CHAPTER 6

ECOLOGICAL AND FISHERIES SUSTAINABILITY:
COMMON GOALS UNCOMMONLY ACHIEVED

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The words "fisheries sustainability" conjure a variety of associations: laudable objective, government policy, attainable goal, socioeconomic necessity. Ten years ago, the phrase "all of the above" would have appropriately captured most sentiments associated with fisheries sustainability; today, the word "oxymoron" increasingly comes to mind. Ecological sustainability and fisheries sustainability are inextricably linked; the latter is not achievable in the long term without the former. Yet, as the title of this essay suggests, commonality in purpose has not been matched by commonality in achievement.

The failure of developed nations to achieve ecological sustainability in the oceans is most aptly reflected by historically unprecedented declines in the abundance and distribution of various forms of marine life,¹ most notably fishes.² Persistently unsustainable rates of targeted and incidental exploitation have reduced marine fish populations to such an extent that their ability to recover to previous levels of abundance has been severely compromised;³ simply put, small populations are less able than large populations to persist in face of the vagaries posed by natural environmental variability. Compounding often-negligible recovery rates are fisheries management strategies, political objectives, and mixed messages from those who develop public policy that further erode the probability of achieving ecological or fisheries sustainability.

At its core, I would argue that the collapse of marine fishes can be attributed to a dissociation of public policy from science, an estrangement that seems to recur with increasing frequency in the management and conservation of natural resources. Malleable links between science and public policy have had especially negative socio-economic, financial, and biological consequences for commercial marine fisheries. I would argue that science-based policies and management strategies should not be implemented, or acted upon, if the science required to support such actions does not exist. In this regard, interference with the communication of science to society and to decision makers has had negative ramifications for major fishery resources, as discussed below in the context of fishery collapses in Canada.

With some exceptions (e.g., the Northeast Pacific fishery for Pacific halibut, Hippoglossus stenolepis), attempts to achieve fisheries sustainability concomitant with increased subsidies,⁴ fishing effort, and technological capability have been abject failures. This essay begins with the empirical justification for this assertion; it will be comparatively brief given the number of recent publications on this topic.⁵,⁶ It then focuses on the collapse of Canada's fisheries for Atlantic cod (Gadus morhua), followed by an exploration of how the integration of science within government has the potential to limit expression of scientific uncertainty, constrain breadth of scientific expertise, and marginalize scientific input to public policy. The cumulative effects of these deleterious consequences include reduced public confidence in the ability of governments to deal appropriately with science-based issues of import to society, and an inability to address fisheries and ecological sustainability in a scientifically defensible and socio-economically meaningful way. After exploring various
means by which science can be more effectively communicated to decision makers and to society, and identifying a Canadian model that might be useful for emulated elsewhere, I describe in some detail how Canada has responded legislatively to the conservation concerns raised by the collapse of directly and incidentally exploited fishes.

MARINE FISH POPULATION COLLAPSES:
A BRIEF OVERVIEW

The world’s oceans are experiencing biological change at an unprecedented rate, reflected in large part by the fact that 75% of the world’s major fish stocks are now fully exploited, over-exploited, or depleted. Potentially permanent influences on species interactions, food web structure, and trophic dynamics are most dramatically reflected by staggering declines in the abundance of marine fishes.

Among species subject especially to incidental catch, large pelagic sharks, including thresher (Alopias spp.), great white (Carcharodon carcharias), and hammerheads (Sphyrna spp.), have declined more than 75% in the Northwest Atlantic since 1986. The porbeagle (Lamna nasus), a shark subjected to directed and incidental bycatch in Canadian fisheries, has declined by an estimated 90% since the early 1960s. Pelagic sharks in the Gulf of Mexico have experienced even greater reductions: silky sharks (Carcharhinus falciformis) and oceanic whitetip sharks (C. longimanus) are estimated to have declined 90% and 99%, respectively, over the past 40 to 50 years.

Similar reductions over the past half-century have been reported for many other fishes. It has been estimated, for example, that the present biomass of large predator fish, such as tuna (Thunnus spp.), may be only 10% of pre-industrial levels. Consistent with this conclusion is a recent analysis of more than 230 marine fish populations that revealed a median 83% reduction in the number of breeding individuals from historic levels. Among 56 populations of clupeid fish (including Atlantic herring, Clupea harengus), 73% had experienced historic declines of 80% or more. Within the Gadidae (including cod and haddock, Melanogrammus aeglefinus), of the 70 populations for which there are data, more than half had declined 80% or more. And among 30 pleuronectids (flatsfishes, including soles, flounders, halibuts), 43% had exhibited declines of 80% or more. These declines, as great as they are, have almost certainly been underestimated in many instances, given that these fishes have been exploited for a considerably longer period of time (typically centuries) than that over which abundance data are available (typically decades).

