*The following paper was presented by Ken Hinman, president of the National Coalition for Marine Conservation (now **Wild Oceans**) to the Annual Meeting of the Marine Working Group, Consultative Group on Biological Diversity, "Ecosystem-Based Approaches to Marine Management: Deconstructing the Pieces," Baltimore, Maryland, March 6, 2008*

THE LIONS, TIGERS AND WOLVES OF THE SEA

The move to an ecosystem-based approach to managing marine fisheries begins with a change in the way we think.

The sharks, tuna and billfish are the lions, tigers and wolves of the sea. We don't often think of them that way, but we should. What we so blandly label the "large pelagics" or "highly migratory species" are wild creatures as magnificent and fascinating as any animal on earth.

- The giant bluefin tuna, weighing 800 pounds, chases into schools of bluefish or herring with bursts of speed up to 60 miles an hour.
- The blue marlin, the legendary adversary of Hemingway's Old Man and the Sea. Santiago wondered if the great fish leapt out of the water just to show him how big he was – "He is 2 feet longer than the skiff," the old man said.
- The swordfish – *Xiphias gladius*, "the gladiator" – uses its spear-like snout to hunt prey as well as for protection from its few natural predators. One of these is the mako shark, one of the only fish big enough and fast enough to run down and take on a big broadbill.
- Sharks, who've been roaming the seas for over 400 million years, are super-evolved pack hunters worthy of our respect; and not the kind born of fear.

"If we see ourselves as part of the natural system," wrote Pat Wray, an elk hunter advocating for the return of timber wolves to Yellowstone, "a predator lucky enough to sit at the top of the food chain, then we are far more willing to accept the presence of other predators without thinking of them as competitors, but as creatures with equally important places in the system."[1]

The big ocean fish, like lions, tigers and wolves on land, sit at the top of the food chain. They are what we call keystone predators. They help maintain a healthy balance in

[1] Pat Wray, "Timber Wolves: A Hunter's Perspective," *Sporting Classics*, Sept/Oct 2006

marine ecosystems by contributing to stability, structure and predictability. Ironically, the top predators are in ways *more* vulnerable than their prey, since they are generally longer-lived and thus slower to adapt to changes in their environment, or to fill niches left by the disappearance of other predators.[2] When predators disappear, the effects cascade down throughout the food web.

The True Cost of Ecosystem Overfishing

Unfortunately, with a few exceptions, the sharks, tuna and billfish are among the most threatened animals in the sea. The numbers of bluefin tuna, white marlin, striped marlin and numerous species of large coastal sharks are barely one-tenth what they were just decades ago. And by removing so many of these predators, we are weakening an entire tier at the top of the food chain, with unpredictable but certainly unhappy ecological consequences.

The plight of bluefin tuna, sharks and other large pelagics has gotten considerable attention in recent years. But lost in the headlines is the real take-home message. A message summed up in this statement from the NMFS Science for Ecosystem-Based Management Initiative: "The costs of mismanaging a community might be far greater than the cost of mismanaging a fishery. Although overfished stocks have been known to recover, revival of communities that have changed states can be excruciatingly slow or even impossible."[3]

That is the true, and much more serious, cost of "ecosystem overfishing."

There is always a great deal of uncertainty when counting wide-ranging species, more so when they live underwater, especially as their populations shrink and they become even more elusive. And the ecosystem effects of overfishing – even serial depletion of an entire eco-stratum like the large pelagics – will always be unpredictable and, at least until it's too late, unknown. Uncertainty is reason for caution. In current practice, however, it is more often an excuse for inaction.

As Pat Wray wrote, again talking about timber wolves: "We want to understand the way everything fits together and we want it to be empirical, exact, certain. We want data. But the accumulation of dependable scientific data is often nearly impossible, at least in wild country where wolves are meant to roam. Our dependence on data blinds us to the truths that should be intuitively obvious. We are all dependent upon our ecosystems. An ecosystem, like a piece of machinery or a team, works best when it is complete, when it has all its parts."

