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American Institute of Fishery Research Biologists

Promoting excellence in fishery science

... BRIEFS ...

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President's Message

I retired at the end of May. I did not stop work, I only adjusted my priorities and reduced my expectations. I kept the priority of giving back something to our profession which I think is the main reason to belong to AIFRB. Our Deputy Minister invited me to come to Ottawa after I retired to meet her and her executive to say whatever I wanted. My message was that government supported research provides a stable workforce and stable worksites that are necessary to solve some difficult problems such as how recruitment of Pacific salmon is regulated. Solving these problems requires teams of researchers to carry out directed research that is focused and accountable. I focused on government research because in the last 15 years in Canada there has been a tendency to question the need for government research. I gave them an example of a research project that I think Canada should support. I suggested that it is timely to have an "International Year of the Salmon". Researchers in all salmon producing countries now work as a team, behave as a family and enjoy each others company when they meet. Thus, it is time to bring everyone together to identify the mechanisms that regulate salmon abundances. The technologies exist, there are enough ships and enough biologists. I believe that a large number of sponsors will share the costs. All we need is someone to step up and lead the parade. I think AIFRB can begin to speak out on similar issues. There are a number of major integrated research projects that we could support. We need to be careful about our priorities, and we do not have money, but we do have a voice. We could develop a short list of essential research projects that we consider are necessary for the development of fisheries research. If we do this I would like to see "The International Year of the Salmon" on the list.

Dick Beamish June 2011

AIFRB would like suggestions for research projects that will be essential for managing fisheries in the future. Suggestions can be emailed to Dick Beamish (Richard.Beamish@dfo-mpo.gc.ca), Steve Cadrin (scadrin@umassd.edu), or the editor John Butler (John.Butler@noaa.gov)

Annual Meeting

The AIFRB annual meeting is tentatively scheduled to meet in the Queen Anne Room at the Sheraton Seattle Hotel (1400 6th Ave., Main Building, 3rd floor), from 8 am to 5 pm on both Saturday and Sunday, Sept. 3-4. District Directors are encouraged to attend.

AIFRB Reception

AIFRB will hold its annual reception jointly with the UW School of Aquatic and Fishery Sciences on Tuesday Sept. 6 (5:30-8:00 pm at the Seattle Convention Center (room number to be announced).

New Director of the New England District

Dr. Gary Nelson was recently elected the Director of the New England District. Gary Nelson holds a BS in Marine Biology from University of Massachusetts-Dartmouth, and an MS and PhD in Wildlife and Fisheries Biology from University of Massachusetts-Amherst. He has worked for the Massachusetts Division of Marine Fisheries (DMF) since 2001 and is the head of the fish biology program. His main duties include: stock assessment of striped bass and river herring and representative of Massachusetts to the Atlantic States Marine Fisheries Commission (ASMFC)'s striped bass stock assessment, technical and tagging subcommittees and to the ASMFC's river herring stock assessment subcommittee. He has



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published papers on the population biology of sand lance (*Ammodytes dubius*), wolfish (*Anarhichas lupus*), pinfish (*Lagodon rhomboides*), spotted seatrout (*Cynoscion nebulosus*) and striped bass (*Morone saxatilis*), gastric evacuation in little skate (*Leucoraja erinacea*), and thermal ecology of striped bass. Gary likes to teach when he has a chance and has taught workshops on the PRIMER multivariate package, the R statistical package, and generalized linear models to state biologists, federal biologists and graduate students through the ASMFC, DMF, the University of Massachusetts-Amherst, and the Southern New England Chapter of the American Fisheries Society. He also likes to use his computer programming skills to assist others with data analyses and has published on-line an R package called *fishmethods* and, recently, developed a Microsoft Access application to assist Massachusetts watershed groups with the statistical estimation of river herring passage numbers using visual methods. As Director-elect, he would like to pursue workshop opportunities for AIFRB members on statistical topics such as spatial analysis and modeling of fisheries data.

AIFRB's John Jolly appointed to South Atlantic Fishery Management Council

Long time member of AIFRB John Jolly of West Palm Beach Florida was recently appointed to a at-large seat on the South Atlantic Fishery Management Council. John recently retired from a career in fisheries and financial industry. John has been an advisor to AIFRB on investment of AIFRB funds for a number of years and a strong financial supporter of AIFRB providing regular donations to the organization.

John worked for a number of years with Florida Fish and Game before turning to the financial world. John has been a strong supporter of fishery science and management of sport fish of the southeast. He served the West Palm Beach Fishing Club's President and board chairman for 30 years and spent a great deal of time developing a body of data on western Atlantic sailfish observing that they are relatively long lived (17 years) and have wide natural variations in reproductive success. John was instrumental in initiating billfish catch-and-release to the West Palm Beach Fishing Club in which led to tag-and-release flags, which encouraged the extremely important spirit of cooperation with scientists and managers for data collection and sharing knowledge. John, in a August 2011 article in SportfishingMag.Com, article sums it up as "Release-idermy" (release rather than skin mounts) and the adoption of circle hooks represent a growing conscientiousness toward long-term protection. "I love this story, It's a success story of self-regulation that resulted in a better fishery and more caring and educated anglers."

We thank John for his many contributions to AIFRB, and wish him success and long service on the SAFMC.