Among these fishes, the Atlantic cod is not only of great socio-economic and historical importance throughout the North Atlantic, but it is among those species that have experienced the greatest rates of decline. Cod in the North Sea have declined by almost 90% since the early 1970s. More dramatic has been the decline experienced by cod ranging from eastern Labrador south to the northeastern half of the Grand Bank off the coast of Newfoundland. Numbering as many as 2 billion breeding individuals in the early 1960s, Canada’s northern cod stock has declined by as much as 99.9% since that time.

The consequences of such declines are no longer limited to the socioeconomic and political spheres of society; increasingly they permeate those aspects of public policy concerned with the protection and recovery of endangered species and the conservation of biodiversity. Inevitably, failure to arrest population declines will result in the loss of species from parts of their current geographical ranges; increasingly, hopes of achieving fisheries sustainability have been replaced by means of preventing and biological extinctions. Notwithstanding suggestions otherwise, it is becoming clear that marine fish do not possess life history characteristics which render them less vulnerable to extinction than other species. It also seems clear that lower extinction rates of marine fish in the past two or three centuries can be attributed to the considerably greater financial and technological challenges in harvesting marine fish than those required to hunt terrestrial and aquatic birds and mammals. Notwithstanding these technological limitations, directed or incidental fishing has been responsible for the local extinction, or extirpation, of more than 55 marine fish, including the common skate, Dipturus laevis, and angel shark, Squatina squatina, from the Irish Sea, and quite possibly populations of Atlantic cod off the northeastern United States.

THE COLLAPSE OF CANADIAN ATLANTIC COD

Historical framework

The Newfoundland fishery for Atlantic cod was once the largest, most productive codfishery in the world. The “northern cod” component of this fishery constituted upwards of 70% of all Newfoundland catches since 1954 and probably did so for most of the 500-year history of the fishery. The geographical range of northern cod extends from southern Labrador (55°20’N) southeasterly along the Northeast Newfoundland Shelf to include the northern half of the once biologically rich Grand Bank (46°00’N). Northern cod have probably been fished since the late 15th century, although the earliest extant documentation of a Newfoundland fishery dates from 1504. Total harvests appear to have been less than 100,000 tonnes until the late 18th century whereafter catches increased to as much as 300,000 tonnes in the 1880s and
1910s before declining to less than 150,000 tonnes in the mid-1940s. Following the expansion of European-based factory trawlers in the late 1950s and early 1960s, particularly in the virtually unfished offshore waters off southern Labrador (e.g., Hamilton Bank), reported catches increased dramatically to a historical maximum of 810,000 tonnes in 1968 before collapsing in equally dramatic fashion to 1977 when Canada extended its fisheries jurisdiction to 200 miles. Controlled in part by catch quotas established by the Canadian government, catches increased gradually to a post-1977 high of 268,000 tonnes in 1988 prior to the imposition of a moratorium on the northern cod fishery in July 1992.

The collapse of Canadian Atlantic cod has been extraordinary. Among the eight stocks under sole or primary Canadian management, five have declined more than 90% percent since the late 1960s and early 1970s. Northern cod experienced the greatest decline. In the early 1960s, northern cod probably numbered almost 2 billion breeding individuals and comprised an estimated 75-80% of all Canada's cod. Estimates of the decline of northern cod since the late 1960s range between 97% and 99.9%. In 1994, I co-authored a paper whose title optimistically posed the question: “What can be learned from the collapse of a renewable resource?” The primary purpose of the paper was to explore the relative importance of environmental change and fishing to the collapse of Newfoundland's northern Atlantic cod. Surprisingly controversial at the time, the paper concluded that the collapse of a fishery once responsible for almost 2% of the world's capture fisheries production could be attributed to over-exploitation. The socio-economic consequences of the commercial fishing moratorium imposed on northern cod in 1992 (and on others earlier) were devastating; the ecological and ecosystem consequences equally so. It seemed unfathomable that society would not have learned a very great deal about what needed to be done to prevent such collapses from recurring and to take all reasonable steps to ensure that recovery occurred as rapidly as possible.

Causes and consequences of population collapse

The primary cause of the reduction of Atlantic cod throughout its Canadian range was over-exploitation. In some areas, reductions in individual growth, attributable to the environment or size-selective fishing, may have exacerbated the rate of decline; in some areas, increased natural mortality may also have contributed.

Threats to recovery have included directed fishing (a consequence of the setting of quotas), unreported catch (a consequence of illegal fishing, catch misreporting, and discarding of fish at sea), and bycatch from other fisheries. Additional threats include altered biological ecosystems and concomitant changes to the magnitude and types of species interactions (such as a possible increase in cod mortality attributable to seal predation), all of which appear to have resulted in increased mortality among older cod. Selection against late maturity and rapid growth rate, induced by previously high rates of exploitation, may also be contributing to the higher mortality (caused by the reproductive costs associated with earlier maturity) and slower growth observed in some areas today.

