

The Conservation of Marine Biological Diversity
and Species Abundance on Canada's West Coast:
Institutional Impediments

Groundfish: A Case Study



A Report by Terry Glavin
for the Sierra Club of British Columbia

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INTRODUCTION

All these years after the East coast cod moratorium of 1992, unsustainable fisheries continue on Canada's west coast. For dozens of fish species, there aren't even catch limits. Conservation is still relegated to the status of one of several ill-defined management objectives, and the needs of science remain ignored.

It is commonly accepted, both among the general public and within the Department of Fisheries and Oceans, that there is widespread "dysfunction" involved in DFO decision-making on Canada's west coast. The following report is an attempt to shed some light on how bad decisions get made, where they get made, and ultimately, why they get made.

This report addresses some of the major "problems" in fisheries management and the state of fisheries science, and provides a synopsis of the decision-making process. This report addresses the management regimes for most of the species, in number and in volume, that comprise the West coast catch, as well as most of the west coast's fisheries, excluding salmon and herring. As you read this document, there is some context you might want to consider:

- DFO's entire \$300 million Pacific budget, which includes the Coast Guard, amounts to less than half the money U.S. government agencies spend every year, just on salmon-conservation initiatives, and just in the Columbia River.
- The lion's share of DFO's west coast fisheries management and science budget is spent on salmon, herring, and a few other species. A mere \$5 million is spent on science with respect to most of the species that comprise the West coast catch—and for an alarming number of those species, there is no "science" done at all.
- In recent years, the overall catch has become concentrated in fewer and fewer boats: we still have thousands of licensed fishing vessels on the coast, but fewer than 100 vessels now catch about two-thirds of all the fish.
- The amount of fish taken just by the 75-vessel groundfish trawl fleet, just between April 1, 2000 and January 8, 2001, amounts to 75 million pounds—an amount of fish that would fill a convoy of pickup trucks, bumper to bumper, between Vancouver and Quesnel.
- Deep-dwelling fish, about which science knows next to nothing, are making up an increasing proportion of the catch, and for most of these species, there are no catch limits.
- The amount of fish taken from B.C.'s waters every year routinely exceeds 225,000 tonnes. This is roughly equal to the weight of the human population of British Columbia.
- The West coast's fisheries are now appropriating fully ten per cent of the primary production (photosynthesis—phytoplankton—zooplankton) that occurs in Canada's Pacific waters.

Stock-assessment work on these species is undertaken by fewer than 20 full-time-equivalents in DFO’s Science Branch, Pacific Region... Next year, the trawl fleet expects to spend \$600,000 on stock-assessment projects.

GROUND FISH: A CASE STUDY

“Groundfish” were chosen as the focus of this report for the following reasons:

- Fish in this management classification, which includes hake (actually a midwater fish), comprise well more than half of the West coast catch;
- All sectors, and all gear types, catch groundfish as target species and as “bycatch”—trawlers, halibut fishermen, commercial hook-and-line rockfish boats, dogfish boats, lingcod boats, recreational anglers, aboriginal communities, and so on;
- Common scientific uncertainties are involved with respect to the abundance and distribution of these species;
- Fisheries management decisions occur as a consequence of deliberations in a variety of forums, involving the various sectors that directly target them.

Stock-assessment work on these species is undertaken by fewer than 20 full-time-equivalents in DFO’s Science Branch, Pacific Region. These scientists are almost all centred at the Pacific Biological Station in Nanaimo. Industry, meanwhile, is spending increasing amounts of its own money to conduct scientific research in “cooperative” fisheries science. Next year, for instance, the trawl fleet expects to spend \$600,000 on stock-assessment projects.

As is the case with all species on Canada's west coast, fisheries-management decisions are generally made this way:

- Stock-status reports and other scientific documents are prepared and put before the *Pacific Scientific Advice Review Committee*. The various PSARC subcommittees meet, in quasi-public fashion, and the recommendations of the subcommittees are intended to set "guidelines" for management decisions.
- These recommendations are then forwarded to the various pertinent *DFO management groups*: Groundfish trawl, hook-and-line, halibut, and so on. DFO managers develop early-draft fisheries management plans, which they put before the various *industry advisory bodies*, such as the Groundfish Trawl Advisory Committee, the Sports Fishing Advisory Board, and others.
- Following these deliberations, fisheries-management plans are generally approved *within the region*, by senior managers, and require the approval of the *regional-director-general*. If there are major changes made to management plans, as a general rule, the decisions go to the *fisheries minister*.

