

Big Old Fat Fecund Female Fish: The BOFFFF Hypothesis and What It Means for MPAs and Fisheries Management

Modern fisheries management has often guided fishermen to select the large individuals of targeted stocks, either by using size-selective gear or releasing small individuals back to the water. The reasoning has been that this allows smaller, younger individuals to grow up to reproductive age, thereby sustaining the stock.

Recent research, however, shows that removing the larger, older individuals of a population may actually undermine stock replenishment. This appears especially to be the case for removal of larger, older females, which often produce significantly more offspring — and sometimes stronger offspring — than younger females do.

Some researchers have proposed the idea that maintaining old-growth age structure can be important for replenishing fished populations. It is termed the Big Old Fat Fecund Female Fish (BOFFFF) hypothesis. This month, *MPA News* briefly examines this hypothesis and what role marine reserves could play in maintaining old-growth age structure of fishery stocks.

Maternal variability and size-selective fishing

The BOFFFF hypothesis arose largely from the recent work of biologists Alan Longhurst on population structure of Atlantic cod and Steven Berkeley on maternal effects in Pacific rockfishes. The hypothesis is based on documented cases of older, larger female fish producing more young per year — often exponentially more — than younger females. The larvae of these older females may also be larger, with greater fat reserves that can aid growth and survival. In several species of rockfish, for example, larvae from older females both grow faster and survive starvation longer than larvae from younger fish. (Rockfish birth their young as larvae, with attached egg yolks; the yolks' oil serves as the fat reserve.) Older females can also have earlier and/or longer spawning seasons than younger, smaller females, and the fact of their longer lives may allow them to outlive periods of low larval recruitment. See the box on p. 2 for more information on several BOFFFF-related studies.

Mark Hixon, a biologist at Oregon State University (U.S.), says various factors contribute to this maternal variability between BOFFFFs and younger females.

“There often are different environmental constraints facing younger vs. older adults,” he says. “Smaller females are more susceptible to predation, and so may be more restricted to safer habitats and thus different food supplies. Smaller females must also devote more energy to growth than larger females, which can devote more energy to reproduction.”

He notes that the BOFFFF hypothesis applies better to some species than to others. The species for which it has been best demonstrated are long-lived and live in temperate waters: Atlantic cod (*Gadus morhua*) can live over 20 years, and Pacific rockfishes (genus *Sebastes*) can exceed 200 years in age. In contrast, says Hixon, short-lived and/or tropical species tend not to exhibit the same degree of variability in size of young and spawning season. The hypothesis might also not apply well to species like sharks that birth fully formed juveniles, for which there is no larval life period. Nonetheless, says Hixon, no fish (whether large or small, temperate or tropical) is totally exempt. “At least part of the hypothesis — that older fish can out-live periods unfavorable for recruitment — pertains to all fishes,” he says.

David Conover, a biologist at Stony Brook University (U.S.), has studied the long-term effect of size-selective fishing on population age and size structure. The studies show how removing BOFFFFs and other large adults can result in evolutionary changes in populations. Using studies of captive and wild Atlantic silverside, Conover discovered that not only does average fish size in some stocks get smaller over time, but the populations also evolve characteristics that make it more difficult to survive and reproduce when fishing ends. That is, size-selective fishing removes stronger individuals and leaves slower-growing ones — the opposite of what evolution would normally do. The phenomenon is called size and age truncation.

Tribute to Steven Berkeley

This *MPA News* coverage of the BOFFFF hypothesis pays tribute to the work of Steven Berkeley, credited with developing the hypothesis in his work on Pacific rockfish. Berkeley, a fisheries ecologist at the University of California at Santa Cruz, died of pancreatic cancer on 27 June 2007. He was 60 years old. In his most recent research, he examined how knowledge of maternal age effects in rockfishes could help identify which species were most likely to benefit from protection in marine reserves. The American Fisheries Society is planning a scholarship in his honor.

Table of Contents

Big Old Fat Fecund Female Fish: The BOFFFF Hypothesis and What It Means for MPAs and Fisheries Management	1
Before All the Ice Melts, Part II: More Experts Weigh In on Proactive Management for Arctic Ocean	3
Notes & News	5

“Chronic age truncation via size-selective fishing, with its artificial selection for smaller size-at-age, can have a corresponding, genetically based drop in yield that may be difficult to reverse even if fishing ceases,” says Conover. He describes this in an article, “Size Matters”, in the July-September 2007 *Conservation* magazine, available at www.conbio.org/CIP/article30713.cfm.

