American Institute of Fishery Research Biologists

Promoting excellence in fishery science

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. . . BRIEFS . . .

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President's Message

In this issue of Briefs, we begin a series that allows members to speak about major issues in fisheries science. One of my favourite quotes is from a book by Feynman in which he writes that honesty in science is providing people with information that will allow them to make intelligent decisions. This is easier to say than to do, but I think that we all would like to receive objective information. However, I think it is fair to say that people in the fishing Industry and perhaps decision makers are uncertain about the information that shows up in the popular literature and even in peer reviewed papers. Ray Hilborn, Brian Rothschild and I recently attended a meeting with a small number of researchers and people in the fishing Industry. It was clear that there is a need for more public discussion of the information and interpretations that they receive. Thus, I would like to suggest that AIFRB sponsor public debates on some key issues in the management of fisheries. For now, it is only an idea, but AIFRB could step up and become an organization that provides important and honest advice in fisheries science.

Dick Beamish, November 2010

W.F. Thompson Award

Best Student Paper Published in 2008

AIFRB is pleased to announce that the following paper has been selected to receive the W.F. Thompson Best Student Paper Award for 2008. Stahl, Jennifer P., and Gordon H. Kruse, 2008. Spatial and temporal variability in size at maturity of walleye pollock in the eastern Bering Sea. Transactions American Fisheries Society 137: 1543-1557.

Ms. Stahl will receive a check, a certificate, and a one-year complimentary membership in AIFRB, and her advisor/coauthor will receive a certificate.

Fourteen papers were nominated for the 2008 award. The papers were scored by fisheries scientists on the basis of contribution to fisheries science, originality, and presentation. One reviewer stated, "This was a very solid statistical analysis of basic biological information that has direct influence on stock assessment results and catch quotas for Alaska pollock."

Research for this paper was conducted while Ms. Stahl was a Master's Degree student at the University of Alaska Fairbanks. She has a B.S. in Biology from the University of Texas at Austin. Currently she works in the Alaska Department of Fish and Game.

Best Student Paper Published in 2009

Nominations are open for the W.F. Thompson Award, which is given by the American Institute of Fishery Research Biologists (AIFRB) to recognize the "best" student paper in fisheries science published during the year in question. The award will consist of a check for $1000, a certificate, and a one-year membership in AIFRB at an appropriate level. The requirements for eligibility are as follows: (1) the paper must be based on research performed while the student was a candidate for a Bachelor's, Master's, or Ph.D. degree at a college or university in the Western Hemisphere; (2) the results of the research must have been submitted to the recognized scientific journal in which it was eventually published, or to the editor of the book in which it was eventually published, within three (3) years of termination of student status; (3) papers that are considered for the award must be concerned with freshwater or marine biological resource problems; (3) the paper must be in English; (4) the student must be the senior author of the paper. Nominations may be submitted by professors or other mentors, associates of the students, or by the students themselves. The deadline for receipt of nominations is January 31, 2010. The nominations should be sent to the Chairman of the W.F. Thompson Award Committee, Dr. Frank Panek, 11649 Leetown Road, Kearneysville, WV 25430 (email: fpanek@usgs.gov). Each nomination must be accompanied by a copy of the paper (unless it is easily available on the internet) and a résumé. The papers will be judged, by knowledgeable reviewers selected by the Chairman and the members of the Committee, on the basis of contribution to fisheries science, originality, and presentation.

The AIFRB is a 501(c)(3) tax-exempt nonprofit organization (EIN 61-6050711).

Frankenfish: A visioning exercise

Fred Utter, AIFRB Emeritus

Recently I sent a favorable message about the content of current issues of BRIEFS to the editor and the AIFRB president. In turn, I am responding to their invitation to prepare a perspective on the pending approval for marketing genetically modified Atlantic salmon dubbed "frankenfish" in some media releases. I have a two-fold interest in this topic. As a consumer, I have found the quality and price of pen-reared fish to be attractive relative to their comparable wild-caught products. This opinion is far from a blanket endorsement (as explored below) but merely acknowledgement of a potentially valid contribution to the marketplace of a specific pen-reared salmon when produced under appropriate conditions. As a biologist, there are multiple issues (e.g., genetic, ecological, public health) that interrelate to complicate guidelines for producing the genetically modified (GM) Atlantic salmon in question. I outline my perception of some of these interactions to anticipate some possible outcomes.

The product. The present product of concern is the AquAdvantage salmon, developed by AquaBounty Technologies and pending FDA approval for human consumption. Three steps for producing the GM fish are: (1) a Chinook salmon growth hormone gene modified for continual hormonal release has been inserted into an all female line of Atlantic salmon; (2) sperm from hormonally sex-reversed (and still genetically female) GM males fertilize normal Atlantic salmon eggs; (3) early embryonic pressure shock creates sterile triploid and all female progeny. The continued hormonal release of these sterile progeny accelerates their growth resulting in earlier marketability relative to non-GM fish.

A visioning exercise. In preparing this item, I came across the scholarly and detailed statements of the underlying issues that are cited below. These steered me away from presenting another (and less authoritative) technical statement towards an imagination exercise based on some common major issues outlined in these sources. The myriad possible consequences arising from the pending FDA approval for marketing the AquAdvantage product defy simple speculation. The process is analogous to predicting my (or anyone's) future from time of conception through the present (a year away from 80) to my ultimate departure. Reflecting on the past and looking ahead, it just can't be done! However, outlining a range of extreme possibilities and following a course somewhere down the middle, though inevitably flawed, puts matters within the realm of feasibility.