Rockfish remain poorly-understood species. They are long-lived, often reaching sexual maturity at about the same age as humans, and living, in some instances, more than a century.

ROCKFISH: A SPECIFIC ANALYSIS

Management Considerations

Among the 100-plus commercially-caught “groundfish” species identified by Fisheries and Oceans are 34 species of “rockfish” (*Sebastes*).

Rockfish remain poorly-understood species. They are long-lived, often reaching sexual maturity at about the same age as humans, and living, in some instances, more than a century. Copper rockfish have been known to live 46 years, quillbacks to 76 years, and red snappers to 117 years. Rockfish are usually sedentary, like lingcod. When juvenile inshore rockfish emerge from the larval stage, they find a reef, settle in, and stay there their whole lives.

Rockfish are not suitable for the range of conventional stock-assessment techniques applied by fisheries managers. They cannot be caught and tagged—their swim bladders decompress when the fish are brought to the surface, almost always resulting in death. DFO is considering recent advances in video-acoustic technology, and is even considering the use of submarines to conduct stock surveys—small submersibles would monitor specific rockfish habitat areas and conduct population surveys over time. The main research advance has been in the area of genetic analysis of the catch; however, DNA studies, unfortunately, have not shed much light on stock structure to date.

DFO scientists and managers have rather arbitrarily divided rockfish into three categories:

- **“Inshore” rockfish**, which are generally caught in relatively protected waters at depths of less than 50 metres;
- **“Slope” rockfish**, which are generally caught offshore at depths greater than 50 metres;
- **“Shelf,” rockfish**, found at the margins of the continental shelf, harvested exclusively by trawlers, at depths up to 1,000 metres and more.

While these distinctions are for management purposes only, the species mix tends to be quite different for each category. Inshore rockfish, meanwhile, are further divided into “Inside” stocks, which generally means the Strait of Georgia and much of Johnstone Straits, and “Outside” stocks, which occur everywhere else. These distinctions, too, are arbitrary, and conform mainly to the inside-outside licensing regime for the coast’s 261 commercial hook-and-line rockfish boats.

INSHORE ROCKFISH

Stock assessments for B.C.'s inshore rockfish have concentrated on a few species—quillbacks, canaries, Chinas, coppers, etc.—which are broadly and generally described in the scientific literature as “depressed,” or are otherwise identified as “stocks of concern,” and so on.

To focus in on the Strait of Georgia, stock-status analyses describe rockfish stocks as “likely overutilized”—a euphemism for “overfished.” A senior fisheries official said, “You could say that the rockfish populations are gone (in Georgia Strait)... I suspect that’s probably the case, at least in terms of a fishable population. But nobody knows.”

A senior fisheries official said, “You could say that the rockfish populations are gone (in Georgia Strait)... I suspect that’s probably the case, at least in terms of a fishable population. But nobody knows.”

There is no estimate of the number of rockfish caught in aboriginal fisheries on Canada’s west coast, but it is believed to be only a fraction of the recreational fishery. But the official estimate of the number of rockfish caught and killed by anglers on Canada’s west coast is tabulated as “unknown.” However, a recent estimate of the number of rockfish caught by anglers in the Strait of Georgia is 84,000 fish. This is an amount roughly equal to the official commercial landings of rockfish by the 70 hook-and-line boats (“ZN” licences) operating in the strait’s waters—there are another 191 ZN boats that target inshore rockfish in the “outside” category. The amount of Strait of Georgia rockfish actually caught by anglers and by ZN boats is officially counted as “unknown”—neither anglers nor ZN boats are required to keep what they catch, anywhere on the coast.

Coastwide, the ZN fishery lands about 4 million pounds of rockfish annually, but as with the case of the ZN fleet’s Strait of Georgia catch, the fleet’s actual coastwide catch is “unknown”. The ZN fleet sells fish to the live market, and as iced-at-sea, whole and gutted fish. But the fleet is moving farther and farther away from its markets, just to find fish to catch. Rockfish appear to have become “commercially extinct” in the most of the Strait of Georgia: by the late 1990s, 70 per cent of the ZN-caught rockfish in the Strait of Georgia was coming from the waters north of Campbell River, and most of them weren’t being caught in the Strait of Georgia at all. They were coming from the southern portions of Johnstone Straits, and as from as far north as Port Hardy.

