffer, Director, RACE Division 526-4170. RACE division working to develop video technology to observe gear and fish behavior during capture; data used to help identify gear modifications to reduce bycatch; NMFS working in Kodiak, AK, on biology of Alaskan crabs as it relates to spatial distribution of animals over time and area; in Newport, OR, running laboratory project studying survival rate of bycatch that has interacted with fishing gear. Agency provides personnel support for mandatory observer programs in Alaskan fisheries. Pacific Whiting fishery off coast of Washington, Oregon, and California.

Though Saltonstall-Kennedy grants are primary tool through which NMFS funds fisheries initiatives, RACE division does approve cooperative research plans in which fishermen can approach them directly with gear research ideas; if project is sound and can be investigated scientifically, NMFS can approve vessel for use in research; there is no formal application procedure. However, Stauffer makes it clear that agency is very careful about which projects, if any, it will support; ideas must be top-notch, and NMFS must feel sure that participating fishermen are committed to research and not just looking for a way to extend their fishing time.

Craig Rose, Research Fisheries Biologist, (206) 526-4176. Works under Stauffer; focuses on development of more efficient commercial fishing gear and equipment; willing to discuss role as a possible support resource on projects that already have funding; for example, if fishermen's association has vessel able to spend time testing new gear, NMFS might provide underwater video equipment

and support, possibly technical help in analysis of data. Rose is happy to talk with callers about his possible role on bycatch projects, especially with regard to video observation.

Bori Olla, Program Manager, Fisheries Behavioral Ecology Program, Alaska Fisheries Science Center, Hatfield Marine Science Center, Marine Science Dr., Newport, OR 97365, (503) 867-0100. Veteran fish behaviorist, in fisheries research more than 30 years. Current interests: consequences of stress in trawls on sablefish, juvenile pollock; focused on mortality rates and longer-term sub-lethal effects of stress; also working on salmon behavior in laboratory environment. Keen on importance of understanding behavior and biochemistry of species; main concern is *long-term* viability of fish that interact with nets.

Oregon Department of Fish and Wildlife, P.O. Box 59, Portland, OR 97201. Contacts: Jim Martin, Bernie Bohn, Bob Hannah. Martin, (503) 229-5400, ext. 346, is Chief of Fisheries at Oregon Dept. of Fish and Wildlife, Portland. Rare among senior fisheries managers, Martin is respected and trusted by fishermen, even when delivering difficult news. Astute, fair, problem-solver interested in sustainability. Bernie Bohn, (503) 229-5400, ext. 355. Harvest Manager, Columbia River. Expert in salmon affairs; involved since the 1960s in management of commercial fishing on lower Columbia River and tribal fishing above Bonneville; working to minimize impacts on ESA salmon stocks; represented Oregon several times on Columbia River Compact, the regulatory organization which, with Washington state, sets policies on Columbia River fishing; on recreational front, key player in implementing selective fishing in terminal fisheries, in the form of "no keep" rules and time/area management. Hannah,(503) 867-4741, fish biologist, got interested in bycatch around time the Nordmore grate appeared in industry literature; received $149,000 Salstonstall-Kennedy grant through NMFS in 1994 to test grates and other gear modifications in West Coast pink shrimp fishery; put together underwater video footage of three excluders in action, to fine-tune gear for optimal use; seeks to keep ahead of bycatch issues before they reach crisis proportions and to provide new tools to industry; so far he's been able to work very effectively with the shrimping fleets and other fishermen.

Sea Grant, Lincoln County Office, OSU Extension Service, 29 SE Second, Newport, OR 97365, (503) 265-3463. Contact: Bob Jacobson. Sea Grant's mission is primarily educational; Jacobson helped organize 1992 National Industry Bycatch Workshop in Newport; followed up trying to get NMFS to loosen purse strings to hire national or regional bycatch coordinator Paul Heikkila, (Coos County Office, OSU Extension Service, 290 N Central Street, Coquille, OR 97423, (503) 396-3121, ext. 288). Heikkila worked with small boat fisheries as they evolved into larger hook-and-line fishery; helped them utilize selective fishing techniques; great success in lingcod and rockfish fisheries, where bycatch is very low.

Washington Dept. of Fish & Wildlife, 600 Capital Way N, Olympia, WA 98501, (206) 902-2200. Contacts: Dennis Austin, Anadromous Division Manager, 902-2627, Bruce Crawford, Assistant Director, Fisheries Management, 902-2325, Keith Wolf, Fish Biologist, (206) 902-2717. Austin is in charge of fish management program; concerned with bycatch in all state's fisheries; deals with everything from halibut and rockfish to offshore trawl fisheries; with regard to salmon, department's work focuses on selective fishing. Crawford's background is in game fish; deeply involved in selective fishing for wild steelhead throughout state; currently heading up a state-mandated environmental impact statement on wild salmonid policy, in conjunction with tribal fisheries, that will examine impact of hatchery fish on wild stocks. Slated for early 1995, statement will outline how to

reduce impacts on wild stocks and address escapement research for endangered fish. Wolf works under 1993 state legislation that allocates funds for bycatch research; looking at how to make selective recreational fisheries work; in commercial fishing, works closely with industry in gear testing; coordinator of Net Gear Discussion Group, a committee of industry, agency, and others that discusses gear modifications and implementation; group produces *Best Fishing Practices* report (available from Don Stuart, Executive Director, Salmon for Washington, (206) 285-8310); administering observer program on Hood Canal and seabird program in 7 and 7A sockeye fisheries; a bycatch expert in the agency world.

Industry Groups

Columbia River Intertribal Fish Commission, 729 NE Oregon St, Suite 200, Portland OR 97232, (503) 238-0667. Contact: Ted Strong, Executive Director. Represents treaty fishing tribes on the river in fisheries management issues, including habitat protection and dam operations. In the midst of crafting a comprehensive salmon restoration plan for Columbia River; especially on salmon, Strong is one of the best public speakers in fish.

Got Yas, 1110 NW 50th, Seattle, WA 98107, (206) 286-9234. Contact: Larry Hendricks. Small gear shop in Ballard; makes sophisticated pot trigger, a device that enables crab pots to catch cod; versed in bycatch issues, cites high selectivity of his pot gear.

Institute for Fisheries Resources/Pacific Coast Federation of Fishermen's Associations, P.O. Box 11170, Eugene, OR 97440-3370, (503) 689-2000. Contact: Glen Spain, Northwest Regional Director, PCFFA, Program Director, IFR. Keen bridge-builder between industry and conservation groups; strong on environment and habitat issues, and on bycatch; promotes conservation awareness in fleet; works with Save Our *Wild* Salmon and Western Ancient Forest Campaign. IFR is scientific, educational, and charitable affiliate (largely grant-funded) of PCFFA, which is funded entirely through fishing revenues; PCFFA was a sponsor of 1992 Newport bycatch workshop. With Pacific States Marine Fisheries Commission and Marine Mammal Center, association sponsored a brochure on sea lions and message: it's not OK to kill them. Spain is an associate of the NFCC.

Natural Resources Consultants, 4055 21st Avenue W, Seattle, WA 98199, (206) 285-3480, Fax (206) 283-8263. Contacts: Lee Alverson, Mark Freeberg, Jeff June, Steve Hughes, Greg Ruggerone, others. Alverson and Freeberg, two of the four authors of *A Global Assessment of Bycatch and Discards* (FAO, 994) are advisors to NFCC. Steve Hughes has been involved in various bycatch studies, including recently one on a method of improving survival of incidentally caught halibut on large trawlers; Jeff June, technical consultant to Purse Seine Vessel Owners Association, helped seiners develop observer program to document bird entanglement, including bringing in volunteer observers from conservation group Adopt-A-Beach, of which he is president; NRC is one the most active players in bycatch work; a treasure trove of knowledge and expertise.

Ocean and Coastal Law Center, University of Oregon, Eugene, OR 97403. Contact: Glen Boledovich, (503) 346-3845. Tracking major legislation and legal issues relevant to fisheries.

Pacific Fishery Management Council, 2130 SW 5th Ave., Ste 224, Portland, OR 97201, (503) 326-6352. Contact: Larry Six, Executive Director; Jim Seger, economist; John Coon, salmon. PFMC crafts regulations to oversee salmon, groundfish fisheries in federal waters off lower-48 west coast; strong interest in documenting

and observing bycatch; working on broad-based observer program for west coast, but facing financial and logistical problems relating to Magnuson Act lack of authority to charge fees to industry; enacted some regulations on whiting fishery for salmon bycatch; working on halibut bycatch reduction.

PSMFC F.I.S.H. Habitat Education Program, P.O. 221, Depoe Bay, OR 97341, Phone/Fax (503) 765-2229. Contact: Fran Recht. Recht's an enthusiastic bridge-builder working on habitat education for Pacific States Marine Fisheries Commission; runs F.I.S.H. Habitat Education Program, providing tools that allow fishermen and others to become community educators on habitat protection issues; sees coalition-building as key to heightening awareness; produced *No Safe Harbor* video to be used in schools and community groups; forming working alliance with Lighthawk, the aerial conservation group, to strengthen communication between fishing industry and environmental groups; publishes *Habitat Hotline* (Stephen Phillips, editor), keeping people updated on regional, state, and federal habitat issues; one of her goals: to make public aware that fishermen are concerned with habitat conservation. Fishermen with habitat concerns should contact Recht for leads on other groups with similar interests.