So here goes, returning to the metaphor of a human lifetime to envision the AquAdvantage salmon. The timeframe in years is realistic given the conception of growth hormone technology in the late 20th century (see references below). With gestation, infancy and childhood already passed, we begin at adolescence. Assuming a favorable FDA ruling, the youthful product is destined for a prep school education through 2020 where product development might follow two extremes. Optimally, a well-behaved development could proceed towards marketability being:

- reared to market size in contained isolation in Panamanian highlands (as proposed),
- close to 100% sterile triploids,
- nutritionally and allergenically equivalent to non-GM Atlantic salmon,
- subject to rigorous environmental impact studies and adaptive management,
- grown on largely synthetic plant-protein feeds supplemented by commercial harvest of such nuisance species as silver (jumping) carp.

In a contrasting rebellious and unconstrained adolescence, marketable fish could be:

- quickly expanded to temperate and escape-prone marine net-pen culture,
- infested with higher proportions of fertile diploids,
- posing elevated risks from ingestion relative to comparable non-GM fish,
- subject to firm regulatory constraints only after crises emerge,
- grown on fish meal derived from over-harvested target marine species.

In a more-likely middle road, the now-mature AquAdantage salmon production would be reared and marketed world wide.

The initial approval would facilitate multiple FDA licenses to the parent organization, and prompt other groups to develop, patent and gain marketing approval for similar Atlantic salmon and other salmonid products. The requirement for land-based containment would be relaxed, particularly in, for instance, Chilean facilities under less rigid regulation. However, there is no evidence from escaped fertile GM fish of colonization or hybridization with indigenous conspecifics. Reliance on marine fish-meal diets has substantially diminished through improved synthetic feeds.

By 2040 the middle-aged AquAdvantage salmon would be nearing retirement. Through its successful commercial career, it has been fully accepted by the public, and has supported its parent organization and mentored abundant offspring. Having undergone numerous environmental impact assessments, this GM salmon has established a standard for production and regulation of GM fish marketed for human consumption. GM fish have become an accepted and necessary commodity in a new generation of co-developed biology and technology that cannot be realistically imagined today.

Final thoughts. Like a flat stone being skipped along the surface of a pond, this thumb-nail overview only skims across the topic, inadequately addressing the area and depth of the complex and cross-relating issues concerning developing, rearing,

marketing and releasing genetically modified fish. Nevertheless, the above vision was not derived in a vacuum. Based on considerable professional experience with population genetics and induced triploidy, it is intended to stimulate differing visions from other readers based on their own and inevitably unique experiences and perspectives. These alternative views, revisited like a time-capsule 40 years down the road, could provide fascinating reading. I thank colleagues Gary Thorgaard, Eric Hallerman, and Orlay Johnson for sharing their own insights, experiences and materials with me as these thoughts were being drafted.

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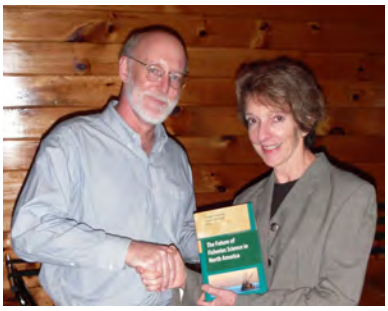
Muir, W.M. 2004. The threats and benefits of GM fish. EMBO reports 5:654-659.

Snow, A.A., D.A. Andow, P. Gepts, E.M. Hallerman, A. Power, J.M. Tiedje, and L.L. Wolfenbarger. 2005. Genetically engineered organisms and the environment: Current status and recommendations.

New England District Dines in Gloucester

Joint image at dinner table;
Back row: Melissa Belcher, Bill Duffy, Amy Koske, Sean Lucey, Ken Beal, Mike Armstrong, and Gary Nelson; Front Row: Rich McBride, Molly Lutcavage, Mike Johnson, and Charlie Blaney

Members of the NE District and distinguished guests met for dinner at the Lobstaland Restaurant in Gloucester, MA, November 16, 2010. Graduate students, current and retired professionals from academic, state, and federal fishery organizations met to exchange lively discussion on a variety of topics. After dinner, Dr. Molly Lutcavage presented a very interesting talk about Atlantic Bluefin Tuna. She reviewed extensive records of tuna movements known from modern tagging data, reflected on the historical trends in tuna populations on both sides of the Atlantic, and updated us on the research ongoing in her lab. Learning more about the wide ranging and even unexpected movements of tuna was very thought-provoking and highly relevant to managing this international species. Everyone was very excited to learn more from Dr. Lutcavage, who has recently joined the faculty at University of Massachusetts, Amherst, and has moved the "Large Pelagics Research Center" to Gloucester's "Hodgkins Lab," a seaside facility being renovated in partnership with the State of Massachusett's Division of Marine Fisheries. Richard McBride also thanks Ken Beal and Mike Armstrong for arranging this event, which was very tasty and fun. We hope to see more NE District members in the spring for our next dinner. If you are interested contact Richard.McBride@noaa.gov (voice: 508-495-2244).



Presentation image;
Dr. Rich McBride (left) presents the speaker, Dr. Molly Lutcavage, with a copy of the AIFRB's book 'The Future of Fisheries Science in North America.'

Generating public discussion on the state of fisheries and the success of fisheries management institutions

Ray Hilborn – November 2010

Almost everyone working in fisheries management recognizes a complex picture of success and failures. But over the last 15 years in the U.S., Canada, Europe, Australia and New Zealand (at least) great progress has been made in instituting sustainable fisheries management and we have seen significant reductions in fishing pressure and in many cases rebuilding of depleted stocks.

This progress has come as a result of years of work by managers, scientists, stakeholders (fishermen, NGO's etc) and politicians, that was long, difficult and unpleasant. Death threats have not been unknown. Despite this progress, there are many in the "conservation community" that fail to acknowledge the progress, and decry fisheries management as a "failed discipline."