CONSERVING INSHORE ROCKFISH:

How Conventional Efforts Fail

It is a Catch-22 sort of approach, particularly for commercial-fisheries controls: the catch is determined by quotas; the quotas are based on catch.

Known Catch and Catch Information: Catch 22

Conventional remedies to this obvious problem—a problem of chronic and persistent overfishing—have been confounded for a variety of reasons.

In 1991—the first year that the Strait’s ZN boats were assigned total-allowable-catch limits for rockfish—the daily recreational rockfish catch limit in the Strait’s sports fishery was reduced to five fish a day (immediately across Boundary Pass in Washington State waters, anglers are permitted only one rockfish a day). This doesn’t mean the Strait’s recreational catch was curtailed in 1991. Lowering daily bag limits did not and will not necessarily reduce the number of fish caught by anglers.

As noted earlier in this report, rockfish are easy to catch, so “catch per unit of effort” doesn’t change much between a reef seething with rockfish and a reef that’s been fished down to only a few rockfish. In spite of these difficulties, total-allowable-catches for rockfish in the commercial fleets are still based on stock assessments that rely overwhelmingly on catch information—catch-per-unit-of-effort, overall numbers of fish caught, the areas in which they were caught, the age of the fish caught, and so on.

This a backwards approach. It is a Catch-22 sort of approach, particularly for commercial-fisheries controls: the catch is determined by quotas; the quotas are based on catch. It’s a recurring absurdity, and it highlights, in great measure, the nature of the “dysfunction” so common within the Department of Fisheries and Oceans. And it’s one reason why fisheries continue when they really should be closed.

Further locking in that absurdity is the general rule that DFO doesn’t spend money on non-commercial species. In order for “stock-assessment science” to be undertaken, and total-allowable-catch ceilings to be applied, the species must be a commercial species. Despite recent attempts to establish independent, habitat-based abundance estimates, catch information for inshore rockfish is still the major source of data upon which total allowable catches are assigned, and that information is wholly unreliable anyway, because the overall catch by the various sectors is “unknown.”

The available “data” suggests precipitous declines in the abundance and distribution of inshore rockfish species.

Relying on trends in catch information is not necessarily always bad. It’s only bad when it’s used to assess stocks of fish such as rockfish, and when it’s practically all you’ve got to base your stock assessments on, and when even the basic catch data is known to be wholly incomplete.

The most recent management plan for the commercial inshore “hook and line” fishery acknowledges this. That management plan states that the problem of managing these fisheries, and the problem of relying on catch information to do so, “implies a window of ten to 20 years for the detection, action and response to the effects of management tactics.”

Relying on catch data for stock assessment could work, to some extent, if scientists were dealing with long-time consistency in fishing rules and fishing practices. Any inconsistencies in these practices over time will confound attempts to discern patterns in stock structure, abundance and distribution—and the catch information upon which quotas are based ends up being useless.

In recent years, profound changes have taken place in fishing rules and fishing practices regarding inshore rockfish species:

- limiting entry in the hook-and-line fisheries, and the creation of a special hook-and-line category (ZN) in the late 1980s;
- changes in market demand (often associated with the growth of the recent Asian immigrant population in the Lower Mainland);
- area closures due to overfishing;
- movement of the fleet from one area to the next with collapses in catch-per-unit-of-effort, etc.

As a consequence, the catch information becomes largely useless, so stock-assessments become largely useless. This is what results even when changes to fishing practices are made for the most honest and well-intentioned conservation reasons. All we know is that all the available “data” suggests precipitous declines in the abundance and distribution of inshore rockfish species, both in the “inside” and “outside” management classifications, everywhere on the coast. But fisheries continue, nonetheless.

This is clearly dysfunctional, and it’s a syndrome of sorts. It’s chronic, and it is acknowledged in the albeit-Orwellian language you’ll find in DFO’s rockfish hook-and-line “outside” management plan: Under the heading, “Data and management mismatched to the scale of depletion,” in a long list of “resource

concerns” there is this: “Lack of coherent data times-series due to the accumulation and variety of management tactics.”

