Back to the Future and Creative Justice:
Recalling and Restoring Forgotten Abundance in Canada's Marine Ecosystems

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Plato (ca 375 BC) defines justice as an orderly relationship between the elements of society in an ideal state where each element of society contributes according to its particular attributes. Continuity of ownership is tacitly assumed. By Plato's criterion, justice would appear to be conspicuously lacking in Canada's west and east coast fisheries, since both are rife with perceived injustices. Pacific salmon allocation generates annual "Fish Wars" between Canada and the U.S. Aboriginal people in the Pacific Northwest feel a profound sense of injustice over reduction of their traditional 100 per cent ownership and jurisdiction to 4 per cent of the catch (Pearse and Larkin 1992). Commercial fishers, who used to take the rest, now feel threatened by legal and political recognition of significant, but as yet unquantified, Aboriginal rights, and growing allocations in a vigorous and politically savvy sport-fishing industry. They are also under pressure from environmental organizations as these turn their attention to the sea (Bonfil *et al.* 1998). The Pacific fishery is also plagued with problems between corporate concentration and owner-operators in coastal communities. This is an issue which has already played out on the east coast where both inshore and offshore sectors lost when a groundfish moratorium was imposed in 1992, although the offshore has now recovered by means of moving its fishing effort elsewhere.

This chapter starts with a review of how the entry of new players into the fisheries has altered the balance of power in that sector with respect both to access and management and how, further, the impact of world markets and increasingly powerful technologies has changed our fishing situation from harvesting abundance to squabbling over scarcity. Issues of changing ownership and biomass depletion have led to an intensification of the separation of fishing interests into increasingly adversarial groups, contributing to a serious breakdown of distributive justice. We explore the potential of a new and inclusive resource management philosophy called "Back to the Future" as a form of *restorative justice* (Brunk and Dunham 2000): an exercise in what Tillich (1960) refers to as "transforming" or "creative justice," which is designed to unite, and sometimes to re-unite, separate interests, through the use of this new set of ecosystem modelling tools to re-create past or forgotten marine abundance. Creative justice, which means the deliberate creation of new opportunities to develop and share knowledge, requires an opportunity to develop a common understanding of the interactions and interdependencies within exploited ecosystems and between those ecosystems and the human communities that interact with them. It therefore embraces and encompasses the concept of ecosystem justice (McFague 1993; Kinne 1997; Brunk and Dunham 2000). In practical terms, here, it means combining the knowledge and values of members of fishing communities with those of scientific communities in identifying strategies for resource conservation and allocation, and in monitoring the effectiveness of those strategies on an ongoing basis. Its implementation also demands the ability to combine local and larger-scale understandings (Neis and Morris 2000; Ommer 2000; Sumaila and Bawumia 2000) and combine local and central perspectives (McGonigle *et al.* 2000). In this way, it can gain the attention of policy-makers by addressing the politician's dilemma of balancing long-term conservation needs against the demands of today's voters for livelihood and lifestyle (Haggan 1998).

If achieved, creative justice should facilitate the sharing of conservation and harvest regimes between different interest groups, and enhance the probability that people will abide by the rules they participate in developing. Setting up conditions in which it can operate will also enhance the likelihood of achieving *distributive justice*, defined for these purposes as equity in the allocation of the costs and benefits of sustainable fisheries, within the present generation as well as between it and future generations. Thoughtful members from a broad range of constituencies will readily agree that creative justice is desirable. The problem is how to bring it about in a climate of resource scarcity and interest group polarization, since it requires finding a way for those with different relationships to the ecosystem to communicate with one another with dignity and respect (Haig-Brown and Archibald 1996; Haggan *et al.* 1998). The creativity here is generated in the ongoing struggle to maintain this dignity and respect in a changing world, and it is urgently needed because we are dealing with a new situation in which, for the first time ever, we face the global prospect of fishless oceans.

Throughout human history, the ocean has been a metaphor for vastness, terror, abundance and, above all, the unknown. Yahweh, for example, demands of Job:

> *Hast thou entered into the springs of the sea? Or hast thou walked in the search of the depth? Canst thou draw out Leviathan with an hook?* (Job 3: 16 and 4: 1)

The vastness has yielded to aircraft and telecommunications; the "terrors of the sea" are now mostly nuclear-armed and of human origin; and abundance has given way to scarcity as 70 per cent of the world's fisheries are pushed to, and beyond, their limits (Sissenwine and Rosenberg 1993; Garcia and Newton 1997). With respect to the "unknown," we now know a great deal about many things. We have "*entered into the springs of the sea"*, and plumbed their uttermost depths, albeit briefly. We have drawn out most of the leviathans and reduced them to oil, corsets, and cat food (Melville 1851). The biology and behaviour of many commercial and some noncommercial species have been studied in depth. However, despite our best efforts at modeling and managing fisheries, the response of ocean ecosystems and fishing communities remains unpredictable and unknown, in that it is little understood (Walters and Maguire 1996; Walters and Pearse 1996). Indeed, it may even be chaotic (Wilson *et al.* 1994; Acheson *et al.* 2000). It would seem that our new relationship with the ocean is a dangerous mix of arrogance and ignorance.

