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Fall 1999

**Listing Puget Sound Chinook  
as Endangered Under the ESA  
-- PART I --**

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In March of 1999, the National Marine Fisheries Service (NMFS) made the determination that Puget Sound chinook salmon were likely to become endangered in the foreseeable future and listed them as threatened. Every wild

population of chinook salmon in the Puget Sound region was listed, beginning at the Elwha River on the Strait of Juan de Fuca, Hood Canal, all of southern Puget Sound and north to the Nooksack River south of the Canadian/US border. With that determination, the full authority of the federal Endangered Species Act (ESA) ascended over chinook salmon management in Puget Sound, including the habitat designated as critical to maintenance and recovery of the species. At town meetings organized to discuss saving the salmon, city and county officials were ready to participate in salmon habitat improvement plans to help recover stream and riparian habitats and reduce the impact of listing on their communities. The City of Seattle sought NMFS’ approval of instream flows in the Cedar River, the city’s water supply. The governor of Washington State formed the Salmon Recovery Office, and, with the Joint Natural Resources Cabinet, developed a draft plan, “Statewide Strategy to Recover Salmon: Extinction is not an Option.” These were measures that reinforce the intense concern that was ushered in by exercise of the federal statute, and there appeared to be little inquiry as to the justification of the listing, or whether the federal action had proceeded along a legitimate administrative framework. For the most part, the listing was accepted as due process, with no recourse left but to enable recovery.

There is another point of view on the listing and on what NMFS’ responsibility actually entails under the ESA. This view entreats the public and the state to re-examine both the process followed by NMFS in assessing risk of extinction, and their definition of the unit at risk of extinction before accepting the inevitable consequences of the present course of action that NMFS has charted. It is important to understand that the template NMFS uses actually emanates from their interpretation of

responsibility under the Act, and a definition of what constitutes the “species” at risk. The formation of such a construct has implications on the rationale for listing Puget Sound chinook salmon and most certainly how justification is perceived for the listing. It is also noteworthy that NMFS has taken the position that part of their responsibility under the ESA is to determine the role of hatchery fish (if any) in development of recovery plans for listed species. These are pertinent issues that have impacts on the fishery, the length of time required for recovery to be completed, changes in land use, cost to private land owners, and other related effects on the residents of Puget Sound that need to be addressed in some detail to understand the implications of the listing.

In the creation of the ESA, Congress intended that species facing risk of extinction be conserved, but they were also concerned about the potential abuse of the federal authority in administering the Act. They instructed NMFS to use the ability to list sparingly and only when the biological evidence warranted such action (96<sup>th</sup> Congress, 1<sup>st</sup> Session, 1979 Senate Report 151). It is incumbent on NMFS to judiciously exercise their responsibility and carefully examine all of the evidence that should be considered in the assessment of a species at risk. Has NMFS exercised the rigor necessary to satisfy that directive? Have they demonstrated that the biological evidence warranted such action? Have the public and the state been careful to understand the limitations of that authority with regard to the intent of the ESA? The issue is not the Act, but the manner in which the Act is administered, and the political ramifications that can result from the exercise of questionable judgement in the case of Puget Sound.

### ***Are There Differences in the Wording and Application of the ESA?***

When Congress enacted the ESA in 1973, the stated purpose was “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species” [ESA, Sec. 2(b)]. The term species “includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature” [ESA, Sec. 3(16)]. Therefore, the term “species” does not refer only to the traditional taxonomic species such as the condor, grizzly bear, or northern spotted owl, but it can refer to distinct population segments within a species when the situation justifies such attention.

Congress specified that the basis for determination of an endangered or threatened status will be made “solely on the basis of the best scientific and commercial data available after conducting a review of the status of the species and after taking into account those efforts, if any, being made by the state to protect such species,” [ESA, Sec 4(b)(1)(A)]. Once a species has been listed, the Secretary of Commerce of Interior “shall issue such regulations as he deems necessary and advisable to provide for the conservation of such species” [ESA, Sec 4(d)]. Furthermore, “the Secretary shall develop and implement plans (referred to as recovery plans) for the conservation and survival of endangered species and threatened species listed pursuant to this section . . .” [ESA, Sec 4(f)(1)].

Congress failed in their legislation to carefully define how to administer the Act, and NMFS took it upon itself to interpret what should constitute the species and the unit at risk as the framework for application of the Act. NMFS adopted the framework that stated a population or a group of populations would be considered distinct under the Act if it represents an evolutionarily significant unit (ESU) of the biological species. NMFS then concluded that to qualify as an ESU, the population or group of populations must satisfy two criteria: (1) the unit must be reproductively isolated from other population units, and (2) it must represent an important component in the evolutionary legacy of the species. Therefore, NMFS defined the ESU to include a single population of fish such as Lake Ozette sockeye, or a broad designation as many populations of a species, such as the Puget Sound chinook. Also, NMFS determined that the species at issue in the Puget Sound ESU are the wild fish, exclusive of fish from direct hatchery origin. The framework was developed to do what NMFS considered the major goal of the Act – to conserve the genetic (taxonomic) diversity of species and the ecosystems they inhabit.

It is important to understand the critical difference between the wording or instructions of the ESA and the manner of its application. The specific framework developed to interpret what the ESA identified as the species unit at risk, and thus the functional element around which the Act would be administered, had its origin as a policy memorandum of the federal

agencies administering the Act, and not from the statute itself. The term "evolutionarily significant unit" is not found in the Act, nor are the words "genetic diversity."

