



# Conservation Biology through the Lens of a Career in Salmon Conservation

CHARLES CONN

Gordon & Betty Moore Foundation

1661 Page Mill Road, Palo Alto, CA 94304, U.S.A., email charles@charlesconn.com

These are personal reflections on the state of the field and thoughts on a potential way forward for conservation biology from a grant maker who came to conservation science late and from an unusual starting point.

In primary school, I fell in love with a drop of pond water under the microscope and from then on thought I would grow up to be a biologist. Somewhere I lost my way and ended up a businessman. I cannot remember exactly how it happened, but eventually I was trained in what is known as the Catholic church of capitalism, Harvard Business School, and then capitalism's U.S. Marine Corps, McKinsey & Company, the management consulting firm. After McKinsey, my partners and I started or acquired several well-known internet companies, which prospered despite market ups and downs.

When we sold the companies in 2001, however, I had a crisis of identity and meaning. I knew I did not want to start another company, but after many years of intense focus on business, I no longer really knew what was important to me.

I stumbled into helping some friends at The Nature Conservancy, who had just acquired Palmyra Atoll and needed assistance with financial modeling of the Conservancy's future science and conservation operations for the atoll. Palmyra is a remarkable jewel in the middle of the Pacific, with a mostly intact terrestrial and marine ecosystem. Working in this incredible environment helped reawaken my childhood fascination with biology and rediscover the wonder of a well-functioning ecosystem. I also learned that analytical and economic skills could be useful tools in leading conservation projects. My work with The Nature Conservancy led to a role with the newly formed Gordon & Betty Moore Foundation, which had funded part of the Palmyra project, where I was asked to help set up their new wild salmon ecosystems initiative. And so began my new life as a conservation professional.

## The Road to Deep Ecology

My work on the wild salmon ecosystems initiative started well, with logic trees of threats to salmon and productive engagement with scientists and grantees to develop solutions to those threats. But after several years of approaching salmon conservation as an analytical business problem, I was frustrated and perplexed. Everyone involved in salmon management talks about science-based decisions and commitment to conservation for future generations, but the dominant harvest-management model continues to be that of a government fisheries agency working closely with their commercial fisheries clients, with few real opportunities for intervention by conservation organizations or other stakeholders. The effects of this model have been failure to maintain both salmon abundance and salmon stock diversity. In addition, sister agencies with similar models were overseeing mining, timber, and energy projects that were damaging key spawning and rearing grounds in freshwater portions of salmon habitat. Our grantees in environmental nongovernmental organizations mostly nipped at the heels of these industrial-scale resource-extraction systems. Agency scientists introduced improved policies from time to time, but these were typically not implemented or softened when implemented in the field. The net result was few genuine victories and extirpation of many salmon stocks, particularly in the heavily affected southern end of the salmon's range, but increasingly in less-developed northern rivers as well.

We know that the probability of conserving salmon increases as stock diversity increases. Over long periods, the cumulative abundance of salmon reflects a mosaic of individual stocks with fluctuating abundances (Schindler et al. 2010). In response to climate change, food availability in the ocean and the short-term success of different ocean-travel and feeding strategies, small stocks become large stocks and previously large stocks decline. Stock

diversity supports salmon resilience to environmental change, and areas where stock diversity has been lost tend to have higher annual variability in returning salmon and higher probability of major declines.

One of the places I work, the Skeena River in British Columbia, Canada, shows what happens as stock diversity erodes. Abundance of sockeye salmon reached historic lows in the 1950s, after 70 years of very high harvest rates. With the aim of stopping the declines, federal management agencies built artificial spawning channels to boost the productivity of two of the sockeye salmon stocks. The spawning channels appeared to work as the abundances of these two stocks grew, but the abundance of many of the more than 40 smaller wild stocks that were caught as bycatch decreased. As stock diversity declined, the resilience of the system was impaired, and annual variability in abundance began to increase, with greater and greater amplitude. The agency was forced to close the fishery more often because more years had low salmon returns, and strife between the commercial, First Nations, and recreational fishers spiked. (see Figure 1)

From my perspective as an economist and businessperson, there seemed to be a fundamental misalignment of incentives and substantial externality problems in salmon management. Agencies that manage salmon fisheries are rewarded primarily for current fisheries production and revenues, but are not charged for economic costs of loss in stock diversity. In addition, commercial salmon fishers, who compete with others in derby style (“race to catch”) fisheries, cannot capture the external benefits of better long-term practices, such as technologies to lower bycatch of less abundant stocks, so the fishers do not adopt such practices. The net result is that the long-term value of stock diversity is an externality, and stock abundance and diversity declines. Although our grantee initiatives could achieve some patchwork habitat protection and some incremental improvement in harvest management, the core management systems were not changing.