Puget Sound Gillnetters Association, 1402 W Marine View Drive, Ste. C, Everett, WA 98201, (206) 252-6699. Contact: Lanny Pillatos, President. Pete Knutson, Environmental Coordinator. A gifted dockside diplomat, Pillatos helped fleet confront problems and stay fishing, particularly by instituting observer program and net modification experiments to cope with crisis over bird entanglement that might otherwise have shut the fleet down in summer 1994. Knutson is knowledgeable on selective salmon fishing strategies with gillnets, experimental gear modifications to reduce bird entanglement; has reached out to organizations such as Greenpeace.

Purse Seine Vessel Owners Association, 4209 21st Ave. W, #301, Seattle, WA 98199, (206) 283-7733. Contact: Rob Zuanich, Executive Director. Veteran salmon hand, versed in U.S.-Canada treaty issues, wide range of salmon management concerns in Washington and Alaska, where much of fleet operates. Developed effective program to monitor bird mortalities and to field-test method of modifying net and operating it to allow birds to escape, much as porpoises do from tuna seines; also gear modifications for selective salmon fishing. Technical consultant: Jeff June, Natural Resources Consultants.

Salmon for All, P.O. Box 56, Astoria, OR 97103, (503) 325-3831, Fax 503-325-2725. Contact: Bob Eaton. Group representing Columbia River commercial salmon fishery (gillnetters, processors, others). Eaton is an energetic advocate; SFA has scheme in works to develop selective terminal area salmon fisheries on lower Columbia by seeding fish into streams and tributary rivers where native salmon have gone extinct. Defeated ban-the-nets referendum in Oregon, partly by proving to public that gillnetters could fish selectively; sometimes involved in lawsuits over Columbia River dams destroying salmon. Thane Tienson, (503) 224-4100, Portland attorney for SFA and several conservation groups, does courtroom sword-swinging for SFA; clobbered industrial concerns over their attempt to shift blame for ruin of Columbia salmon from dams to fishermen. Widely knowledgeable in fisheries, conservation, and related politics, Tienson is an NFCC associate.

Skippers for Equitable Access, 1515 NW 51st Street, Seattle, WA 98107, (206) 782-4454, Fax (206) 783 4342. Contact: Tom Suryan. Advocacy group for non-vessel-owning skippers in the debates over limiting entry in the North Pacific. Suryan, a crab skipper, is an advisor to NFCC.

Washington Trollers Association, P.O. Box 7431, Bellevue, WA 98008, (206) 747-9287, Fax (206) 747-2568. Contact: Judie Graham, Executive Director. Sharp on salmon selectivity, comparative mortality rates of released fish, and all issues affecting trollers' capacity to stay in business. Trollers are eager to show that they can release non-target salmon with comparatively low mortality rate, a matter that helps determine how much fishing opportunity their fleet gets in mixed-stock areas off Washington, Oregon, and California coast.

Willapa Bay Gillnetters Association, P.O. Box 26, Grayland, WA, 98547, (206) 267-5244. Contact: Bob Lake. Until 1993 association had marine mammal observer program for several years; it cleared fleet of concern over impacts upon mammals, birds; to avoid catching coastal coho and chinook, Willapa gillnetters have quit summer fishing, a step they suggested themselves (fall fishery targets local runs and hatchery fish that are in good shape); active in developing local broodstocking efforts. ❑

California

Fishing Industry

Compiled by Mick Kronman

American Tunaboat Assn., 1050 Rosecrans, Ste. E, San Diego, CA 92106, (619) 233-6405, Fax (619) 223-6761, Contact: Julius Zolessi. Been fighting dolphin/tuna bycatch wars for years; knowledgeable but wary; familiar with confusion between moral/emotional issues and population/biology issues. Consult on all tuna-related bycatch issues affecting U.S.-flag tuna boats. Former fisherman; patient negotiator; determined to re-open the eastern Pacific to U.S. tuna purse seiners.

California Fisheries and Seafood Institute, 1100 K St., Suite 200, Sacramento, CA 95814, (916) 447-4068, Fax 447-0552, Contact: Rob Ross. Ross, professional lobbyist, primarily represents fish processors at state capital; also works with California Gillnet Assn.; very knowledgeable about California fish laws and policies; good negotiator; excellent politician; able to strike compromise on wide range of issues, including bycatch in commercial fisheries; has long problem-solving record in gillnet bycatch matters; CFSI urges full utilization of bycatch when possible, and reduction of unmarketable bycatch to greatest extent feasible.

California Gillnetters Assn., P.O. Box, 2729, San Pedro CA 90733, (310) 832-8143,; Fax (310) 514-2193, Contact: Tony West. West's a gillnet war vet; expert politician; able to work with other user groups; helped draft bycatch-related legislation; understands need for conservation, value of compromise; has helped driftnet swordfish fishery survive since 1979; respected at state capital, PFMC, and Cal Fish and Game Commission; student of process and protocol.

California Shark Driftline Association, 253 Highland Dr., Channel Islands, CA 93035, (805) 984-5338, Fax 984-3474, Contact: Tim Athens. Organization inactive; Athens was heavily involved in experimental mako shark driftline fishery; well schooled in bycatch issues related to hook-and-line operations targeting sharks, swordfish, tuna; has become savvy politician in recent years.

Central Coast Hook-and-Line Association, 14212 Alta, Westminster, CA 92683, (714) 898-7825, Contact: Phil Schenck. Heavy involvement with oilfield/fisheries matters, though may be a valuable source if bycatch issues emerge in shallow-water live-fish fishery; Schenck a reasonable negotiator; forthright; distrusts government regulators but able to work with them.

Fishermen's Marketing Association, 320 2nd Street, Suite 2B, Eureka, CA 95501, (707) 442-3789, Fax (707) 442-9166, Contact: Pete Leipzig. Represents trawlers from Morro Bay, California, to Ilwaco, Washington; works with regulators and researchers to help craft policies that reduce bycatch while keeping fisheries afloat. FMA is trawlers' primary vehicle for assisting and commenting on fisheries research; Leipzig is vice chair of Pacific Fishery Management Council; entirely familiar with regulatory/policy-making process.

Fishermen's Coalition, 826 Orange Ave. #504, Coronado, CA 92118, (619) 575-4664, Fax 575-5578, Contact: Teresa Platt. A leading voice for U.S. tuna seiners in the eastern Pacific; known worldwide for participation in dolphin bycatch issues; tireless researcher; unflappable politician; respected by scientists; distrusted and/or disliked by animal rights groups; willing to compromise, but demands good science; an avowed "Wise-User" who favors utilization *and* conservation of marine resources; undaunted by activists who lay claim to high moral ground.

Golden Gate Fishermen's Assn., P.O. Box 40, Sausalito, CA 94966, (415) 348-2107.

Contact: Roger Thomas. Speaks for sport party boats from Morro Bay to Crescent City. Thomas has served on several councils and advisory groups that address marine mammal bycatch in salmon troll fishery; not unreasonably anti-commercial; able to compromise where sport and commercial fisheries enjoy common interests; works closely with PCFFA on many issues.

Half Moon Bay Fishermen's Marketing Assn., P.O. Box 340, El Granada, CA 94018, (415) 726-1607. Contact: Pietro Parravano. Group represents salmon trollers/crabbers; smart politicians and industry spokesmen; knowledgeable and articulate; experts on salmon-related bycatch issues; able to work toward compromise based on good science. Paravanno, strong-willed and direct, brings hefty academic background to fisheries politics; serves as president of PCFFA; good negotiator; personable.

Humboldt Fishermen's Marketing Assn., 216 H. Street, Eureka, CA 95501, (707) 443-0537, Fax 443-1724, Contact: Dave Bitts, Jimmy Smith. Smith and Bitts are veteran fish pols and data-rich sources; both are experts on salmon bycatch in midwater whiting trawl fishery; Smith adept at behind-the-scenes compromise; both quite articulate.

Los Angeles Commercial Fishermen's Assn., Harbor Bldg., Rm. #221, 1300 Beacon Street, San Pedro, CA 90731, (310) 831-5467, Fax (310) 831-9283, Contact: Donna Panto. Represents many small-boat gillnetters in San Pedro; has fought vigorously to defeat Proposition 132, an anti- gillnet voter initiative that alleged bycatch abuses; good data source for bycatch issues in southern California gillnet fisheries; Panto a passionate, dedicated team player; hard worker; deplores emotions displacing science in fisheries management.

Midwater Trawlers Cooperative, 6988 Southwest Abalone St., South Beach, OR 97366, (503) 867-6143, Contact: Barry Fisher. Involved deeply in midwater trawl fisheries; Fisher pioneered several midwater and bottom species in Oregon and Alaska; knowledgeable, well-respected politician not afraid to speak his mind on difficult issues; looks out for fish and fishermen alike; scrappy, hard-nosed industry rep who faces bycatch issues with an eye toward productive, balanced resolution. Bridgebuilder with conservation groups, Fisher has spurred industry initiatives to understand and reduce bycatch, marine debris, habitat protection. An advisor to NFCC.

Morro Bay Commercial Fishermen's Organization, 436 Fresno, Morro Bay, CA 93442, (805) 772-4893, (805) 772-5094, Fax (805) 772-9499, Contact: Cathy Novak. Novak a diligent worker experienced in gillnet bycatch issues in central California; articulate and dependable; good ambassador for fishing interests; also serves as vice-chair, California Seafood Council and Secretary, PCFFA.

Oregon Trawl Commission, P.O. Box 569, Astoria, OR 97103, (503) 325-3384, Fax 325-4416, Contact: Joe Easley. Primarily a commodities association, though involved in researching ways to reduce bycatch of prohibited species (salmon and halibut) in groundfish and shrimp trawl fisheries; Easley, retired dragger, has served on several councils and advisory boards, including PFMC; should be included in discussion of all trawl-related bycatch issues.