John Jolly and Vidar Westestad at the West Palm Beach Fishing Club in 2009

Dr. George H. Allen

Emeritus Fellow George Allen died on May 9, 2011 at the age of 87. He was born August 16, 1923, in Kusnacht, Switzerland where his father was a U.S. Consul. His mother was a watercolor artist and avid tennis player. When George was four years old, his father was transferred to Calgary, Canada where he resided until he attended the University of Wyoming. George completed his undergraduate degree after serving three years in the United States military. He is a World War II Veteran. He completed his Master's and Doctorate studies at the University of Washington in 1956. During his last year at the "U Dub," he met and married Beverly Robinson, "that beautiful red headed woman who lived next door," and moved to Humboldt County to begin a 30+ year career at Humboldt State University (HSU) as a Fisheries professor. While teaching at HSU, George was a motivating force in helping build the University's fish collection into the fourth largest collection the state of California. He was also instrumental in establishing the HSU Oceanography program and developing the HSU graduate program in Fisheries. George's experience with wastewater aquaculture and his work with graduate students in raising trout and salmon in tertiary treated wastewater made him an excellent candidate to work in collaboration with the City of Arcata and Humboldt State University to create the internationally recognized artificial marsh wastewater treatment system which is part of the Arcata Marsh and Wildlife Sanctuary (AMWS). The AMWS received an award and grant from the Ford Foundation making it possible to build the Arcata Marsh and

Wildlife Sanctuary Interpretive Center. For his work on the marsh projects, an AMWS marsh was named in George's honor. In 1985, shortly after he retired, HSU President Alistair McCrone awarded George the President's Distinguished Service Award for his outstanding contributions and service to HSU and the City of Arcata. In 2008, an Ichthyology Laboratory at HSU was named in his honor.

Ultimately George was a modest man who gave credit to others. His greatest rewards have largely been the successes of his students, to whom he has been no less than inspirational. On the personal side, George was an avid fly fisherman and spent summers hiking and back packing with his family in the Marble Mountains, Trinity Alps, Woolly Creek and Willow Creek. The family's first trip was to Monument Lake, when their youngest child was age four, a six mile trip at that time. He was a collector of 'found objects' which he put together in his own inimitable style and placed them to be enjoyed around the family property. The family is deeply grateful for over 50 years of devoted friendships throughout Humboldt County, including Archie and Sue Mossman, a friendship sustained by weekly dinners that in later years included Phyllis Helligas, Bert Taylor, and Marilyn Walker. George had many university colleagues that he regarded with deep fondness, unfortunately space does not allow. He leaves his wife Beverly after 56 years of marriage, daughters Terryll Allen (Jim Lee) of Albuquerque, New Mexico; Wendy Burroughs of Bainbridge Island, Washington; Stasia (Jim) Buffenbarger of Eagle, Idaho; grandchildren Chelsea and Trent Burroughs, Hannah and Dylan Buffenbarger. The family is grateful for the support and compassion of the staff and residents at the Timber Ridge Retirement Community in McKinleyville, California.

Robert Stickney Retires

Robert R. Stickney, AIFRB Fellow and member since 1983, is retiring as the Director of the Texas Sea Grant College Program and Professor of Oceanography at Texas A&M University at the end of August, 2011. Bob received his B.S. in Zoology at the University of Nebraska in 1967, his M.A. in Zoology (Limnology) at the University of Missouri in 1968 and his Ph.D. in Oceanography (Biological) in 1971.



*Bob with a Bass he caught in
November 2010*

He conducted his Ph.D. research at the Skidaway Institute of Oceanography on channel catfish nutrition during 1970 and joined the staff after graduation from FSU as an Assistant Professor where his research focused on flounder culture and estuarine ecology. His first stint at Texas A&M began in early 1975, again at the Assistant Professor level, in the Department of Wildlife and Fisheries Sciences. He managed the Aquaculture Research Center and, over a period of almost nine years, had a large number of graduate students (at one time he was supervising 17 of them) and taught aquaculture, mariculture and estuarine ecology. Bob left Texas A&M as a Professor in January, 1984 to assume the position of Director of the Fisheries Research Laboratory at Southern Illinois University and professor in the Zoology Department. That position lasted for a brief, but enjoyable 18 months, when he joined the faculty at the University of Washington as the Director of the School of Fisheries in September of 1985. He stepped down from that position after several years but remained on the faculty until returning to Texas A&M as Sea Grant Director.

In addition to the species mentioned, over the years Bob and his students were involved in aquaculture research on red drum, freshwater shrimp, rainbow trout, salmon, Pacific halibut and even grew water chestnuts. He first heard of and collected tilapia in 1975 and was the first research in Texas to study the nutritional requirements and other topics related to the culture of various tilapia species. Nearly unheard of, at least by the general public in the United States in 1975, tilapia are now one of the most popular seafoods in the country.

Bob had a number of opportunities to work or attend meetings in over 20 countries around the world as part of various research projects, program reviews or to assist with the development of laboratories or university curricula. Bob's wife of nearly 50 years, Carolan, shared some of the international experiences, including a month in Haiti in 1983 and a month in New Zealand in the early 1990s.

When Bob and Carolan returned to Texas in 1996, they bought several acres about 30 miles north of College Station and built their retirement home. He plans to punch his small herd of cows occasionally, get much more serious about his photography hobby, and perhaps catch a few fish. There are also plans for Bob and Carolan to travel, with at least one visit a year to visit daughter Marolan and her family in Seattle and more frequently up to Keller (just north of Ft. Worth, Texas) where his son Bob and his family live.



Get To Know Phil Mundy

Phil Mundy, director of the NOAA Auke Bay Laboratories in Juneau, Alaska, is as passionate about his lab's role in supporting stewardship of marine and coastal resources as he is about explain the lab's work to broader audiences.

1. Why is your research important?

I came to work for DOC/NOAA because its mission is an exact fit for my career objectives; part of the Department of Commerce mission statement is to “provide effective management and stewardship of our nation’s resources and assets to ensure sustainable economic opportunities.” My research is important because conservation of living marine resources and protection of coastal and ocean habitats is essential to the health and economy of our country. If marine resources are to contribute to the economic well being of the nation on a sustainable basis, resource utilization decisions need to be guided along sustainable pathways by policy-relevant scientific information. I believe that building readily understandable scientific information from the basic building blocks of observations and models is the most important work that a NOAA scientist can do.