It seemed increasingly clear that the rational, science-based management in which I had such faith as a business builder was mostly window dressing in resource management. Most resource-management systems produce inexpensive food, building materials, and energy, and not surprisingly are therefore very resistant to change. Despite ample evidence of long-term damage to natural resources, powerful constituents defend the status quo. If we cannot make science-centered sustainability work in the United States and Canada, with wealth, good national environmental policies, an educated populace, well-trained management staff, and respect for the rule of law, is there any hope for conservation?

While I worked on salmon, I continued to be involved with Palmyra Atoll, which presented a sharp contrast. The conservation of Palmyra, with little economic value and massive natural values, was the classic case of the

value of protection *from* people, not *for* people. Over time I began to think that only humans’ transformation—or self-destruction—would save salmon and the habitats in which they co-occur with other species. I embraced the deep ecology perspective that a fundamental overthrow of human economic and consumption systems would be required for the planet to survive the effects of humans.

There is much that is compelling in the deep ecology philosophy. Whereas economic development has significantly improved living standards and health and longevity for many people, ultimately the well-being of humans and other species depends on well-functioning water, air, and soil systems. If the human population continues to grow, and with it the drive to increase material consumption, it is difficult to imagine how humans can live in concert with these systems. By some reckoning, the current human population already exceeds sustainability limits by a substantial measure. Unless population is somehow reduced and people begin to consume less and assign greater weight to nonmaterial values, our children and their children are in trouble. Given this behavior does not appear likely, a reasonably gloomy nihilism is difficult to avoid.

## Emerging Natural-System Governance Models

Of course, there are responses other than deep-ecology nihilism to the fundamental challenges of conservation biology—human population growth, increasing consumption, and uncaptured positive and negative externalities. A currently popular response to these challenges is the concept of valuing the services provided by various ecosystem functions in order to internalize externalities in a way that changes human behavior toward natural systems.

Valuing ecosystem services makes some sense in theory, but has been difficult to implement in practice. Principal among these difficulties, except in relatively simple cases such as pollinating bees and cultivation of fruit trees, is knowing how to assign economic values to these services. One of the definitional difficulties with complex externalities is that markets do not exist to value them. In most cases such markets must be created by government regulation as opposed to free markets. But government regulation often is not forthcoming or mis-prices the externality. It is especially difficult to create such markets in the international commons, such as the oceans, where multinational conventions are fragile or do not exist. Also, the ecosystem services with the greatest direct and immediate benefit to humans are those for which regulated markets are most likely to be created, not necessarily those, such as genetic diversity, that provide long-term value to all species (Redford & Adams 2009).