Pacific Coast Federation of Fishermen's Associations, P.O. Box 989, Sausalito, CA 94966, (415) 332-5080, Fax 331-2722, Contact: Zeke Grader. Involved for years in policy and legislative assistance for contributing fisheries, especially salmon, herring, crab, and inshore gillnets; PCFFA works to reduce salmon bycatch in all fisheries, other bycatch problems. Grader, a skilled, workaholic negotiator; de-

mands sound science; knows how and when to compromise; well known and well regarded at state capital. PCFFA's habitat quarterback is Nat Bingham, Box 783, Mendocino CA 95460, (707) 937-4145, Fax (707) 937-2617. A fishing vet, activist, politician, and facilitator; expert on mammal bycatch in troll salmon fishery, recently focusing on drawing together broad coalitions of stakeholders (landowners, fish, farm, forest interests) to restore productivity of salmon streams.

Pacific Offshore Fishermen's Assn., 18212 Rosita St., Tarzana, CA 91356, (818) 343-9927, Fax (818) 881-5003. Contact: Pete Dupuy. Represents driftnetters, harpooners, and longliners targeting swordfish, tuna, and sharks; broad experience with bycatch issues on east and west coasts; politically tenacious; Dupuy insists on good science; fears international management of pelagic fisheries or bycatch policy; recently helped persuade Pacific Council to resist bid by Western Pacific Council to take over management of pelagics in the Pacific.

San Pedro Fishermen's Cooperative Assn., 26509 Academy Dr., Palos Verdes, CA 90274, (310) 541-7968, Contact: Thomas M. Crehan. Co-op inactive, but Crehan, a lawyer, represents majority of San Pedro purse seiners; well versed in wetfish bycatch issues, especially sardines taken by mackerel fleet; willing to compromise, but insists on good science; will be major player if PFMC adopts a Coastal Pelagic Species Management Plan.

Save Our Shellfish, Box 571, San Luis Obispo CA 93406, (805) 543-2248, (805) 544-5415, Contact: Steve Rebuck. Years of effort to limit further expansion of sea otters into abalone and sea urchin fishing grounds; Rebuck's a diligent researcher and consummate diplomat; articulate, able to arrange compromise among disparate groups; should be contacted whenever marine mammals are potential bycatch in California fisheries.

Southern California Trawlers Assn. #6 Harbor Way, Santa Barbara, CA 93109, (805) 566-1400, Fax (805) 566-0188, Contact: Mike McCorkle. McCorkle, a 30-year vet of fishing and politics; encyclopedic memory for detail and facts; broad knowledge of gear types; has helped draft bycatch legislation and policy in trawl and gillnet fisheries; SCTA very active in issues affecting small draggers; also offers time and help for other gear types in other locales. SCTA's a team player, willing to negotiate with disparate groups, seek compromise.

Vietnamese Fishermen of America, 570 10th St. #306, Oakland, CA 94607, (510) 834-7971, Fax (510) 834-7974, Contact: John Nguyen. No direct involvement in bycatch policy discussions, though constituents participate in fisheries where bycatch is a mounting issue; should be included in discussions involving these fisheries, especially rockfish gillnets, trawling, and nearshore hook-and-line; VFA works closely with PCFFA.

Western Fishboat Owners Assn., P.O. Box 926, Dana Point, CA, 92629, wk (714) 248-5355, hm (714) 496-4318, Hawaii (808) 326-3230, Contact: Bill Perkins. Represents albacore trollers and albacore/tuna bait boats from New Zealand to Alaska, who encounter little bycatch; WFOA negotiates prices, delivery procedures, and schedules; should be included in discussions of fisheries whose bycatch includes albacore or tuna; also represents several longliners and swordfish gillnetters who face growing attention regarding bycatch; Perkins experienced in the global politics of pelagic fisheries.

Conservations Groups

American Cetacean Society, P.O. Box 2639, San Pedro, CA 90731-0943, (310) 548-

6279, Fax (310) 548-6950, Contact: Katy Castagna. One of the oldest cetacean-protection groups in U.S.; ACS literature says, "If enough people become alarmed, changes will be made." However, organization seems to be dwindling, held together by volunteer staff; nonetheless, should be consulted on bycatch issues involving whales, dolphins, sea lions, and seals.

American Oceans Campaign, 725 Arizona Ave., Suite 102, Santa Monica, CA 90401, (310) 576-6162, Fax 576-6170, Contact: Robert Fulnick. Multi-faceted conservation organization whose projects range from habitat restoration to vigorous anti-gillnet endeavors (especially high-seas driftnets); heavily involved in reauthorization of U.S. Clean Water Act; advocates strong public policy to protect marine resources; an influential organization, must be included in all high-impact bycatch issues.

California Wildlife Federation, 6239 Marlborough Dr., Goleta, CA 93117, Phone/Fax (805) 964-5097, Contact: John Barthel. Statewide umbrella group for hunting, trapping, and sportfishing interests; active in attempts to block anti-gillnet campaigns; Barthel, a researcher able to excavate valuable minutia of resource management issues; decidedly pro-utilization; advocates management plan for marine mammals where they are abundant or overpopulated; CWF willing to address and resolve bycatch problems, but remains dedicated to sustainable utilization of living, wild resources.

Center for Marine Conservation, 580 Market St., Ste 550, San Francisco, CA, 94104, (415) 391-6204, Fax (415) 956-7441, Contact: Warner Chabot. Heavily involved in fisheries management issues, especially groundfish; rational, solution-oriented on bycatch and related policy issues; sponsored white shark protection bill in California in 1993.

Earth Island Institute, 300 Broadway, Suite 28, San Francisco, CA 94133, (415) 788-3666, Fax (415) 788-7324, Contact: David Phillips. Spearheaded dolphin-safe campaign aimed at tuna seiners in eastern Pacific; powerful activists; tough negotiators who stand firm on "zero-kill" bycatch philosophy; should be included in discussion of bycatch among fisheries targeting pelagic species, or trawl fisheries where turtles are taken.

Friends of the Sea Otter, 2150 Garden Rd., Suite B-4, Monterey, CA 93940, (408) 373-2747. Fax (408) 373-2749, Contact: Ellen Faurot-Daniels. Spearheaded campaign to ban gillnets in sea otters' central California habitat; animal protectionist but claims interest in keeping fishermen fishing; must be part of bycatch discussions affecting sea otters; little knowledge or experience in other marine matters; increasingly involved however, in issues surrounding reauthorization of the U.S Marine Mammal Protection Act.

Greater Los Angeles Council of Divers, P.O. Box 1533, Beverly Hills, CA 90213, wk: (213) 272-3456, hm: (805) 647-5141, Contact: Lockey Brown. Represents dozens of So. Calif. sport dive clubs; assails gillnet bycatch but shares commercial fishermen's view on containment of sea otters; fisheries knowledge limited, though GLCD's interest in bycatch issues is high, especially for species hunted by sport divers.

National Audubon Society, 555 Audubon Place, Sacramento, CA 95825, (916) 481-5332, Fax (916) 481-6228, Contact: Dan Taylor. Nevada, California, and regional office for Oregon and Washington; involved wherever bycatch of birds is an issue; reasonable negotiators, willing to seek viable solutions and compromise; also active in salmon habitat issues.

Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970, (415) 868-1221, Fax (415) 868-1946, Contact: Daniel Evans. Heavily involved in promoting gillnet restrictions in northern California, where birds were a bycatch; not as radical as Earth Island, however; good listeners, not anti-commercial; willing to seek compromise as long as birds can be protected; helped craft workable regulations governing dive boat activity near bird nests at Farallon Islands.

Santa Barbara Marine Mammal Center, 3930 Harrold Ave., Santa Barbara, CA, (805) 687-3255, Contact: Pete Howorth. Mammal-rescue operation; decidedly protectionist (beyond conservationist); difficult relations with commercial fishermen; proponents of zero bycatch.

Sportfishing Assn. of Calif., 2917 Cannon St., San Diego, CA 92106, (619) 226-6455, Fax (619) 226-0175, Contact: Bob Fletcher. Speaks for open-party and charter sportfishing boats from Morro Bay to San Diego; also active negotiating sportfishing agreements with Mexican government; politically cautious, owing to bycatch problems in sportfishing fleet; not avowedly anti-commercial; should be consulted on bycatch issues involving marine mammals or fish species taken by anglers.

United Anglers of Northern California, 5200 Huntington, #300, Richmond, CA 94804, (510) 525-3474, Fax (510) 525-3664, Contact: John Beuttler. Coalition of northern California sport groups; active in water allocation and habitat restoration issues; not as anti-commercial as southern California counterpart; should be consulted on bycatch issues involving salmon or rockfish.

United Anglers of Southern California, 7755 Center Ave., Suite 1100, Huntington Beach, CA 92647, (714) 891-5055, Fax (714) 840-3318, Contact: Jim Paulk. Led Proposition 132 anti-gillnet campaign; claims bycatch in several fisheries is harming marine resources; anti-gillnet, anti-longline, anti-trawl; hard-nosed, well-financed activists; difficult relations with commercial fishermen; should be included in discussions regarding bycatch of marine mammals or fish taken by anglers.

Scientific/Management Community

California Dept. of Fish and Game, Marine Resources Division, 1416 9th St., Sacramento, CA 95814, (916) 653-6281, Fax 663-1856, Contact: Rolf Mall. Headquartered in Sacramento, with seven coastal field offices; resource-protection mandate; makes recommendations for action on seasons, permits, policy changes; slow to act on some issues due to lack of funds; swift to act on others due to political pressure; operates under Calif. Fish and Game Commission, a body of political appointees not necessarily interested in conserving fisheries or habitat.