In theory, removal of the dominant source of anthropogenic mortality (fishing) should have resulted in population recovery. However, with one exception (St. Pierre Bank cod off Newfoundland's south coast), recovery has not been forthcoming in the decade since the fisheries were initially closed. Empirical analyses of these issues suggest that factors other than fishing may be of greater importance to recovery than fishing alone. Indeed, recent work suggests that lack of recovery is not unusual among marine fish populations that experience 15-year rates of decline greater than 80%, even when associated with dramatic reductions in fishing mortality.

The tremendous influence that even small catches (in the absolute sense) can have on recovery can be illustrated by considering the lack of recovery for northern cod. Despite having experienced declines in excess of 97%, the Canadian Department of Fisheries and Oceans (DFO) accepted the advice of the quasi-independent Fisheries Resource Conservation Council and allowed directed commercial fishing on this stock from 1999 through 2002, a measure that has had a clear and deleterious impact on the recovery of the world's most depleted cod stock. Although the quotas from 1999 through 2002 were relative to those set in the mid-1980s (5600-9000 tonnes compared with quotas exceeding 200,000 tonnes), the impact on northern cod was high because the size of the population was correspondingly low. Exploitation rates exacted by these fisheries exceeded, sometimes by more than two-fold, estimates of the maximum rate of population growth for northern cod.

If physical structure is critically important to the survival of juvenile cod, notably in the form of plants, bottom heterogeneity, and possibly corals in some regions, then physical alterations in suitable habitat might also affect recovery. The reduction in physical heterogeneity on the bottom, and the loss of potentially important deep-sea corals, have been attributed to the bottom-trawling gear used to catch groundfish. In Canadian waters, it has also been reported that bottom-trawling may have relatively little impact on invertebrate macrofauna inhabiting sandy bottoms, although similar studies on the potential effects of trawling on fishes and fish habitat have not been undertaken. Regarding predation by marine
mammals, an independent expert panel concluded that the recoveries of northern cod in the Newfoundland & Labrador Population and that of northern Gulf cod in the Laurentian North Population may have been negatively affected by seal predation.¹⁸

The possibility that the intense fishing pressure experienced by cod in the late 1980s and early 1990s resulted in genetic changes to heritable life history traits cannot be discounted.¹⁹ ²⁰ There is evidence to suggest that age at maturity and growth rate is lower in several cod stocks at present than it was prior to the stock collapses. The observed changes in age at maturity cannot be explained as phenotypic responses to changes in population density,²¹ leaving genetic responses to selection (selecting against late-maturing genotypes) as the most parsimonious explanation for the earlier maturity observed in some areas.²² ²³ Similarly, smaller weights-at-age among cod in some areas can also be explained as a result of selection against fast-growing genotypes during periods of intensive fishing.²⁴

In summary, the primary cause of the reduction of Atlantic cod throughout its Canadian range in the Northwest Atlantic was over-exploitation; in some areas, the rate of decline may have been exacerbated by reductions in individual growth and increases in natural mortality. Identifiable threats to the recovery of Atlantic cod include directed fishing, unreported catch, and bycatch from other fisheries for bottom-dwelling species. Additional threats to recovery include altered biological ecosystems, and concomitant changes to the magnitude and types of species interactions. These ecosystem-level changes appear to have resulted in increased mortality among older cod. Selection against late maturity and rapid growth rate, induced by previously high rates of exploitation, may also be contributing to the higher mortality and slower growth observed in some areas today.

ESTRANGEMENT OF SCIENCE FROM PUBLIC POLICY: CONSEQUENCES FOR FISHERIES SUSTAINABILITY

I recently came across an article written by a Norwegian scientist during the 1970s, when I was Norway's Minister of the Environment. In the article he argued that there was no such problem as acid rain and that 'facts' and 'science' did not belong in the arena of politics and policy. This assertion was counter to my own beliefs and made me react strongly. Politics that disregard science and knowledge will not stand the test of time. Indeed there is no other basis for sound political decisions than the best available scientific evidence. This is especially true in the fields of resource management and environmental protection.

Gro Harlem Brundtland 1997 ²⁶

Gro Harlem Brundtland's prescient observation serves as an instructive point of departure for an exploration of the risks to achieving ecological and fisheries sustainability in dissociating public policy from science, an estrangement that has recurved with distressing regularity in the management and conservation of natural resources. Norway's former Prime Minister is well placed to comment on the necessity of underpinning public policy with science. However, strong as her assertion is, it is weakened by the realisation that rarely is it necessary for politics per se to "stand the test of time", unless time is measured by the brief intervals that separate successive governments. Rather, it might be more instructive to observe that "Policies that disregard science will not stand the test of time".