In the next issue of *Idaho Aquaculture News* (Winter 1999-2000), Part II of this article will answer the questions:

1. What is the basis for listing chinook as threatened with extinction?
2. Is the Puget Sound chinook listing consistent with the listing criteria?

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## Aquaculture Facilities in Idaho Get EPA Permit

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After working closely with a wide array of agency partners, industry stakeholders, interest groups, and the general public since 1991, the US Environmental Protection Agency has issued the final general wastewater discharge permit for Idaho's aquaculture industry. EPA officials believe the new permit represents a major step forward in reducing phosphorous loadings in the Mid-Snake River.

Chuck Clark, EPA's Northwest regional administrator in Seattle, said, "The aquaculture industry of south-central Idaho has taken a significant step forward in reducing nutrient loads within the system. We commend them for setting an example that agricultural producers and other non-point sources can follow."

EPA and the Idaho Division of Environmental Quality (IDEQ) worked closely to ensure that the new permit meets state water quality standards and incorporates requirements set forth in Idaho's management plan for the Mid-Snake watershed.

The 15 facilities that produce one million pounds of fish or more a year account for more than 80% of the total production in Idaho. The new permit requires those 15 producers to monitor their discharges to the Middle Snake more frequently than the smaller dischargers. The purpose of the monitoring would be to quantify how much phosphorous or other nutrients, as well as other potentially damaging substances, were being discharged as waste into the river. All permits, including those for potato processors, municipal treatment plants and aquaculture facilities, include a five-year compliance schedule for facilities to meet phosphorous limits.

Copies of the general NPDES permit, supporting fact sheet for the draft general NPDES permit, response to public comments, may be obtained from the EPA Region 10 Public Environmental Resource Center at

800-424-4EPA (4372). Documents can also be downloaded from the following website: [www.epa.gov/rl0earth/offices/water/ow.htm](http://www.epa.gov/rl0earth/offices/water/ow.htm). Copies are also available from the EPA-Idaho at 1435 N. Orchard, Boise, Idaho 83706; IDEQ-Twin Falls Regional Office at 601 Pole Line Road, Suite 2, Twin Falls, Idaho 83301, and at the IDEQ-Boise Regional Office at 1445 N. Orchard, Boise, Idaho 83706-2239.

[*The Aquaculture News* 7(11), September 1999.]

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## The "MUMS" Proposals: Minor Use and Minor Species

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US aquaculture has a rare opportunity to improve the mechanism by which drugs for fish are made available in the US. The FDA Center for Veterinary Medicine (CVM) developed the MUMS proposals in August 1998 and a coalition of industry associations, including the National Aquaculture Association (NAA) and its member associations, Catfish Farmers of America, Arkansas Bait and Ornamental Fish Growers Association, American Farm Bureau, American Veterinary Medicine Association, and the American Feed Industry Association formed in an attempt to amend and implement many of the proposals. Draft legislation should be available soon, at which time every US aquaculturist should contact their Congressional Representatives and Senators and ask that they support the MUMS legislation. While the MUMS proposals are not a total solution to the lack of drugs in US aquaculture, they do provide a significant step toward improving a 30-year-old drug approval process that has not been effective for aquaculture. Implementation of the MUMS proposals will only occur with substantial assistance from the US aquaculture industry. For additional information, please contact Dr. Randy MacMillan (208-543-3456).

[*NAA Close-Up*, September 1999.]

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## Bird Predation Strategies – Conventional and Innovative Approaches

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### What Works; What Doesn't

[From the article entitled "Bird Predation Control Strategies" by Jim Rubingh, Colorado Dept. of Agriculture. Published in *The Fishline* XI(3), September 1999, by the Colorado Aquaculture Association.]

One of the serious problems facing many aquaculturists is the damage caused by bird predation. One study reported that foraging by great blue herons resulted in production losses of up to 39% in trout rearing facilities. It's reported that a heron will consume up to ¾ pound of food per day, and a pelican will consume 1-3 pounds per day. In addition, trout losses are often due to wounding of fish that are not eaten. Because of the potential for significant losses, aquaculturists continue to search for cost-effective methods of controlling avian predators.

Determining what action to take will depend upon the amount of losses being experienced, species and number of birds, and the physical characteristics of the facilities. Netting or barrier wires often are the most economical for concrete runways or small ponds; while on larger facilities, pyrotechnics or live ammunition are often used.

Research conducted at Colorado State University in 1997 found pyrotechnics to be effective, but flashing lights and ScareyMan® were ineffective in deterring heron predation on trout. Birds soon became habituated to these at several sites where they were used.

Except for total exclusion, researchers have found that single control methods rarely solve bird control problems. All methods seem to succeed or fail to some degree and a combination of methods is usually needed. The methods most often relied upon are (1) exclusion netting is most effective, but not practical for ponds over 5 acres; (2) impediments such as overhead wires or lines with hand streamers on them to make sure they're visible to birds; (3) perimeter fencing or wires can work well for wading birds, such as herons (recommended fencing to be 3 ft. high in water 2-3 feet deep which has mesh to prevent fish from entering); (4) metal spines or porcupine wires can deter perching and roosting

birds; (5) frightening devices and techniques can modify behavior and discourage birds from feeding, roosting, and gathering (the value of these devices is usually limited to short-term control, since birds often adapt as they become familiar with them); (6) automatic exploders can usually cover 3-5 acres; (7) pyrotechnic devices were found to be effective by Colorado researchers in reducing damage by great blue herons and black-crowned night herons; (8) alarm or distress calls should be used as soon as birds arrive, but if used frequently, birds soon habituate; (9) lights and strobes seem to be the most effective in frightening night-feeding birds; (10) water sprays have worked with gulls; (11) ultrasonics don't seem to work; (12) raptor models need to be relocated fairly often to have any effect, and scarecrows have had only limited success; (13) chemical frightening agents such as Avitrol® can be used for blackbirds and starlings; (14) shooting is illegal without a permit from the US Fish and Wildlife Service. The author was unable to find any information on the use of dogs trained to harass birds, but he has heard that some producers are trying this strategy (see following article).