Implications for management

Hixon and Conover say steps are needed to protect BOFFFFs and guard against the evolutionary changes caused by size-selective harvesting. The answer, however, is not as simple as turning size selection on its head and catching smaller individuals instead. By necessity, it is also important to have smaller, younger fish in populations because they are the source from which larger fish emerge.

In general, according to Hixon, there are three main management methods available to conserve older fish in an exploited population:

- Reduce the rate of exploitation significantly — an economically infeasible option for many fisheries;
- Institute slot size limits in which there is both a minimum and maximum size for retention — an option primarily available for fishes that can readily be released unharmed after capture; or
- Designate marine reserves that set aside areas in which fishing is prohibited and older fish can survive and spawn.

Conover says the marine reserve option makes sense, particularly for non-migratory species. “For some fisheries, we may need no-take zones where the full range of sizes and ages of a given species can thrive,” he writes in *Conservation*. Hixon, in a paper he co-authored with Steven Berkeley, Ralph Larson, and Milton Love in the journal *Fisheries* in August 2004, said, “No other method of management, even slot limits, can preserve the potential for longevity as well as marine reserves and allow the unique contributions of older fish to accrue to the population.”

No-take marine reserves can be a hard sell to fishermen. Hixon says that in his experience, however, the BOFFFF concept resonates with fishermen more than any other issue regarding MPAs. “From my perspective, fishermen know the value of large spawners — if for no other reason than the fact that larger females produce more eggs,” he says. This knowledge, he says, comes from watching the huge roe of a BOFFFF hit the deck when cleaning such a fish.


The BOFFFF hypothesis is still new, and there remain relatively few examples of management programs created specifically to protect larger, older females. One such program emerged recently from actions that some fishermen had already adopted informally. In a live fishery of rockfish and other groundfish species in Port Orford, Oregon (U.S.), several local fishermen had begun returning gravid females — full of

larvae — to the water. These fishermen wanted their local colleagues to follow their lead.

In May 2007, the Port Orford Ocean Resource Team (POORT), which represents the local fishing community and other stakeholders, responded by formalizing a voluntary conservation measure for the live fishery — to release all gravid and spawning females. Gravid and spawning females are identified by a variety of physiological and behavioral characteristics: gravid individuals, for example, often expel some of their larvae when brought on deck.

Leesa Cobb, POORT executive director, says the Port Orford fishing community is very aware of the BOFFFF hypothesis. (Technically, the voluntary measure covers all gravid and spawning females, not just the largest, oldest females.) Cobb says POORT has considered marine reserves, as well, to protect BOFFFFs — particularly their spawning sites. “In the interest of what we could achieve right away, however, and to get fishermen to start thinking about the role of spawning in healthy populations, marine reserves were not something we felt we could achieve in the short term like we could with this voluntary conservation measure,” she says.

For POORT’s program to be successful, the females need to survive their release back to the water. This is not straightforward. Rockfish and some other fish species have gas-filled swim bladders that help to control buoyancy; on rapid ascent, these swim bladders can burst. For their live fishery, Port Orford fishermen regularly “vent” (poke a hole in) each fish’s swim bladder with a needle to relieve the pressure. This technique is reliable enough that catches regularly remain alive on their way to market in tanks. For the females that are released, however, the venting process could weaken them in the wild, both during descent and onward. Although Port Orford fishermen report recatching females with venting scars — indicating that survival does occur — there is likely some mortality as well. POORT is now conducting research with Oregon State University to tag females as part of the release program, and measure the survival rate of vented fish in the wild.

“We want to run the program for two years,” says Cobb. “By that point we hope to have the data to support continuing it.” 

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Additional sources of information on the BOFFFF Hypothesis

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Before All the Ice Melts, Part II: More Experts Weigh In on Proactive Management for Arctic Ocean

Due to climate change it is possible that the summertime Arctic Ocean could become ice-free by mid-century, according to the worst-case scenario of warming. This would open the relatively pristine Arctic marine ecosystem to industrial activities including fishing, shipping, and petroleum exploration and drilling. Arctic nations are already staking claims to portions of the Arctic seabed beyond their traditional 200-nm EEZs, seeking national jurisdiction over the resources there.