For the most part, policies fail to contribute effectively to society either because of deficiencies in their formulation or because of deficiencies in their enactment. It is the latter to which I address my remarks, specifically within the context of linking science with public policy pertaining to the exploitation, sustainability, and conservation of fisheries resources. I would also acknowledge the obvious constraint that political decisions founded ostensibly upon science-based policies need not always reflect the science that informs such policies. But I would argue, quite strongly, that the greater the risks to society of a failure in science-based policy, the greater the need for the necessary science and for its appropriate communication to decision makers and to society, and the greater the need to ensure that the policy decisions are consistent with that science.

Brundtland referred to the risks of "disregarding" science. How might a disregard for science be manifested in public policy? Such a disregard might be reflected in one of two ways. The first occurs when a science-based policy decision is made in the absence of the science required to support that decision. The second is more blatant, and is reflected by policy decisions that are, to varying degrees, inconsistent with science. The consequences of both can be equally injurious. Furthermore, they both reflect a failure in communication, the science pertaining to a particular decision having been improperly communicated between scientists and decision makers, between decision makers and the public, or both. Improper communication among scientists, decision makers, and society has had serious consequences for the conservation of natural resources, most recently in the harvesting of commercially exploited marine fishes.
Ineffective communication among scientists, decision makers, and society

The collapse of Canada's Atlantic cod in the early 1990s prompted several examinations of the means by which fisheries science had been interpreted and publicly communicated by the Department of Fisheries and Oceans (DFO), the federal government department responsible for the sustainable exploitation of Canada's fisheries for marine fishes. The title of one of these was framed in the form of a question: "Is scientific inquiry incompatible with government information control?" It addressed the question of whether the conservation of natural resources is best ensured by having science fully integrated within a political body. It was concluded that the greater the input from independent, arm's-length scientists and science advisory bodies, the stronger and more transparent the links between science and policy in natural resource management, and the greater the benefits to society.

In my view, the perceived need for scientific consensus and an "official" position on science matters has often limited the ability of government-based research to contribute effectively towards the sustainable exploitation of fishery resources and to achieve a comprehensive understanding of the factors that affect their persistence. In the context of the demise of Atlantic cod, and based on examples drawn from the mid-1980s to the mid-1990s, Hutchings et al. argued that the communication of science to decision makers, and to the public, had been hindered by a number of factors, including government marginalisation of independent work, misrepresentation of alternative hypotheses, interference in scientific conclusions, disciplinary action against government scientists who communicated publicly the results of peer-reviewed research published in the primary scientific literature, and misrepresentation of the scientific basis of public reports, management strategies, and government statements.

If anything, bureaucratic interference had been even more pronounced in DFO's ill-fated attempts to balance the needs of an industry (Aluminum Company of Canada, or ALCAN) and the needs of Pacific salmon (Onchorhyncus spp.) for the same water in the Nechako River in British Columbia. Notwithstanding two arguments to the contrary (one by government bureaucrats, the other by a former DFO scientist), Leiss concluded that "none of the replies published to date challenge seriously the evidentiary basis of [Hutchings et al.'s] indictment."

Recurring "disregard" for science in the management of Canada's Atlantic cod

One might argue that it would be naive to expect scientific information to flow unimpeded or uninterrupted from scientists to decision makers and then to society. In the field of health and environmental risk, for example, good government practice can require the bureaucracies that serve ministers to manage policy-relevant information flow. Under some circumstances, the benefits of such information management might well outweigh the costs. It is unlikely, however, that such an asymmetric payoff, in which the benefits of information control outweigh the costs, will be realised in the management of natural resources, the conservation of biodiversity, or in the protection of species at risk. This point can be illustrated by examples, drawn from the 1990s, of how DFO communicated scientific information on the conservation status, biology, and recovery of Atlantic cod.

The first concerns an example of a government statement that gave the appearance of being based on science, when in fact it was not. In the late 1980s, the Newfoundland Inshore Fisherman's Association (NIFA) initiated legal action against DFO, arguing that the department was in violation of the federal Fisheries Act because it permitted the fishing of cod during spawning, an activity that NIFA asserted was disruptive of cod spawning behaviour and injurious to successful cod reproduction. In February 1990, Fisheries Minister Tom Siddon informed the House of Commons that, "scientists advise me that there is no recorded evidence in the scientific literature or our own research which states that fishing on the spawning grounds does measurable damage to the cod stocks". The Minister had in effect performed the classic "absence of evidence = evidence of absence" sleight of hand. The statement that there was no evidence that fishing during spawning damages cod stocks was truthful, but only because there had been no scientific investigations of the problem, either by DFO or anyone else.

The fishery for Canada's northern cod was closed on 2 July 1992 by Fisheries Minister John Crosbie. The primary reason for the closure was a decline in the size of the breeding part of the population to an historic low, a decline of 99% since the early 1960s. A little more than one year prior to the closure (April 1991), briefing notes prepared for the Minister stated, "Scientific advice is that lower inshore catch rates and smaller fish in the inshore fishery in recent years do not indicate stock decline". The fact that such scientifically misleading information, particularly given its potentially enormous socio-economic and biological consequences, found its way to the Minister's desk reflects an extraordinary degree of information control and even contempt for science.