Does it pay to employ these strategies? A study of trout hatcheries in California found that facilities using exclusion strategies were able to increase production 25-30% and paid for the cost of their investment in 3-4 years.

The author recommends the following publications which he found to be very helpful in preparing this article. He would be glad to reproduce them for anyone interested in more information on this subject.

1. Control of Bird Predation at Aquaculture Facilities: Strategies and Cost Estimates, SRAC
2. Effectiveness of Barriers, Pyrotechnics, Flashing Lights, and ScareyMan® for Deterring Heron Predation on Fish, CSU
3. Bird Damage at Aquaculture Facilities, U of N
4. Avian Predators: Frightening Techniques for Reducing Bird Damage at Aquaculture Facilities, SRAC
5. Effectiveness of Alarm-Distress Calls for Frightening Herons from a Fish Rearing Facility, CSU

# Cabo - The Nation's First Fish Dog

[Press Release from Border Collie Rescue, Inc., Center Hill, FL, September 15, 1999, which appeared in a recent edition of the Florida Aquaculture Association's newsletter.]

The newest employee at Florida Fish Farms works like a dog. In fact, Cabo IS a dog – a 2-year-old border collie specifically trained to chase birds away from aquaculture ponds. Cabo was acquired, as part of the facility's ongoing wildlife management effort, from Border Collie Rescue (BCR), a national non-profit organization based in Melrose, Florida. Cabo may be the first dog in the country used in a bird reduction program at a commercial aquaculture facility. His job is to convince birds that the fish ponds are no longer a pleasant place to live or feed. Border collies are highly intelligent, adaptable and intense. They work tirelessly and persistently, and can be precisely guided to herd birds in specific directions, rather than just scattering them, or going into the water to drive the birds off airlines or buoys.

Cabo is perceived by the birds as a stealth predator; consequently, they do not become desensitized to him as they have to other methods of bird harassment, such as noise and pyrotechnics. Ron Slay, owner of Florida Fish Farms, says he is ecstatic with the work Cabo has been doing and is amazed at the reduction of bird predation he has already witnessed in the months that Cabo has been on the job. "Every minute he is out on the ponds, the meter is running. When he's around, the birds aren't eating and that's money in our account." Slay notes that the hefty initial investment in the custom-trained dog and farm staff training from BCR was well worth it. "He's already paid for himself and he's only been here a short while."

According to BCR, a single border collie and handler can easily maintain a 2-square-mile area. Florida Fish Farms houses approximately 48 ponds on a 50-acre site. Border collies are the fastest-growing and most popular form of bird control on golf courses, airports, and other venues across the country.

Border Collie Rescue, Inc. has been operating since 1990 as a non-profit organization dedicated to placement of the traditional herding dogs. Although border collies are extremely intelligent, families frequently give them up because the dog's strong herding instinct often results in problems, especially with nipping the heels of young children. BCR's Executive Director, Dr. Nicholas Carter, who is an animal behavior specialist and wildlife ecologist, says

he has found that his most troublesome dogs are best suited for aquaculture work.

The revenue from the training of each fish farm dog will help support 10 other dogs at the center. BCR has a policy of never destroying an animal. They can live out their lives at the center if they cannot find another adoptive home. "Aquaculture facilities are great homes for our dogs. They get the best vet care in the world and they have a job to do every day. These dogs are working dogs and we see it as an outlet for some of our most intense dogs," Carter says. He can be contacted at 352-473-0100. More information on the aquaculture/airport program can be obtained at <http://birdstrike.bcrescue.org>.

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## Fee Fishing Followup

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B. L. Jacobsen  
Editor

In the last issue of *Idaho Aquaculture News*, the featured article was about fee-fishing ventures in Colorado. If the article peaked your interest in pursuing such a venture, I'd like to provide some valuable resources. The University of Maryland Cooperative Extension program has been teaching folks in their region how to develop successful natural resources income opportunities, including fee fishing.

The proceedings of the Natural Resources Income Opportunities on Private Lands Conference, held in Hagerstown, Maryland April 5-7, 1998, can be ordered by contacting Don Schwartz, Washington County Extension Office, 1260 Maryland Avenue, Hagerstown, Maryland 21740; phone (301) 791-1304; Fax (301) 791-1048.

An excellent Maryland Cooperative Extension publication (Fact Sheet 754) entitled "Developing a Fee-Fishing Enterprise: An Opportunity in Recreational Tourism" is available by contacting Jonathan Kays, Regional Extension Specialist, Natural Resources, Western Maryland Research and Education Center, 18330 Keedysville Road, Keedysville, MD 21756; phone (301) 432-2767, ext. 323; fax: (301) 432-4089; e-mail: [jk87@umail.umd.edu](mailto:jk87@umail.umd.edu).

In addition, a video entitled "*Management of Recreational Fish Ponds*," is available from the Alabama Cooperative Extension Service, Auburn, University, Alabama.