So long as such a Catch-22 remains in place, chances are that efforts to reduce the catch, reduce bycatch,¹ improve reporting, and so on, may actually end up doing more harm than good. So long as catch data is being relied upon as the primary stock-assessment tool, adjusting fishery rules and adding information may only produce even greater incoherence in the time-series data.

Still, fisheries scientists and managers continue to focus their efforts on “improving” rockfish catch information. But to get that information, it’s not enough to know exactly what’s being taken by the directed fisheries prosecuted by the commercial (ZN) fisheries, the recreational fisheries, and the aboriginal fisheries. You have to start looking further afield, to other fisheries.

The Scale of the Catch

Halibut fisheries

One key fishery with an enormous inshore rockfish “bycatch” is the halibut fishery.

In 1999/2000, the commercial halibut fleet landed 12 million pounds of halibut, with a landed value of about \$38 million. DFO offers only an educated guess about the catch of halibut by B.C.’s sportsfishermen—a million pounds a year. The aboriginal halibut catch is considered “unknown.”

It’s not clear that the halibut fishery is harming halibut stocks, but something is happening. Up and down the coast, halibut are smaller than they used to be. They’re taking longer to grow to legal size, and nobody knows why.

Meanwhile, recent changes in commercial halibut-landing rules show that the commercial halibut fleet is catching an enormous amount of inshore rockfish, apparently because of growing market demand.

¹ The term “bycatch” appears several times in this report. The term is generally applied to unintentionally-caught fish—fish of one species caught during fisheries conducted upon another species. In the case of groundfish, however, “bycatch” is such a widespread and significant component of the catch that the term applies to species for which there are no restrictions on catch; species for which “bycatch” limits are allowed; and species which are unavoidably caught because of the non-selective nature of both trawl and hook-and-line gear, but must be thrown back over the side of the vessel.

DFO chose to allow every halibut boat to legally land 30,000 pounds of rockfish every year, 8,000 pounds of which may be red snapper.

By 1999, halibut fishermen were landing 700,000 pounds of rockfish every year, half a million pounds of which were high-value red snapper. And that's just what the halibut boats brought back to port. The actual halibut-fleet catch of rockfish species is considered "unknown." The impact of the halibut-fleet effort on rockfish and lingcod stocks is identified as "not known."

Halibut vessel owners have resisted DFO proposals to subject them to mandatory on-board observer coverage, of the kind that applies to B.C.'s offshore trawl fleet. Instead, industry and government are investigating alternatives, such as equipping the boats with special cameras that monitor all fishing activity.

In 1999, DFO began an attempt to regulate the amount of bycatch associated with the halibut fleet. DFO managers recognized that if regulations simply prohibited halibut fishermen from landing anything but halibut, fishermen would simply dump all the rockfish and lingcod back, dead (for both rockfish and lingcod, the swim bladder explodes and internal organs are damaged when they're hauled from depths at which halibut are found).

So, instead, DFO chose to allow every halibut boat to legally land 30,000 pounds of rockfish every year, 8,000 pounds of which may be red snapper. In addition, each halibut boat is allowed to land up to 15,000 pounds of lingcod, every month. What the halibut fleet actually catches of these species, however, remains officially tabulated as "unknown," because when a halibut boat reaches its non-halibut bycatch limit, the fish must legally go back over the side, dead.²

Other "hook-and-line" fisheries

Another fleet known to result in large rockfish catches is the "Schedule II" hook-and-line fleet, which consists of a number of vessels that fluctuates depending on market demand for dogfish, lingcod, skate, sole and so on. The fleet has been growing in recent years because of reduced opportunities in the salmon fisheries.

² There is a significant cross-over between the halibut fleet and the ZN fleet. In fact, most of the "outside" ZN licences are on vessels also licensed to fish halibut. As part of its attempt to reign in the halibut fleet's rockfish bycatch—or at least get a grip on the amount of rockfish and lingcod halibut boats were actually catching—DFO's changes in 1999 allowed halibut boats with ZN licences much larger allowable rockfish and lingcod landings, in exchange for the halibut boats forgoing their ZN privileges.

Most effort by this fleet is concentrated on dogfish, which inhabit similar depths and habitat to rockfish, particularly red snapper. The dogfish fishery is concentrated on the Strait of Georgia and the West coast of Vancouver Island, but it's growing in the waters around the Queen Charlotte Islands. The management plan sets out area catch limits for dogfish, although for individual boats, "there is no limit on the quantity of dogfish permitted to be taken" on the coast. Also, "there is no limit on the quantity of skate and sole and flounder" that a vessel may land. The fishery is open year-round.