Inclusion of science within a political body can allow information to be presented as having a scientific basis, and potentially legitimizing government decisions, even when the science on which the decisions are based has not been subjected to independent peer review, a process fundamental to the integrity of science. One example of
such a portrayal of "science" as science was presented to the Canadian public in 1992 when the DFO announced that a moratorium would be imposed on the commercial fishery for northern cod. The federal government predicted the moratorium would be in place from 1992 to 1994, a two-year time frame that provided the temporal basis for an income support package for displaced workers (the sum total of all financial assistance resulting from the moratorium has been estimated at C$2 to C$3 billion, roughly $0.8 to $1.2 billion, or €1.2 to €1.8 billion).

The two-year time frame for recovery included projections which indicated that, in the absence of fishing, northern cod spawner biomass would increase more than sixfold between 1992 and 1994 to a level that had not existed since 1972. For the DFO’s projections to be realized, the cod stock would have to grow between 126 and 200% per annum, rates of increase that are biologically unrealistic for northern cod, given that they do not reproduce until they are 6 or 7 years of age. Indeed, based on analyses of data that were available in 1992, a scientifically defendable range of maximum population growth for northern cod was 9 to 19% per annum, one order of magnitude lower than the DFO’s predictions, rendering the government’s recovery time frame logically suspect and scientifically ill-founded.

The fourth example describes a resource management decision that was scientifically indefensible, a conclusion reached even by the government advisory body that proffered the advice (27 May 1999 letter from the Fisheries Resource Conservation Council to Fisheries Minister David Anderson). Against advice from government and academic scientists, the Fisheries Minister reopened the fishery for northern cod in 1999. In effect, the government was sanctioning the hunt of a population that had declined 99%. The reopening was described as a "limited fishery" because catch quotas were low relative to historic levels. But, of course, it is not the size of the quota that matters, it is the size of the quota relative to what is available to be caught that is of importance when evaluating the precautionary nature of any harvesting decision. This critically important distinction, however, was not communicated to the media or to society by government spokespersons. Between 1999 and 2002, the rate at which cod were extracted by this "limited" fishery exceeded the rate at which the cod population was increasing. As a consequence, the slow recovery of the stock was halted and the fishery was "re-closed" in 2003; today, northern cod remains at less than 1% of its abundance in the early 1960s.

**Strengthening the communication of science and its links with public policy**

Malleable links between science and public policy have had highly negative socioeconomic, financial, and biological consequences for commercial marine fisheries in Canada and elsewhere. The examples discussed above underscore the necessity, and utility, of having the science pertaining to a particular issue clearly communicated to decision makers and to the public. There are a number of ways of accomplishing this, most if not all of which require the inclusion of independent scientists unaffiliated with government. I touch upon three here.

One comparatively simple means of better communicating scientific advice to decision makers is to involve individual scientific experts from academic institutions directly in the regular affairs of government. The American government recently took small steps in this regard with the establishment of a programme that allows senior researchers from universities to interact directly, and regularly, with officials in the US State Department. After spending a year in the State Department, the researchers return to their universities where they serve as consultants with government for a further five years. Such an arrangement should increase the level of scientific expertise directly available to decision makers; it may increase the breadth of independent advice considered by government; and it will better inform academic scientists of the specific demands of policy makers and of the constraints that can prevent effective incorporation of science advice in government decisions. However, by involving relatively few scientists in any one discipline, there is a risk that decision makers will receive biased or unduly narrow perspectives.

Scientific advice can be communicated effectively through the findings of expert panels established by independent national scientific academies, such as the Royal Society (United Kingdom), the Royal Society of Canada, and the National Academy of Sciences in the United States. Examples of publications from such academies that address questions of import to fisheries sustainability include Royal Society Responses to

(a) the Royal Commission on Environmental Pollution Consultation on the environmental effects of marine fisheries in May 2003, and

(b) the Prime Minister’s Strategy Unit Consultation on UK fisheries, and the US National Academy of Sciences publication on science and its role in the National Marine Fisheries Service.

When such expert panels are properly constituted, decision makers and society benefit from the knowledge that the advice they are receiving is as unexerted as possible by
non-science influences. A second benefit lies in the scientific expertise that such panels can offer, an expertise that, for a variety of reasons, might not be widely available from amongst government scientists. Another key advantage to expert panels is that, in general, their work is undertaken in response to clear and (preferably) unambiguous questions or mandates from policy makers. There is a directness in this approach that is often lacking in communications between decision makers and scientists.

