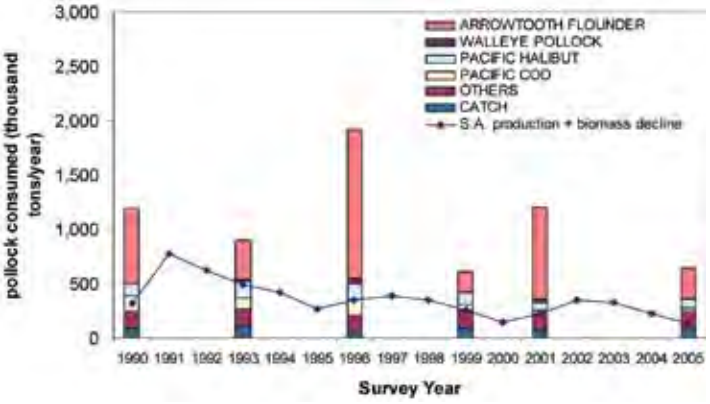
Sampling What Predators Eat in Fall, Winter and Spring

Project 622

A CURRENT KEY SHORTFALL OF MULTI-SPECIES AND ecosystem models is that most of the diet information they depend on comes from fish collected during assessment surveys, which typically take place between May and September. Different key ecological processes occur during fall, winter and spring, which likely have strong impacts on fish populations and model results, as illustrated by the mismatch between production and consumption estimates of walleye pollock in the Gulf of Alaska. To address this shortfall, Project 622 is sampling predator stomach contents collected by observers during non-survey months from the period 2000-2006 and synthesizing the resulting data on a monthly and geographical scale to provide inputs for future modeling efforts. Particular emphasis will be placed on stable isotope analysis that reveals diets over a longer period of time.



Total production of Gulf of Alaska walleye pollock (lines and points) 1990-2005, according to the most recent stock assessment, compared with independent consumption estimates of major predators on pollock.

Bycatch Reduction

THE INCIDENTAL CATCH OF FISHES, MARINE MAMMALS, SEA TURTLES, SEABIRDS, AND OTHER LIVING MARINE RESOURCES HAS BECOME A CENTRAL CONCERN OF THE COMMERCIAL AND RECREATIONAL FISHING INDUSTRIES, RESOURCE MANAGERS, CONSERVATION ORGANIZATIONS, SCIENTISTS, AND THE PUBLIC, BOTH NATIONALLY AND GLOBALLY

The Magnuson-Stevens Act defined bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program. In 1998, the National Marine Fisheries Service report "Managing the Nation's Bycatch," expanded the definition to include "discarded catch of any living marine resource plus retained incidental catch and unobserved mortality due to a direct encounter with fishing gear."

We need to improve mitigation measures designed to reduce the catch of unwanted species, or perhaps of certain age groups of targeted species. Incidental harvests of endangered species, such as short-tailed albatross, or bycatch of prohibited species, such as red king crab, Pacific herring, chinook and chum salmon, can curtail fisheries and elevate concerns for the effects of fishing on other living resources.

Incidental catch of undesirable species leads to increased costs of fishing operations and decreases its sustainability. If bycatch mortality is not adequately monitored, it increases the uncertainty concerning total fishing-related mortality, which in turn makes it more difficult to assess the status of stocks. Also, concentrated discards can result in localized environmental degradation, and hampers growth of that stock and limits future catch.

The bycatch problem is complex because actions taken to reduce the bycatch of one species can increase that of another, and efforts to reduce bycatch mortality typically change the distribution of the net benefits from the fisheries.

In its *Science Plan*, the Board stated that research priorities under this topic should include, but are not limited to, mitigation of seabird and marine mammal interactions with fisheries, new technologies, and methods to reduce bycatch, and studies of survival rates of discarded fish to allow accurate estimation of total fishing mortality. The Board has funded five projects for $900,000 related to fish and invertebrate bycatch. Seabird and marine mammal-related bycatch studies are expanded upon in their respective sections.