In the August 2007 edition of *MPA News*, scientists and conservationists commented on opportunities for proactive management of the Arctic Ocean — establishing systems for sustainable management of the Arctic Ocean before the ice melts, rather than afterward (*MPA News* 9:2). This month, two more experts provide their insights:

Andrew Constable is a biologist with the Australian Antarctic Division. He helps lead Australia's delegation to the Convention on the Conservation of Antarctic Marine Living Resources, or CCAMLR — an intergovernmental body that manages resources of the Southern Ocean (www.ccamlr.org); and

Jeanne Pagnan, formerly with Canada's National Energy Board and Environment Canada, has led several international working groups on marine strategy and biodiversity for the Arctic, and is Arctic regional marine coordinator for the World Commission on Protected Areas. As a consultant, she has worked on Arctic protected areas and World Heritage assessments, and with the oil and gas industry on its Arctic marine guidelines. She also has extensive work experience with Arctic indigenous peoples.

Arctic areas outside national jurisdiction should be managed like CCAMLR

By Andrew Constable

If a relatively pristine area of the Arctic Ocean is exposed by climate change, it would make sense for all high seas areas outside of national jurisdiction in the region to be managed by an intergovernmental body similar to CCAMLR.

So far, CCAMLR is the only high seas regional body that has a conservation remit with rational use being allowed. Thus, activities are managed in a way that has to meet environmental objectives: that is, conserving the whole ecosystem, not only fish stocks. In addition, CCAMLR can take conservation actions without their necessarily being related to fishing or other activities. This provides opportunities for the CCAMLR Commission to be proactive. The Commission has a suite of tools explicitly indicated in the Convention that can be used to help achieve conservation objectives. The Commission has adopted a spatial management

framework that achieves a variety of objectives, based on the best scientific evidence available. The suite of management measures (known as Conservation Measures) provide for orderly development of fisheries from new fisheries to the more established fisheries. The experience of CCAMLR shows that a multiple-use spatially explicit framework is essential for achieving sustainable outcomes in high seas areas outside of national jurisdiction.

The international mood is to establish regional management bodies in areas outside of national jurisdiction before problems emerge. The experience of CCAMLR would suggest that establishing a regime for such areas outside of national jurisdiction in advance and determining some of the modes of operation such as how to achieve orderly development of fisheries to safeguard the environment is an essential component for achieving long-term ecological sustainability for high seas areas. There is considerable fishing effort available to exploit new areas. The increasing recognition of the global impacts on fisheries resources from illegal, unregulated, and unreported (IUU) fishing indicates the need to have controls in place at the outset.

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Three issues in protecting the Arctic Ocean

By Jeanne Pagnan

In response to calls to protect the Arctic Ocean as an MPA, my view is that there are three main issues to be resolved before such an enterprise is feasible. The first is, what would be the geographic boundaries of such an MPA? Second, is there a suitable governance system already in place and, if not, could one realistically be formed? And third, how would the interests of the various stakeholders and of the northern peoples be accommodated?

Geographically, the Arctic marine system includes the Arctic Ocean proper and over a dozen seas, straits, and bays. Six countries already claim large portions of Arctic waters as their Exclusive Economic Zones. However, several existing EEZ boundaries are in dispute and there are proposals to extend some well into the Arctic high seas. There is a new urgency to settle the boundaries since within its EEZ, a country has the exclusive right to explore, exploit, conserve, and manage both the living and non-living natural resources of the seabed, its subsoil, and waters above it. The economic stakes are high and the competition for EEZ rights is heating up.

However, it will probably be at least 10 years before the boundaries are settled. Under the circumstances, the chances of getting the countries to agree to create a

Clarification on Antarctic Treaty System

A mention of the Antarctic Treaty System in the August 2007 *MPA News* requires clarification. An editor's note on page 3 suggested that the phrase "Antarctic Treaty System" referred specifically to the Convention on the Conservation of Antarctic Marine Living Resources, or CCAMLR. Reader Lee Kimball writes that the treaty system covers more than just CCAMLR:

"The reference is to the 1959 Antarctic Treaty, including its Protocol on Environmental Protection (1991) as well as the other components of the system, which include CCAMLR (as noted) as well as the Convention for the Conservation of Antarctic Seals (1972). CCAMLR's conservation mandate regarding marine living resources relates to harvesting and associated activities. The Antarctic Treaty is the 'framework' convention through which a broad range of Antarctic activities, including emerging issues, are considered and, hopefully, addressed."

Note: A draft resolution (S.J. Res. 117) has been introduced in the U.S. Congress that calls on the U.S. to initiate international discussions to negotiate an agreement for managing migratory and transboundary fish stocks in the Arctic Ocean. For a copy of the draft resolution and to track its progress, go to www.govtrack.us/congress/bill.xpd?bill=sj110-17.