More charitably, we could acknowledge that the major consequence of a finite view of the ocean is a need to re-think almost the entire course of human evolution and experience. For thousands of years, our relationship to marine ecosystems was shaped by those living in settlements close to inshore fishery resources. In the Pacific Northwest, for example, Aboriginal peoples drew their stability, economic wealth, and cultural richness from salmon runs supplemented by other significant resources (Jones 2000). It was common practice to have a main or winter settlement and a very large number of seasonal villages and fish camps[i]. Over time, the interdependence of human communities and marine ecosystems gave rise to systems of knowledge and values commonly referred to as traditional ecological knowledge or "TEK." The TEK of Aboriginal people is the product of thousands of years of interaction between people and fish. Traditional fishing activities often involved the entire community and continued year-round. Different months of the year were associated with different fish species (Danko 1998). Women and children would trap fish in streams, gather shellfish, and pick seaweed. Men might go further afield for larger fish or marine mammals. Families and communities would follow a seasonal

round, occupying fishing camps and stations throughout a large traditional territory. TEK thus formed a broad base of *survival* (as well as cultural) knowledge of different types of shoreline, the different types of resources available in different habitats and at different seasons (Brown *et al.* 1994). Necessarily, it involved an intimate knowledge of tides, currents, effects of weather, lunar, and other cycles.

Traditional knowledge had an active role in resource management but, wherever the world market became dominant, eons of Aboriginal stability were brought to a close. Early fleets of sailing vessels yielded first to steam trawlers; then, as advances in engine design, radar, and sonar altered the face of the industry, large vessels were able to work further and further offshore, searching for new stocks. The longevity of east coast outports, which had been founded on the knowledge of, and capacity to access, rich schools of inshore cod and other marine species, began to falter as the lion's share of the catch moved to the offshore fleet.

In the Pacific Northwest, that shift was at the root of the change from TEK systems to modern fisheries management science (see Jones and Williams-Davidson 2000; Ommer 2000). The mandate of that science also seemed to change over time. A classificatory natural history or biological approach gave way, particularly in the second half of the twentieth century, to an industrial phase where scientists and fishers collaborated in developing new gear and opening up new fishing grounds. As fishing pressure grew in the post World War II era, this in turn was superseded by a period of reliance on single-species mathematical models (Haggan 1998). Recent stock collapses have reduced faith in stock assessment science (Daan *et al.* 1990), and we are now seeing an increasing involvement of social scientists in the analysis of the interaction between fishers and fish (Neis *et al.* 1999a; 1999b). The difficulties of communication between natural and social scientists add yet another level of complexity to the challenge of dialogue with fishing communities (Haggan *et al.* 1998; Haggan 1998).

The last 100 years, then, have seen a shift from a preponderance of stable communities harvesting many species (Brown *et al.* 1994) to the present dominance of mobile, largely corporate-owned fleets targeting a very limited number of species and relentlessly moving down the food web (Pauly *et al.* 1998b; Pitcher and Pauly 1998). Today, small-boat commercial fishers on the B.C. coast are caught between U.S. demands, increasing sport-fishing industry allocation, environmentalists, and the legal and political recognition of a significant but still unquantified Aboriginal right-to-fish (Canada 1982; 1990; BC Claims Task Force 1991; Canada 1996; 1998). Currently, both Aboriginal and non-Aboriginal owner-operators are losing to corporate ownership and commercial fishers are now feeling the same pressure that Aboriginal people experienced as they were squeezed out in the earlier years of the commercial fishery[ii].