Daniel Pauly and others scorn these successes and impugn the motives of fisheries scientists. In 2009 Pauly wrote "fisheries biologists traditionally work for government agencies, like the National Marine Fisheries Service at the Commerce Department, or as consultants to the fishing industry, and their chief goal is to protect fisheries and the fishermen they employ." Pauly and

many others continue to use the "all fish will be gone by 2048" as a cry for more funding and the failure of fisheries management.

I believe it is time that fisheries scientists and managers unite in a defense of their motives and work, and for proclaim the success they have achieved. Certainly there are many areas and fisheries that still need improvement and the existing fisheries management systems are not perfect, but we have the institutions and tools to rebuild fisheries and it is working. Fine tuning is needed, not wholesale abandonment of current approaches.

I suggest we, as a profession, actively engage the gloom-and-doomers in public discussions of the success of regional fisheries and encourage press coverage of these events. For instance, Doug Butterworth, in South Africa recently orchestrated a discussion with some NGOs just after a screening of the apocalyptic move "End of the Line." The major newspaper covered the event and the headline read "Science does not support film's message".

AIFRB was formed to address important issues in fisheries science. I am suggesting that AIFRB sponsor public debates/ discussions on these issues and the first one could be on the accuracy of the recent claims of a catastrophic failure of fisheries management. AIFRB could take a lead in organize these public events – probably best done at local Universities. My suggestion would be to invite 2-4 people with different perspectives to give their views. A moderator from AIFRB would introduce the speakers, and moderate discussion between the speakers and then the public.

Losses

John C. Marr 1918-2010

John C. Marr, 91, died on August 18, 2010 after a short illness in Glendale, CA. where he had been in poor health for the past few years. He was born in Oakland, CA, raised in St. Louis, MO, and had a very long and extremely varied career in fisheries research and international fisheries development. He was the author of over 50 articles and books on fishery development, tuna, sardine and anchovy biology and fisheries, and oceanography, and participated in about 40 international fishery meetings in over 17 countries as a technical expert, officer of the meetings, and/or U. S. Government representative and, during 1970-74, as a UNDP/FAO representative. He was a Guggenheim Fellow in 1964.

Marr received his AB and MA from Stanford University in Marine Fisheries, and spent most of WWII as the ichthyologist responsible for inspecting the health of the Monterey Bay sardine catch. During the period 1946-48 he supervised the collection of pelagic fish samples during the South Pacific atomic bomb tests at Eniwetok Island. Although he was usually professionally referred to as Dr. Marr, he never actually finished his PHD, as the boat carrying the fish which would have constituted his thesis ran aground in the fog near Half Moon Bay, CA.

During the late 1940's and most of the 1950's Marr was Director of U. S. Bureau of Commercial Fisheries Labs, first at Stanford, CA, then in La Jolla, CA, and finally from 1959-69 he was the Hawaii Area Director of the BCF lab in Honolulu.

Based in Rome, Italy from 1970-74, he was Program Leader of the Indian Ocean Program for the United Nations Development Program/Food & Agriculture Organization (UNDP/FAO), where he organized a broad effort to improve the economic development of Indian Ocean fisheries. From 1974-76, he was the Chairman of Mardela Fisheries in Honolulu, a private consulting and management firm which worked with the governments of Indonesia, Thailand, South Vietnam, & the World Bank.

A project example was the two months he spent living in an Indonesian Village on the south coast of Java near Cilacap, studying a proposal to construct tidal barriers across a large estuary which would generate electricity as the tide moved in and out. He determined that due to deforestation the estuary would rapidly silt up if the barriers were put in place.

From 1976-79 he was the Director General of the International Center for Living Aquatic Resources Management (ICLARM) based in Manila, Philippines and from 1979-1980 Marr was the Executive Director of the Western Pacific Regional Fishery Management Council.

His final fisheries work was from 1980-88 as President of John C. Marr Associates, which consulted with Asian, South Asian, and East Africa/Middle Eastern governments and agencies. During this period for the FAO he developed a 20 year fisheries development plan for the Government of Bangladesh, and a complete evaluation of the status of marine resources in Malaysia. For the World Bank he evaluated the fishery research and facilities in Indonesia, studied the fisheries of the People's Republic of Yemen, and reviewed the fisheries of the Seychelles. For the UNDP he reviewed and evaluated a grey mullet hatchery and culture project in China, reviewed and evaluated a seafarming project in Indonesia, reviewed small scale fishery developments on the coast of Somalia, as well as other evaluations of projects in Egypt, Jordan, Saudi Arabia, and Sudan.

Marr's "retirement" overlapped with his consulting work from 1980 to 1996 when he was the managing owner of Los Nogales Creek Vineyard, in Temecula, CA, with 28 acres of five varietal wine grapes. During those years he was an active participant in many wine society activities and helped to encourage the development of the Riverside County Temecula Valley Wine Country area.

He was a lecturer in Biology at Stanford University from 1948-54; Research Associate, Scripps Institution of Oceanography, University of California from 1954-59; and a member of the Affiliate Graduate Faculty at the University of Hawaii from 1959-69.

Marr was a member of the American Association for the Advancement of Science (Fellow 1961), the American Fisheries Society, the American Institute of Fishery Research Biologists (Fellow 1960), the Hawaiian Academy of Science (President 1967-69), the Society for International Development, and the Society of the Sigma XI.

Marr was married to the former Louise Morse, who died in 2001, for 61 years. He is survived by two children, Warren Marr and Molly Kay Marr York, three grandchildren, Matthew Marr, Julie Marr McCoy, and Meaghan York, and four great grandchildren.