These vessels are not permitted to land rockfish species (strictly speaking, rockfish may consist of no more than one per cent, round weight, of the catch aboard a vessel), so rockfish are thrown back over the side, dead. The actual rockfish catch by this fleet is unknown. Each vessel is permitted to land 15,000 pounds of lingcod per month. Apart from the Strait of Georgia, where lingcod must be thrown back over the side, lingcod catch ceilings are set for various areas of the coast, amounting to close to 1,000 tonnes.

"Inshore" trawling³

Finally, inshore rockfish bycatch occurs in unknown quantities in a little-known trawl fishery underway in the Strait of Georgia known as the "Option B" fishery.

Contrary to public perceptions about trawl-fishery management, the "Option B" groundfish trawl fleet:

- is not subjected to mandatory on-board observer coverage;
- targets fish that are not "offshore" species, but inshore species;
- targets and lands fish for which no catch-limits are assigned;
- is permitted to catch and land Strait of Georgia lingcod.

³ This category does not include the small-boat "beam-trawl" shrimp fishery, but it does warrant mention. At the November, 2000 PSARC invertebrate subcommittee meeting, the bycatch associated with this fishery was addressed, and the subcommittee's report noted: "Unreported catch, which is not included in stock assessments, can at times be a significant proportion of the allowable catch for some species, or may prevent the rebuilding of species at low levels of abundance...the subcommittee was certain that the magnitude of these bycatch removals were not being considered in the assessment of these species." Subcommittee members identified the beam-trawl bycatch as rockfish, skate, dogfish, and other species.

In 1997, when individual-vessel-quotas, mandatory onboard observers and area/species quotas were introduced to B.C.'s trawl fishery, the number of active vessels (about 140) was cut almost in half. Quota was “stacked” on the remaining vessels, but a few trawlers were allowed to opt out of the general groundfish-trawl fishery. These vessels comprise the “Option B” fleet, which varies from about a dozen to 17 vessels fishing in the Strait of Georgia.

Option B trawlers target groundfish species for which stock-status information is so unreliable that DFO scientists have not assigned total–allowable catches to them. The species these vessels land are mainly species of sole and dogfish.

No catch limits apply to the Option B fleet, but individual vessels are restricted to 15 “trips” a month, and each vessel is permitted to land 15,000 pounds of fish a month. Between April 1, 2000 and January 8, 2001, this fleet has landed eight tonnes of Pacific cod, 69 tonnes of Dover sole, 35 tonnes of rock sole, 75 tonnes of English sole, and 49 tonnes of spiny dogfish, all from Strait of Georgia waters. No lingcod landings are shown for the fleet in these reports, although “a 15,000-lb. calendar month limit for lingcod” is allowed for each vessel.

The number of incidentally-caught rockfish involved in these inshore trawl fisheries is counted as “unknown.”

SLOPE AND SHELF ROCKFISH

These rockfish are the species about which DFO scientists often know next to nothing, a situation that prevails with most of the species in the offshore “groundfish” category within which shelf and slope rockfish have been assigned. For the sake of brevity, shelf and slope rockfish are considered in this report simply as “offshore” rockfish. Also, these rockfish will be considered in the context of those other groundfish species with which they are caught.

The catch of offshore groundfish is almost entirely attributable to about 75 offshore trawlers in the “Option A” trawl fishery.

Of the 50 finfish species routinely harvested by trawlers for which no total-allowable-catches are set, there are at least 15 species of rockfish.

Of the 100-or-so species routinely brought up in offshore trawl nets, only 23 species are subject to total-allowable-catch limits set by DFO’s science branch. Of these 23 species, 12 are “rockfish.” By volume, they are mainly yellowtails, widows, canaries and redstripes. For management purposes, the relatively small catch of inshore rockfish species on the offshore grounds is counted as a single “species”, arbitrarily designated “inshore rockfish”. Of the other 11 species for which total allowable catches are set, four are species of sole; the others are Pacific cod, lingcod, dogfish, sablefish, pollock, and hake.

Of the remaining 75-or-so species in the offshore trawl catch, none are protected by any total-allowable-catch limits at all. This is mainly because there is no stock-assessment data of any consequence upon which annual catch limits might be based.