## A Taste of the Northwest: Clear Springs Foods Inc.

Northwest products are in demand across the country and even worldwide. One of the companies which produces a Northwest favorite is Clear Springs Foods Inc. headquartered in Buhl, Idaho. This is their story, reprinted (with permission) as it appeared in an article entitled "Made in the Northwest" by Carolyn Latteier, a freelance writer living in Port Townsend, Washington. The article was published in *Horizon Air Magazine* 10(12), December 1999.

Why is 75 percent of the rainbow trout eaten in the United States grown in the high desert plateau of southern Idaho? The answer is the water. Clear, cold spring water bubbles up through a layer of basalt, producing a constant year-round supply of the clean, well-oxygenated, 58-degree fluid in which trout thrive.

Thirty-three years ago, with investment money from local Idahoans, entrepreneur Ted Eastman started a trout farm in the spring-filled Magic Valley. His idea was to use the wonderful water to raise trout, then sell them wholesale to processors. It was not long, however, before he grasped the same concept that drove Columbia Empire Farms to expand and diversify its operation. If somebody else is cutting and shipping your fish, that person is making money from your product. By the end of its second year, Clear Springs was doing its own processing – albeit by hand, with 29 employees cutting fillets.

Today Clear Springs Foods Inc. is the largest rainbow-trout farm in the world and a vertically integrated food company, with multiple complementary operations and \$40 million in annual sales. It has its own feed mill, brood operation, rearing tanks and processing plants. And it has its own fleet of 10 refrigerated trucks that whisk the product to market. Trout swimming in Idaho can be harvested, processed and delivered to an East Coast restaurant or fish store in 48 hours or less.

Eastman retired from day-to-day involvement in the business in 1992, although he remains chairman of the board. Larry Cope, who has been CEO for 26

years, says the challenge currently facing the company is how to continue to grow. "We had rapid growth in the 1970s and 1980s as we acquired other trout farms in the Magic Valley, built our feed mill and expanded our processing plant," he says, "but our growth in the 1990s has come from value-added products."

Today's diet-conscious market is increasingly receptive to fish, and Clear Springs has been developing new fish products to satisfy that market. A major breakthrough came in 1991 when the company created what is now its core product, the "clear cut," a boneless fillet. "We recognized that a real barrier to growing our business was having bones in the product," Cope says.

Key to the new product was the company's creation of computerized machinery to cut the new boneless fillet, making obsolete the laborious hand-cutting. "Now all our fish is cut by robots," Cope says. Making the clear cuts involves three separate machines. One of these, which removes the small "pin" bones from the flank of the trout, took a year to develop and remains proprietary, giving Clear Springs the cutting edge (so to speak) over the competition, he says.

The company took another leap forward in 1995, when it purchased from Pillsbury a 42,000-square-foot food-manufacturing building in the southern Idaho town of Buhl. Clear Springs remodeled the building and launched a specialty-products branch the next year. Its new specialty products include trout appetizers for the gourmet market and ready-to-serve fish products for institutions. The company makes fish patties cut into the shapes of whales and sharks for day-care centers, and makes cheese-covered trout patties for extended-care homes.

Clear Springs is also taking care to preserve its most precious resource: The water. Although the Magic Valley's springs have flowed steady and strong for years, no resource is inexhaustible. Recognizing the increasing pressures on the aquifer, Clear Springs began diverting waste to agricultural lands and returning clean water to the Snake River in 1989, despite a price tag of \$400,000 just for the waste-processing equipment. Prior to that the company treated its wastewater in anaerobic lagoons, a process approved by the EPA but not good enough for Clear Springs, Cope says.

"In today's world the bad players will not be in business. We have a real interest in seeing that the

resource we utilize is well-managed. The reason we're here is the water. That's why we're in Idaho."

Like Clear Springs, [other Northwest companies] have succeeded through prudent and creative use of Northwest resources. . . . Not only do Northwest companies prosper, the rest of the country gets to enjoy the best of the Northwest. Just ask any New Yorker sitting in a restaurant and eating a succulent trout amandine.

## Aquaculture Outlook

[From *AQUACULTURE OUTLOOK*, October 1999, ERS-LDP-AQS-10, Principal contributor: Dave Harvey 202-694-5177.]

### Competition Facing US Aquaculture in 2000 and Beyond

Numerous forces are expected to influence the growth of the US aquaculture industry over the next several years. These forces will be in the areas of competition within the seafood market, competition from other protein sources, and changing consumption patterns in many of the world's economies. In the domestic market, aquacultural producers were confronted with a basically flat US per capita seafood consumption over the last decade. This means that the only growth in total US consumption has come from the 1 to 2 million person population increase that the United States experiences each year. Unless this changes, the only way consumption of a specific commodity will increase is by taking market share from other fish species. This situation would favor already established aquaculture species that have a level of production to justify research into various areas of the production process and to explore promotional efforts to broaden product awareness and acceptance among consumers and the food service industry.

This concentration in the seafood diet to a small number of species can already be seen in the current levels of consumption for the major seafood species. According to 1998 data from the National Marine Fisheries Service, per capita consumption of shrimp, salmon, tuna, and catfish made up approximately 50 to 60 percent of total seafood consumption. This share may increase as a greater percentage of total food consumption is eaten away from home, and food service firms may choose to carry only a limited number of seafood species on their menus.

Domestic aquaculture producers will also be faced with strong competition from other protein sources, especially pork and poultry. Both of these industries are expected to expand production in the coming years, and most of this larger production will be aimed at domestic users. Pork and poultry producers are expected to try to expand consumption of their products through strong promotional efforts and the development of new products for both the at-home and the food service markets.