2. What do you do to share your passion about research with broader audiences?

One of the best ways I have found to infuse the public with a passion for science is through scientific meetings where the format allows the public and media to understand what is presented. As an original convener of the Alaska Marine Sciences Symposium, which today annually attracts 800 – 900 scientists from Alaska and the rest of the nation, I helped establish a plenary format where speakers are required to use jargon-less English and simple illustrations that can reach people of all scientific disciplines. The meeting is becoming popular with members of the public and the press as a place to hear about the most recent scientific discoveries relevant to their livelihoods and interests. I also provide written work, oral interviews, and background materials to our public outreach specialists who work with the media, I often do the “meet-and-greet” function when members of the public come to visit our facility, and I work with graduate students when time permits.

3. What do you enjoy the most about your work?

I really enjoy the positive energy I receive from daily interactions with the people at our lab who share a common sense of urgency about the work we do, and who so obviously enjoy meeting the intellectual and physical challenges of gathering data from some of the harshest environments in the world, the Bering Sea, the Gulf of Alaska, and the Arctic. The team spirit at our lab keeps me energized even when problems with budgets and logistics make things really tough.

4. Where do you do most of your work? In a lab? In field studies?

Most of my work is done on the Internet, working with the data and information from our scientists who work on the water, and using information produced by other parts of NOAA and other entities. I use the Internet each day to connect scientists with the financial and material resources they need, to connect scientists with potential collaborators, to answer regional and national questions with our lab’s information, to engage teams of scientists who are developing research strategies to deal with existing and emerging marine resource management problems, and to look for better ways to apply our scientific resources to meet the needs of our client agencies, such as the North Pacific Fishery Management Council.

5. What in your lab could you not live without?

I absolutely could not live without the facilities crew members who keep the seawater running to the labs, plow the snow, maintain the heating and ventilation systems, build infrastructure to support experiments, and so much more. Juneau is a high latitude location (58N) with no road access, so I couldn’t live without the peace of mind provided by a talented group of people who are always ready to deal with “things that go bump in the night.”

6. If you could invent any instrument to advance your research and cost were no object, what would it be? Why?

It would be an inexpensive tag the size and weight of a thumbnail to record the physical oceanographic conditions surrounding a fish by time and location. Tags like this already exist but they are relatively large and expensive, so there are many species of fish for which current tags are too big, and regardless of size, cost now prohibits applying them to enough individuals to make inferences to the larger population. Physical observations from satellites, moorings and ships have really helped our understanding of how climate shapes fish production. Taking our understanding to the next level requires physical observations of the waters that actually surround the fish.

7. When did you know you wanted to pursue science??

I grew up on the “lab bench,” as the son of a research toxicologist who shared his work with me, so I had a lot of opportunities to get to know biochemistry and molecular biology at an early age. Spending long hours indoors wrestling cranky analytic instruments while suffering the occasional rat bite did not appeal to me as a career. It wasn’t until college that I started to understand there were other areas of science that would allow me to combine my interests in fish, fishing, and diving with making a living. When I learned that I could do some of my work outside without ever again having to clean out rat cages, I was sold on a career in fisheries science.

8. What’s at the top of your recommended reading list for someone wanting to explore a career in science?

Careers in science don’t get much better than that of Prof. Edward O. Wilson, who has won two Pulitzer Prizes for his ability to communicate the wonder and fulfillment of science to the public. His autobiographical work, *Naturalist*, in tracing his path in science from the beaches of Alabama to the Harvard Biological Laboratories, Wilson provides an allegorical history of science that doubles as a road map for aspiring scientists.

9. What part of your job as a NOAA scientist did you least expect to be doing?

I joined NOAA late in my career, after having worked frequently with NOAA scientists over the years, so I have to say that this job didn’t hold any real surprises for me.

10. Do you have an outside hobby?

I enjoy music, as a listener and collector of everything from Texas swing to chamber music. Thanks to my iPod I can combine music with hiking and weight training, which fill out the rest of my spare time.

11. What would you be doing if you had not become a scientist?

I would have enjoyed being a software engineer, the trials of the engineers depicted in the comic strip, *Dilbert*, notwithstanding. To support my family while in fisheries graduate school, I worked as an application programmer for the School of Public Health at the University of Washington where I coded custom statistical programs and wrangled databases for the faculty. I loved the challenges of translating the mathematics into computer language, and threading the programs and large data sets through the computer’s operating system. I was tempted to leave fisheries for computers, but I didn’t want to give up working summers on the water amid beautiful scenery.

12. Who is your favorite historical scientist and why?

Galileo Galilei is said to have been called the “father of modern science” by his intellectual descendant and beneficiary, Sir Isaac Newton, so who am I to disagree? In all seriousness, I readily identify with the challenges Galileo faced in describing the workings of the natural world in terms of mathematical models. What I find even more admirable than his successes in understanding and communicating how so many things worked, is that he did so while inventing a good deal of the mathematics he applied to the problems encountered. In Galileo’s life and times I also find confirmation of the comforting thought that science always eventually trumps politics, whether or not those involved live to see it. Galileo reminds me that the political controversies over the facts and origins of global climate change that have buffeted so many scientists inside and outside of NOAA will eventually cease, and to the extent that it is supported by observation, the science will remain for all time.