For more information


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single large Arctic MPA are slim indeed since some may feel this might potentially impinge on their sovereign control over their EEZs. That being said, the countries have already been increasing the protection of their marine and coastal waters. For example, the U.S. protects the waters around the Aleutian Islands. Russia protects out to the 12-nm limit around Wrangel Island, a new World Heritage Site. Iceland has established a marine conservation area at Breidafjörður and uses a system of no-take zones to protect important fisheries. Greenland has protected the entire coastline of the Greenland National Park, the largest park in the world, out to the 3-nm limit. Canada and Norway each have marine conservation plans in place and are gradually implementing them. Admittedly progress is slow, but in my opinion these are encouraging trends.

The second issue is governance. At the moment, the Arctic Council (www.arctic-council.org) is the only circumpolar intergovernmental body that could potentially establish and manage a large multinational Arctic MPA. However, the eight countries of the Arctic Council are not bound by legal instrument; they cooperate voluntarily through ministerial declaration and operate by consensus. The Council was set up as a high-level forum for dialogue and cooperation rather than to design and implement circumpolar management regimes. In terms of marine issues, the Council's track record is checkered. The countries have collaborated to produce some very useful reports on, *inter alia*, Arctic pollution, climate, and species. However, it has been less effective in dealing collaboratively with marine conservation. For instance, several years ago the Arctic countries decided to establish a Circumpolar Protected Area Network (CPAN) that would include a marine component, and eventually developed a *CPAN Strategy and Action Plan*. However, the initiative stalled and is now dormant. As 2012 approaches, they may decide to resuscitate it in response to the target of the World Summit on Sustainable Development that there be representative networks of MPAs worldwide by that date. On the question of establishing and collectively managing a single, large multiple-use MPA and assuming that the EEZ boundary issues are sorted out: the Arctic countries might find it beneficial to pool their efforts as a means to conserve the Arctic marine ecosystem and its economic resources.

The third issue is how to accommodate the interests of various stakeholders and northerners. By stakeholder, I speak here of industry. By northerner, I speak of the Arctic's indigenous peoples. As the ice melts, there will be easier access to the Arctic's resources, increased shipping along the Northwest Passage and the Northern Sea Route, and major infrastructure development. These will place heavy burdens on the Arctic ecosystem. Under these circumstances, how can it be protected? In my view, the answer is neither to ban exploitation nor to expect the industries to take the lead in environmen-

tal protection. After all, the primary objective of the oil and gas, mining, shipping, and fisheries industries is not to conserve wildlife or ecosystems but to supply energy, foodstuffs, ores, and minerals and to move goods across oceans. That being said, they should not do so with utter disregard for the environment in which they operate. In fact, industry is already issuing guidance for its Arctic operations: for example, in 2002 the Oil and Gas Producers Association published its guidelines for Arctic offshore activities. Governments are also strengthening their own regulations for marine activities and are banding together to produce common sets of guidelines for various marine activities. Protecting the Arctic marine environment must also include a strong regulatory regime based on reasonable, fair, and practical standards and an organization to back it up. Such a regime should include strong environmental protection and conservation measures and be strictly enforced. This is a task I can see eventually taken on in a cooperative venture by the Arctic Council somewhere down the line.

My final point concerns the people of the Arctic. They fall into two main categories: those who have moved up from the south and those whose homelands have always been the Arctic — i.e. the indigenous peoples of the Arctic. Some of those groups are the Saami and Chukchi of Russia, the Upik and Aleuts of Alaska and Russia, and the Inuit groups who reside primarily in Greenland and Canada. Today, those traditional peoples make up only a fraction of the greater population of the Arctic and while many still live in small communities and practice their traditional skills, many more have basically been marginalized in a region increasingly driven by global and national politics, economics, and the “bottom line”. Many indigenous people have adapted their skills to this new reality. For example, wealthy Americans or Europeans will pay an Inuit scout upwards of US \$50,000 to stalk and kill a polar bear. Others have joined the growing workforce associated with industrial development. But most remain on the sidelines of economic prosperity. In terms of protecting the marine environment, most countries have given their indigenous populations rights of traditional marine harvest and use. But in these changing times, that is insufficient to provide them with adequate livelihoods and is often not embraced by indigenous youth. Unless they are economically and socially secure, it will be difficult to engage indigenous peoples in environmental conservation. The answer is to provide training and build professional capacity, and give them a real stake in the industrial development of the Arctic marine environment that will soon be upon us and in protecting it. This could also mean setting quotas and guaranteeing long-term employment and management opportunities associated with MPAs, or with emerging industrial development such as, for example, the growing marine transport industry. 