Notwithstanding these benefits, the effectiveness of expert panels as a regular means of providing independent advice to government can be problematic. The panels are generally constituted several months, but often several years, after the problem at hand has been identified; this can negatively affect the timeliness of the panel's response. By necessity, the membership of expert panels changes with the subject matter; this can increase the variability in the quality of expert panel reports, and can reduce the likelihood that the advice will be communicated to government in a consistent manner among panels (although an overseeing National Academy of Science can minimize this influence). It is also important to acknowledge the reality that advice proffered by expert panels that exclude government employees is less likely to be accepted than that proffered by bodies to which government has explicitly invested expertise. Finally, under most circumstances, expert panel advice, although communicated to the public, can often be ignored by government when there is no legislative requirement for such advice to be part of the decision-making process.

A third means by which the communication of science to decision makers can be better effected is through science advisory bodies comprised of members who act independently of government, have the capacity to respond rapidly to policy "crises" when situations demand it, and are well-informed of the policies to which they are contributing scientific advice. Unfortunately, such bodies are exceedingly rare. However, in the context of ecological sustainability, I would argue that one of the best examples of such an advisory body is the Committee on the Status of Endangered Wildlife in Canada, or COSEWIC. It is the role of COSEWIC, legally recognised in 2003 in the national legislation embodied by the Species at Risk Act, to assign status to species at risk in Canada. Although it may be too early to judge the degree to which such an advisory body can effectively provide advice to government and have that advice heeded by government, the model of providing scientific advice it embraces bears examination, given its rarity among countries, particularly in the realm of matters pertaining to ecological sustainability.

PROVISION OF INDEPENDENT SCIENTIFIC ADVICE TO GOVERNMENT: A CASE STUDY

The assessment of species at risk in Canada

The Committee on the Status of Endangered Wildlife in Canada (hereafter, COSEWIC) is the national advisory body responsible for assessing the risk of extinction of native Canadian fauna and flora. COSEWIC was created in 1977 in response to a recommendation made the previous year at a conference of federal, provincial, and territorial Wildlife Directors; it made its first species status designation in April 1978 and has met at least annually ever since. Until the passage of the Species at Risk Act (hereafter, SARA), COSEWIC designations bore no legal consequences. Despite this, COSEWIC-listed species were usually accorded special consideration by the provinces and territories where they occurred and in environmental impact assessments of projects that may have directly or incidentally harmed designated species.

Initially, the committee was comprised almost entirely of government officials. Between 1978 and 2003 (the year in which the SARA was proclaimed by parliament), the number of Species Specialist Subcommittees (SSCs, groups of scientific experts responsible for the preparation and review of the species status reports upon which COSEWIC's assessments are based) had increased to eight: Birds, Terrestrial Mammals, Marine Mammals, Freshwater Fishes, Marine Fishes, Amphibians and Reptiles, Plants and Lichens, and Molluscs and Lepidoptera. A ninth SSC was established in 2004, with lepidopteran species now being assessed by the new Arthropod SSC.

Species status assignments are conducted once or twice annually. A minimum of two-thirds of the electronically cast votes must be achieved before a specific status can be assigned. There are 30 votes on COSEWIC: one for each of four federal organisations (Department of Fisheries & Oceans, Canadian Wildlife Service, Parks Canada, and Canadian Museum of Nature on behalf of the Federal Biodiversity Information Partnership), one for each of the nine Species Specialist Subcommittees, one for each of the ten provinces and three territories, one for each of three non-government members, and one for the Aboriginal Traditional Knowledge Subcommittee. Although governments are represented at COSEWIC, members do not represent their governments when species are being assessed; all members of COSEWIC are expected to act independently and to base their assessments on the best available scientific, community, and aboriginal knowledge, irrespective of the consequences of that advice.
As of June 2005, COSEWIC had assigned status to 500 species in Canada (excluding those deemed Not At Risk and Data Deficient) in the following categories: Extinct (n=13 species), Extirpated, i.e., no longer found in the wild in Canada (n=22), Endangered (n=184), Threatened (n=129), and Special Concern (n=152). Extant species or populations assigned a status of Endangered or Threatened are afforded the greatest protection under SARA.

Scientific and political realities: uneasy or unwanted bedfellows

A central thesis to this chapter is that the implementation of government policy can be measurably strengthened by the inclusion of an independent, expert science advisory body in the decision-making process. Such a model seems to be particularly appropriate in those circumstances in which political considerations are likely to take precedence over scientific considerations. Although political considerations will always be prominent (and appropriately so, given that elected officials are ultimately accountable to society and that scientific consequences are but one of many considerations in the decision-making process), there is a real risk that the under-valuing of science can reap irreparable harm to ecological sustainability in general and to fisheries sustainability in particular.