California Fish and Game Commission, 1416 9th St., Box 944209, Sacramento, CA 94244-2090, (916) 653-4899, Fax (916) 653-1856, Contact: Robert Treanor. Five members, appointed by the governor (not necessarily aware of fisheries issues); promulgates sportfishing and hunting regs, controls permits for California fisheries, and rules on policies related to those permits; acts swiftly when it believes a resource is endangered (often on political input, not science); important to keep commissioners informed, since they are a powerful, unpredictable body.

California Sea Grant Extension Agency, Dept. of Wildlife and Fisheries Biology, University of California, Davis, CA 95616-8751, (916) 752-1497, Fax (916) 752-4154, Contact: Chris Dewees. Disseminates information about marine-related issues, including commercial fishing; excellent resource for investigating solutions

to bycatch problems; not a political body; has accumulated research and contacts in academia and applied science; extension agents who work with fishermen have hands-on knowledge of bycatch issues in regional offices. Contact Davis headquarters for field office information.

Channel Islands National Marine Sanctuary, 113 Harbor Way, Santa Barbara, CA 93109, (805) 966-7107, Fax (805) 568-1582, Contact: Lt. Cmdr. John Miller. Charged with protecting resources in multi-island sanctuary; not normally involved in bycatch issues, but potentially very powerful player; should be informed of bycatch-related matters in its jurisdiction, especially since its mandate includes policy coordination with all levels of government.

Hubbs-Sea World Research Institute, 2595 Ingram St., San Diego, CA, 2109, (619) 226-3870, Fax (619) 226-3944, Contact: Katy Koster. Applied science regarding interaction of human and marine populations; sponsored studies of bio-acoustic devices to reduce mammal/fishing conflicts; should be consulted for experimental models aimed at reducing bycatch and high-tech means of tracking (or separating) target/non-target species; wide range of scientific applications in bycatch arena (mammals, turtles, birds).

Impact Assessment, Inc., 2160 Avenida de la Playa, Ste A, La Jolla, CA 92037, (619) 459-0142, Fax (619) 459-9461, Contact: John Petterson. Firm does fisheries and statistical analysis; could be useful in bycatch modeling and impact assessment.

Inter American Tropical Tuna Commission, 8604 La Jolla Shores Dr., La Jolla, CA 92037, (619) 546-7100, Fax (619) 546-7133, Contact; Dr. James Joseph. Multinational scientific body whose tuna-dolphin program monitors populations and mortalities of dolphins in tuna purse seine fisheries in eastern Pacific; drafts conservation measures aimed at reducing dolphin kills, including avoidance techniques and workshops for tuna skippers; earnest, dependable scientists; strong proponents of applied research; programs to eliminate bycatch appear quite successful; must be consulted on all bycatch matters involving region's tuna fisheries.

Joint Committee on Fisheries and Aquaculture, Room 2003, State Capital, Sacramento, CA 95814, (916) 445-8360, Fax (916) 322-5214, Contact: Assemblyman Dan Hauser. Joint committee of California legislature that convenes at least once yearly to discuss coastal and fisheries-related items; should be kept abreast of all bycatch matters affecting coastal fisheries or economies.

LMR Fisheries Research, Inc., 11855 Sorrento Valley Rd. #A, San Diego, CA 92121, (619) 792-6515, Fax (619) 792-6519, Contact: Charles Peckham. Strong history of biomass assessment, stock modeling, and fisheries/cannery feasibility studies; has completed considerable work on bycatch issues in the sardine and tuna fisheries; had reputation as industry apologist but currently enjoys respect for sound science and rational management perspectives; valuable source for scientific/economic analysis of bycatch issues, alternatives, and strategies.

National Marine Fisheries Service, Fisheries/Marine Mammal Interaction Division, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, CA 92038, (619) 546-7000, Fax 546-7003, Contact: Bob Brownell. Provides scientific data for NMFS Protected Species Program (population surveys, stock structures, reproductive rates); information used to establish quotas or "biologically allowable" takes of marine mammals; networking with these NMFS scientists crucial to establishing reasonable mammal bycatch regulations.

National Marine Fisheries Service, Protected Species Management Division, Southwest Region, 501 W Ocean Blvd., Ste. 4200, Long Beach CA 90802, (310) 980-4000, Fax (310) 980-4047, Contact: Jim Lecky. Responsible for conservation and management programs involving marine mammals and endangered species, including protected salmon populations, sea turtles, and Hawaiian monk seals. This branch of NMFS must be included in all relevant bycatch and policy discussions.

Pacific Fishery Management Council, 2130 SW 5th Ave.Suite 224, Portland, OR 97201, (503) 326-6352, Fax (503) 326-6831, Contact: Larry Six. One of eight federal councils comprising the nation's most comprehensive and powerful fisheries management network; drafts management plans and regulates quotas, trip limits, permit systems, and seasons for groundfish, troll salmon, and Pacific halibut fisheries in Washington, Oregon, California, and Idaho; Council seats represent a wide range of marine interests and are appointed by the Secretary of Commerce; Council is consummately involved in bycatch issues, especially in trawl fisheries; the most powerful regional body responsible for solving bycatch problems; much of this work is undertaken by PFMC scientific and advisory committees.

U.S. Fish and Wildlife Service, Sea Otter Recovery Program, 2140 Eastman Ave., Suite 100, Ventura, CA 93003, (805) 644-1766, Fax (818) 904-6288, Contact: Carl Benz. Distrusted by fishermen, especially abalone and urchin divers who fear otter recovery plan will spread animals to all Channel Islands; powerful, must be consulted on all bycatch issues that might involve otters.

Western Pacific Fishery Management Council, 1164 Bishop Street, Suite 1405, Honolulu, Hawaii 96813, (808) 522-8220, Fax (808) 522-8226, Contact: Kitty Simonds. Management jurisdiction includes American Samoa, Guam, Hawaii, and the Northern Mariana Islands; dominant fisheries are longline, trolling, handline, and pole-and-line for swordfish, tuna, sharks; WPFMC has recently expressed a desire to better identify optimum yield and bycatch in pelagic fisheries throughout the eastern Pacific; Council's effort to become lead agency in managing these pelagics hasn't yet succeeded, but they should be kept abreast of all relevant bycatch data; California longliners and swordfish driftnetters fear the WPFMC agenda, wishing to keep management of their fisheries closer to home.

Additional Resources

Dr. Larry Allen, biology professor, Cal State Northridge, wk: (818) 885-3340, hm: (818) 222-2473, White seabass expert; savvy with population dynamics; able to separate utilization/conservation issues from politics and user-group squabbles.

California Seafood Council, P.O. Box 91540, Santa Barbara, CA 93190, (805) 568-3811, Fax (805) 965-5840, Contact: Diane Pleschner, Manager. Mandate to promote California fisheries, though education programs often aim to erase misconceptions about bycatch; delicate balance between education and politics.

EJL & Associates, P.O. Box 162696, Sacramento, CA 95816, (916) 444-2161, Fax (916) 444-2162, Contact: Eugenia Laychak. Fisheries-oriented consulting group with unbiased approach to problematic issues, including bycatch; trained facilitators who specialize in forging compromise out of conflict; strong background in fisheries development and environmental analysis; EJL has managed over 50 projects; maintains comprehensive fishing maps and database; useful consultants on general bycatch issues.

Peter Flournoy, attorney, 945 Fourth Avenue, San Diego, CA9210, (619) 232-0954, Fax (619) 696-9476. Former State Dept. official involved in tuna-dolphin issues.

Flournoy now represents variety of fishing industry clients. Active in fishermen's appeal of Proposition 132, California's anti-gillnet initiative; knowledgeable on fisheries statistics and bycatch issues.

Dr. Walter Howard, wildlife biology professor, University of California, Davis, CA 95616-8751, (916) 756-1509, Fax 752-4154. Professor emeritus, expert on utilization/conservation matters; doesn't shy from tough questions about the nature of nature—red in tooth and claw; valuable resource on gritty biological matters.

Ilson New, attorney, 1275 Columbus Ave., Second Floor, San Francisco, CA 94133, wk (415) 567-7595, hm (415) 441-4331, Fax 567-7594. Experienced in several fields of fisheries law, including issues related to bycatch; demands good science; scrutinizes fisheries data in detail; good track record in court and with Cal Fish and Game Commission; helped mako shark driftliners win experimental permits (this involved negotiating and compromising on issues involving the bycatch of blue sharks). ❑

Gulf and Southeast

Compiled by David Krapf

Atlantic Coast Conservation Association, 154 Rebellion Farms, Wando, SC 29492, (803) 572-4758. Contact: Joesph Detyens. South Carolina chapter of Houston-based Coastal Conservation Association. Funding primarily from its membership of 700 recreational fishermen. Supports search for bycatch solution; satisfied with progress in development of Bycatch Reduction Devices. Detyens is on the Gulf & South Atlantic Fisheries Development Foundation's Bycatch Steering Committee; has been observer on Georgia Sea Grant bycatch "characterization" trips.