Donations in his memory can be made to the Ocean Conservancy.

For further information, please contact Warren Marr: (818) 384-2974, warren@warrenmarr.com.

Dr. Richard Gale Bakkala EM72

Dr. Richard Gale Bakkala of Seattle passed away October 12, 2010. Born in Kalama Washington on November 3, 1930 he attended R.A. Long High School, earned his Bachelor in Marine Biology from the University of Washington. After college, Dick served two years with the U.S. Army in a medical unit in Germany, where he met his wife, Lore. As a Marine Research Biologist, he was devoted to the study of Bering Sea salmon and groundfish. He later received his Doctorate through Japan's Hokkaido University. Dr, Bakkala published over 50 scientific articles and technical reports. His dedication to his work with NOAA earned him the Silver Medal Award from the US Department of Commerce. He is survived by his loving wife of 53 years, Lore and his three children; Linda Baker (Gordon), Norman Bakkala, and Karen Flinchbaugh as well as his two sisters; Catherine Schafer and Caroline Mayer and seven grandchildren; Tim, Jon, Tony, Jason, Aaron, Julie, Rebecca, one great grandchild; Joshua, and nieces, nephews, and many good friends. In Lieu of flowers, donations can be made to the Maple Leaf Lutheran Church, Parkinson's Research Foundation, or a charity of your choice.

Ed W. Bonn Emeritus Member M73 EM81

Ed W. Bonn, of Denison, Texas, passed away on October 5, 2009. He was born on November 13, 1925.

Born and raised in Alton, Illinois, Ed first came to Texas to attend Texas A&M to study Fisheries Science. He graduated in 1943 and immediately entered WWII as a Naval Gunfire Officer in the Pacific.

He participated in combat landings with the U.S. Marines on Guam, Palau and was in the initial occupying force in Japan. He met the true love of his life, Ensign Paula Milkovich (USN Nurse Corps) at the Great Lakes Naval Station Officers Club.

After the war they soon married and moved to Texas where they lived for over 63 years.

Ed was one of three fisheries biologists hired in 1946 by what later became TPWD. As many new reservoirs were built to serve Texas' growing population, a sport fish able to utilize open-water habitat was needed. Under Bonn's leadership and direction, experiments were carried out with striped bass, a marine species, to develop ways to stock them into Texas lakes.

Ed also worked to develop methods to cross striped bass with native white bass to produce hybrid stripers. Both species now furnish recreation and food for large numbers of anglers.

Ed was also responsible for training many biologists and technicians who came to work for TPWD as the department grew. "Ed was always a very thorough and exacting biologist who was so influential to me in my early training," said retired fisheries biologist Charles Inman. "He loved fishery management and certainly helped make Texas fishing what it is today."

Ed served as the first President of the Texas Chapter, American Fisheries Society, and was inducted into the Texas Parks & Wildlife Departments Freshwater Fisheries Hall of Fame in June 2010.

Ed loved all of his family and friends and was a devoted husband, father, and a willing mentor to many. He will be dearly missed.

Tom D. Bonn, Caldwell County Judge

Fredrik V. Thorsteinson M59 EM85

Fredrik V. Thorsteinson passed away October 7, 2010. Born 1920 and raised in Seattle, he attended the University of Washington until 1943. He served in the 251st General Hospital Army Corp in Europe and North Africa until discharged in 1946. He completed his degree in Zoology at UW in 1947. He subsequently worked for the Fisheries Research Institute at Anan Creek near Ketchikan and at Chignik on the Alaskan Peninsula. He moved to Alaska for work with the U.S. Bureau of Commercial Fisheries in 1957. He supervised salmon studies at Little Port Walter in Southeastern Alaska and Olsen Bay in Prince William

Sound until moving on to an administrative position with the National Marine Fisheries Service Regional Office in Juneau where he was heavily involved with US/Canada salmon treaty negotiations. He retired from the National Marine Fisheries Service 1981.

Fred enjoyed sport fishing, hunting (including story telling at the end of the day), golf, and spending time with his family and dog. He was an active member of Pioneers of Alaska and Friends of the Library. He is survived by his wife Jean of 62 years, four children and their spouses: Fred (Carol); Donald (Susan); Lyman (Susan); Carol (Brad), nine grandchildren and three great grandchildren.

Widely adopted indicator of fisheries health questioned

The most widely adopted measure for assessing the state of the world's oceans and fisheries led to inaccurate conclusions in nearly half the ecosystems where it was applied. The new analysis was performed by an international team of fisheries scientists, and is reported in this week's issue of the journal Nature. "Applied to individual ecosystems it's like flipping a coin; half the time you get the right answer and half the time you get the wrong answer," said Trevor Branch, a University of Washington (UW) aquatic and fisheries scientist. "Monitoring all the fish in the sea would be an enormous, and impossible, task," said Henry Gholz, program director in the National Science Foundation (NSF)'s Division of Environmental Biology, which co-funded the research with NSF's Division of Ocean Sciences. "This study makes clear that the most common indicator, average catch trophic level, is a woefully inadequate measure of the status of marine fisheries."

In 1998, the journal Science published a groundbreaking paper that was the first to use trends in the trophic levels of fish that were caught to measure the health of world fisheries. The trophic level of an organism shows where it fits in food webs, with microscopic algae at a trophic level of one and large predators such as sharks, halibut and tuna at a trophic level around four. The 1998 paper relied on four decades of catch data and averaged the trophic levels of what was caught. The authors determined that those averages were declining over time and warned we were "fishing down the food web" by overharvesting fish at the highest trophic levels and then sequentially going after fish farther down the food web.