In Memory of Dr. Theodore R. Rice

By James E. Sykes

Ted Rice and I reported to work at the Fishery Laboratory in Beaufort, NC on the same day; November 11, 1949. We both went to work for the U.S. Fish and Wildlife Service. He had just received a PhD from Harvard under the guidance of Professor George Clark. Ted had been interviewed by Bert Walford, in Washington, D.C. and was reporting to work under Walter Chipman in the Radiobiological part of the lab, while I reported to work under Clinton E. Atkinson, who was in charge of both labs and was Chief, Middle Atlantic Fishery Investigations. Ted, was very bright, a fact that was attested by Dr. Carl Sinderman who was at Harvard taking some sort of advanced chemistry in a class with him. Carl said that Ted would be washing up his glass ware and hanging up his apron in preparation to leave the chern Lab, at a point when fellow students were in the middle of their experiments. I believe that Robert Edwards was also a student at Harvard at the same time.

On his way to the lab, Ted remarked to his wife, Frankie, that Morehead City would be a good place to settle down and rear their kids. They did and they did. They reared Teddy, who came with them and became a PhD in physics, Gregory. who is a PhD in pharmacy, and Scott, a PhD, MD, who practices in Morehead.

Ted and his family remained close friends of my family through the years. He was a devout Christian, and taught a Sunday School class of boys for many years in the local First Baptist Church. He and I both were members of the local U.S. Army Reserves. He had served as a Major in the U.S. Chemical Corps. Among his greatest accomplishments at the Beaufort lab was the recruitment of several top flight scientists, among them being Claire Shelske, Bud Cross and Douglas Wolfe. Bud succeeded Ted as Director. Ted also had a couple or three misfires, as were common to most of us. He was also recognized by the few who knew, as a compassionate leader who worked with members of his staff on personal problems, including certain addictions.

Having left Beaufort in 1962 to serve as director of the St. Pete Beach NOAA Lab. Ted recruited me back to Beaufort ten

years later to serve as his chief of fisheries until my retirement ten years later. During that time we had few disagreements, but I spent a substantial amount of time attempting to remind him that there were other labs in existence in addition to the one at Beaufort. He would fight doggedly in behalf of Regional funds being allocated to our lab. A good amount of his insistence may have stemmed from the fact that Harvey Bullis was such a formidable contender for the same funds.

Ted, in addition to being a good leader, was a great family man. He loved Frankie, and when he bought something for his boys, whether it was stamps, coins, certificates or chain saws, he always bought three; one for each son. He also kept careful file records of their progress as they progressed through life. The Beaufort lab library bears his name.

Through a Fish's Eye: Status of Fish Habitats in the United States 2010

The National Fish Habitat Board (www.fishhabitat.org) has released a first-of-its-kind status of fish habitats in the United States report as envisioned in the National Fish Habitat Action Plan, an effort to protect, restore and enhance our nation's aquatic habitats. The report titled *THROUGH A FISH'S EYE: The Status of Fish Habitats In The United States 2010* summarizes the results of an unprecedented, nationwide assessment of the human effects on fish habitat in the rivers and estuaries of the United States.

Through a Fish's Eye, provides an important picture of the challenges and opportunities facing fish and those engaged in fish habitat conservation efforts. Urbanization, agriculture, dams, culverts, pollution and other human impacts have resulted in specific areas of degraded habitat where restoration is most likely needed to bring back the healthy habitats and fishing opportunities that once existed. Addressing degraded habitat also requires reducing or eliminating the sources of degradation mentioned in this report, through best management practices, land use planning, and engaging landowners, businesses, and local communities in the effort.

The assessment detailed in the report assigns watersheds and estuaries a risk of current habitat degradation ranging from very low to very high. These results allow comparisons of aquatic habitats across the nation and within 14 sub-regions. The results also identify some of the major sources of habitat degradation that plague waterways across the nation.

Overall, 27 percent of the miles of stream in the lower 48 states are at high or very high risk of current habitat degradation and 44 percent are at low or very low risk. Twenty-nine percent of stream miles in the lower 48 states are at moderate risk of current habitat degradation.

Fifty-three percent of estuaries (by area) are at high or very high risk of current habitat degradation, while 23 percent of estuaries are at low or very low risk of current habitat degradation. Marine habitats of the United States tend to be most degraded near the coast, where they are most affected by human activity.

The goal of the national assessment was to estimate disturbance levels to fish habitats in rivers and estuaries from information about human activities occurring in the watersheds and the local areas affecting each aquatic habitat. This approach is supported by a large body of scientific research showing that human disturbances to the land transfer to receiving waters and contribute to disturbance in downstream fish habitats in rivers, estuaries, and the ocean.

While the specific analytical approaches used to assess habitats in the lower-48 states, Alaska, Hawaii and U.S. estuaries differed slightly, the end product of each analysis was similar—an estimate of the risk that discrete habitat units will be degraded due to current human activities on the landscape.

"This report identifies areas where those efforts are most needed and points to areas where fish habitat is most likely still intact and should be protected to maintain its value for fish and other aquatic organisms. Resources for fish habitat conservation are limited, especially for the next few years," said Kelly Hepler, Chairman of the National Fish Habitat Board.

"Fish Habitat partnerships ensure coordinated work around specific habitat challenges," said Eric Schwaab, Assistant Administrator for NOAA Fisheries. "This information will help bring strategic focus to conservation efforts and allow rigorous measurement of results."

"This report clearly illustrates the need for strategic use of existing resources through partnerships that can identify the most effective use of funds and help the nation as a whole make progress in fish habitat conservation," said U.S. Fish and Wildlife Service Acting Director Rowan Gould. "There are many major threats to the health of fish habitat and the National Fish Habitat Action plan helps to focus and leverage available funds, pool technical expertise, and enlist new partners to address the challenges to fish habitat."

Key findings from the "Through a Fish's Eye: Status of Fish Habitats" report include:

Habitats with a very high risk of current habitat degradation include those in or near urban development, livestock grazing, agriculture, point source pollution or areas with high numbers of active mines and dams. Specific locations that stand out as regions at high risk of current habitat degradation include: the urban corridor between Boston and Atlanta; the Central Midwestern states of Iowa, Illinois, Indiana and Ohio; the Mississippi River Basin, including habitats adjacent to the lower Mississippi River in Arkansas, Mississippi and Louisiana; habitats in eastern Texas; and habitats in Central California and along the Columbia River in Oregon and Washington.