At face value, COSEWIC would appear to represent the type of independent advisory body that many would consider an ideal means of infusing government decisions with sound, independent scientific advice. It is a body that includes individuals from academia, several levels of government, non-governmental organisations, and the aboriginal community. Members of COSEWIC act and vote in accordance with their expertise in the science, conservation and management of endangered species, not in accordance with the institutions with whom they are employed. By virtue of their membership on COSEWIC, government departments are inextricably linked to the species assessment process, rendering them less able to discount COSEWIC’s assessments outright. The species assessment process is open and transparent; status reports are typically subjected to at least one year of review, with input from all individuals and groups who have information bearing on the status of species at risk. The results of COSEWIC’s assessments are communicated publicly at the same time that they are communicated to government, thus fulfilling a key requirement of having scientific advice communicated directly to society, unaffected by the various communication filters often used to smooth the rough edges of scientific advice, or to eliminate them completely. As a consequence, society is fully knowledgeable of the status of endangered species in Canada from a scientific perspective, unfiltered by political considerations. Finally, COSEWIC is a legally and legislatively recognised advisory body integral to the protection of endangered species in Canada; in other words, it has real influence.

To what degree then has this Canadian model of providing independent scientific advice in the arena of ecological sustainability been successful? It may be too early to tell, given the comparatively brief time that has elapsed since SARA was proclaimed in 2003. But the “growing pains” associated with the implementation of SARA, particularly as they pertain to the communication of COSEWIC’s assessments to government decision makers, bear examination. Regrettably, an early assessment of the process would suggest that aquatic species in general, and marine fishes in particular, might be afforded considerably less protection under SARA than might have been initially presumed.

Barriers to timely communication and implementation of independent scientific advice

The prohibitions identified under SARA (it is illegal to kill, harm, harass, capture or take legally listed endangered or threatened species, and to damage or destroy their residence) came into force on 1 June 2004. All 233 species assigned Endangered or Threatened status by COSEWIC prior to the passage of SARA by both houses of parliament in December 2002 were automatically placed on the SARA legal list; those assessed by COSEWIC after the passage of SARA are subjected to a lengthy, and potentially indeterminate (see below), period of time before the decision is made as to whether they will be legally listed or not.

In January 2004, as required by law, COSEWIC communicated its species assessments of the previous year – 91 in total – to the federal Minister of the Environment. On 23 April 2004, Minister David Anderson, presented the Governor in Council (GIC), a subcommittee of the federal Cabinet, with the assessments of 79 of these 91 species. The 12 species whose assessments were not communicated to GIC were all aquatic (note that the SARA definition of “species” includes “subspecies” and “geographically or genetically distinct populations”); their exclusion from the GIC submission was made upon request by the federal Fisheries Minister Geoff Regan.

Among the 12 species that the Minister of the Environment subjected to an extended listing process were six marine fish (cusk [Broome broome], bocaccio [Sebastes paucispinis], and four populations of Atlantic cod); one salmonid (one population of coho salmon [Oncorhynchus kisutch]); two marine mammals (harbour porpoise [Phocoena phocoena], northern bottlenose whale [Hyperoodon ampullatus]), two freshwater fish (channel
Ecological and Fisheries Sustainability

darter \([\text{Percina capela}\])\), shortjaw cisco \([\text{Coregonus \(zenithicus\)}]\), and one freshwater mollusc \((\text{Lake Winnipeg physsa snail \([\text{Physa sp.}]\))\). These species were eventually submitted to GIC in July 2005, fifteen months later than most had anticipated, based on the time-lines detailed in SARA (see below). The Environment Minister has indicated that these 12 species will be submitted to GIC in January 2005. In addition, the Minister declined to make an emergency listing, as assigned by COSEWIC, of two Endangered populations of sockeye salmon \((\text{O. nerka})\), populations that had declined as much as 99% in the past decade and whose spawning population sizes in recent years numbered as small as single digits.

SARA identifies specific time-lines for the listing process. Upon receipt of the previous year’s assessments by COSEWIC (which the Minister of the Environment will receive annually in July), the Minister has 90 days to indicate how he/she will respond to those assessments. The Minister received the first set of COSEWIC assessments in January 2004. The second and third assessments were communicated to the Minister in July 2004 and April 2005. Upon receipt of COSEWIC’s assessments from the Minister, the GIC has nine months to decide whether to

(a) accept the assessment and add the species to the SARA legal list,

(b) not add the species to the list, or

(c) refer the matter back to COSEWIC for further information or consideration.

These 90-day and 9-month time-lines are clearly specified in the Act. What is not specified in the Act is the time period during which the Minister of the Environment must submit the COSEWIC assessments to GIC. Herein lies some highly regrettable flexibility in SARA. It is this flexibility that allowed the Minister of the Environment, on request by the Minister of DFO, to postpone the submission of 12 aquatic species (all of which are under DFO’s jurisdiction) to GIC in 2004.

The Fisheries Department argued that an “extended consultation process” was required for these 12 species because of the anticipated complexities associated with implementing SARA for aquatic organisms that may be directly or incidentally harmed by the fishing industry.