Notes & News

Names of newly discovered species to be auctioned for MPA-related conservation

Looking for new ways to raise funds for your MPA? If so, take note of "The Blue Auction", occurring 20 September in Monaco. The event will sell the rights to name several species of fish discovered during surveys of the Bird's Head Seascape region of Indonesia. The surveys, conducted in 2006, were part of an ongoing initiative to establish ecosystem-based management in the region, including designation of MPA networks (*MPA News* 8:4).

Proceeds from the auction will go to fund the initiative, which is a partnership of Conservation International, The Nature Conservancy, WWF-Indonesia, local and national governments, and local NGOs.

For sale are the naming rights to each of 12 items: 10 endemic species of fish as well as a patrol vessel and a future research expedition in the region. The high bidder for each fish species will gain the right to provide the species name in Latinized form. Suggested starting bids for the fish range from US \$45,000 for a species of rainbowfish, to \$500,000 for a unique shark species that crawls on its pectoral fins. Suggested starting bids to name the patrol vessel and the future research expedition are each \$200,000.

The Bird's Head Seascape region encompasses an area of 180,000 km² and more than 2500 islands and submerged reefs. In May 2007, the Indonesian government designated a network of seven MPAs, totaling 9,000 km², in one archipelago of the region (*MPA News* 8:11).

The Blue Auction will be held at the Oceanographic Museum in Monaco. More information is available at www.theblueauction.com.

Guide available for MPA practitioners on ecological gap analyses

A new report offers advice on analyzing gaps in conservation coverage for use in planning MPA networks. Featuring brief case studies from four nations (Ecuador, Grenada, Jamaica, and Palau) and best practices learned to date, the guide serves as an introduction and overview to ecological gap analyses. "An ecological gap assessment is the basis for developing a clear vision of the scope and future direction of [a] protected area system," states the report. "[The] assessment can be a compelling, science-based framework that ensures that a protected area network is truly viable and representative."

The 21-page report, *A Quick Guide to Conducting Marine Ecological Gap Assessments*, is published by The Nature Conservancy and is available in PDF format at <http://conserveonline.org/workspaces/patools/resources/gapassessment/gapdocs/marinegapquickguide>.

Funding available for coral reef conservation

Pre-applications are due 6 November 2007 for the NOAA International Coral Reef Conservation Grant Program, operated by the International Program Office of the (U.S.) National Oceanic and Atmospheric Administration. The program provides grants to international, governmental (except U.S. government agencies), and non-governmental entities working to conserve coral reefs. Grants for fiscal year 2008 are available in four categories:

- Promoting watershed management;
- Enhancing regional MPA management effectiveness;
- Encouraging development of national MPA networks; and
- Promoting regional socioeconomic training and monitoring in coral reef management.

Country eligibility varies by grant category, and proposed work must be conducted at non-U.S. sites. For details on categories and eligibility, go to <http://nosinternational.noaa.gov/coralgrants.html>.

Research spotlight: Paper finds loss of coral cover in Indo-Pacific

A paper in the August 2007 edition of the online journal *PLoS ONE* reports that live coral cover in the Indo-Pacific region has declined significantly over the past two decades — from a region-wide average of roughly 42% in 1984, to 22% in 2003. Live coral cover is the percentage of a reef that consists of live coral, and is a key measure of reef habitat quality and quantity. Authors John Bruno and Elizabeth Selig of the University of North Carolina at Chapel Hill (U.S.) analyzed more than 6000 quantitative surveys of Indo-Pacific reefs performed since 1968. The Indo-Pacific encompasses three-quarters of the world's shallow-water coral reefs.

"Climate change is certainly a primary cause of the decline," says Bruno. "But there are several other equally important factors including outbreaks of disease and *Acanthaster* (crown-of-thorns starfish), sedimentation from poor land usage, and destructive fishing practices."

He and Selig acknowledge the rate of loss could be exaggerated by the possibility that early reef surveys focused on high-cover reefs and subregions (i.e., the most spectacular coral sites), whereas recent surveys may be more comprehensive in sampling. Still, Bruno says, the decline is too significant to be explained by sampling bias alone. The decline was even found on some of the Pacific's most intensively managed and researched reefs, including in the Great Barrier Reef Marine Park.