Center for Marine Conservation, 1725 DeSales St., NW, Suite 500, Washington, DC 20036, (202) 429-5609, Fax(202) 872-0619. Contact: Suzanne Iudicello also: 1 Beach Dr. SE, Ste 304, St. Petersburg, FL 33701, (813) 895-2188, Fax (813) 895-3248. Contact: Ellen Peel. Non-profit organization founded 1972. Preferred role: educator, advocate for continuing abundance of marine resources. CMC conducts policy-oriented research and supports national and international conservation programs. Membership of approximately 120,000 funds one-third of CMC's budget ($6.5 million in 1993); balance comes from individual and corporate donations, endowment earnings, foundations, and government grants. Bycatch reduction efforts have involved harbor porpoises on the West Coast and salmon; currently involved in longline and gillnet bycatch reduction of billfish and sharks; reducing shrimp trawl bycatch of red snapper, grouper, sea trout, Spanish mackerel, weakfish, and other finfish. For over 10 years, the group has pushed for the protection of endangered sea turtles and the use of TEDs in shrimp trawls; has hosted shrimp trawl bycatch workshop and published research reports addressing several bycatch issues. Peel is on the Gulf & South Atlantic Fisheries Development Foundation's Shrimp Bycatch Steering Committee. Iudicello is an advisor to NFCC.

Georgia Fisherman's Association, P.O. Box 509, Crescent, GA 31304, (912) 832-4480, 832-5394. Contact: Jack D'Antignac. An affiliate member of the Southeastern Fisheries Association; has over 300 members, made up of mostly commercial fisherman. Members have participated in NMFS and Sea Grant bycatch characterization studies. Members have reportedly developed a BRD by making a small change to the flap on the Georgia Jumper TED; the variation does not cause additional shrimp loss and may allow adequate escapement of juvenile red snapper in the Gulf. GFA wants additional testing done on the device. D'Antignac is on the Gulf & South Atlantic Fisheries Development Foundation's Bycatch Steering Committee.

Gulf of Mexico Fishery Management Council, Lincoln Center, Ste 331, 5401 W Kennedy Blvd., Tampa, FL 33609, (813) 228-2815, Fax (813) 225-7015. Contact: Wayne Swingle, Terrance Leary. Responsible for developing, monitoring, and revising Gulf of Mexico fishery management plans (FMP); currently initiating the development of management measures in its shrimp and reef fish plans to reduce fish bycatch and setting up a procedure for NMFS to certify BRDs. The council recently released a document that contains options for reduction of bycatch in shrimp trawls; can provide updates on where the process stands, what gear has been tested, available data, options discussed, and who to contact.

Gulf & South Atlantic Fisheries Development Foundation Inc., Lincoln Center, Ste. 997, 5401 West Kennedy Blvd., Tampa, FL 33609-2486, (813)286-8390, Fax (813) 286-8261. Contact: Judy Jamison, Dr. Steven Branstetter. Non-profit

educational and research organization. Goal: to advance the interests of the commercial fishing industry and aid fishermen in providing quality seafood to U.S. consumers; also conducts market and scientific research and product and gear development. Since 1976, the foundation has administered close to $15 million in grants, funding approximately 600 projects. Instrumental in developing the first comprehensive bycatch research program for Gulf and South Atlantic; program places industry observers aboard fishing vessels to accumulate bycatch "characterization" data and conduct bycatch reduction device evaluation and testing; involves commercial shrimp vessels in the Gulf and South Atlantic, coordinated through Texas A&M and University of Georgia Sea Grant; has six contracted observers--four in the Gulf and two in the South Atlantic. Foundation has a Bycatch Steering Committee made up of industry, scientific, management, and recreational interests; has sponsored numerous bycatch workshops. Funded by commercial fishermen, federal grants; currently funded to continue bycatch observer program through April 1996.

Louisiana Department of Wildlife and Fisheries, Marine Fisheries Division, P.O. Box 98000, Baton Rouge, LA 70898-9000, (504) 765-2384, Fax (504) 765-2489. Contact: William S. Perret. Perret is administrator of the LDWF's Marine Fisheries Division, a Gulf Council member, and sits on the Gulf & South Atlantic Fisheries Development Foundation's Shrimp Bycatch Steering Committee.

Louisiana Seafood Promotion and Marketing Board, 400 Royal St., New Orleans, LA 70130, (504) 568-5693. Contact: Karl Turner. Affiliated with the Louisiana Department of Wildlife and Fisheries; funded mainly through a surcharge on commercial fishing licenses; members are mainly from the seafood industry; primary mission to develop existing and new markets for Louisiana seafood. The board also awards grants to further this effort and contributed to the University of Southwestern Louisiana's BRD development work in 1992.

Louisiana Shrimp Association, Route 1, Box 241, Lockport, LA 70374, (504) 532-3635, Fax (504) 532-3634. Contact: Darcy Kiffe. Represents Louisiana's commercial shrimpers. Kiffe is on the Gulf & South Atlantic Fisheries Development Foundation's board and its Bycatch Steering Committee.

Louisiana State University, Cooperative Extension Service, Knapp Hall, Baton Rouge, LA 70803, (504) 388-2145. Contact: Ken Roberts. LSU has conducted several bycatch research projects funded through federal grants. Currently has several underway, including "Bycatch in the U.S. Gulf of Mexico Menhaden Fishery," and "The Behavior of Fish and Shrimp in Relation to Trawl Modifications to Reduce Shrimp Trawler Bycatch."

National Coalition for Marine Conservation, 3 West Market St., Leesburg, VA 22075, (703) 777-0037, Fax (703) 777-1107. Contact: Ken Hinman. Small conservation group; has attempted to keep the bycatch issue in the forefront since the bycatch moratorium was implemented; willing to promote dialogue and cooperate with commercial fishermen on bycatch issues. Membership mostly recreational fishermen; roughly half its funding from membership, half from foundations inman is an advisor to NFCC..

National Marine Fisheries Service Southeast Regional Office, 9721 Executive Center Dr., St. Petersburg, FL 33702, (813) 570-5301, Fax (813) 570-5300. Contact: Andrew Kemmerer. Commerce Department agency responsible for implementation and enforcement of fishery management plans; assists in bycatch characterization studies and gear research through its labs and research facilities. Kemmerer is

on Gulf & South Atlantic Fisheries Development Foundation's Bycatch Steering Committee.

National Marine Fisheries Service Galveston Laboratory, 4700 Avenue U. Galveston, TX 77551. (409) 766-3507, Fax (409) 766-3508. Contact: Dr. Jim Nance, Dr. Roger Zimmermann. Accumulating "effort" data used to estimate fish bycatch in shrimp trawls. Lab has conducted bycatch characterization research and observer programs and BRD operational testing on vessels.

National Marine Fisheries Service Pascagoula Laboratory, Gear Research Facility, P.O. Drawer 1207, Pascagoula, MS 39568-1207, (601) 762-4591, Fax (601) 769-8699. Contact: John Watson, John Mitchell, Wil Seidel, Scott Nichols. Lab has performed most of the BRD testing and engineering work in the Gulf for NMFS; has produced and presented an underwater video of BRDs in use. Watson and Seidel are on the Gulf & South Atlantic Fisheries Development Foundation's Bycatch Steering Committee. Seidel is also on the foundation's Gear Review Panel.

North Carolina Fisheries Association, P.O. Box 12303, New Bern, NC 28561, (919) 633-2288, Fax (919) 633-9616. Contact: Jerry Schill. Private non-profit trade group representing commercial fishermen, seafood dealers, and processors in North Carolina. The 42-year-old organization is funded mainly from dues from its 1,000 members. Several members were involved in BRD development in North Carolina, which is currently the only state that requires BRDs.

Organized Fishermen of Florida, P.O. Box 740, Melbourne, FL 32901, (407) 773-0212, Fax (407) 779-4884. Contact: Jerry Sansom. Represents Florida commercial fishermen. Fought losing battle against the state's anti-net initiative in1994. Sansom is on the board of the Gulf & South Atlantic Fisheries Development Foundation.

South Atlantic Fishery Management Council, 1 South Park Circle, Ste 306, Charleston, SC 29407-4699, (803) 571-4366, Fax (803) 769-4520. Contact: Bob Mahood, Roger Pugliese. Responsible for fisheries management in federal waters off the Southeast coast. The council will likely spend most of 1995 working on the bycatch amendment to the shrimp fishery management plan, and is targeting early 1996 for implementation of BRD requirements.

Walter Shaffer, (803) 881-6206, Fax (803) 881-8891. Shaffer is former director of the South Carolina Shrimpers Association and still chairman of the Gulf & South Atlantic Fisheries Development Foundation's Shrimp Bycatch Steering Committee.

South Carolina Department of Natural Resources, Office of Fisheries Management, Division of Marine Resources, P.O. Box 12559, Charleston, SC 29422, (803) 762-5010. Contact: David Cupka, David Whitaker. State agency that oversees South Carolina's marine fisheries; conducting bycatch research funded by federal grants. Cupka and Whitaker have conducted and published research on bycatch in the state.

Southeastern Fisheries Association, Inc., 312 E Georgia, Tallahassee, FL 32301, (904) 224-0612, Fax (904) 222-3663. Contact: Robert P. Jones. Commercial fishing industry group with 250 member companies; established 1952. Membership from North Carolina to Louisiana, includes commercial fisherman from all fisheries, seafood dealers, processors. Florida has provided approximately 80% of membership and funding. Fought Florida's anti-net initiative; feels fishing industry has

been treated unfairly by conservationists; pessimistic about teaming up with them on bycatch issues.

Texas A&M University, Sea Grant Marine Extension Service, P.O. Box 1675, Galveston, TX 77553, (409) 762-9800, Fax (409) 762-8276. Contact: Gary Graham; also, Research Foundation, (409) 845-4291. Contact: Dr. Wade Griffin. Conducts bycatch research and gear testing. Graham is Gulf coordinator for the Gulf & South Atlantic Fisheries Development Foundation's Shrimp Bycatch Research Program; also on its Gear Review Panel. The university's research foundation has received federal grants for numerous bycatch studies.