In wild oceans, where sharks, tuna and billfish are meant to roam, we cannot know everything about how these predators shape and, yes, give life to the ecosystems they sit atop of. But some things are intuitively obvious.

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[2] Larkin, P.A. Predator-Prey Relations in Fishes: An Overview of the Theory. Predator-Prey Systems in Fisheries Management. Sport Fishing Institute. 1979.

[3] Zabel et al, Ecologically Sustainable Yield, American Scientist, March/April 2003

And sometimes we don't know what we've lost until we get it back. When wolves were re-introduced into Yellowstone in the mid-1990s, we expected they would reduce the size of the elk herds. What we didn't appreciate was that they would so drastically re-invigorate the park's ecology. As reported by Lisa Pickoff-White: "(The wolves) altered the movement of the herds, forcing the animals to continuously seek safer regions of the park to graze. With the redistribution and lower population of elk, vegetation has begun to flourish in certain areas, which in turn allows other wildlife populations to swell. Willow and cottonwoods stabilized streams, increasing the amount of trout. Beavers that feed on willow and aspen are thriving; there are now 10 dams where there was only one in 1996. Grizzlies, coyotes, magpies, and ravens feast on the elk carcasses left by the wolves."[4]

By overfishing the ocean's top predators, we put at risk much more than the social and economic benefits we accrue from healthy and sustainable fisheries; the fresh seafood, the recreation, and the future of coastal communities that depend on fishing.

By trying to maximize the catch of these fish – the epitaph for maximum sustainable yield was written decades ago, but it won't die; it still guides our fishery management policies – we take everything to the limit and usually beyond, damaging food webs we may not be able to repair. Re-introducing a population of wolves is one thing. But large, migratory fish?

And in the case of the sharks, bluefin tuna and other large pelagics, we do it all – sadly – not to feed the hungry but to supply exotic markets. Most sharks die to make shark-fin soup. Most bluefin tuna die for the wealthy patrons of elite sushi bars.

And we do it so we can fish for tuna and swordfish on the cheap and easy, using indiscriminate gear like longlines – 30-plus miles of floating mainline fishing thousands of hooks; an underwater minefield that opportunistically captures a wide range of marketable and unmarketable species. Because longline fisheries take indiscriminately from the top of the food chain, increased fishing rates for any one species means the *total* amount of predation in the system is being reduced.

<u>Ecosystem Principles for Conserving Big Fish</u>

There are three basic principles for an ecologically-based approach to managing large pelagic fish. First, we must fish them much more conservatively. This means dispensing with the goal of Maximum Sustainable Yield and replacing it with the concept of Ecologically Sustainable Yield. The population that supports MSY is typically only 40-50 percent of an unfished population and overfishing thresholds, the point at which rebuilding efforts kick in, are set at half that. From an ecological standpoint, the target population should be significantly higher, safely higher. The MSY level should become the overfishing threshold. We need to revise our national and international rebuilding goals accordingly.

Second, we have to modify or phase out fishing gear types that have significant adverse effects on other ecosystem components. Because the predominant gear in the

[4] Lisa Pickoff-White, "Hunting Patterns of Wolves Change Yellowstone Ecology," October 21, 2005, www.nationalacademies.org

pelagic fisheries is the longline, and because this gear routinely kills an enormous amount of bycatch – juveniles of the target fishery, marlins, sharks, seabirds and even marine mammals – it must be tightly regulated as to where, when and *how* it is used. The success of fisheries management quite simply depends on our ability to regulate the number of animals we kill, whether our aim is protecting a single species from over-exploitation or preserving the ocean's biodiversity – and it should be both.

Third, we must preserve the habitat of large ocean fish - such as the vast expanses of *sargassum* that serve as nursery grounds for literally hundreds of species of ocean-going migrants - and protect predator-prey relationships. Just think about giant bluefin tuna, which must keep swimming in order to breathe, and the enormous amount of energy that takes for a fish so big. They wander the high seas, for the most part a watery desert, yet must obtain enough food to keep going and keep growing. The abundance and location of prey determines the migratory routes and feeding activities of large pelagics. If their prey of choice isn't there, in the numbers they require, these patterns change. They arrive on their spawning grounds depleted. Reproduction and survival of the species are at stake.