Areas that stand out as being at very low risk of current habitat degradation include rural areas in New England and the Great Lakes states; many habitats throughout the Mountain, Southwest and Pacific Coast states; and most of Alaska. It should be noted that not all water and land management issues could be addressed in the assessment, so some of the areas mapped as at low risk of current habitat degradation actually may be at higher risk due to disturbance factors not assessed. For example, most arid regions of the western United States were found to be at low risk of current habitat degradation.

Estuaries in the mid-Atlantic have a very high risk of habitat degradation related to polluted run-off and other effects of the intense urbanization and agriculture in this area. The estuaries of southern California also have a high risk of current habitat degradation for similar reasons. Estuaries in the north Pacific and downeast Maine have a low risk of current habitat degradation.

The release of this report is also accompanied with the release of a map viewer, which offers the maps that are in the report in greater detail. The National Fish Habitat Action Plan map and data web tool (www.nbj.gov/far/nfhap) was developed by the U.S. Geological Survey's Biological Informatics Program under guidance of the National Fish Habitat Action Plan Science and Data Committee. This tool not only enables users to see multiple views depicting the condition of stream and coastal habitats across the country, but also means that users can access more detailed information at finer scales, as well as the option to download data files and map services.

Administration issues new rules for fish farms

The Obama administration released new guidelines that would make it easier to farm fish in federal waters, a move that could transform the nation's coasts and the food Americans will consume in years to come.

The proposal, which sparked immediate criticism from some environmental groups, aims to increase the amount of farm-raised seafood in the United States by authorizing regional fisheries management councils to approve aquaculture operations off the coasts and in the Gulf of Mexico.

Currently there are no fish farms in federal waters, only in the three-mile band of state waters. Some operators have applied to build fish farms in federal waters in the past, but none have won approval yet.

National Oceanic and Atmospheric Administration's Fisheries Service officials said new ventures could ease fishing pressures on wild stocks and cut the nation's seafood imports.

The new policy, released late Thursday, underscores the extent to which the United States and other nations are struggling to find enough seafood to supply their growing populations. Aquaculture — in which operators cultivate everything from oysters, mussels and algae to top predators such as salmon — now accounts for roughly half the fish consumed, as the world's wild stocks continue to dwindle.

But it has also raised serious environmental questions, ranging from whether raising carnivorous fish ends up depleting forage fish stocks to concerns about farmed fish escaping and mixing with wild species.

Michael Rubino, who directs the aquaculture program for NOAA Fisheries, said the new rules seek to address the fact that the United States currently has a \$9 billion seafood trade deficit. Of those imports, 84 percent are cultivated rather than caught.

Referring to the Agriculture Department's new dietary guidelines released this month, Rubino said, "USDA is asking us to eat twice as much seafood. Where is that going to come from? ... There aren't going to be large numbers of fish farms out there anytime soon. But it's coming."

The aquaculture guidelines, which have been in the works for a year and-a-half and will take another year to finalize, greenlights fish farms in the Gulf of Mexico and elsewhere. It applies the nation's traditional fishery management laws — which were originally crafted to set criteria for how much wild fish can be caught in a season — to aquaculture.

Rubino said the agency must rely on existing fisheries law because Congress has not passed legislation tailored toward farm-raised fish. "It wasn't designed for aquaculture but it can be used for aquaculture," Rubino said.

But George Leonard, director of aquaculture for the Ocean Conservancy, an advocacy group, said the idea of using the same laws that apply to wild-caught fish is equivalent to "a square peg in a round hole," adding it was "nonsensical" to apply the same yield calculations to operations where fish are grown from the start.

The new policy comes just as two groups, Australia's World Fish Center and the U.S. advocacy group Conservation International, are about to release the first global assessment of aquaculture next week. Their analysis found that out of the 75 species they surveyed, raising more fish translated into greater environmental damage, but this impact was less harmful when compared to raising livestock.

China and the rest of Asia account for 91 percent of the world's cultivated seafood, the report found, while North America produces just 1.9 percent. The researchers found that raising eel, salmon shrimp and prawns had the biggest environmental impact because of the energy and amount of fish feed required to produce them, while mussels, oysters, clams and seaweed had the smallest impact.

"There are a number of well-founded concerns about aquaculture, in terms of its impacts on marine ecosystems and wild fisheries," said Sebastian Troëng, Conservation International's vice president for marine conservation. "But with global fisheries reaching alarming and unprecedented levels of depletion, fish cultivation versus wild fish capture has to be considered."

From: Washington Post

The Great California Caviar Rush

In only a decade, the Golden State has become the unlikely epicenter of America's caviar industry. How does the Sacramento Valley's harvest match up to the pearls of the Caspian Sea?

On a breezy April afternoon in the grassy delta flatlands of Galt, Calif., fins and tails were churning the waters inside raised tanks the size of above-ground swimming pools.

The bellies of the 100-pound, six-foot-long sturgeon of the Fishery aquaculture farm were white, their vacuum cleaner-nozzle mouths toothless and slightly be-whiskered. The fish have shark-like skin. Down their wide flanks run reptilian spikes, called "scutes," ancient prototypes of fish scales. They are brutal in appearance, ugly even, living fossils from a prehistoric evolutionary crossroads.

Sturgeon—Acipenseridae—have outlived whatever killed the dinosaurs. They've survived everything in the past 250 million years, only now to fall prey to man's desire for their clusters of glistening roe. Their eggs sell for as much as \$270 per ounce in gourmet shops world-wide, and garnish the \$50 entrees of white-tablecloth plates everywhere.