### Recovery of Asian Economies Benefits Seafood and Aquaculture

Many of the Asian countries that experienced economic difficulties over the last several years are either large producers or purchasers of seafood and aquaculture products. Japan has been the world's largest purchaser of seafood. As Japan recovers, it is expected to expand its imports of seafood from a number of countries. The chief beneficiary in the United States is likely to be the wild harvest salmon industry, but higher imports will also impact the farmed mollusk industry. Korea's economic expansion will also positively impact the US mollusk industry and some other specialty items. As the Japanese and Korean currencies strengthen against the US dollar, their markets will become more attractive to US exporters and also to aquaculture producers in other Asian countries. Thailand and Indonesia are large producers of farm-raised shrimp, tilapia, and other species and will benefit from improved economic conditions in Asia, especially Japan. As the US market becomes somewhat less attractive, US producers may find less competition from imports, which could allow for them to expand production.

### Catfish Sales Expected Higher in 1999

Sales of catfish by growers to processors are expected to be between 585 million and 595 million pounds in 1999, 3 to 5 percent above a year earlier. Over the first 8 months of 1999, sales totaled 397 million pounds, 3.7 percent higher than a year earlier. Based on the size of grower inventories reported at the beginning of July, grower sales are expected to show modest growth through the remainder of 1999 and into 2000. Farm prices for catfish are expected to remain in the low to mid 70 cents per pound range through the remainder of the year, and the annual average for 1999 is likely to be close to that of 1998.

Falling prices for both corn and soybeans over the last several years have resulted in declining feed costs for most catfish farmers. This has been especially beneficial as overall farm prices for catfish have been relatively stable. In the last 2 years, the combination of lower feed costs and stable prices have improved the economic position of most catfish growers and supported an expansion in pond acreage and grower inventories. However, the latest forecast indicates that grain prices may be bottoming out in 1999 and are expected to increase slightly in 2000, although they will still be low on a historical basis. The farm price of corn in 2000 is now expected to be about even with 1999's forecasted average of \$1.95 a bushel. The price for 48 percent protein soybean meal is forecast to average around \$139 a ton in 1999 and increase to \$148 a ton in 2000. This is still a far cry from the \$267 per ton average of 1997.

### Trout Report Changed

Through 1998, NASS surveyed the domestic trout industry once a year. The reporting period for these surveys was from September 1 of the previous year through August 31 of the current year. On August 19, NASS announced that the trout survey originally to be released on September 29, 1999, would not be released until February 3, 2000.

This change in the release date allows the reporting period to be changed to a calendar year basis, January 1 - December 31. This serves two purposes. First, the new trout report will have the same reporting period as the Aquaculture Census. Second, the annual reporting period will match the reporting period of the annual Catfish Production Survey. These two reports will now have the same release date. The switch to the calendar year is expected to reduce the reporting burden on trout growers. The 2000 report will also increase the number of reporting States to 18 with the addition of Arkansas, Maine, and Minnesota.

### US Tilapia Use Moves Higher

Both domestic production and imports of tilapia are continuing to expand. The latest estimates for the domestic industry show production at approximately 18 million pounds, liveweight, in 1998. These estimates are from a survey of growers by the American Tilapia Association. Unlike many other aquaculture species, domestic tilapia production is widely dispersed in the United States. The north central region is now one of our largest producers of

tilapia. All north central region production comes from indoor recirculating systems utilizing heated water. One production disadvantage in the north central region is the high cost of shipping live fish to the prime markets on the east and west coasts. Tilapia production should continue to expand in 1999 and 2000 as a number of new production sites in the southern and north central regions come on-line. The long-term growth prospects for domestic tilapia production are somewhat constrained however, if domestic growers are limited to supplying the live market. The larger long term market is expected to be for processed products, but US growers must be able to lower production costs so that they can compete effectively with imported products.

Imports of tilapia are larger than domestic production. For comparison, US imports of tilapia, on a liveweight basis, reached 94 million pounds in 1998. This was a 15-percent increase from the previous year, and imports have continued to rise in the first half of 1999. US tilapia imports in the first 6 months of 1999 were 26 percent higher than the previous year. Frozen whole tilapia continues to dominate imports. Total imports were 37.6 million pounds, with whole fish at 27.8 million, fresh fillets at 5.6 million, and frozen fillets at 4.3 million. Imports of tilapia were higher in all categories.

Shipments from Taiwan have always dominated frozen whole imports, but over the last couple of years, Taiwan has also begun to export fresh and frozen fillets. In the first half of 1999, Taiwan was the largest source of frozen tilapia fillets, ahead of Indonesia. Taiwan is still a relatively small supplier of fresh fillets, but if it can duplicate its success in the frozen fillet market where it has almost doubled shipments to the United States in each of the last 4 years, it will be a strong competitor to the Central American countries now supplying the majority of fresh fillets.

The value of tilapia imports jumped 40 percent to \$35.4 million in the first half of 1999. The average price for frozen whole tilapia and frozen fillets both increased, and prices for frozen whole fish increased 7 cents to \$.55 a pound. This is a turnaround from the previous 2 years, which saw tilapia prices fall in all three market categories. With tilapia imports fairly steady throughout the year, imports for 1999 are expected to reach 75 million to 80 million pounds on a product weight basis and 115 million to 120 million pounds on a live weight basis. Prices may decline slightly in the second half of 1999, but the overall value of imported products is expected to reach between \$70 million and \$75 million.