Current Threats and Needed Actions

These are general principles. I'll conclude by talking about some specific threats, and what I think we can and should do about them:

- The western Atlantic bluefin tuna's breeding population is in serious danger of falling below critical mass, defined biologically as numbers so minuscule the stock cannot replenish itself. Stock failure in northern Europe was recently documented by the Census for Marine Life. Rampant overfishing of the eastern stock, particularly on its spawning grounds in the Mediterranean, has pulled back the veil, so to speak – fewer and fewer migrants cross over to our side to prop up our fisheries - and exposed the remnant western stock as too small to support a viable fishery. Since 2004, the U.S. bluefin tuna fishery has literally collapsed; catches are only 10 percent of what they were over the previous 20 years. Meanwhile, we allow longlining for yellowfin tuna and swordfish to continue in the Gulf of Mexico, where the last breeding bluefin go to spawn each year.

  At the top of my list is a time-area closure in the Gulf – the one place we can be assured of giving full protection to the western spawning population. In the Gulf, in the spring, every fish we kill is a rare western breeder. We're killing hundreds each year, as longline bycatch. That's out of a total population of 8-10,000. Closing the gulf to longlining where and when the bluefin spawn – a time and area identified by the research of Dr. Barbara Block[5] – would do more than anything else to protect what's left of the western bluefin spawning stock and preserve a U.S. fishery for the future.

[5] Block et al, "Electronic Tagging and Population Structure of Atlantic Bluefin Tuna," *Nature*, April 28, 2005

- We've long known that commercial fisheries for sharks are unsustainable and now, the demise of these once-abundant predators mocks are futile attempts to manage the unmanageable. Most large coastal and pelagic sharks mature late in a long life and produce not millions of eggs but just a fin-full of live "pups." Fished down to low levels, as many species have been, they are now the object of "management" plans with projected recovery periods that stagger the mind: 70 years for sandbars, and 100-400 years for duskies! Yet fishery managers bend over backwards to keep these fisheries alive. At what cost?

  The notion of doing stock assessments, holding meetings, and forever adjusting fishing regulations—all to keep a relative few fishermen in business— for the next 100 years or so, as we have for the past 20, is, quite frankly, insane. So is asking the public to pay for it. The definition of insanity is to keep doing the same thing over and over again and expecting a different result. Sharks can handle only the most limited fishing. Commercial shark fisheries are simply not sustainable, and that fact isn't going to change during the next century. Let's call the whole thing off.

- The white marlin, reduced to about 12 percent of its numbers in the 1960s, has been flirting with listing under the Endangered Species Act since 2002. It's so far escaped that ignoble designation –the most recent assessment gave the first sign of a turnaround – but now we've learned that its nearly identical genetic cousin in the Pacific – the striped marlin – heretofore "status unknown" – is just as bad off. Without, however, the benefit of any conservation measures in place to reverse the decline.

  Outside the U.S., billfish are caught as bycatch in swordfish and tuna longline fisheries. Because of the commercial value of marlin, foreign fishermen often land and sell billfish for commercial markets. It will surprise many to learn that the U.S., despite its home-grown conservation ethic (anglers release virtually all billfish alive; sale of Atlantic billfish is illegal; so is sale of striped marlin caught off the west coast), is a major importer of billfish caught by foreign fishermen. Over 2 million pounds are imported each year - fish that come mainly from the Pacific (legal) but also from the Atlantic (illegal). An open and flourishing U.S. market for foreign-caught billfish places additional pressure on unregulated Pacific stocks, while creating a black market for Atlantic-origin fish.

  The biggest contribution the U.S. can make to conserving Pacific billfish at this time is to close our markets to <u>all</u> marlin and sailfish, regardless of origin, while making it a priority to seek stronger international conservation agreements in the Pacific.