High-tech industrial fishing has given people the ability to follow fish no matter how far the journey, how deep the water, how foul the weather (Ommer 1994). As it dawned on government that fisheries were finite, successive control measures were brought in to regulate fishing pressures exerted by the new fleets. Traditional knowledge systems based on thousands of years' experience were superseded, and data bases compiled for the new fisheries science were generated at the kind of geographical scales that made little sense to fishers who were intimately aware of the underlying ecological complexity of inshore resources (Neis and Ripley 1998; Acheson *et al.* 2000). In B.C. in the "glory days" of the commercial fishery, fishers shared information with managers and scientists, but the transition from the comfort of abundance to the panic of scarcity led to "cops and robbers" games where science and government made rules and

fishers did their best to get round them (Haggan 1998). Deepening scarcity brought stricter rules. Fisheries sectors began to hire their own scientific expertise: companies and inshore fishermen's associations on the east coast; commercial salmon fishers, sport fishing interests, and environmentalists on the west coast. Aboriginal peoples developed their own fisheries programs. Information evolved, or rather degenerated, from a tool for management to a weapon in struggles to allocate blame, preserve existing institutions, and protect fishery allocations rather than as a tool to protect marine ecosystems.

What was being lost? Haggan (1998) identifies a "vicious cycle" where scarcity requires maximum investment in science at a time when resource rents are minimal or negative. In recent years in Canada, government data-gathering capacity has been reduced by a series of cutbacks, just at the time when stock assessment science has had to come to grips with the fact that it has not yet developed sufficiently powerful methodologies to be able to guarantee that it will have the capacity to foresee or avert stock collapse. This makes it vitally important to incorporate any and all other data that can contribute to our better understanding of fish stocks. The traditional knowledge of Aboriginal people is one important source of such information; other rich sources include the experience, logbooks, and journals of commercial and sport fishers, Women who work in the fish-processing industry are very sensitive to resource decline that affects their opportunities for employment and their work dynamics; shorter seasons and less fish mean less work, smaller fish means deteriorating working conditions. Observing changes in raw material and technological and product changes in fish processing can provide valuable insights on ecological change and point to the need for the kind of industrial response that can change the location and type of pressure on fish stocks. It is, moreover, often women who manage the accounts of family fishing enterprises. They may well be the best source information on the timing and nature of changes in catch rates and fisheries technology. Fishing households, where fish often is prepared at home, are also constantly observing trends in the quality, type, and amount of fish available. This information, too, can add important dimensions to fisheries management and provide clues related to ecological change (Power 1997; Neis *et al.* 1999a; Neis *et al.* 1999b).

The knowledge of fishing communities, however, is not limited to active fishers. Retired fishers' knowledge, for example, provides a sense of continuity with the past that can act as a check and balance on the relatively short time series used in stock assessments. The Georgia Strait "Back to the Future" project (Pauly *et al.* 1998a) identified many other links with the past in B.C., including early processing company records, government reports, old newspaper articles, the archaeological record, and the exciting possibility that pre-contact Aboriginal pictographs and petroglyphs could contain information on past ecosystems (Williams 1998). Instead, at present, opposing sectors are using such data as do exist exactly as lawyers in court use the same minute quantum of facts to support diametrically opposite cases for the prosecution and defense.
Polarization makes it almost inevitable that any source of information will be distrusted (Haggan 1998). Polarization ensures that data will continue to be hoarded by sectors and used as a weapon at the allocation table.

We now have the technological capacity to catch all the fish in the sea (Sissenwine and Rosenberg 1993; Garcia and Newton 1997). This has broadened the crisis from one of *distributive justice* between human communities to one dealing with issues surrounding the health and survival of exploited marine ecosystems. Hence, the need for a concept of *ecosystem* justice (McFague 1993; Kinne 1997; Brunk and Dunham 2000) and a reactivated debate on the

respective "rights" of human communities, non-human ecosystem components and the environment[iii]. Throughout all this, it is important to remember that the imbalances in distributive justice and decision-making power were not created deliberately. Aboriginal people, commercial and sport fishers, and environmentalists are not natural enemies. Distrust of science is not an innate human quality. Fishers have been forced into an adversarial position. The challenges for creative justice are to provide an enabling context, a respectful process and a tool that can actually integrate the highly quantitative data of twentieth century fisheries management with the qualitative data from maritime communities in a way that all can understand and find useful.

Despite polarization, several university-based projects in the last seven years showed that a broad range of interests in the B.C. fishery are prepared to accept a university as a neutral and facilitative meeting place and an honest broker of information. Examples include the Common Ground Fisheries Forum that ran at USC Fisheries Centre from 1993 to 1995. Its main achievement was to hammer out a *Code of Conduct*. This led into the 1996 Pacific Fisheries Think Tank collaboration between UBC Fisheries Centre and Simon Fraser University Institute of Fisheries Analysis. The Think Tank was designed to work with government and stakeholders to frame Pacific fisheries issues in terms of questions that could be addressed by science and develop options. Both were enthusiastically supported by Aboriginal people, federal and provincial governments, the commercial and sport sectors, processors, environmentalists, and others.