Twelve years later newly compiled data has emerged that considers the numbers and types of fish that actually live in these ecosystems, as well as catch data. The new analysis reveals weaknesses in assessing ecosystem health from changes in the trophic levels of what is being caught. "This is important because that measure is the most widely adopted indicator by which to determine the overall health of marine ecosystems," said Branch, lead author of the Nature paper.

Those involved with the U.N.'s Convention on Biodiversity, for instance, chose to use the average trophic level of fish caught as the main measure of global marine diversity. An example of the problem with the measure is in the Gulf of Thailand where the average trophic level of what is being caught is rising, which should indicate improving ecosystem health according to proponents of that measure. Instead, it turns out fish at all levels have declined tenfold since the 1950s because of overharvesting. "The measure only declines if fisheries aimed for top predators first, but for the Gulf of Thailand the measure fails because fisheries first target mussels and shrimp near the bottom of the food web, before shifting to fish higher up," Branch said. Including the Gulf of Thailand, Branch found that changes in the average trophic levels of what was being caught, and what was found when fish populations were surveyed, differed in 13 of the 29 trawl surveys from 14 ecosystems.

Trawl surveys, generally done from research vessels, count the kinds and abundance of fish and are repeated over time to reveal trends. Branch and co-authors are the first to combine many trawl surveys for analysis–no one had combined more than a handful before. The trawl survey data came from efforts started three years ago by fisheries scientists and ecologists, who gathered at the NSF-supported National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, Calif. They brought together world-wide catch data, stock assessments, scientific trawl surveys, small-scale fishery data and modeling results.

What emerged is the most comprehensive set of data yet for fisheries researchers and managers. It paints a different picture from previous catch data and has revealed another major new finding: on a global scale humans don't appear to be fishing down the food web, Branch said. "The research shows the importance of synthesis to furthering an understanding of fisheries impacts and management strategies," said Phillip Taylor, section head in NSF's Division of Ocean Sciences. "For complex ecosystem interactions, answers can only come from repeated scrutiny of data, and comparisons of different scientific methods and systems," said Taylor. "This synthesis points to a path forward to evaluate fisheries influences on ocean ecosystems."

The new catch data reveal that, following declines during the 1970s in the average trophic levels of fish being caught, catches of fish at all trophic levels have generally gone up since the mid-80s. Included are high-trophic predators such as bigeye tuna, skipjack tuna and blue whiting. "Globally we're catching more of just about everything," Branch said. "Therefore relying on changes in the average trophic level of fish being caught won't tell us when fishing is sustainable–or if it is leading to collapse." When harvests of everything increase equally, the average trophic level of what is caught remains steady. The same is true if everything is overfished to collapse. Both scenarios were modeled as part of the analysis. "The 1998 paper was

tremendously influential in gathering together global data on catches and trophic levels, and it warned about fishing impacts on ecosystems," Branch said. "Our new data from trawl surveys and fisheries assessments now tell us that catches weren't enough. In the future we will need to target limited resources in the best way, focusing on species that are especially vulnerable to fishing and developing indicators that reflect fish abundance, biodiversity and marine ecosystem health. "Only through such efforts can we reliably assess human impacts on marine ecosystems." "We conducted the first large-scale test of whether changes in the average trophic levels of what's caught is a good indicator of ecosystem status," said Beth Fulton, co-author of the paper and an ecosystem modeler with the Commonwealth Scientific and Industrial Research Organisation, Australia. "Catch data might be easiest to get, but that doesn't help if what it tells us is wrong," said Fulton. "Instead we really need to look directly at what the ecosystems are doing."

Co-authors of the paper are Reg Watson and Grace Pablico, University of British Columbia; Simon Jennings, Centre for Environment, Fisheries and Aquaculture Science and University of East Anglia, England; Carey McGilliard, University of Washington; Daniel Ricard, Dalhousie University in Halifax, Nova Scotia; and Sean Tracey, University of Tasmania, Australia. The research also was supported by the Gordon and Betty Moore Foundation and the UW School of Aquatic and Fishery Sciences.

Sparks fly over theory that volcano caused salmon boom.

Could volcanic ash feed ailing fish populations?

Speculation has been flying this week that a 2008 volcanic eruption on an Alaskan island was responsible for this year's glut of salmon in rivers in British Columbia, Canada. If confirmed, the idea will improve biologist's understanding of the notoriously unpredictable size of salmon runs, and add fuel to the controversial idea of intentionally seeding the ocean with iron to boost diminishing fish stocks. But some researchers contacted by *Nature* warn that the theory is "far fetched".

After dismally low numbers in 2009, sockeye salmon mysteriously returned in record numbers to British Columbia's Fraser River this year (see 'Canada sees shock salmon glut'). Tim Parsons, one of Canada's most eminent fisheries researchers, has suggested that iron in the ash from the volcanic eruption on Kasatochi island, which spurred a phytoplankton bloom, could have indirectly provided a feast for the salmon. Parsons, an honorary scientist at the Institute of Ocean Sciences in Sidney, Canada, has a government-awarded medal named after him for ocean sciences. So fisheries experts are keen to hear Parsons out and look forward to studies that might confirm the theory. "It's as good as any other theory we have at this time," says Carl Walters at the University of British Columbia's Fisheries Centre in Vancouver.

"It's as good as any other theory we have at this time."

Carl Walters, University of British Columbia

One way to check the idea, says David Welch of Kintama Research Corporation, a marine science consultancy in Nanaimo, British Columbia, would be to check the scales of salmon that returned in 2010 to see if they experienced an unusual growth burst in the autumn of 2008. "Salmon [scales] have growth rings just like tree rings," says Welch. "That would be a very useful way to test this quickly." Walters says that will happen, but he's not convinced it will be very revealing.