Caviar—the other black gold—sublimely salty, sweet, earthy, an acquired taste, to be sure, and pleasant to the eye, has been a delicacy of khans, tsars, monarchs and aristocracy for millennia. But in the past decade the market for wild sturgeon caviar—the *crème de la crème* of the delicacy—has been wracked by poachers, smugglers, polluted waters and the threat of extinction for the most prized of the world's 27 sturgeon species, those producing wild beluga caviar.

Caviar is packed into aging tins.

Besides protecting endangered sturgeon, import bans on Caspian Sea caviar have another upside. They created an opportunity for a group of entrepreneurial biologists and fish farmers in California's Central Valley region, where cattle ranches have given way to sturgeon farms. Now domestic roe farmers have birthed a sustainable caviar industry, winning over, however reticently, the collective palate of the haute-cuisine stratosphere. And greenmarket grocery chains such as Whole Foods Market have dropped Caspian Sea caviar mainstays for the sustainable domestic brands.

"Caviar plays an extremely important role in my cuisine," said Timothy Hollingsworth, the chef de cuisine at Napa Valley's three-Michelin-star French Laundry. "Russian caviar is, unfortunately, pretty much obsolete. So having an alternative that is local, and sustainable, is simply...great."

Corey Lee, the James Beard Award-winning chef at San Francisco's Benu restaurant, has mixed feelings about the California product. "I've tried most of them, and there's some good ones out there, but they can't be compared to the wild caviar," he said. "I realized years ago that I have to view farmed caviar as a new ingredient, with its own measures of quality, and not as a substitute for the wild."

Mr. Lee conceded, however, that farmed caviar will only continue to get better as the industry becomes more competitive and knowledgeable. "I do think that the farmed caviar is the future," he said.

Now even purist caviar stalwart Petrossian, based in Paris and New York, has turned to the West Coast for its product, oft-laddled into blini by its American enthusiasts. "Ten years ago we sold 100% wild," said Michel Emery, Petrossian's director of sales. "Now we are 100% sustainable." The cachet of wild caviar-versus-farmed caviar has become a "nonissue," according to Mr. Emery.

Five years ago, Petrossian sold wild Beluga caviar for \$270 a tin or jar (Ossetra, for \$220). Now the figures for their farm-raised caviar are nearly two-thirds lower.

Petrossian represents 30% of the U.S. caviar market, and all of the white sturgeon caviar it sells in the States comes from Sacramento Valley farms. That factor alone is reason enough to hang a highway sign outside the city limits reading: "Welcome to Caviar Country."

The new caviar country is located six hours north of Los Angeles and an hour and a half east of San Francisco. It's a 60-mile stretch of lush, grassy, stream-crossed plains spanning from the Sacramento-San Joaquin Delta to the Sacramento Valley. The region now produces an estimated 85% of all the white sturgeon caviar in the U.S., including the creamy, crystalline dollops served in A-list eateries such as The French Laundry, Per Se and Nobu.

"We are witnessing a historic shift in the caviar world," said Richard Adams Carey, author of "The Philosopher Fish: Sturgeon, Caviar, and the Geography Of Desire." His globetrotting 2005 book exposed Caspian caviar cartels and predicted the delicacy's future home in the States.

"Throughout the history of caviar consumption, the Caspian Sea has been the Champagne region of the industry," Mr. Carey said. "But the Sacramento Valley is establishing itself as the new center of it all." There are five "aqua farms" in the region, two actual caviar producers: Sterling Caviar and Tsar Nicoulai. Sterling is the larger of the two, producing 12 tons of caviar per year—its tanks churning with 2.5 million gallons of freshwater. Sterling appears to be winning the game, having nabbed an exclusive partnership with Petrossian.

Caviar "harvest" occurs only once a year, and is rarely witnessed by outsiders. But on a recent morning, Peter Struffenegger, the manager of Sterling, permitted a visitor to watch the process, exhibiting what it takes to make caviar worthy of the finest mother-of-pearl spoons and Champagne pairings.

Inside a metal-and-concrete processing building, 100-pound female sturgeon are hoisted onto a trough, where their ripe

bellies are opened with a single deft slice, and their prized eggs are delicately removed and whisked off to a sterile, climate-controlled anteroom—a far cry from the gill nets and haphazard savagery of the Caspian Sea poachers.

Pearls of Wisdom

How caviar goes from being tasteless roe found in sturgeons' gullets to tasty delicacies on your table.

Ancient Greeks and Romans ate the meat of sturgeon. But it's unknown who sampled the first roe. The first recorded usage of the term "caviar," which derives from the Turkish word "khavyar," is attributed to Batu Kahn, Ghenghis Khan's grandson, in a written description of a meal he ate in 1240 at a monastery north of Moscow. Russia is recognized as having created the methods to making caviar taste as it does. In general terms, here's how it's done today:

1. After they're taken from female sturgeons' bellies, eggs are hand-pressed through a fine steel grate.
2. Carefully washed, the eggs are weighed and hand-mixed with superfine salt to a precise ratio of 4.25% salt to caviar.
3. The caviar is dried on a stainless-steel rack, then tinned in a unique batch (not to be mixed with the eggs of another fish).
4. "Grading" of the caviar is conducted by specialists. (Compared with wild Caspian, farm-raised white sturgeon caviar is most often compared to, in taste and appearance, to Russian ossetra.)
5. A 100-pound sturgeon can produce as many as 22 pounds of caviar, which can fetch a price of up to \$28,000, if rated the highest grade based on color, size, firmness and taste, "Imperial." (1% of most American caviar farms' harvest earns this rating.)
6. Finally, comes the pricing: Sterling Caviar's top-grade Imperial sells for \$88 per ounce, a marked contrast to Caspian Sea wild beluga caviar, which retailed five years ago in gourmet shops for \$270 per ounce.