"Quality of management is paramount in mitigating local threats, like sedimentation and destructive fishing," says Bruno. "However, I am not surprised that managers have been far less successful in battling

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Publication describes emerging technologies for reef fisheries research, management

A report by the (U.S.) National Marine Fisheries Service offers articles on newer technologies for use in research and management of reef fisheries. Several of the articles feature research in MPAs, including the use of multibeam bathymetry and submersibles to survey, respectively, the Florida Keys National Marine Sanctuary and Flower Garden Banks National Marine Sanctuary in the U.S. Another article describes the use of passive acoustic telemetry to design marine reserves. The 116-page report *Emerging Technologies for Reef Fisheries Research and Management* is available in PDF format at <http://spo.nmfs.noaa.gov/pp5.pdf>.

regional-scale stressors. Like many of my colleagues, I think that we have to directly confront the regional causes of coral loss by augmenting strong local management with global policies to reduce anthropogenic ocean warming and acidification.”

The paper “Regional Decline of Coral Cover in the Indo-Pacific: Timing, Extent, and Subregional Comparisons” is available in PDF format at www.plosone.org/article/doi/10.1371/journal.pone.0000711.

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Book describes history of ocean resource exploitation and early calls for marine reserves

In his new book *The Unnatural History of the Sea*, biologist Callum Roberts explores the dawn and growth of commercial fishing from the 11th century to today, and how the abundance of marine life described by early seafarers exists no more. He also traces the history of calls for marine resource conservation — including the use of no-take marine reserves, which Roberts recommends as a critical tool for restoring marine life populations. The book is available in hardcover on Amazon.com for US \$18.48 plus shipping.

MPA News: In your book, you draw on firsthand accounts of early explorers, fishermen, and others to recreate what the oceans of the past looked like, with waters teeming with marine life. You write that today’s oceans are “empty” compared to the oceans of the past.

Callum Roberts: In places like Britain, it is hard to imagine looking out to sea from the beach and seeing dozens of porpoises playing amid the waves, or watching the blow of whales and the splash of giant tuna tearing into shoals of fish. Most shallow-water trawler captains have never fished on virgin grounds and seen the net come to the surface bursting with corals, sponges, and seafans. Scientists are now

reconstructing marine ecosystems of the past from sources that were until recently shunned as unscientific, and therefore unreliable. There is a shift in worldview among some parts of the science community, and it will take time to filter through to the public and decision makers. I wrote this book to bring the oceans of the past alive again for modern generations. I hope it will spark in them a desire to recover some of what has been lost.

MPA News: In your research, you encountered a book written in 1912 by a French fishery scientist named Marcel Hérubel. In it he argued the merits of designating no-take marine reserves as a way to sustain commercially fished stocks. You say that book predates by several decades the first paper written on marine reserves by a modern author.

Roberts: I found Hérubel’s book in the library of the Port Erin Marine Station on the Isle of Man in the Irish Sea. The book in Port Erin library didn’t look like it had been opened for about eighty years. Standing among the bookshelves I read through it with growing excitement to discover such an early, detailed picture of the principles behind the use of marine reserves in fishery management.

Hérubel obviously had come across considerable skepticism of his views, because he wrote: “The exigencies of theory often accord ill with corporate interests, and the multiplication of coastal reserves would quickly arouse the anger of fishers.” Even given the evidence of the impacts of fishing that was available at the time, I think it was possible then to ignore the idea of conservation of resources. There were still plenty of fish in the sea, and fishers responded to local depletion by fishing farther afield or fishing for something else. It is increasingly hard today to adopt these approaches. In my view, reserves have become a necessity for sustainable fisheries, and can no longer be ignored.

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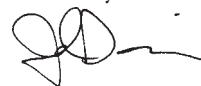
Coming this month: The Launch of *Marine Ecosystems and Management*

Dear Reader:

This month marks the launch of *Marine Ecosystems and Management (MEAM)*, a new quarterly publication on marine ecosystem-based management. As a subscriber to *MPA News*, you will automatically receive the first two issues of *MEAM*. After that, you will be invited to subscribe officially to the new publication or opt out of receiving future issues. Like *MPA News*, *MEAM* will be free of charge, thanks to support from the David and Lucile Packard Foundation and other funders.

On behalf of the team that produces *MPA News* and *MEAM*, I hope the new publication proves useful to your work. Please let me know what you think, and how we can serve you best.

Sincerely,



John Davis
Editor, *MPA News*