Texas Parks and Wildlife Department, 4200 Smith School Rd., Austin, TX 78744, (512) 389-4801, 389-4849, Fax (512) 389-4383, 389-4814. Contact: Ralph Rayburn, Andrew Sansom. Oversees the state's marine fisheries; also assisted in bycatch research, currently conducting a shrimp bycatch research project under a MARFIN (Marine Fisheries Initiative) grant. Rayburn is on the Gulf & South Atlantic Fisheries Development Foundation's Bycatch Steering Committee.

Texas Shrimp Association, P.O. Box 1020, Aransas Pass, TX 78335, (512) 758-5024, Fax (512) 758-5853. Contact: Wilma Anderson. Association representing Texas shrimpers; has 385 members with about 700 boats, members are on the Gulf Council's Shrimp Advisory Panel and have made their vessels available for BRD testing; supportive of Sea Grant BRD-research efforts. Along with NMFS and the GSAFDF, TSA has been conducting studies to characterize shrimp bycatch and analyze BRDs. Anderson is on the board of the Gulf & South Atlantic Fisheries Development Foundation and its Bycatch Steering Committee.

University of Georgia, Sea Grant Marine Extension Service, 715 Bay St., Brunswick, GA 31520, (912) 264-7268, Fax (912) 264-7312. Contact: David Harrington, Duncan Amos. Conducts testing on fishing gear, including BRDs; can test innovative gear ideas on its vessels, was instrumental in TED testing. Harrington is the South Atlantic coordinator for the Gulf & South Atlantic Fisheries Development Foundation's Bycatch Research Program; is also on its Gear Review Panel.

University of Southwestern Louisiana, P.O. Box 44509, Lafayette, LA 70509. Contact: Dr. Jay Huner; also, P.O. Box 115, Milton, LA 70558, (318) 856-7313. Contact: Greg Faulkner. USL began developing finfish bycatch reduction devices (BRDs) in 1989. A grant in 1992 led to the development of the USL Spider Web Excluder and the USL Canopy Excluder. In 1993, the Pipeline Excluder was developed. USL is seeking additional funding to conduct more testing. ❑

Northeast

Fishing Industry

Dirigo Instruments, 14 Industrial Parkway, Brunswick, ME 04011, (207) 721-1044. Contact: Chris Tupper. Engineer involved with several fishermen in developing a pinger for gillnet fishery being manufactured by Saunders Electronics.

Maine Gillnetters Association, P.O. Box 306 or 188, Stonington, ME 04681, (207) 367-5907. Contact: Ted Ames, President. Active in studies to reduce porpoise bycatch in Gulf of Maine sink gillnet fishery through the use of net pingers and other devices.

N.H. Commercial Fisherman's Association, 38th Georges Terrace, Portsmouth, NH 03801, (603) 431-1779. Contact: Eric Anderson. Involved for three years on studies assessing the feasibility of pingers on gillnets to discourage porpoise bycatch.

Compiled by Ken Kelley

Offshore Mariners Association, 114 MacCarthur Dr, Ste 3, New Bedford, MA 02740, (508) 990-1377. Contact: Howard Nickerson. Organization has been involved in developing markets for various species caught by New Bedford fishing fleet, including monkfish, skate, and dogfish.

Point Judith Fishermen's Co-op, Box 730, 75 State St., Narragansett, RI 02882, (401) 782-1500. Contact: Jim McCauley. Point Judith Co-op was one of the earliest in trying to develop use of underutilized species and bycatch in southern New England fishery by not targeting groundfish. Primarily has worked to develop markets for squid, butterfish, and mackerel caught by co-op members.

Portland Trawler Supply, 260 Commercial Street, Portland, ME 04011, (207) 772-3275. Contact: Jeffrey Flagg. A trawl technician who has worked with and sells the Nordmore grate to prevent juvenile groundfish bycatch in the northern shrimp fishery.

Saunders Electronics, 82 Industrial Park Dr, Saco, ME 04072, (207) 283-9106. Contact: David Saunders. Manufacturers of net pingers for use in gillnet fishery, prototype was shown at Fish Expo-Boston. Unit is in custom-molded enclosure specifically made for gillnet deployment, with batteries that last four months.

Ronald Smolowitz, Coonamessett Farm, 277 Hatchville Rd, East Falmouth, MA 02536, (508) 564-5516, Fax (508) 564-5003. Formerly a NMFS gear specialist, now a private consultant, has been involved in studying gear modifications to reduce fish bycatch in New England and elsewhere for 25 years. Worked on developing and testing large mesh codends and larger rings in scallop dredges to reduce bycatch of juvenile groundfish. Also involved in testing pingers on gillnets to reduce porpoise bycatch. Last year completed project for Greenpeace International on bycatch in fisheries worldwide.

Joe Testaverde, Gloucester, MA, (508) 283-2976. Owner of 70-foot dragger, also chair of the Gloucester Fisheries Commission and director of the Gloucester Inshore Fisheries Association. Actively involved in bycatch issues, has used Nordmore grate in shrimp fishery. Also active in trying to reduce bycatch of juvenile fish in the small-mesh whiting fishery; favors enacting minimum mesh size.

Government Agencies and Research Scientists

Center for Coastal Studies, P.O. Box 1036, Provincetown, MA 02657, (508) 487-3622.

Contact: Ross DiConti. Chairman of the Harbor Porpoise Working Group, which is involved in the problem of sink gillnets and porpoise entanglement, and use of pingers to reduce porpoise bycatch. Working with NMFS grant to study the feasiblity of collecting and recylcing of fishing nets and gear. Center is nonprofit; active in promoting the use of groundfish bycatch such as dogfish and skate, with annual "Trash Fish Banquet."

Department of Fisheries, Animal and Veterinary Science, University of Rhode Island, Kingston, RI 02881, (401) 752-5333. Contact: Joseph DeAlteris. Working with the commercial industry; has tested a number of selective trawls for the New England groundfishery with the aim of reducing bycatch of non-target species. As part of this, has helped develop underwater video cameras to record fish behavior for use in making gear modifications to reduce bycatch.

Department of Fisheries and Ocean, Scotia-Fundy Region, P.O. Box 550, Halifax, Nova Scotia, Canada, (902) 426-7239. Contact: Chris Cooper. Has studied the use of horizontal panels in groundfish trawls to separate cod and haddock, for use in groundfishery so fishermen could selectively fish for either species. Sea trials showed trawls caught 90% of the haddock in the top, with 60% of the cod in the bottom. It also worked to separate halibut and other flatfish species from cod and haddock.

Maine Division of Marine Resources, P.O. Box 8, West Boothbay Harbor, ME 04575, (207) 633-9528. Contact: Mike Brown. Work includes looking at modification in orientation and angle of Nordmore grate, and use of mesh panels to sort out and prevent bycatch of lobsters, fish, and other species in Gulf of Maine shrimp fishery.

Maine Division of Marine Resources, P.O. Box 8, West Boothbay Harbor, ME 04575, (207) 633-9528. Contact: Dan Schick. Working on study to determine whether use of square mesh behind Nordmore grate in New England shrimp fishery, will help release small finfish such as whiting, which are still retained in catch. Also studied fish behavior with different net designs to reduce bycatch, versus use of mechanical separators like Nordmore grate.

Manomet Observatory, P.O. Box 1770, Manomet, MA 02345, (800) 621-0000. Contact: Steve Drew. Director of fisheries observer program, which among other things monitors bycatch in fisheries, including Northeast groundfishery.

Massachusetts Division of Marine Fisheries, 18 Route 6A, Sandwich, MA 02563, (508) 888-1155. Contact: Arnold Carr. Work includes study and development of selective gear to reduce groundfish bycatch, including sea trials of separator trawl for the small-mesh whiting fishery. Test trawls on a fishing boat showed gear dramatically reduced groundfish bycatch, but at present is not commercially viable. Also has worked cooperatively with the Conservation Law Foundation to test commercial trawls that could separate haddock from cod.

Massachusetts Institute of Technology Sea Grant, MIT Bldg. E-38-372, 292 Main St, Cambridge, MA 02139, (617) 253-7041. Contact: Cliff Goudey. Since the 1980s has tested various net models at David Taylor Underwater Model Basin in Maryland, to study gear performance and improve selectivity. Also has helped developed towed underwater remote sensing system for trawls to study species behavior for use in reducing bycatch. Currently involved in testing gear in experimental midwater pair trawl for tuna, which would reduce bycatch of marine mammals and turtles.

Memorial University, Whale Research Group, St. John's, Newfoundland, Canada, (709) 753-5495. Contact: Jon Lien. Has developed pingers for use on gillnets and other fishing gear to prevent marine mammal bycatch. Working with fishermen from Newfoundland to New England to experiment with pingers that show promise in reducing porpoise bycatch in gillnets.

National Marine Fisheries Service, Fisheries Engineering Group, Box 2282, Kingston, RI 02881, (401) 782-3345. Contact: Alan Blott. Has worked on various projects including development of separator trawl to reduce juvenile finfish bycatch in Gulf of Maine shrimp fishery. Also looked at losses caused by ghost gillnets in the inshore waters of southern New England.