Behind plastic curtain-strip doors, workers in hairnets, smocks and surgical masks move with assembly-line efficiency in the 40-degree Fahrenheit room (warm temperature affects the caviar's taste) separating eggs from ovary, then washing, salting and tinning the caviar.

Quality control is conducted by Lucy Bowman, an animal and food science expert from Lake Charles, La. She tastes each batch with the same plastic spoons you might use for sampling ice cream, grading it on firmness, color and taste. "I eat enough caviar during harvest to carry me through the year," said Ms. Bowman.

"It all gets regraded by Petrossian in New York," said Mr. Struffenegger, referring to the gourmet company's knack for allocating caviar according to the tastes and preferences of chefs and purveyors they supply. "After it's farmed, that's when our specialty begins," said Alexandre Petrossian, the company's managing director and heir to the caviar house.

Fresh-from-the-belly caviar isn't fishy, but sea-like in flavor, with a texture of cool tapioca. Caviar must be aged between three months to a year and a half before it develops its full flavor. Comparing fresh caviar to aged, said Sterling's Mr. Struffenegger, "is like comparing grape juice to wine."

So why is the Sacramento Valley—the uncelebrated cousin of Napa and Sonoma—ground zero for caviar?

The 65- to 75-degree temperature of the local groundwater creates a perennial summer for farmed sturgeon, allowing them to mature in seven years instead of 14 (in the wild). The nearby Sacramento River provided the original brood-stock for the farms. And luck played a hand in it all.

In 1977, Serge Doroshov, a Soviet scientist and sturgeon expert, defected from the Soviet Union, migrating to the Sacramento area to work in the Animal Science department at University of California, Davis. Sharing his aquaculture experience in Russia—where caviar-making methods were long shrouded in Iron Curtain secrecy—Mr. Doroshov sponsored studies on sturgeon biology that allowed the local caviar industry to be developed within a relatively short time. So brief, in fact, that The Fishery owner Ken Beer, a former grad student of Mr. Doroshov, said "We've now got a 10-year head start on everybody."

"Philosopher Fish" author Richard Adams Carey made a comparison to the wine world. "Just as California wines can now rival and sometimes exceed European wines, the same thing's happening with caviar."

David Bouley, the chef and owner of Manhattan's two-Michelin-starred Bouley, expanded the analogy. "The salty-sweet balance of caviar adds length to the flavor of food the way oak does to wine," said Mr. Bouley, who shares Mr. Carey's faith in the Sacramento Valley aquaculture farms. "In the last few years," he said, "farmed caviar has really evolved in its balance of flavor. In a blind tasting, sometimes it can be difficult to distinguish it from wild caviar."

Meanwhile, the competition is heating up. Said Dale Sherrow, owner of 1991-founded Seattle Caviar, "In the next four years, the quality level of American caviar makers is going to separate the men from the boys."

Wall Street Journal

West Coast boasts underwater Serengeti, study finds

How many fish can we harvest to feed growing populations without entirely depleting ocean reserves? What kind of damage did last year's oil spill actually cause to the Gulf of Mexico's wildlife? And when is it safest to swim in waters that man-eating sharks sometimes haunt? The way to find out: Attach electronic tags to ocean-going creatures and send them out to do the research.

That's what a team of researchers did in a decade-long project that has shone unprecedented light under the waters of the world's biggest ocean — the Pacific — and proved the value of methodology that can be adapted to unlock key secrets of the deep elsewhere around the world.

The Census of Marine Life's Tagging of Pacific Predators (TOPP) project, published Wednesday in the online version of the journal *Nature*, deployed 4,036 tags on 23 different species of ocean predators, including following a single salmon shark for more than $3\frac{1}{2}$ years. It reveals the eastern Pacific Ocean is akin to Africa's Serengeti, teeming with wildlife and crisscrossed by migration corridors used by sharks and seabirds. But the census's greater value might be in advancing knowledge of a largely uncharted underwater world on which we increasingly depend.

"It's precedent-setting. It's a tremendous tool for conservation and management," said Jesse Ausubel, vice president of the Alfred P. Sloan Foundation and co-founder of the Census of Marine Life. "We were literally blind. We can now see. We know what's underneath now."

Seventy-five researchers from five countries collaborated on the project, which cost between \$20 million and \$25 million, analyzing the ocean's chlorophyll content and tracking the nature of the water through which the predators moved. The study proves that the California Current (which flows south along the West Coast of the U.S., Canada and Mexico) and a trans-oceanic migration highway called the North Pacific Transition Zone (which connects the western and eastern Pacific on the boundary between sub-arctic and subtropical waters) provide a critical habitat for many species.

"Just off the West Coast may be one of the greatest hot spots for open ocean predators in the world," said Barbara Block of Stanford University's Hopkins Marine Station, the lead author of the study along with Daniel Costa, professor of ecology and evolutionary biology at the University of California at Santa Cruz.

In a phone interview, Block said she was struck by how each spring the rich nutrients in the cool water along the California Current drew an array of animals to the same place. Young bluefin tuna make their way from Japan for the area's oceanic soup of krill, sardines, anchovies and squid, as do leatherback turtles from Indonesia and sooty shearwater birds from New Zealand.

"They have their favorite haunts, they clearly have the places they keep going back to," Block said. "The upwelling [of nutrients] is so intense there in the springtime it really sets the table for the whales, the tuna and the sharks. They come and lunch at that table, from everywhere in the entire Pacific realm."

Steven Bograd, a research oceanographer at the National Oceanic and Atmospheric Administration's Southwest Fisheries Science Center and one of the paper's co-authors, said scientists had determined the California Current is "a predictably and persistently productive region" many marine creatures gravitate to over and over again.

"We've characterized, better than ever before, that it is a really critical area in the life history of these animals," he said in an interview.