- The Atlantic swordfish is a success story. Because of international conservation measures implemented in the 1990s, we've seen a historic rebound from decades of overfishing. Because of areas in the U.S. closed to longlining in 2000, we've seen a resurgence of swordfish (along with sailfish and other species) off

the southeast coast. But for a variety of reasons, U.S. longline fishermen have been unable to fill their allotted quota. They are coveting a return to the closed areas, which would jeopardize the enormous conservation gains, including protection of the swordfish nursery grounds which helped fuel the recovery.

These marine protected areas – comprising an area the size of South Carolina, Georgia and Florida directly off the coast of these three states – are of proven value and effectiveness. Longline bycatch of billfish, sharks, dolphin and juvenile swordfish has been reduced by 50 – 75 percent. It is critical that we keep these no-longlining zones in place unless and until research demonstrates that changes in fishing gear – circle hooks, shorter sets and soak times – achieve the same level of conservation.

- Finally, sharks, tuna and billfish feed on forage species such as squid, mackerel, herring, sardine and menhaden. Increasing pressure on forage fish directly affects predator abundance, behavior and reproductive success, as they compete for a food source that becomes more and more limited.

  Forage fish are often reduced into fishmeal and fish oil for agriculture and aquaculture and, to a lesser extent, used as bait in other fisheries. The aquaculture industry is the largest consumer of fishmeal and fish oil, using more than half of the global supply, and this demand is projected to more than double in the next decade. While aquaculture is promoted as a solution to reduce pressure on wild fish stocks, the most highly-prized aquaculture species are carnivorous finfish that require significant amounts of fish-based feed. More than three pounds of wild-caught forage fish are needed to raise a single pound of salmon. Forage needed to rear a pound of tuna is estimated at 20 pounds.

  Fishery managers must develop new, more conservative standards that put "forage first" by:

  1) Amending forage fish plans to make preserving an adequate supply of prey for predators the primary plan goal;
  2) Allocating forage fish to meet predator needs first, before allocating fish to fisheries; and, as an interim measure,
  3) Placing a moratorium on any increase in harvest of forage fish or development of new fisheries.

<u>A Change in the Way We Think</u>

As the last speaker in this conference, I want to leave you with a few thoughts:

Ten years after the Ecosystem Principles Advisory Panel (EPAP)[6] Report to Congress, which laid out a blueprint for implementing "Ecosystem-Based Fishery

[6] The author served as a member of the EPAP, 1997-99.

Management," fishery managers are still protesting that they don't know what it is, or that it's too complex, too difficult.

My response is to quote the old Chinese saying that nature is not composed of things, but of relations. Likewise, an ecosystem is not made up of species, but of the relationships among them. Ecosystem-based management, simply put, takes those relationships into account.

As the EPAP noted, "(EBFM) does not require that we understand all things about all components of the ecosystem…the approach need not be endlessly complicated."

I return to what Pat Wray said about those who would wait for absolute science, while ignoring truths that are "intuitively obvious." And I must add, that when a hunter from Wyoming and a Zen philosopher from the 1950s make precisely the same point, there might be something to it. Alan Watts points out that the study of nature began with the rigorous identification and classification of species, and proceeded linearly from there, until we discovered that nature can't be wisely controlled the way we study it - piecemeal.[7]

"Nature is through and through relational," he wrote," and interference at one point has interminable and unforeseeable effects. The analytic study of these interrelations produces an ever-growing accumulation of extremely complicated information, so vast and so complex as to be unwieldy for many practical purposes, especially when quick decisions are needed."

The predictable outcome, scientifically, would be total self-strangulation, said Watts. "That it has done so only in some degree is because the scientist actually understands interrelations by other means than analysis and step-by-step thinking. *In practice he relies heavily upon intuition."*

A wise person once noted that "(s)cience cannot teach us what we need most to know about nature, that is, how to value it."[8] That, to me, is the most important thing, what's needed most to protect ocean life, from the biggest fish to the smallest. A change in the way we think. A sea-change.

[7] Alan Watts, Nature, Man and Woman, Vintage Books, New York 1958
[8] Holmes Rolston III