However, the prohibitions under SARA were well-known as early as the mid-1990s, and debated endlessly in the House of Commons Standing Committee on Environment and Sustainable Development from the late 1990s through 2002. It was no secret that COSEWIC would be assessing, on a regular basis, high-profile marine species; for example, the status report preparation process for Atlantic cod was initiated in September 2001. Three to four years, a time frame long enough to encompass most terms of national government office, should have been sufficiently long for the DFO to have prepared for the implementation of SARA for aquatic species. Rather than reflecting perceived complexities in implementing SARA, one could interpret the delay in submitting aquatic species assessments to GIC as either an extraordinary lack of preparedness on the part of the federal fisheries department, or an intent to disrupt the SARA listing process, either by minimizing the number of aquatic species assigned to the legal list or by extending indefinitely the listing process by taking advantage of the unintended, but now well-underscored, time “flexibility” in SARA discussed above.

**EPILOGUE**

To be optimistic about the degree to which meaningful fisheries recovery can be achieved for many depleted stocks in the next two or three decades is almost to invite ridicule. One would have reasonably thought that the ecological debacle reflected by the collapse of Newfoundland’s northern cod in 1992 would have fundamentally changed the way that governments managed their ocean resources, not simply in Canada but in many parts of the developed world. For the most part, however, real fundamental change has not been forthcoming.

The United States, not normally considered a pantheon for progressive change on the ecological front, might be said to be at the forefront of establishing means by which fisheries sustainability can be achieved. The *Magnuson-Stevens Fisheries Conservation and Management Act* identifies targets, or reference points, against which over-exploitation and recovery for a specific fish stock can be identified. It also makes explicit the time frame over which recovery targets are to be achieved. One can argue about the reliability of the methods used to identify these targets, and many have, but one cannot argue that the establishment of specific targets for over-fishing and recovery, coupled with a legislative commitment to avoid the former and achieve the latter, is not consistent with the goal of attaining fisheries sustainability.

In Canada, the signals have been considerably mixed, at least with respect to the prospects of achieving ecological and fisheries sustainability in the marine environment. Although Canada’s national legislation to protect species at risk has the potential to protect and to allow for the recovery of fish and fisheries — where the *Fisheries Act* and *Oceans Act* have been found wanting — the fisheries department’s responses to COSEWIC’s assessments in the early stages of the implementation of SARA have not engendered a great deal of confidence. For example, Canada’s sanctioning, from 1999 to 2002, of the harvest of a population (northern cod) that had declined 99.9% cannot be said to be consistent with any conservation or precautionary principle.
The DFO Minister's re-opening of previously closed fisheries for two other populations of Atlantic cod – in the Northern and Southern Gulf of St. Lawrence – in May 2004 seemed to be similarly inconsistent with a precautionary approach to fisheries management. Consider one of these stocks for which the fishery was re-opened: Northern Gulf of St. Lawrence. The stock had been estimated to be 7% of its level in the mid-1970s, is predicted to decline further in the presence of a harvest, and was assessed as Threatened by COSEWIC in 2003, and represents one of the 12 aquatic species afforded an "extended consultation period" in the SARA legal listing process (discussed above).

Sadly, but not surprisingly, the 2004 re-opening of these cod fisheries is entirely consistent with the time-honoured practice of linking fishery management decisions with politics. The Gulf of St. Lawrence fisheries were re-opened less than one month before the widely anticipated 2004 Canadian federal election was announced. Inconsistencies between political objectives and fisheries science have rarely been viewed as problematic by governments. Rather, purported short-term benefits associated with such political decisions are often peddled with an alarming dismissal of concerns related to their scientific legitimacy or their long-term consequences to fish, fisheries, and fishing communities.

One can argue, as I have done here, that a failure to address existing deficiencies in the communication of science will erode public confidence in the ability of governments to deal effectively with science-based issues of import to society. These deficiencies, both real and perceived, necessitate fundamental change to the means by which science is integrated with public policy.

Ultimately, of course, it is neither government bureaucrats, nor fish harvesters, nor politicians, nor industry to whom the blame for the collapse of marine fish, and to whom the responsibility for their recovery, can be ascribed. Blame and responsibility falls to all of these groups, but it falls to all of society as well. The unprecedented collapse of Atlantic cod in Canadian waters, and to marine fishes worldwide, has happened on our collective watch. The best of legislative intentions and most appropriately constituted science advisory bodies may be for naught if the will to achieve ecological and fisheries sustainability among the populace is lacking.

NOTES AND SOURCES

9. For more on fishery subsidies, see Earle, Chapter 15.


There was a Prime Minister named Paul
Whose prospects for election looked small
For his Atlantic wish
He cried "I need more fish!"
And his Minister said "No problem at all."

Jeff Hutchings 2004