Tagging revealed that several species — including leatherback sea turtles, black-footed albatrosses and salmon sharks — followed similar routes from the western, central or south Pacific to reach the current's rich resources. For shearwaters tagged off New Zealand, this amounted to a 262-day, 39,790-mile round-trip journey in a figure-eight pattern, the longest animal migration ever recorded electronically at the time.

Costa said the fact that these different creatures are following the same path helps account for why some of them, including leatherback turtles, get caught by fishing vessels that are targeting other species. In one instance, he noted, the same female elephant seal tagged in 1995 off the island of Ano Nuevo north of Santa Cruz "took the same exact path 11 years later" when researchers tagged her again.

"It's not genetic; it's some sort of learned behavior," Costa said in an interview.

Elephant seals won another distinction in the course of the project: At 5,492 feet, one seal dove deeper than any other tagged animal in the study.

Ausubel said the findings would be "as if from space we can see the people on the D.C. metro, and not only the D.C. metro but the people on Amtrak, and at Dulles Airport, and Reagan National Airport and BWI."

"Now you suddenly see these incredible patterns by these commuters, long distance and short distance," Ausubel said, referring to the animals.

The scientists emphasized that the fact that many of these commutes largely take place within the exclusive economic zones of the United States, Canada and Mexico — the 200-mile stretch from shore that individual countries can govern — means that the three countries can adequately protect these areas.

Heidi Dewar, another co-author and scientist at NOAA's Southwest Fisheries Science Center, wrote in an e-mail that the fact that "many species return to predictable neighborhoods both near shore and on the high seas" means policymakers can now target these areas for protection with greater precision.

In the case of sharks, Block said, researchers were able to determine that species with a common ancestor — salmon, white and mako sharks — preferred to spend time in slightly different temperatures. In Alaska, salmon sharks swim in water as cold as minus 9.4 degrees Fahrenheit but can manage in temperatures as high as 53.6 degrees; great whites stick close to the California coast at 53.6 degrees but journey to Hawaiian waters as warm as 69.8 degrees; and makos inhabit seas as warm as 80.6 degrees Fahrenheit.

“We’ve dug inside the guilds down to the species level,” Block said.

The information revealed through electronic tagging, Ausubel said, should compel policymakers to protect these underwater animal meccas. “It’s a joy and a revelation, and it’s also a call to action.”

New warning on Arctic sea ice melt

Scientists who predicted a few years ago that Arctic summers could be ice-free by 2013 now say summer sea ice will probably be gone in this decade. The original prediction, made in 2007, gained Wieslaw Maslowski’s team a deal of criticism from some of their peers. Now they are working with a new computer model - compiled partly in response to those criticisms - that produces a “best guess” date of 2016. Their work was unveiled at the European Geosciences Union (EGU) annual meeting. The new model is designed to replicate real-world interactions, or “couplings”, between the Arctic ocean, the atmosphere, the sea ice and rivers carrying freshwater into the sea. “In the past... we were just extrapolating into the future assuming that trends might persist as we’ve seen in recent times,” said Dr Maslowski, who works at Naval Postgraduate School in Monterey, California. “Now we’re trying to be more systematic, and we’ve developed a regional Arctic climate model that’s very similar to the global climate models participating in Intergovernmental Panel on Climate Change (IPCC) assessments,” he told BBC News. “We can run a fully coupled model for the past and present and see what our model will predict for the future in terms of the sea ice and the Arctic climate.”

And one of the projections it comes out with is that the summer melt could lead to ice-free Arctic seas by 2016 - “plus or minus three years”. It does not make predictions about the Greenland ice cap.

Thin evidence

One of the important ingredients of the new model is data on the thickness of ice floating on the sea. Satellites are increasingly able to detect this, usually by measuring how far the ice sits above the sea surface - which also indicates how far the ice extends beneath.

Inclusion of this data into the team’s modelling was one of the factors causing them to retrench on the 2013 date, which raised eyebrows - and subsequently some criticism - when it emerged at a US science meeting four years ago. Since the spectacularly pronounced melting of 2007, a greater proportion of the Arctic Ocean has been covered by thin ice that is formed in a single season and is more vulnerable to slight temperature increases than older, thicker ice. Even taking this into account, the projected date range is earlier than other researchers believe likely.

But one peer - Dr Walt Meier from the US National Snow and Ice Data Center in Boulder, Colorado - said the behavior of sea ice becomes less predictable as it gets thinner. “[Maslowski’s] is quite a good model, one thing it has is really high resolution, it can capture details that are lost in global climate models,” he said. “But 2019 is only eight years away; there’s been modelling showing that [likely dates are around] 2040/50, and I’d still lean towards that. “I’d be very surprised if it’s 2013 - I wouldn’t be totally surprised if it’s 2019.”

The drastic melt of 2007 remains the record loss of ice area in the satellite era, although subsequent years have still been below the long-term average. But some researchers believe 2010’s melt was equally as notable as 2007’s, given weather conditions that were favorable to the durability of ice. Although many climate scientists and environmental campaigners are seriously concerned about the fate of the Arctic sea ice, for other parts of society and other arms of government its degradation presents challenges and opportunities.

The Russian and Canadian governments, for example, are looking to the opportunities for mineral exploitation that will arise; while the US military has expressed concern about losing a natural defense around the country’s northern border for part of the year. “I’m not trying to be alarmist and not trying to say ‘we know the future because we have a crystal ball’,” said Dr Maslowski. “Basically, we’re trying to make policymakers and people who need to know about climate change in the Arctic realize there is a chance that summer sea ice could be gone by the end of the decade. “For the national interest, the defense interest, I think it’s important to realise that 2040 is not a crystal ball prediction.”

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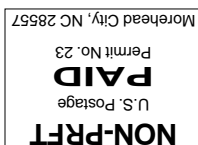
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