## US Salmon Imports Higher, But Canadian and Chilean Shipments Down

US imports of Atlantic salmon in first-half 1999 reached 117.5 million pounds and \$311 million, up 13 and 25 percent from first-half 1998. All three Atlantic salmon import categories (fresh whole fish, frozen whole fish, and fresh and frozen fillets) showed increases in both quantity and value, but the largest growth was in the fresh and frozen fillets categories. Imports of filleted products in the first half of 1999 were 56 million pounds, about the same as imports of fresh whole fish. Shipments of filleted products have risen very quickly over the last several years. For example, imports of filleted products totaled 56 million pounds in first-half 1999, but were only 16 million pounds in the first half of 1996. The value of filleted products totaled \$161 million in the first half of 1999, passing those of fresh whole fish and accounting for 52 percent of all Atlantic salmon imports.

The biggest development in the Atlantic salmon market so far in 1999 is that the import growth has not come from either Canada or Chile. These two countries are the dominant suppliers of Atlantic salmon products to the United States and have accounted for almost all the growth in imports over the last several years. In the first half of 1999, the growth in imports has come from European growers, notably those in Norway and the United Kingdom. Higher imports from these sources more than offset small declines in shipments from Canada and Chile. The decrease in imports from Canada was puzzling, as the current weakness of the Canadian dollar versus the US dollar would be expected to make the US market very attractive.

If the normal seasonal pattern for salmon imports holds true in 1999, shipments are expected to reach between 230 million and 240 million pounds and to be between \$600 million and \$620 million in value. With the growth of the worldwide farmed salmon industry, salmon has changed from a seasonal product to a regular component of grocery store retail sales and a popular seafood item at a wide variety of restaurants. The condition of the US economy will be a major factor in the future growth of the worldwide farmed salmon industry. A strong US dollar is expected to make imports from most countries relatively less expensive. Imports are expected to continue to be strong in the second half of 1999 and into 2000. Shipments from Canada and Chile are

expected to be close to or slightly above year-earlier levels.

While imports of Atlantic salmon have been increasing, the United States' wild harvest of Pacific salmon in Alaska has been falling, and exports of US salmon products have declined. For 1998, the latest data available, the US wild harvest of salmon was estimated at 644 million pounds. This is an increase from 1997, but it is the second lowest wild harvest in the 1990's and well below the record harvest of over 1 billion pounds in 1995. Even though the quantity of harvest increased in 1998, the value declined by 5 percent to \$258 million. This is the third decline in a row and the lowest value for a salmon harvest, even on a nominal basis, since 1978. The primary cause of the lower harvest and the resulting falling value is the lower level of sockeye catch. The sockeye catch has normally been one of the largest, and the price of sockeye is second only to king salmon. Sockeye salmon has also been the primary salmon exported, chiefly to Japan.

The decline in the sockeye harvest had three impacts. First, the falling harvest greatly lowered the total value of the US salmon harvest. Second, because of its relatively high price, the total value of the salmon harvest was also lower. Third, sockeye was probably the salmon species that would have competed most directly with farmed Atlantic salmon, so a partial void in the market was available to be filled by farmed products.

Although Canada and Chile are still the largest suppliers of farmed Atlantic salmon to the United States, the increase in imports from European countries is expected to continue through the end of 1999. A number of factors will influence the Atlantic salmon market in the second half of 1999. First is the impact of the anti-dumping duties on Chilean producers' shipments to the United States. Second is the competitiveness of Canadian salmon prices due to the weakness of the Canadian dollar versus the US dollar. Canada also enjoys an advantage over most producers in transportation costs. Third is the impact on the Alaskan wild harvest salmon fishery and the worldwide farmed salmon industry of a recovery in Japan's economy, which is expected to increase salmon demand in that country.

## Ornamental Fish Exports Rise

With the beginnings of a recovery for many of the Asian economies, US ornamental fish exports (\$6.4 million) rose by 11 percent in the first half of 1999 compared with the previous year. Exports to Hong

Kong rebounded strongly (up over 400 percent) after almost being nonexistent in the first half of 1998. Exports to Japan were down, but only by 2 percent, and if their economy continues to strengthen, the decline in exports is expected to bottom out in the second half of 1999. Exports to Japan had fallen over 50 percent between 1997 and 1998. Exports were also aided by an increase in shipments to the European Union, particularly the United Kingdom and Belgium, that more than offset falling exports to Canada and Mexico. Canada is currently the largest market for US ornamental fish. Shipments to Canada in 1999 were down 5 percent from the previous year to \$2.2 million. With the price of US ornamental fish being made higher by the relative weakness of the Canadian dollar versus the US dollar, a continued slide in exports is expected in the second half of 1999. It is hoped that this can be offset by some growth in sales to Asia and other markets.

The value of imports of ornamental fish was \$20.5 million in the first half of 1999, down 14 percent from a year earlier. Shipments to the United States were down from virtually every major exporting country. Imports have declined in the last several years, and it is unclear whether the market is not as strong as it was before or if domestic producers are now growing varieties that they previously imported. The release of the Census of Aquaculture in 2000 is expected to provide a benchmark as to the size of the domestic ornamental fish industry. The Census of Aquaculture is then expected to be partially updated with biannual data from surveys done by the Florida Department of Agriculture.

## -- Seafood -- Trends for the New Millennium

[Condensed from an article entitled "Seafood report: Aquaculture expanding faster than FAO projections," by Howard M. Johnson, published in *The Aquaculture News* 7(11), September 1999.]