National Marine Fisheries Service, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, (508) ~~548-5123.~~ Contact: Steve Murawski. Director of Population Dynamics Studies at the NMFS Northeast Fisheries Center. Involved in sampling and analyzing historical changes in New England groundfishery, including recent shifts in biomass on Georges Bank from traditional groundfish species to skate and dogfish. Co-author of *Bycatch and Discards in World Fisheries: Quantities, Impacts and the Philosophic Bases for their Management.*

National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole, MA 02543, (508) 548-5123. Contact: Dave Potter. The NMFS coordinator on gillnet pinger project to reduce harbor porpoise bycatch. NMFS has an advisory role in the project. Potter is the contact point for specimens that are collected.

New England Aquarium, Central Wharf, Boston, MA 02810, (617) 973-5253, Fax (617) 367-6615. Contact: Scott Kraus. Chief investigator for Gulf of Maine study of using pinger on commercial gillnets to discourage and reduce harbor porpoise bycatch in New England groundfishery.

New England Fishery Management Council, 5 Broadway, Saugus, MA 01906, (617)231-0422. Contact: Philip Haring. In the past when the Council funded gear modification studies for New England groundfishery, Haring administered projects on gear and technical issues.

University of New Hampshire, Cooperative Extension Service, 113 North Rd., Brentwood, NH 08333-6623, (603) 679-5616. Contact: Rollie Barnaby. One of the five principal investigators for gillnet pinger project to reduce take of porpoises in Gulf of Maine.

University of Rhode Island, Department of Fisheries, Animal and Veterinary Science, Kingston, RI 02881, (401) 752-5333. Contact: Kathleen Castro. Has worked to perfect a video system to study fish behavior in trawls, to help develop gear that would reduce bycatch in northeast groundfishery. Besides traditional groundfish, has looked at behavior of whiting, dogfish, and skates.

University of Rhode Island, Department of Fisheries, Animal and Veteninary Science, Kingston, RI 02881, (401) 792-5333. Contact: Chris Gagnon. Involved in bycatch studies; organizer of conference to be held in Newport, RI, in late March-early April, 1995, that will deal with bycatch in the Northeast and mid-Atlantic fisheries.

Foundations

Conservation Law Foundation, 62 Summer St., Boston, MA 02110-1008, (617) 350-0990. Contact: Eleanor Dorsey. Staff scientist who has worked on groundfish issues, including bycatch and ways to eliminate it. CLF has non-profit status;

partially funded studies by MA DMF researchers to test a commercial trawl to separate haddock from cod.

National Fish and Wildlife Foundation, 1120 Connecticut Ave., NW, Ste. 900, Washington, D.C. 20036, (202) 857-0166. Contact: Whit Fosburgh. Foundation is the funding source for the Gulf of Maine gillnet pinger project. Also funded industry bycatch workshop in Oregon several years ago, and provided funding for Alaskan project for incentive-based program to encourage clean fishing techniques.

Conservation Groups

Fisheries Program Specialist, Center for Marine Conservation, 1725 De Sales St., NW, Washington, D.C. 20036, (202) 429-5609. Contact: Sonja V. Fordham. Primary concerns include depletion of Northeast groundfish stocks. Has pushed for introduction of the Nordmore grate in the northern shrimp fishery to prevent juvenile groundfish bycatch.

Greenpeace, 155 Massachusetts Ave., Boston, MA 02115, (617) 266-2505, Fax (617) 266-1311. Contact: Niaz Dory. Dory, who lives in Gloucester, is focusing on listening to the concerns of the fishing community there and elsewhere as they deal with new groundfish regulations. Among other things, she is addressing bycatch issues in the small-mesh whiting fishery.

Greenpeace, 1436 U. St., NW, Washington, D.C. 20009, (202) 462-1177. Contact: Gerald Leape. Works on legislative issues; seeking out allies in the fishing industry to come up with solutions for particular bycatch issues in New England groundfishery.

National Coalition for Marine Conservation, 3 W Market St., Leesburg, VA 22075, (703) 777-0037. Contact: Ken Hinman. Involved in supporting management decisions for New England groundfishery, with an interest in finding bycatch solutions. ❑

Fishing Gear Manufacturers

Compiled by Mary Sue Lonnevik

It is always in the manufacturer's best interest to provide the most efficient gear for the job. For fishermen, the most efficient gear means equipment that catches the highest volume, targets the desired species, is easy for the boat and crew to handle, has the least amount of down time, and is cost effective to operate and buy.

Research and development is a necessary cost of doing business if product manufacturers are going to stay on the leading edge of technology. Many commercial fishing gear manufacturers spend thousands of dollars each year for their own and government-funded projects for gear modification and fish selectivity. Many ideas for new concepts, modifications, and fishing techniques come from the fishermen themselves. They incorporate ideas into the gear while they are fishing, or produce designs to be built by gear companies.

Once a new design or modification has been agreed on by the fishermen and gear company, a number of steps occur before it is considered a proven design. First, the concept must be drawn up either on paper or drafted on the computer. Formulas are then used to calculate the possible performance of the gear. Once the designer is confident that the gear will perform its task, a model is made and tested in a flume tank, wind tunnel, or other testing facility.

Based on the test results, any necessary changes are made to the original drawing of the gear. Then full-scale gear is built and put through at-sea trials. This part of the testing is usually the most expensive and unpredictable. Even though the design looked good on paper, calculated perfectly on the computer, and beat all the records at the testing facility, it still could bomb on the fishing grounds. Many factors can effect the gear, and unexpected situations can occur. The weather, currents, water temperature and clarity, fishing ground habitat, fish behavior, unforeseen handling problems, and lack of target species can all play a part in increasing costs and limiting research productivity. All in all, coming up with the most efficient, selective, and habitat-sensitive gear can be a costly project.

Because of the cost and risks involved, the fishing industry, government agencies, academia, nonprofit associations, and other interested parties must band together to compile their knowledge, funds, and time to provide the most selective gear possible while maintaining a profitable, viable and stable fishery.

The following are some gear manufacturers interested in participating in bycatch reduction projects. The (*) asterisk before a product signifies that the manufacturer has done bycatch research in the past on this gear.

Cantrawl Pacific Fishing Services, Ltd.,140 6660 Graybar Road, Richmond, British Columbia V6W 1H9 Canada, (604) 270-6387, (800) 656-1468, Fax (604) 270-2527. Contact: Bob McIlwaine. Products: *bottom trawl, midwater trawl, shrimp trawls, *shrimp grid, and doors.

Dantrawl, Inc., 4776 Shilshole Ave. NW, Seattle, WA 98107, (206) 789-8840, Fax (206) 789-8973. Contact: Elias Olafsson. Products: bottom trawls, midwater trawls, doors, and codends.

Dirico Instruments, 14 Industrial Park Way, Brunswick ME 04011, (207) 721-1044. Fax (207) 798-5060. Contact: Chris Tupper. Products: pingers for sinking gillnet, trawl net instrumentation.

Dorian Metal Fabricating Co., Inc., 3950 6th Ave. NW, Seattle, WA 98107, (206) 547-8585, Fax (206) 547-6553. Contact: Bob Scofield. Products: *crab pots, *cod pots.

Driscoll Net Service, P.O. Box 326, Warrenton, OR 97146, (503) 738-9296. Contact:

Bob Driscoll. Products: bottom trawls, *prawn nets with fish eyes, *shrimp trawls, beam trawls, and codends.

Dungeness Gear Works, Inc., 12800 Hwy 99 So, Everett, WA 98204, (206) 742-4327, (800) 548-9743, Fax (206) 745-2009. Contact: Lance Nylander. Products: *crab pots, *fish pots, and *flatfish pots.

Eagle Claw Fishing Tackle, Wright McGill Co., P.O. Box 16011, Denver CO 80216-0011, (303) 321-1481, Fax (303) 321-4750. Contact: Gene Wilson. Products: longline fishing hooks.

Electra-Dyne Co., P.O. Box 3545, Plymouth, MA 02361, (508) 747-4017, Fax (508) 746-5225. Contact: Peter Maccaferri. Products: electric hauling systems (which pull traps, nets, and dredges for lobster, crab, and shrimp).

Fathoms Plus, Inc., P.O. Box 6307, San Diego, CA 92166, (619) 222-8385, Fax (619) 222-8247. Contact: Victor Da Rosa, John Tarantino. Products: plastic shellfish traps (lobster, crab, shrimp, and spot prawns).

Fife Forge, Inc., P.O. Box 3896, Seattle, WA 98124, (206) 937-2533. Contact: Lee Cooper. Products: Fishing gear and forged steel products.

Foulweather Trawl, P.O. Box 311, Newport, OR 97365, (503) 867-4975, Fax (503) 867-4975. Contact: Sara Witalison. Products: bottom trawls, midwater trawls, shrimp trawls, codends, and doors.

Gourock Trawls, 2600 West Commodore Way, Seattle, WA 98119, (206) 282-8066, Fax (206) 284-0394. Contact: Jon Jonsson. Products: *bottom trawls, *midwater trawls, shrimp trawls, doors, and codends.

Gunnar Electronics, 5801 14th Ave.NW, Seattle, WA 98107, (206) 781-7234, Fax (206) 781-8657. Contact: Birger Johannesson. Products: jigging machinery (bottom fish).

Hi Seas Industries, Inc., 18-22 Minetta Lane, New York, NY 10012, (212) 979-8989, Fax (212) 979-9306. Contact: John Kaiser. Products: longline equipment.

LFS, INC., 9th & Harris, Bldg. 2, Bellingham, WA 98225 U.S.A., (206) 734-3336, Fax (206) 738-9601. Contact: Dick Schleitweiler, Trawl Div. Manager. Products: *bottom trawls, midwater trawls, shrimp trawls, *gillnet, *longline, pots, *purse seine, doors, and codends.