Ashes to food

Parsons' suggestion relies on a study in *Geophysical Research Letters* by Roberta Hamme of the University of Victoria, British Columbia[1]. The paper links the 7-8 August 2008 eruption of the Kasatochi volcano in the Aleutian Islands to a huge phyotoplankton bloom later that month. The eruption wasn't particularly large, but a storm spread its ash over a wide area. The resulting bloom was the biggest in 12 years of records, covering 1.5-2 million square kilometres of ocean. "We'd never seen anything like that," says Hamme.

It has long been known that the growth of phytoplankton in the North Pacific is limited by the amount of iron in the water. Dust storms from Asian deserts add doses of iron to the North Pacific, and volcanoes have recently been considered to be another important source[2,3]. The Hamme paper hammers home that connection. The question is whether such eruptions can have an impact on salmon.

Salmon don't eat phytoplankton: they eat zooplankton and small fish, which in turn feed on phytoplankton. Zooplankton take months to a year to reproduce, so a single big burst of food for them over 3-4 weeks doesn't necessarily boost their numbers much, says Welch. Hamme says there were high levels of zooplankton in surface waters in August and September of 2008, but not as high as in early summer, before the eruption occurred.

The salmon that returned to British Columbia this summer would have been in the Alaskan Gulf in the autumn or early winter of 2008, in time to benefit from the food boom. But when Randall Peterman of Simon Fraser University in Burnaby, Canada looked at 18 other populations of salmon that wintered in the Gulf of Alaska in 2008, only three had unusually high

return rates. “Whatever effects there were, they would have had to be right where the Fraser River sockeye were, but not where the other fish were,” says Peterman. That’s possible, but “kind of far fetched”, he says. “It’s more likely that the large returns this year in the Fraser are due to something closer to the British Columbia coast,” he says.

But Walters notes that the last big salmon run in part of the Fraser River, in 1958, came two years after a huge eruption on the Kamchatka Peninsula. “The story makes sense,” he says.

Global glut?

If the Alaskan volcano did cause this year’s salmon boon, such a glut could happen elsewhere too. But for the hypothesis to work, a series of things have to line up. The volcano has to have iron-rich ash, and has to dump it in those parts of the oceans that are iron-limited: the northern and equatorial Pacific or the Southern Ocean. The eruption has to happen in the spring or summer, when phytoplankton growth isn’t limited by low light, and it has to spur the growth of zooplankton rather than algae. And the fish have to stumble on that patch during their critical growth period.

All this could spur some to think of intentionally seeding the ocean with iron to boost fish numbers. Some companies formed with the controversial intent of dumping iron into the sea in order to combat climate change have also advertised the positive side-effects on fish food. But is that a good idea? “Good god no,” says Walters. “Our experience with fertilizing things is it’s way too easy to fertilize the wrong thing. In general, it’s a pretty dangerous thing to do.”

The Canadian Prime Minister ordered an inquiry into what is happening with salmon numbers, and why predictions of the British Columbia salmon runs have been so wrong in recent years — in particular in 2009. They are now considering whether the 2010 boom is a sign of improvement, or just a fluke event — whether caused by the volcano or by something else.

Nicola Jones From Nature

Study provides data that can inform Atlantic sturgeon recovery efforts

Study of ocean migration indicates that local management of the population may be insufficient and supports recently proposed listing for Atlantic sturgeon under US Endangered Species Act

STONY BROOK, NY, October 6, 2010 - A first-of-its-kind study that tracked the oceanic migrations of adult Atlantic sturgeon that were caught and tagged in the Hudson River discovered that these fish move vast distances in the Atlantic Ocean, traveling as far south as Georgia and as far north as Nova Scotia, Canada. The findings indicate that recovery of Atlantic sturgeon fisheries will need to address long-range oceanic threats to the species in addition to local measures closer to spawning grounds. These results are particularly timely given the announcement on October 5 by NOAA’s Fisheries Service, proposing that five populations of Atlantic sturgeon along the U.S. East Coast, including the population examined in this study, receive protection under the federal Endangered Species Act (http://www.nefsc.noaa.gov/press_release/2010/News/NR1025/index.html).

The researchers used pop-up satellite archival tags (PSAT), which were affixed to sturgeon in their freshwater spawning grounds in the Hudson River. This relatively new technology enabled researchers to track fish movements over a larger area, and without the bias that can occur with other commonly used methods such as fixed acoustic arrays or fishery-dependent observations.

“This study of Atlantic sturgeon provides us with new insight into the very critical oceanic phase of the lives of these fish,” said Dr. Ellen Pikitch, Executive Director of the Institute for Ocean Conservation Science at Stony Brook University and co-author of the study. “Effective restoration policies for sturgeon must consider threats to the species throughout their life cycle.”

As is the case for most species of sturgeon, Atlantic sturgeon spawn in fresh water but spend the majority of their lives in the sea, A status review conducted in 2007 identified five Distinct Population Segments for Atlantic Sturgeon, which are genetically and ecologically distinct groups of fish.

“This research demonstrates Atlantic sturgeon from the New York Bight move widely through the near-shore Atlantic Ocean and thus, likely mix with groups of other Atlantic sturgeon along the East Coast of the United States, making the conservation and management of Distinct Population Segments as separate and distinct groups very difficult, if not impossible,” said Daniel L. Erickson, Oregon Department of Fish and Wildlife, and primary author of the study, who was a researcher for the Institute and the Wildlife Conservation Study while the study was being conducted. “The results also suggest that PSAT technology can be an effective means for studying Atlantic sturgeon and possibly other sturgeon species, and is particularly helpful for uncovering oceanic behavior and for defining critical habitat.”