To be more precise, some species are not assigned catch limits because they’re not supposed to be caught by trawlers in the first place (salmon, sturgeon, halibut, octopus, crab and sea cucumbers are routinely caught and thrown back over the side). But for the rest, about 50 finfish species and another dozen-or-so invertebrate species, there are no formal controls on what the trawlers can catch, or on what they can land, or on what they can throw back—because there is no stock-assessment science involved at all, and no total-allowable-catch limits are set.

Because of these things, offshore rockfish—indeed, all offshore groundfish—are entangled in two Catch-22 situations. The first is the same as the one that prevails with inshore rockfish—catches are based on quotas, but quotas are based on stock-assessment that relies overwhelmingly on catch, and catch-information is wholly unreliable because of many things, not the least of which

is the lack of any consistent time-series data. In the case of offshore rockfish, a second Catch-22 applies, involving all those “groundfish” species for which no annual catch limits are set. Stock-assessment science is not conducted for species without known and significant “commercial value,” but there isn’t much consistent value associated with most trawl-caught offshore species, and practically nothing is known about them anyway, so there is no stock-assessment, hence no catch-limits.

Of the 50 finfish species routinely harvested by trawlers for which no total-allowable-catches are set, there are at least 15 species of rockfish. These include sharp-chinned, red-banded, longjaw, splitnose, darkblotch, greenstripe, rosethorn and harlequin rockfish, as well as an “unidentified” species of thornyhead rockfish.

CONSERVING
OFFSHORE
ROCKFISH:
How
Conventional
Efforts Fail

Species that never showed up in the industry's 60-year history on the coast have started showing up, in tremendous volume, only in recent years' landings.

More Catch 22, Less Science, Same Compromise

As is the case with inshore rockfish, stock assessment for offshore rockfish relies heavily on catch information, although the Pacific Biological Station is attempting several approaches that might produce more independent assessment.

Of the various problems associated with the reliability of trawl catch data, the first is simply that until recently, there really wasn't any. There was reliable landings information for certain groundfish species, but it wasn't until 1997 that the offshore trawlers were subjected to mandatory observer coverage.

The second reason why trawl catch data is often of little use in determining anything but the most dramatic trends in stock status is that the fleet is heading further offshore and fishing at greater depths than ever before.

Species that never showed up in the industry's 60-year history on the coast have started showing up, in tremendous volume, only in recent years' landings.

The third reason why trawl catch data is an unreliable indicator of stock status involves the changes in fishing practices that resulted from the consolidation of the fleet in the late 1990s following the introduction of individual vessel quotas, and the "stacking" of those quotas on ever-fewer vessels.

An analysis of the post-1997 regulatory regime shows how even the best intentions can be confounded by loopholes, compromise, and obfuscation.

Individual vessel quotas were made transferable between boats to ensure that the overall fleet would stay within the total-allowable-catch limits for the species the boats are out there catching. And all fish, kept or dumped, were to be accounted for. The rules discouraged "mining," and made the fleet's practices look more like fishing. The rules also discouraged high-grading—keeping high-value fish and dumping everything else. And the rules did reduce the bycatch of species the fleet wasn't supposed to be catching: In the early 1990s, trawlers were catching 1.5 million pounds of halibut every year, pitching it all back over the side. Last year, the trawl fleet's halibut bycatch was less than a million pounds.

But it is a fiction to assert that the offshore trawl fishery's bycatch is really being accounted for. It's "counted," by weight and species, but it isn't deducted against the total-allowable catch limits for the 23 species for which such limits are set. Only "marketable" fish of those species are counted against individual-

vessel quotas and against overall total-allowable catch limits. Between April 1, 2000 and January 8, 2001, 200,000 pounds of fish, thrown back dead, was deducted in this way. However, the total amount of fish from these 23 species actually caught and thrown back dead—but not counted against quotas or the total-allowable-catch—amounted to about six million pounds of fish over the same period. That’s because 99 per cent of the discarded fish were classified as “unmarketable,” which is a euphemism for small, juvenile fish.

As for the roughly 75 species of finfish and invertebrates not covered by total-allowable-catch limits, and caught by B.C.’s offshore trawlers between April 1, 2000 and January 8, 2001, the catch exceeds 24 million pounds of fish. More than half of these fish were thrown back, almost all of them dead. More than 12 million pounds of these fish were turbot; more than six million pounds of turbot was thrown back dead.