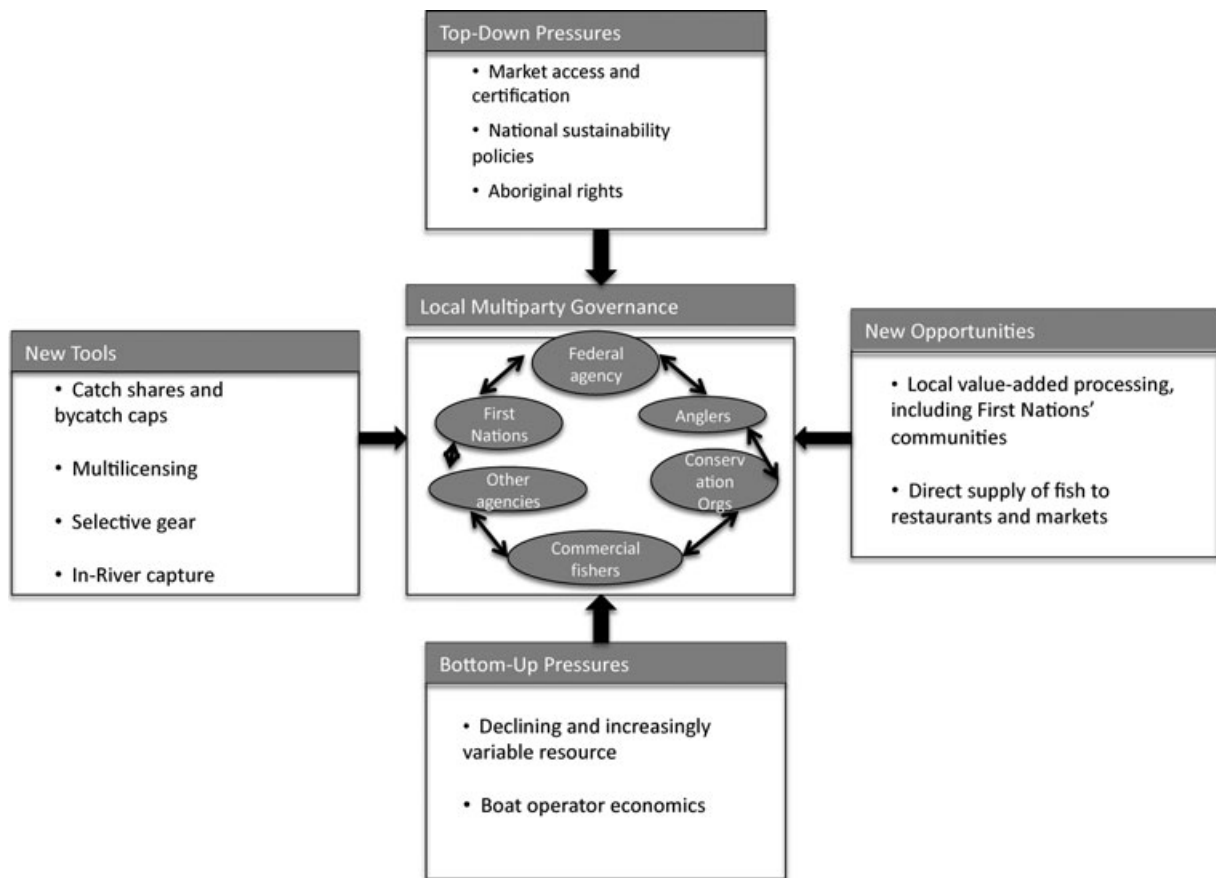


Figure 1. Emerging aligned salmon governance and management model.

Recently, however, in salmon and some other managed fisheries, there are the beginnings of a resource-management and governance approach that captures externalities without explicitly focusing on valuing ecosystem services. This approach may be transferable to other managed systems. In some places the dominant bilateral management agency-industry model is starting to change, mostly due to its failure to continue providing cheap food and jobs. Emerging in its place is a reinforcing combination of new national sustainability policies, international certification regimes, changes to resource access, and altered resource governance. This model of aligned biological and economic values is complicated, and it does not have a snappy name, but it gives me some hope that there may be a way forward.

The elements of the new model are new pressures, new governance, and new tools (see Figure 1). New pressures: a number of salmon systems have come under bottom-up and top-down pressures that have helped catalyze changes in governance and management. First, as salmon returns have declined and become much more variable, the reliability of commercial fisheries catches has declined. Along with sharply increasing energy costs, economic operation of the marine capture fleet has become attenuated. Second, both national policies pro-

pounded for sustainability (e.g., Wild Salmon Policy in Canada, an only partly implemented policy that recognizes and values salmon genetic diversity and describes precautionary practices to preserve this) and the market-driven requirements of international sustainability certification bodies, such as the Marine Stewardship Council, have pushed fisheries managers to further lower overall catch and reduce effects on nontarget species and smaller salmon stocks. Access to some of the more lucrative markets in Europe and increasingly to large U.S. retailers now requires certification.

New governance: in many regions, intensified conflict over natural resources has started to generate experimentation in resource governance. A feature of most experimental governance approaches is involvement of more stakeholders, including small-scale fishers, First Nations, recreational anglers, and nongovernmental conservation organizations. In some cases the resource-management agency retains final decision-making control, and in others control is shared with the local decision-making body. Where new approaches to governance are achieving their objectives, local stakeholders are developing locally tailored solutions to resource conflict that meet the agency or national policy sustainability mandate.

New tools: although it is too early to tell how effective they will be, some new tools and market opportunities may help mitigate catch-allocation issues and align incentives for sustainability. Multilicensing, whereby boats are allocated access to several species, can relieve economic pressure on operators of small boats by providing access to other species with lower variability in abundance than salmon and that are available at different times of the year. Catch shares or other forms of quota can reduce the costs, physical risks to fishers, and economic inequities of derby-style fishing seasons and can lead to risk-sharing cooperatives. Gear types that target certain species and are less lethal, for example fish wheels and fish traps, combined with in-river fisheries that are selective by location can allow reasonably high harvest rates of target stocks, while reducing bycatch of weak stocks (stocks that are below their theoretical carrying capacity due to intensive fishing or other stressors).