This method of study was first applied to sturgeon by Erickson and Dr. Pikitch to understand the migratory behavior of green sturgeon on the West Coast. Results of that study have since been used by NOAA’s Fisheries Service to help delineate critical marine habitat for these sturgeon, which were recently listed as threatened.

The research revealed three major sturgeon aggregation areas of these Atlantic sturgeon, including aggregations off the southwest shore of Long Island, the New Jersey shore, and off shore of Delaware Bay. A small concentration was also found within Long Island Sound. While most of the tags popped off within the mid-Atlantic Bight, two of the tagged sturgeons traveled much further afield, with one traveling north to Cobequid Bay off Nova Scotia and the other traveling south to the coast

of Georgia.

"Atlantic sturgeon were almost rendered extinct in the late 1800s due to over-fishing, and recent protections enacted to save these fish have prevented further declines," said Dr. Pikitch. "If we want Atlantic sturgeon to make a full recovery, we need to understand and address the threats these fish face during their oceanic phase. This study provides the most comprehensive picture of the migratory behavior of sturgeon in the ocean to date."

Atlantic sturgeon are directly harvested in Canadian waters, and although they are currently protected from directed take in U.S. waters, they are subject to by-catch mortality by commercial fisheries. Bycatch mortality of Atlantic sturgeon over a broad swath of ocean may be an important factor impeding their recovery. This week, NOAA's Fisheries Service proposed that five populations of Atlantic sturgeon along the U.S. East Coast receive protection under the federal Endangered Species Act. The Gulf of Maine population is proposed for listing as threatened, and endangered status is proposed for the Chesapeake Bay, New York Bight, Carolina, and South Atlantic populations. Species listed as endangered receive the full protection of the Endangered Species Act, including a prohibition against "take," defined to include harassing, harming, pursuing, wounding, killing, trapping, capturing, or collecting. Similar prohibitions usually extend to threatened species.

The research reported herein was the result of a collaborative effort among the Institute for Ocean Conservation Science at Stony Brook University, the Wildlife Conservation Society, the New York State Department of Environmental Conservation - Hudson River Estuary Program, and the U.S. Fish and Wildlife Service - Northeast Fishery Center. The work was made possible through several sources, including the Fish America Foundation, the Hudson River Foundation, the National Fish and Wildlife Foundation, John Frederick Thye, and Pamela M. Thye.

"Use of pop-up satellite archival tags to identify oceanic-migratory patterns for adult Atlantic Sturgeon" will be published in the December issue of the Journal of Applied Ichthyology. For more information, visit http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1439-0426/issues.

Great Lakes Fishery Commission Lauds Canada's Plan to Assess Risk of Asian Carpes

Fisheries and Oceans Minister Gail Shea launches first binational Asian carp initiative

ANN ARBOR, MI—

The Great Lakes Fishery Commission today praised Fisheries and Oceans Minister Gail Shea for launching a major initiative to assess the risk Asian carps pose to the Great Lakes. The risk assessment will be conducted jointly between scientists in Canada and the United States; the Great Lakes Fishery Commission will facilitate the project. This risk assessment will be the first binational effort to evaluate the likelihood of Asian carps spreading throughout the Great Lakes basin and to gauge the potential effect of the species on the Great Lakes ecosystem. The assessment will involve preeminent scientists in the field, will be peer-reviewed, and should take about eighteen months to complete.

The term "Asian carps" refers to several species of fish originating from Asia. Three species of Asian carps—the bighead, silver, and black—were imported into the southern United States in the early 1970s to keep aquaculture ponds clean and to provide fresh fish for markets. The fish escaped into the Mississippi River system in the 1980s and 1990s after large floods and have been expanding their range northward ever since. The impact of Asian carps on the Mississippi system has been quite profound: the fish reproduce in large numbers, consume vast quantities of food, and displace native species. The silver carp (often called the "flying carp") leaps out of the water and has injured people and damaged property.

A non-natural connection—the Chicago Sanitary and Ship Canal—links the Mississippi basin to the Great Lakes and is the primary pathway of concern for the Asian carps. An electrical barrier on the waterway prevents carp migration, but sampling—and the capture of one live bighead carp in June, 2010—has raised concern that Asian carps might be on the Lake Michigan side of the barrier, though probably in small numbers. The Great Lakes Fishery Commission has joined other agencies in working together to support measures to monitor carp movement and prevent entry into the Great Lakes. (For more information see www.asiancarp.org)

"The Great Lakes Fishery Commission commends Canada for launching this initiative to better understand the potential for Asian carps to spread throughout the Great Lakes ecosystem," said David Ullrich, the commission's U.S. Section Chair. "With this risk assessment, we will have a vastly improved understanding about where Asian carps might establish a population within the basin, as well as important information about the probable impact of Asian carps on the fishery and environment, should they enter the lakes."

NOAA: More Fishing, Higher Consumption Might Help Reverse Lionfish Invasion

Massive fishing effort also involves chefs to introduce "delicious" fish to consumers

A new study looking at how to curb the rapid growth of lionfish, an invasive species not native to the Atlantic Ocean, suggests that approximately 27 percent of mature lionfish will have to be removed monthly for one year to reduce its population growth rate to zero. But the good news is that the invasive fish happens to be delicious—and NOAA is encouraging chefs to find new ways to introduce it to U.S. consumers.

Lionfish are native to the western and central Pacific Ocean, but have established themselves from North Carolina to South America. They are a popular aquarium fish that were likely first released in Florida waters in the mid-1980s. Since then, the species has spread rapidly. Scientists and public officials are seriously concerned at the effect lionfish are having on reef ecosystems, since this predator is capable of rapid population growth and outcompeting native fish for food and territory. "This study offers us the first target for fishing and other local control efforts such as lionfish derbies," says Lad Akins, director of operations for the Reef Environmental and Education Foundation, an organization of divers and marine enthusiasts who are working to combat the lionfish problem.