Stock Status Anomalies

Of the suite of 23 offshore groundfish species for which stock assessments are routinely done and total-allowable-catch limits are set annually, scientists are rarely confident of the assessed status of the various species. This is particularly true for rockfish, but it applies across the board. Most species for which stock-assessment science is done remain poorly understood, and the impacts of the trawl fleet on their populations, and on the ecosystems they inhabit, are also poorly understood.

For some groundfish species, such as Pacific ocean perch (a significant trawler target species) scientists have the benefit of relatively consistent catch data and stock assessment information going back 30 years. But for other species, such consistency rarely exists. The paucity of independent and reliable stock-status data results in dramatic inconsistencies between what fisheries managers identify as a “safe” level of harvest (based on the “advice” of scientists) and what the fleet actually ends up catching.

Sometimes, the inconsistencies may be a consequence of deliberately-changed fishing practices: Vessel owners will claim they didn’t catch their quotas for a particular species because they were avoiding an area of known abundance of another species for which they were approaching their quota limits. At other times, the contradictions appear to suggest that the fish simply aren’t there in numbers approaching what the quota limits would suggest.

And sometimes, species just start showing up in the catch, in massive quantities, and fisheries scientists are obliged to scramble and produce something that might be considered a “stock-assessment” document—just in effort to place limits on the catch.

- *Thornyhead rockfish*

Thornyheads are a species about which practically nothing is known. Found at depths often exceeding 1,000 meters, thornyheads have become the top-dollar fish in the trawl catch. Most trawl-caught rockfish species fetch a few pennies a pound, but frozen-at-sea thornyheads can fetch up to \$4 a pound in the Japanese delicacy market. The discovery of thornyheads in B.C. waters, and the discovery of the Japanese market for them, produced a gold rush in the 1990s.

It wasn't until the thornyhead fishery had taken off that fisheries scientists discovered that actually two species were involved—short-spine and long-spine thornyheads. Age-analysis studies suggested estimates of at least 60 years in thornyhead longevity.

The shortspine thornyhead catch had mushroomed to about 1200 tonnes by 1995, but catches have since fallen off to about 500 tonnes. Longspine thornyhead were found in deep water off Vancouver Island's west coast only three years ago, and last year the catch had mushroomed to 800 tonnes. Coastwide, stocks of both thornyhead species appear to be declining, but fishing pressure remains high.

DFO scientists concede that they don't really know what kind of fishing pressure thornyheads can bear, but the fishery continues.

- *Pacific cod*

One of the most dramatic contradictions between total-allowable catches and what the fleet actually catches, is the case of Pacific cod in Hecate Strait. Total-allowable catches weren't even assigned to Pacific cod until 1992, and nobody in the trawling industry can complain that the catch ceilings haven't been generous enough. In 1997, trawlers in Hecate Strait managed to catch only

15 per cent of the Pacific cod they were allowed to catch. In 1999, the fleet caught about 40 per cent of what it was allowed to catch.

At DFO's November, 2000, groundfish stock assessment meeting in Nanaimo, scientists were unusually frank about the situation with Pacific cod. "Current catches, even though well below TACs, threaten the stock's viability," the scientists noted in their formal report. "The current fishing mortality is unsustainable."

- *Canary rockfish*

In the case of canary rockfish, which inhabit deep waters off the West coast of Vancouver Island and Queen Charlotte Sound, total-allowable-catch limits routinely exceed the amount of fish trawlers have been catching. The most recent official stock assessment report for canary rockfish, concluded in 1999, contains this illustration of the extent to which guesswork occurs: "The stocks are probably close to maximum exploitation at present but actual status is unknown."

- *Lingcod*

Deepwater lingcod stocks, targeted mainly by trawlers, appear to be undergoing dramatic declines, but these apparent declines have not resulted in reduced quotas. As is the case with canary rockfish, the allowable trawl harvest of lingcod, for several years, has far exceeded the number of lingcod the trawlers have caught, in all areas of the coast.

SUMMARY

This report has attempted mainly to show how things go wrong within the Department of Fisheries and Oceans, and to illustrate where the impediments to the conservation of marine resources manifest themselves. To conclude, we provide an overview of *why* things go wrong, with some suggestions about how DFO's decision-making dysfunction may be addressed.