Published by H.M. Johnson & Associates, a Bellevue, Washington-based seafood research and consulting company, *The Annual Report on the United States Seafood Industry* has become the standard reference to the industry regarding market size, consumption trends, supply trends and consumer attitudes. Utilizing a wide variety of sources, including international agencies, US government reports and proprietary data, The Annual Report contains almost 100 pages of analysis, charts, graphs, and data tables detailing the key

trends affecting the US seafood industry. Sections include:

- World and US seafood supply trends, including aquaculture.
- Ten-year trends for major seafood commodities.
- Trends in value-added seafood.
- Key economic indicators including ex-vessel, producer and consumer prices.
- Total market value for retail and foodservice.
- Research on consumption and consumer trends.

Howard M. Johnson, author of *The Annual Report*, is a well-known seafood industry marketing consultant and authority on consumer trends.

The 1999 Annual Report, addresses the following six issues.

### **1. Supply – An Ocean Half Full, or Half Empty?**

While US seafood supply increased in 1998, it's unlikely it represents a long-term trend. Projected improvements in the global economy will mean a return to world market competition for finite seafood supplies. The United Nations Food and Agricultural Organization (FAO) reports capture fishery harvests have peaked and are unlikely to contribute to any future global expansion of supply.

### **2. Aquaculture – Growing for the Future.**

Aquaculture will fill some of the gap in supply. To date, aquaculture production has expanded at a pace beyond FAO projections and may continue to do so for some time. Feed suppliers and scientists are optimistic that they can provide the necessary diets and the technical advances in (1) feed conversion, (2) disease, and (3) growth rates that will increase production. In addition, aquaculture may provide an opportunity to enhance wild stocks in some areas, and open ocean farming may eventually provide large volumes of fish. Technological advances also offer the prospect of higher yields, faster growth and greater survival. Within the next 20 years aquaculture will surpass capture fisheries in supplying seafood to the world.

### **3. US Fishermen – The New Endangered Species.**

In a number of states, voters have already restricted or eliminated commercial fishing based not on science, but on emotion. In order to survive, commercial fishermen will need to adopt, not oppose, sustainable fishery standards (many already

do so) and promote their trade as necessary producers of food for America's table. We need commercial fishermen, and industry must do more to support them.

#### **4. Seafood in Supermarkets – The Vanishing Service Counter.**

The consolidation of supermarket chains will advance the changing face of seafood retailing. The four or five major chains remaining after all the mergers will represent considerable buying clout on the supply side, but will either eliminate or streamline service seafood on the sales side. Seafood departments have historically been one of the lowest returning areas of the store and mega-chain executives will figure out ways to reduce costs and raise margins. The consequence will likely be self-service seafood counters. It's difficult to predict the outcome of this change. There appear to be more questions than answers.

#### **5. Technology – Better Processing, Packaging and Products.**

With constraints on supply and the changing face of retail, innovation in all areas of the seafood industry will be required to respond to these changes. Seafood products of the future will most likely be further processed and tailored to specific market segments. For instance, home meal replacement, the current mantra of the food industry, will have to rely on species not only abundant and in reliable supply, but also representing good comparative value (e.g., salmon, not swordfish; catfish, not cod).

#### **6. New Marketing Strategies – Reaching Tomorrow's Consumer.**

The seafood consumer of the future will be older, better educated, health-conscious, and more demanding. Seafood marketing strategies will be directed at creating awareness and via trial of specific products in specific markets, not raising per capita consumption.

*The 1999 Annual Report can be purchased via the worldwide web at [www.hmj.com](http://www.hmj.com) or by fax at (425) 747-2672.*

## How Much Shrimp Will the World Eat Today?

[Condensed from *Sky: Food & Travel – A Special Issue*, November 1999.]

The world may be running out of food, but it certainly isn't running out of shrimp. Just the sight of a half-dozen pink, sweet jumbo shrimp, naked and chilled to perfection on a bed of ice with a savory side of cocktail sauce, throttles up the salivary glands. Yet, even as demand increases for this versatile and delectable morsel, it keeps getting less expensive, and the supply seems endless.

Annual US consumption of shrimp has grown from 2.6 pounds to 3.5 pounds per capita during the past two decades. Over the same period, yearly worldwide consumption has increased by 50% to a 1998 figure of more than 7.5 billion pounds (about 20 million pounds a day!).

According to Joseph Bagshaw, professor of biology and biotechnology at Worcester Polytechnic Institute in Massachusetts, the wild shrimp populations are dwindling, just as are all fish stocks. In fact, some fishing grounds are basically being shut down because there's nothing left. The seemingly endless supply of Atlantic salmon is the result of fish farming . . . . 95% of it is cultured. Probably 100 different species of fish have their own farming industry, and shrimp is fast becoming a high-value, mass-market item, second only to tuna as the US consumer's favorite seafood.

Farmed shrimp have gone from about 3% of total US shrimp production 20 years ago to about 25% of shrimp consumed today in the US. Bob Rosenberry, the San Diego-based publisher of Shrimp News International says, "Many fishing countries are discovering it's more economical to farm shrimp than to fish them." Although US shrimpers catch 150 million pounds of the little fellows annually in the Gulf of Mexico alone, the real growth in shrimp production during the past decade has come from aquaculture.

Most of the world's shrimp farmers today raise shrimp in low-tech ponds of up to 200 acres along bays and tidal rivers. When shrimp swarm in the local waters, the farmer opens the gates and lets the shrimp flow in. The shrimp are left to eat natural organisms in the water until they're big enough to sell.