Compared with the older and still-dominant industrial resource-extraction approach, this new aligned approach forces consideration of the long-term value of salmon stock diversity (via national sustainability policies and international certification regime requirements), better aligns incentives (via dedicated catch shares and higher value products), and encourages better recognition of all values of salmon ecosystems (via multiparty governance). The approach may lead to stable local jobs, lower energy use, improved social justice, and increased sustainability of resource use. Fundamentally, this set of management and governance innovations gives local people a stake in long-term protection of both fish abundance and stock diversity.

## A New Way Forward

So what can one generalize to the state of conservation biology from one personal journey through salmon conservation? The technocratic, top-down approach to resource management typically has not achieved long-term conservation goals. Its stated science-based decision framework is too easily compromised by short-term government priorities and economic needs of dominant stakeholders. It does not capture externalities well, particularly the value of diverse species and ecosystems to resilience of natural systems. It leads to adoption of short-term, technical palliative measures, such as salmon hatcheries, rather than addressing long-term management of habitat or harvest. Lately this approach is breaking down in some locales in response to its failure to deliver jobs and resource revenues.

The ecosystem-services model for reforming management systems has some attractive features for aligning the externalities of ecosystem functions with human needs via pricing. But it is challenging to implement well given

existing limitations of government regulation, especially in the international commons. It is biased toward the ecosystem functions that humans value most. It may encourage replacement of species-rich systems with a small number of productive crops that meet human needs, but that reduce long-term resilience to environmental change.

The emerging model of aligned natural-resource governance can help capture externalities without explicit ecosystem service pricing through a reinforcing set of changes in local access to resources, evolution of local governance, market-based certification pressure, and national policy frameworks. It allows more stakeholders, including consumers via market certification, to participate in governance processes, and it goes some distance toward aligning incentives for managers and participants. From my perspective as a grant maker, this emerging approach provides a daily alternative to the frustration of trying to achieve sustainability within the old salmon management system—and to environmental nihilism. Although these changes in governance and management are advancing in fits and starts, with much conflict, the elements of the new approach are providing participants with a palate of new ways to solve problems, avoid old stalemates, and develop new families of solutions.

This is still a human-centered conservation approach, however, and like the ecosystem-services model, may lead to decreases in ecosystem function as it focuses on meeting human needs. It also involves many participants in governance at different levels, which will be difficult to coordinate in some regions.

It is a valid question whether these models, even if they help solve difficult local resource sustainability problems, can provide a coherent way forward for the practice of conservation that is transferable among locations and spatial and temporal extents. To date these approaches have only been applied to a limited number of fisheries and forests. Economic development in fast-growing countries will continue to put pressure on natural resources of all types, and unsustainable fisheries that are denied access to European, U.S., and Canadian markets via certification requirements may simply find outlets in other less-restrictive regions. We may end up with enclaves of partial sustainability that do not alter global patterns of resource loss, or that are eroded by climate change and other external cumulative effects.

It is also not clear whether these new management approaches will address the deep-ecology challenge to fundamentally alter human consumption patterns. Models suggest that population will eventually peak and, with reduced birthrates that better material conditions typically engender, decline. But there is little evidence that a somewhat lower population will be enough to establish a new value set for human interaction with the natural world.

Through a deep-ecology lens, we have to accept that the evolving resource-governance approaches discussed here are likely not sufficient. As conservation practitioners, however, we have to resist the pull of environmental nihilism and continue to build pragmatic approaches to conservation while we strive for more fundamental change.

### About the Author

Charles Conn is senior advisor at the Gordon & Betty Moore Foundation. He sits on several company and non-profit boards, including Patagonia and Trout Unlimited. Previously, he cofounded Citysearch and as chief execu-

utive officer led the company through its merger with Ticketmaster, as well as acquisitions of Microsoft SideWalk, Match.com, and Evite. Prior to starting the company, Charles was a partner with McKinsey & Company. Charles has been a Henry Crown Fellow of the Aspen Institute and is a graduate of Harvard Business School, Oxford University, and Boston University. The views expressed here are his own.

### Literature Cited

- Redford, K. H., and W. M. Adams. 2009. Payment for ecosystem services and the challenge of saving nature. *Conservation Biology* 23:785-787.
- Schindler, D. E., et al. 2010. Population diversity and the portfolio effect in an exploited species. *Nature* 465:609-612.