Policy

The Department of Fisheries and Oceans formally claims to be entering a new age of fisheries management based on the precautionary principle and risk-averse management practices, following the lead of international standards as set out in such documents as the United Nations Convention on Biological Diversity, the U.N. Food and Agriculture Organization's Code of Conduct for Responsible Fisheries, and so on. In reality, the precautionary approach applies fully to "new and emerging" fisheries, and even then, only in a dubious way.

Further, the Department of Fisheries and Oceans' emerging "New Directions" policies set out the objective of "ecosystem-based" management of natural-resource harvesting activities, which includes "integrated fisheries management."

While most senior DFO officials may be sincerely committed to these principles, it is another thing entirely to move the institution towards truly "sustainable" fisheries that take these principles into account. For one thing, nobody's quite sure what an "ecosystem-based approach" would look like. Short of shutting the entire trawl fleet down, nobody among at least a dozen DFO scientists and managers consulted for this report is quite sure what a "precautionary approach" would imply in the context of existing processes and departmental policy objectives.

To focus on integrated fisheries management plans as a means to move away from single-species approaches and towards an "ecosystem" approach—which is exactly what most fisheries managers are trying to do—is to end up with snail's-pace change. And it's change of the type that can disrupt what few tools fisheries scientists have (consistent long time-series catch data, for instance) to assess stocks, assign catch limits, and prevent overfishing. It is unreasonable to expect that perfectly sound policy objectives, such as the policy focus on "selective fishing", will get anywhere in the current institutional environment.

The current institutional environment is reflected in departmental goals and objectives. Those objectives are set out for each fishery, and they are contained

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in every fisheries-management plan, and the language is almost exactly the same. There are eight such objectives commonly identified in fisheries management plans, and only one of them is explicitly about conservation.

To paraphrase for brevity, the objectives are usually identified this way:

- **To conserve and protect the resource by applying scientific management principles in accordance with the precautionary principle, in a risk-averse manner, “based on the best scientific advice available.”**
- To meet the Crown’s fiduciary obligations to aboriginal people.
- To develop fisheries by pursuing partnerships and co-management arrangements with stakeholders.
- To develop fishing plans and conduct cooperative research to improve knowledge of the resource.
- To consider the goals of stakeholders, and the cultural, social and economic value of the fishery.
- To consider health and safety in fishery openings and closures.
- To consider opportunities for developing aquaculture.
- To provide recreational-fishery opportunities.

These are the objectives set out in groundfish trawl management plans, hook-and-line management plans, halibut management plans, and so on. The fisheries addressed in this report are fisheries which, as currently managed, obviously do not accord with the precautionary principle or risk-averse management practices. But such considerations arise in only one of the eight objectives for which these same fisheries are managed.

Until management objectives more clearly accord with conservation principles, particularly the precautionary principle, the current situation will persist. Clearly, conservation, the precautionary principle and risk-averse management practices must take precedence over all other management objectives.

The Pacific Scientific Advice Review Committee

The conscientious scientists involved in the process need encouragement and support. The concerns they raise explicitly and routinely, through the PSARC process, should become part of the public debate about “the environment” in British Columbia. Ultimately, PSARC should be reformed, and made more publicly accountable.

Management/ Industry Deliberations

This is where the contradictions of policy and the inadequacies of “science” meet their fate. Fisheries managers consider the advice of scientists, the circumstances of previous management plans, and begin consulting with industry about fisheries-management plans. Without persistent and well-informed public pressure, insufficient caution will be used in devising fisheries-management plans.

Fisheries-management plans should more accurately reflect scientific uncertainties, and should be made more openly and publicly. At the very least, advisory processes should be reformed to include public-interest groups as “stakeholders.”

The Fisheries Minister

This is the level at which fisheries-management decisions are officially made, but it is the level at which consideration to the issues must be given routine, intense scrutiny—at least until such time as DFO is more firmly governed by conservation principles. It is at the political level that fisheries-management plans must be more thoroughly assessed. The federal government must be made directly and politically accountable for the sorry state of “fisheries science” and “fisheries management” on Canada’s west coast. The fisheries minister should be forced to shoulder responsibility for decisions made within his department. Decisions normally made almost anonymously, and behind closed doors, must be made more openly and treated as the important, national political decisions that they truly are.

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