The effort to fish down the species has already begun. Caribbean nations such as the Turks and Caicos Islands are encouraging widespread fishing for lionfish by instituting year-long tournaments with cash prizes for the most lionfish caught.

Authorities are also encouraging a local market for the species, whose delicate white flesh tastes similar to a snapper or grouper. NOAA scientists concur that developing a market for lionfish is one of the only ways to substantially reduce their numbers. To this end, NOAA has developed an "Eat Lionfish" campaign that brings together fishing communities, wholesalers, and chefs in an effort to broaden U.S. consumers' awareness of this delicious invader.

While the study represents a significant step forward in understanding how to turn the tide of the invasion, the study's authors warn that more work is needed to understand the ecological effects of lionfish, track the population, and develop control strategies. "Lionfish represent the first reef fish invader to become established in the Atlantic, but as we know from history, invasive species are a persistent problem," says Dr. James Morris, a marine ecologist with NOAA's Center for Coastal Fisheries and Habitat Research. "Understanding the factors involved in the spread of lionfish may help us be better prepared for future invasions."

The study's recommendation of a 27 percent monthly reduction represents a major fishing effort which may not be feasible in some areas, such as the expansive areas where lionfish have become established off the southeast U.S. coast, but which may be possible in areas where lionfish habitat is more constrained. The study, a collaboration between scientists from NOAA and North Carolina State University, can be found in the June 2010 issue of Biological Invasions.

Goverment scientists find first damage to marine life on ocean floor near blown-out oil well

NEW ORLEANS (AP) — For the first time, federal scientists have found damage to deep sea coral and other marine life on the ocean floor several miles from the blown-out BP well — a strong indication that damage from the spill could be significantly greater than officials had previously acknowledged. Tests are needed to verify that the coral died from oil that spewed into the Gulf of Mexico after the Deepwater Horizon rig explosion, but the chief scientist who led the government-funded expedition said Friday he was convinced it was related. "What we have at this point is the smoking gun," said Charles Fisher, a biologist with Penn State University who led the expedition aboard the Ronald Brown, a National Oceanic and Atmospheric Administration research vessel. "There is an abundance of circumstantial data that suggests that what happened is related to the recent oil spill," Fisher said.

For the government, the findings were a departure from earlier statements. Until now, federal teams have painted relatively rosy pictures about the spill's effect on the sea and its ecosystem, saying they had not found any damage on the ocean floor. In early August, a federal report said that nearly 70 percent of the 170 million gallons of oil that gushed from the well into the sea had dissolved naturally, or was burned, skimmed, dispersed or captured, with almost nothing left to see — at least on top of the water. The report was blasted by scientists.

Most of the Gulf's bottom is muddy, but coral colonies that pop up every once in a while are vital oases for marine life in the chilly ocean depths. Coral is essential to the Gulf because it provides a habitat for fish and other organisms such as snails and crabs, making any large-scale death of coral a problem for many species. It might need years, or even decades, to grow back. "It's cold on the bottom, and things don't grow as quickly," said Paul Montagna, a marine scientist at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University in Corpus Christi. He was not on the expedition. Montagna said the affected area is so large, and scientists' ability to explore it with underwater robots so limited that "we'll never be able to see everything that happened down there." Using a robot called Jason II, researchers found the dead coral in an area measuring up to 130 feet by 50 feet, about 4,600 feet under the surface. "These kinds of coral are normally beautiful, brightly colored," Fisher said. "What you saw was a field of brown corals with exposed skeleton — white, brittle stars tightly wound around the skeleton, not waving their arms like they usually do." Fisher described the soft and hard coral they found seven miles southwest of the well as an underwater graveyard. He said oil probably passed over the coral and killed it. The coral has "been dying for months," he said. "What we are looking at is a combination of dead gooey tissues and sediment. Gunk is a good word for what it is." Eric Cordes, a Temple University marine scientist on the expedition, said his colleagues have identified about 25 other sites in the vicinity of the well where similar damage may have occurred. An expedition is planned for next month to explore those sites.

When coral is threatened, its first reaction is to release large amounts of mucus, "and anything drifting by in the water column would get bound up in this mucus," Cordes said. "And that is what this (brown) substance would be: A variety of things bound up in the mucus." About 90 percent of the large coral was damaged, Fisher said. The expedition was funded by the Bureau of Ocean Energy Management and the National Oceanic and Atmospheric Administration. The mission was part of a four-year study of the Gulf's depths, but it was expanded this year to look at oil spill damage.

In a statement released Thursday night, NOAA Administrator Jane Lubchenco said the expedition underscored that the damage to marine life from the oil spill is "not easily seen." She added that more research was needed to gain a "comprehensive understanding of impacts to the Gulf." "Given the toxic nature of oil, and the unprecedented amount of oil spilled, it would be surprising if we did not find damage," she said. NOAA did not provide any officials or scientists of its own who went on the expedition. The Bureau of Ocean Energy Management said its researcher on the expedition was unavailable. Cordes said that the expedition did not find dramatic visual evidence of coral damage in other sites north of the well. But he said it was premature to say coral elsewhere in the Gulf was not damaged. The new findings, though, could mean long-term trouble for the coral southwest of the well, where computer models and research cruises mapped much of the deepwater oil. Referring to one type of coral known as "gorgonians," Cordes said he had never seen them "come back from having lost so much tissue. It would have to be re-colonization from scratch."

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