Both unfortunately ran out of steam. Part of the reason was certainly because codes of conduct and consensus-building on key issues were too "plodding" to win and hold support when there were fish wars to fight with the U.S. With hindsight, it seems that the Common Ground Project, the Think Tank, and indeed the SFU Coastal Community Consultation (Gallaugher 1996) suffered from the same problem. The Pacific fishery was far too large a topic. There was too much time to vent frustration at DFO for "mismanagement" but above all for not listening. There was plenty of time to forge strategic alliances, but no real way to promote dialogue between conflicting players or develop a common understanding of the nature of the marine ecosystem or the social and economic factors in play.

In a depleted ecosystem, sustainability is the wrong goal. All we are doing is sustaining the present misery (Pitcher and Pauly 1998). The truth of this is borne out by recent research on the impacts of industrial fishing on the food web. The key insight is that people make profound changes to marine ecosystems. Industrial fisheries first reduce the abundance and diversity of top predators, then, when economic returns fall off, gear up to catch what the top predators were eating. The productive potential is still there, but biodiversity and abundance are severely reduced. Pauly *et al*. (1998b) predicted that large fish such as cod, tuna, and salmon will disappear from the world ocean to be replaced by krill, squid, and lanternfish. This process is already far advanced in the South China Sea where large fish exist only in the memory of old fishermen (Pitcher *et al*. 1999). This is not exactly news to east coast fishers or to B.C. Aboriginal peoples who have seen their traditional food and livelihood vanish. Commercial and sport fishers in B.C. are also feeling the pinch of severe coho salmon restrictions during 1998 and the first-ever total closure of the Fraser River salmon fishery in 1999.

"Back to the Future[iv], is a philosophy that presents rebuilding as the proper goal of fisheries management (Pitcher *et al*. 2000). The central question addressed is, what was the productive

capacity of the system before depletion by modern industrial fishing and dwindling perceptions of what ought to be there (Pauly 1995). It uses inputs from the traditional knowledge of Aboriginal peoples and maritime communities, industrial fishers, sport fishers, government and university science, archives and the archaeological record to reconstruct ecosystems as they might have been prior to modern industrial fishing. Focusing on past abundance highlights what could be achieved by adopting an ecosystem restoration policy, as opposed to fighting over present scarcity. Moreover, when such policy goals are identified, an ecosystem-based agenda means that, during rebuilding, the public can act as sentinels of progress, and many diverse groups, including Aboriginal peoples, fishing communities, schools, and colleges can have roles in providing data (Pitcher 2000). A sense of ownership of the process and goals fosters co-operation and reduces conflict.

By asking what the abundance of marine life in our waters was before we disturbed them so seriously, we avoid setting our sights too low as a result of baseline shift over time (Pauly 1995). "Back to the Future" (BTF) is grounded in the realization that marine ecosystems are in trouble and that over-harvesting by humans is the major cause. The voices of Aboriginal, small- and large-scale commercial fishers, the processing industry, and sport fishers in Victoria, St. John's, and Haida Gwaii acknowledged that they had a hand in the depletion. While they were not optimistic for the future, they were very willing to co-operate in understanding and rebuilding.

The main BTF elements are: a neutral forum where different sectors feel sufficiently comfortable to meet and share knowledge in the interests of conservation and rebuilding; participants with a common interest in a particular marine ecosystem; a commitment to respect other traditions and systems of knowledge besides one's own; *cross-validation and integration* of different traditions and systems of knowledge; new ecosystem modelling tools that can reconstruct past systems using the inputs; and the use with Aboriginal communities of ceremonies of respect and reciprocity.

The Stó:lō Nation insight - "Knowledge gains power as it is shared" is grounded in the principles of respect for other ways of thinking and knowing than one's own and reciprocity in the sharing of knowledge (Haig-Brown and Archibald 1996; Haggan *et al.* 1998). These principles are central to creative justice. A 1997 Strait of Georgia ecosystem reconstruction workshop was held at the First Nations Longhouse, a traditional west coast building on the UBC campus (which is itself in the traditional territory of the Musqueam Nation). Opening remarks acknowledged the symbolism of the meeting of two systems of knowledge, the traditional knowledge and values of the Musqueam Nation founded and sustained for thousands of years by the fisheries of Georgia Strait (Salas *et al.* 1998), and the academic tradition symbolized by UBC. The opening remarks also recognized the vital contributions which commercial and sport fishers, government scientists, historians, and others had to make to a broader and deeper understanding of the ecosystem on which we all depend.