Steve Barbeaux

FEATURE PROJECT

FISH & INVERTS :: Bycatch Reduction

Development of New Salmon Bycatch Technologies

Project 202

IN 2002, THE NPRB FUNDED PROJECT 202 TO EXAMINE THE FEASIBILITY OF using sonar technology to reduce salmon bycatch in the Alaska pollock fishery. Salmon are a prohibited species in groundfish fishery management plans and cannot be retained or sold if taken incidentally. Pollock fishermen try to avoid salmon "hotspots" to stay under bycatch caps, but the effort costs fishing time and fuel as they seek fishing grounds with lower salmon bycatch rates, which potentially also have smaller pollock concentrations.

Researchers developed and attached an Advanced Dual-frequency Identification SONar (DIDSON) to nets to provide higher-resolution images that distinguish between different species of fish entering the net. During capture, pollock continuously moved toward the back of the net, with relatively infrequent, brief efforts to hold position or move slightly forward. Salmon, by contrast, frequently moved forward, and swam nearer the top of the net than the pollock.

When the net slowed during retrieval, many salmon swam forward, away from the trawl's codend, whereas pollock remained in the back of the net. This new information aided researchers in developing and testing a new type of salmon excluder that relies on the differences in body shapes and behavior to separate animals during capture.

By using DIDSON to identify species before catching them, chinook salmon bycatch was reduced by 12.9%, while pollock still comprised 95.4% by weight of the groundfish capture, with flatfish and cod being the primary bycatch. Active industry interest has motivated continued work to improve and apply these excluders.

Orientation of the DIDSON sonar and the area that it imaged on the trawl net.

The difference in salmon and pollock behavior in nets lets researchers develop and test a new type of salmon excluder.

FISH & INVERTS :: Bycatch Reduction

Exploring Temperature and Bycatch Rates

Project 731

TO FURTHER PREVENT SALMON BYCATCH IN THE pollock fishery, Project 731 is investigating the relationship between water column structure and temperature, and the spatial patterns in the catch of pollock, salmon, and other species. Researchers think temperature is one of the strongest factors controlling where pollock live. We know less about the specific temperature preferences for adult and young salmon in the Bering Sea, which Project 204 revealed to have substantial variation.

Scientists participating in this study are deploying up to 20 temperature-depth recorders on the trawl nets of Bering Sea fishing vessels to collect the necessary physical data to relate to the catch information. If a significant relationship between temperature and catch rates for pollock, salmon, and other incidental species is found, this could be a quick and useful tool for fishermen to predict bycatch rates of salmon and other species, resulting in more selective "temperature-directed fishing."

FISH & INVERTS :: Bycatch Reduction

Electronic Bycatch Monitoring

Project 325

TO ACCOUNT FOR BYCATCH WHEN ASSESSING FISH stocks and setting fishing quotas, resource managers need to know the amounts. Independently collected at-sea data is essential for science, management, and compliance monitoring objectives. Over the past two decades, the traditional method of at-sea monitoring of commercial fisheries by human observers has grown.

With growing monitoring needs, increasing costs and space limits on smaller vessels hampering human observing programs, technology-based at-sea monitoring has emerged. In partnership with industry, Project 325 experimented with hardware and software to develop a verifiable and efficient method of remotely counting bycatch aboard certain trawl vessels that would allow a trained human observer on land to evaluate and process catch data collected remotely at sea.

Once the tool was designed, 2.5 terabytes of shipboard video data were collected, which a professional fisheries observer viewed to identify at-sea discards by event and, if possible, by species. The reviewer watched videos covering a total of 780 hours of at-sea activities, and determined whether there were any bycatch and discards on each haul. It took only 68 hours to physically review and produce reports on those videos, compressing time by a ratio of 11.5:1. The project successfully demonstrated that electronic bycatch monitoring is feasible and could be considered by management agencies as an additional tool to on-board human observers.

Mark Buckley

Technicians secure a downward-looking canera to trawler stern gantry.