With increasing sophistication of management and technology, shrimp farms are growing more intensive. While extensive farms grow hundreds of pounds of shrimp per acre, most farms being built today grow them in the thousands, and some in the tens of thousands, of pounds per acre. Since shrimp grow fast enough to produce at least two crops per year, and since farmers can sell them to processors at an average of \$2.50 per pound versus about 75 cents a pound for farmed trout or catfish, there's sufficient reason to hail this new age of aquaculture.

Modern shrimp farming is moving toward closed systems where the water is cleaned and recycled, and it's being attempted in places like west Texas and Arizona. In Okemos, Michigan, Seafoods Systems Inc. is developing a mechanized, enclosed shrimp farm in which water and effluents are completely recycled and the shrimp are protected from weather and disease.

Does this type of shrimp farming cost more than the more traditional low-tech method? "Our capital and operating costs are about the same or less than theirs," says Seafoods Systems President Russell Allen, who also serves as president of the US Shrimp Farming Association. Seafoods Systems' commercial pilot operation went into production this fall, and if it demonstrates the performance Allen's experience and research tell him it should, he plans to launch a full-scale Michigan shrimp farm producing 3 to 10 million pounds annually within the next few years. If their system is successful, it's easy to envision such factories speckling the landscape of the US and the other big shrimp-consuming nations.

## Calendar of Events

Idaho Water Users Association Annual Meeting. The IWUA will hold their annual meeting in Boise, January 18-20, 2000 at the Double Tree Hotel Riverside. Contact IWUA at (208) 344-6690 for further information.

Aquaculture America 2000 Conference. The conference, hosted by the Louisiana Aquaculture Association, will be held February 2-5, 2000 at the New Orleans Marriott, New Orleans, LA. Further information may be obtained by contacting the Conference Manager: Phone (425) 485-6682 or Web: [www.was.org](http://www.was.org) or E-mail: [worldaqua@aol.com](mailto:worldaqua@aol.com).

The National Aquaculture Association is sponsoring a special producer session, APHIS Services and Industry Needs, on February 3, 2000 at 1:00 pm during the above conference. The purpose of the four-hour session is to provide a forum for producers, resource personnel and regulators to discuss aquatic animal health needs of aquaculture industries and to learn more about USDA-APHIS' programs, services and intentions for aquatic animal health. Please contact Betsy Sheehan at (803) 734-2151 (phone), (803) 734-0325 (fax), or [betsy@sca.state.sc.us](mailto:betsy@sca.state.sc.us) (e-mail) with suggestions of workshops or session topics that you would like to see addressed at the conference.

## Cook's Corner

### Smoked-Trout Party Spread

½ pound smoked trout (skin and bones removed)  
½ cup mayonnaise  
½ cup sour cream  
2-3 tablespoons chopped fresh dill leaves  
2 tablespoons drained bottled horseradish, or to taste

Pulse trout in a food processor until finely chopped. Stir in remaining ingredients and salt and pepper to taste. Spread on sourdough, rye or pumpernickel toast points or crackers of your choice, and top with a garnish of pimiento, shrimp, dill sprig, slice of hard-boiled egg, finely chopped sweet red onion, or another garnish of your choice.



## Information Transfer

### Web Sites . . .



Fishlink's Million "Hits." In the first nine months of this year, **Fishlink** has received one million "hits". The service is now delivering 30,000 pages of information to the aquaculture sector each month, supplying around 8,000

individuals. Fishlink can be found at:  
<http://www.fishlink.com> or <http://www.fishlink.co.uk>

## Publications . . .



***“Developing a Fee-Fishing Enterprise: An Opportunity in Recreational Tourism”*** is available by contacting Jonathan Kays, Regional Extension Specialist, Natural Resources, Western Maryland Research and Education Center, 18330 Keedysville Road, Keedysville, MD 21756; phone (301)432-2767, ext. 323; fax: (301) 432-4089; e-mail: [jk87@umail.umd.edu](mailto:jk87@umail.umd.edu).

The publication entitled ***“Grant Programs for Aquaculture and General Industry Development”*** can be found at the DOC-NMFS homepage under the “Special Reports” and “what’s New” buttons at [www.nmfs.gov/trade](http://www.nmfs.gov/trade). Other aquaculture-related reports in addition to fisheries statistics information can be found at this website.

***The 1999 Annual Report on the United States Seafood Industry.*** \$59 in North America; \$65 elsewhere (including shipping). A table of contents and order form are available on the worldwide web at [www.hmj.com](http://www.hmj.com) or by fax at (425) 747-2672.

***Protecting and Restoring Watersheds: A Tribal Approach to Salmon Recovery.*** The Columbia River

Inter-Tribal Fish Commission has developed this handbook to explain the Columbia River treaty tribes’ strategic approach to watershed restoration. It includes sections on watershed assessment, watershed protection, active and passive restoration, and monitoring. The book also includes an extensive resources section with links to web sites, bibliographies, and contacts at organizations that can help you get started on the ground. The handbook draws on up-to-date science, is presented in easy-to-understand language, and is intended to help watershed councils, landowners, and other natural resource practitioners undertake restoration in ways consistent with the tribal restoration philosophy. It is organized around the concept that good science, good sense, and good partnerships produce good results. [For a copy of this free handbook, contact Jill Ory, Watershed Department, Columbia River-Inter-Tribal Fish Commission, 729 Northeast Oregon, Suite 200, Portland, OR 97232. Phone: (503) 238-0667; e-mail: [oryj@critfc.org](mailto:oryj@critfc.org); web site: [oryj@critfc.org](http://critfc.org).]

## Videos . . .



***“Management of Recreational Fish Ponds,”*** Alabama Cooperative Extension Service, Auburn, University, Alabama.

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