The next step is to explain how ecosystem modelling can bring the qualitative knowledge of fishing communities, the quantitative knowledge of fisheries scientists, and other sources of information together. The BTF approach is made possible by scientific developments in the 1990s. The first is the capability to simulate a marine food web using a mass-balance or "eat or be eaten" approach (Christensen and Pauly 1992). This is essentially an accounting system. It differs from personal and government accounting systems only in that it can't run a deficit because its "currency" is flesh or biomass. There can’t be more biomass in the system than the

plankton at the bottom of the web can produce. Ecopath models differ from previous single species approaches because they include all groups from plant and animal plankton, crabs, starfish, fish from plankton feeders to top predators, seabirds, and whales. Commercial fisheries are included as predators or "exports" from the system.

Ecopath models have two strengths. First, to build a credible model, scientists working on different ecosystem components have to get together, standardize their data and put it into the model. The model that formed the basis for the Strait of Georgia BTF project was done at a UEC Fisheries Centre workshop involving experts on all the relevant species from plankton to seabirds and whales (Pauly *et al.* 1996). Because Ecopath is an accounting system, the data must add up to a "possible" ecosystem, i.e., one where there is enough for everyone to eat. In the context of creative justice, it reunites the separated by bringing the scientific community together.

The second strength of Ecopath derives from the fact that it is more concerned with the connections between ecosystem components than with the components themselves. In this it is much closer to TEK than it is to single species models (Haggan 1996). This means that people who spend a lot of time on the ocean can readily understand a "possible ecosystem constructed by scientists. More importantly, they can improve the model by providing information on what is and isn't really there. As an example, scientists dismissed Nuu-chah-nulth Nation Elders' accounts of harpooning large fish until archaeologists discovered bluefin tuna remains in middens on the west coast of Vancouver Island and Haida Gwaii (Crockford 1994; 1997). There is a palpable excitement when this type of cross-validation happens in a workshop. Cross-validated inputs are then entered into the Ecopath model and a possible past ecosystem reconstructed. It is significant that all values provided by TEK at a Strait of Georgia reconstruction fell within the limits of possibility.

In conclusion, redirection of human ingenuity to rebuild depleted systems requires a paradigm shift. The global challenge of reducing fishing effort in the face of overcapacity and stock collapse is compounded by an entire history of human development when the challenge has been how to catch more fish with less effort. The shift from permanent fishing communities to offshore fisheries inevitably dispossessed land-based fishing communities and marginalized their resource management knowledge. Despite the history, different interests in the fishery have much in common. They have been forced into adversarial roles through scarcity. Put another way, the failure of distributive justice is not the result of deliberate evil, but an inevitable consequence of our changing relationship to the sea. Faced with failure of distributive justice, we have to look to a new concept of creative justice to re-unite the separated so that they can share their knowledge and apply it to restore depleted marine ecosystems. "Back to the Future" is a philosophy and approach designed to bring people together. Ecopath is a tool they can apply to develop a collective understanding of the marine ecosystem. The hope is that co-operation, friendship, and energy engendered in the Strait of Georgia project can be continued in an explicit process to evaluate the ecological, economic, social, and cultural benefits that could flow from restoring depleted systems and that this in turn could lead to the setting of common goals and a commitment to work together to attain them.

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Endnotes

[i] This is well illustrated on a map of the southern Queen Charlotte Islands (Swanton 1905).

[ii] Corporate concentration began when the rising costs of vessels, gear, and electronics put them out of reach of many people. Once started, it tends to increase as a result of scarcity since, in hard times, small owner-operators are forced to sell boats and licences to meet immediate mortgage or other payments. Corporations with pockets can afford to buy, the cost being a useful tax write-off against present or future profits. That is why government fleet reduction of "buyback" programs, such as the 1968 Davis Plan (Meggs 1991) and the 1997 Mifflin Plan, work to reduce the number of active small-boat operators in Aboriginal and coastal communities.

[iii] Tillich, as early as 1960, provided a framework for assessing the claim for justice of non-human ecosystem components.

[iv] The name arose out of a conversation between the author and Cliff Hanuse of the Oweekeno Nation on the central coast of B.C. Cliff was explaining the importance of Elders to modern society, He said we have to ask why the old people did things in a certain way, and what it means to First Nations people today: in a sense he was suggesting we needed to go back to the future. This is a valuable insight that brings Pitcher's concept of "primal abundance" prior to industrial fishing together with First Nations' desire to restore depleted ecosystems to their "historic abundance."