Lindgren-Pitman, Inc., 2615 N.E. 5th Ave, Pompano Beach, FL 33064, (305) 943-4243, Fax (305) 943-7877. Contact: Walter Flanagan. Products: longline (monofilament line, reels, and spools).

Longline Marine Systems, Inc., 1220 West Nickerson, Seattle, WA 98119, (206) 284-9670, Fax (206) 284-9686. Contact: John Andrews. Products: *longline equipment, pots (crab and fish).

Marco Seattle, 2300 West Commodore Way, Seattle, WA 98199, (206) 285-3200, Fax (206) 285-8486. Contact: Hal Cook. Products: longline equipment.

Neptune Trap & Trigger, 5330 Ballard Ave. NW, Seattle, WA 98107, (206) 789-3790, Fax (206) 789-1795. Contact: Ed Wyman. Products: crab triggers.

NET Systems, Inc., 7910 NE Day Rd W, Bainbridge Island, WA 98110, (206) 842-5623, Fax (206) 842-6832. Contact: Lori Swanson. Products: *bottom trawls, *midwater trawls, *codends, and *doors.

Norsol, Inc., 1220 80th Southwest, Everett, WA 98203, (206) 743-4428, (800) 752-0202, Fax (200) 743-5578. Contact: Dennis Johnson. Products: *crab pots, *fish pots, bait products, *galvanized time release to prevent pots from fishing, and cod triggers.

Pacific Ocean Producers, 965B-N Nimitz, Honolulu, HI 96817, (808) 537-2905, Fax (808) 536-3225. Contact: Jim Cook or Sean Martin. Products: monofilament longline equipment.

Pacific Trawl Co., Inc., P.O. Box 6353, Eureka, CA 95502, (707) 444-0431, Fax (707) 444-2751. Contact: Liam Massey. Products: *bottom trawls, midwater trawls, *shrimp trawls, *prawn trawls, cucumber trawls, *codends, and doors.

Pfister Nets, P.O. Box 548, South Beach, OR 97366, (503) 867-8234. Contact: Tom Pfister. Products: *shrimp trawls

Riverdale Mills Corp., P.O. Box 200, 130 Riverdale St., Northbridge, MA 01534, (508) 234-8715, Fax (508) 234-9595. Contact: Andrew Knott. Products: welded wire mesh for lobster and crab pots.

Saunders Electronics, 82 Industrial Park Drive, Saco, ME 04072, (207) 283-9106, Fax (207) 282-8832. Contact: Paul Meserve. Products: pingers for sinking gillnets.

Seattle Marine & Fishing Supply Co., 2121 West Commodore Way, Seattle, WA 98199, (206) 285-5010, Fax (206) 285-7925. Contact: Dan Farrow, Trawl Dept. Products: *bottom trawls, longline, gillnet, purse seines, crab supplies, codends, midwater trawls, doors, and shrimp trawls.

Swan Net (USA), Inc., 4802 Airport Way South, Seattle, WA 98108, (206) 382-0795, Fax (206) 625-9805. Contact: Jesse C. Furnival. Products: midwater trawls.

Timothy's Nets, 5105 Troller Rd, P.O. Box 5560, Charlston, OR 97420, (503) 888-6513, Fax (503) 888-6838. Contact: Tom Timothy. Products: shrimp trawls, bottom trawls, codends, doors, and prawn trawls.

Trawl and Repair Service, P.O. Box 115, Milton, LA 70558, (318) 856-7313, Fax (318) 856-7313. Contact: Greg Faulkner. Products: trawls, beam trawls, and skimmer nets.

Troyer's Marine Supply, Inc., 1244 Yaquina Bay Rd., Newport, OR 97365, (503) 265-6653, (800) 772-4772, Fax (503) 265-5489. Contact: Dave Thalman. Products: marine gear, longline, trawl equipment, crab gear, and doors.

Unicrab, Inc., 310 NW 40th St, Seattle, WA 98107, (206) 789-1899, Fax (206) 789-1899. Contact: Koll Hagen. Products: crab pots.

Victory Fishing Gear International, Ltd., 3412 16th W, P.O. Box 71069, Seattle, WA 98107, (206) 706-0789, Fax (206) 706-0790. Contact: Mike Stone. Products: *bottom trawls, *midwater trawls, *shrimp trawls, *codends, *doors, and longline equipment.

Viking Net Supply, 1507 Brunswick, P.O. Box 1233, Mount Vernon, WA 98273, (206) 428-7879, (800) 553-8601, Fax (206) 466-2122. Contact: Olaf Gildnes. Products: purse seines & gillnet for herring and salmon.

Wilcox Marine Supply, Inc., P.O. Box 99, Mystic CT 06355, (203) 536-4206, Fax (203) 536-8326. Contact: Jonathan Gibson, Barbara Gay. Products: *bottom trawls, shrimp trawls, squid trawls, pair trawls, *codends, doors, monk fish nets, purse seines, gillnets, and *environmental survey equipment.

World Plastics Corp., P.O. Box 14873, Cincinatti, OH 45250, (513) 471-7075, Fax (513) 471-7081. Contact: Vic World. Products: longline lures . ❑

Glossary of terms

Some of the key terms used to discuss bycatch are often glibly interchanged. In the interest of clearing muddy waters, here are short definitions for some of the important concepts.

Conservation: An ethic focused on sustainability; holds that use of renewable resources should not threaten viability of populations; in principle based in biology, taking whole populations and ecosystems into consideration, not elevating certain species above others on moral or aesthetic grounds. Term is distinct from protection, which sets a tougher standard: elimination of threats to individual animals, rather than to whole populations.

Environmentalism: Catch-all term for concern about earth, ocean, and natural resources, including a broad spectrum of ideologies: from mainstream sustainable use to radical opposition to most forms of resource exploitation.

Management: Regulation of fisheries. In principle, management aims to promote sustainable production, avoid overfishing (and increasingly, ecosystem damage), allow reasonable economic opportunity for fishery participants, and mediate between competing interests. Decisions and debates are supposed to be based on science, not merely greed and guesswork; but nobody is perfect. Management is unavoidably political. Decision makers are frequently political appointees, susceptible to external pressures; when assembled in councils and commissions, they often act like legislatures—horsetrading toward policy. Dull, difficult, frequently discouraging, this work is also necessary. Nonetheless, underpinning the idea of management is an assumption that humans are in charge; not everyone believes we are up to the job, but we try.

Protection: An ethic opposing harm to individual creatures, not just whole populations. Crucial term in U.S. marine mammal policy and animal-rights concerns. Frequently a moral view, not a biological one: establishes code of "right" and "wrong" action with regard to certain species (but generally ignoring others). Principal legal expression of this philosophy is Marine Mammal Protection Act. However, MMPA does not strictly require "zero mortality;" it calls for "insignificant mortality approaching zero," a concept usually defined in terms of mortality *rates* instead of absolute numbers. A volatile, passionately argued topic.

Sustainability: Principle that use of nature should not mean wearing it out. Cornerstone of conservation ethic. In bycatch issues, includes effect on non-target organisms along with intended catch. Focus is generally on keeping fishing pressure and methods from undermining viability of marine populations.

Wise Use: A term originally meaning use in accordance with sound conservation principles. Recently, and controversially, embraced by a loose coalition of resource users and industries opposed to "environmental overkill." The Wise Use movement is scrappy and volatile.

Bycatch issues have become ammunition, especially where policies arise from less-than-solid conservation data. The coalition's agendas are mixed. Declawing environmental law is a binding theme. While some participants are interested in sustainability, others seem out to strip and run. Some fishing leaders are skeptical, some sympathetic; a growing number are active in the movement.

Anacronyms

ACCA Atlantic Coast Conservation Association
ADF&G Alask Department of Fish and Game
AFDF Alaska Fisheries Development Foundation
AFTA American Factory Trawler Association
AMCC Alaska Marine Conservation Council
ATA American Tunaboat Association
BRD Bycatch Reduction Device
CDQ Community Development Quota
CFEC Commercial Fishing Entry Commission
CLF Conservation law Foundation
CWT Coded Wire Tagging
ETP Eastern Tropical Pacific
FAO Food and Agriculture Organization
FED Fish Excluder Device
FITC Fishery Industrial Technology Center
FMP Fishery Management Plan
FR/FU Full Retention/Full Utilization
FVOA Fishing Vessel Owners' Association
GOMFMC Gulf of Mexico Fishery Management Council
GSAFDF Gulf and South Atlantic Fisheries Foundation
H&G Head-and-Gut
HP Harvest Priority
IATTC Inter-American Tropical Tuna Commission
IBQ Individual Bycatch Quota
IFQ Individual Fishing Quota
IPHC International Pacific Halibut Commission
ITQ Individual Transferable Quota
IVQ Individual Vessel Quota
MLA Maine Lobstermen's Association
NWIFC Northwest Indian Fisheries Commission
NMFS National Marine Fisheries Service
NPFMC North Pacific Fishery Management Council
OFF Organized Fishermen of Florida
PCFFA Pacific Coast Federation of Fishermen's Associations
PFMC Pacific Fishery Management Council

TAC Total Allowable Catch

TED Turtle Excluder Device

TSA Texas Shrimp Association

The National Fisheries Conservation Center, established in 1994, promotes collaboration between the fishing industry, conservation groups, and private-sector grantmakers in addressing problems associated with fisheries bycatch and waste. The Center provides tools and strategies to help donors, conservationists, and fishermen join forces to deal with bycatch problems. By sharing resources and skills, leaders from these three communities can accelerate the process of finding solutions.