Fish, Money, and Science in Puget Sound

Environmentalists and state officials are going head to head over the potential effects of salmon farming near Seattle

WHAT'S THE CLEANEST INDUSTRY you can think of? Fish farming, perhaps? Not exactly: a 2-acre salmon farm produces as much organic waste as a town of 10,000 people. And that is one reason why salmon farming in Washington State is becoming enmeshed in controversy. The dispute pits opponents of the farms against the state government, and it has been complicated by research on the consequences of fish farming that is suggestive but far from complete.

It remains to be seen whether this controversy will hold back the nascent salmon farming industry in Puget Sound, the arm of the Pacific on which Seattle lies. Although the farming of salmon in submerged floating pens has been practiced for decades in Japan—and boomed in the 1980s in Norway and British Columbia—it is only beginning to catch on in Washington. On offshore sites leased from the state, 13 farms cover a scant 23 of Puget Sound's 3 million acres, producing several thousand tons of fish per year.

The critics of salmon farming make up a mixed group that includes fishermen worried about competition, owners of waterfront property, and environmentalists. This coalition is facing off with state officials who support the new industry. "The governor's position on floating aquaculture is that . . . it is a clean industry and a reasonable industry for Washington State," says Judith Freeman of the state Department of Fisheries.

These are some of the hazards the critics point to:

■ **Pollution**. The 50,000 to 100,000 salmon concentrated in a 2-acre farm leave more than 100,000 kilograms of feces and uneaten food each year. Experience from British Columbia and Norway shows that decay of this solid waste can deplete oxygen in water and sediments beneath the farm, killing bottom-dwelling organisms that may have commercial or ecological value.

■ **Algal blooms**. Nitrogenous wastes from urine, feces, and uneaten food can fuel "blooms" of algae that poison marine life. Although marine fish farms have not been proven to cause the blooms, algae has been a recurring problem in Canada, where deaths of salmon due to algae have forced farms into bankruptcy. Tons of dead fish have been dumped in landfills or (illegally) in the ocean, according to a Canadian Department of Fisheries and Oceans memo leaked to the Canadian press last year.

■ **New diseases**. Atlantic salmon are the preferred farm stock and eggs imported from Scandinavia may bring new diseases to the native Pacific salmon. Norwegian fisheries have suffered severely from diseases brought in by foreign fish imported to stock wild streams. Last year, two Pacific salmon hatcheries suffered a mysterious outbreak of viral hemorrhagic septicemia, a disease never seen before in North America, convincing some people the damage has already begun. But there is as yet no conclusive proof.

■ **Antibiotics**. Fish food laced with sulfa drugs or oxytetracycline is commonly used to treat bacterial outbreaks in farmed fish. The antibiotics can persist in ocean sediments for months—long enough to promote the growth of antibiotic-resistant bacteria. Resistant pathogens have been found near Japanese fish farms, and some biologists worry that plasmids carrying the genes for antibiotic resistance could be transferred to human pathogens in the same waters.

Conrad Mahnken

Boon or burden? *Floating pens hold thousands of salmon in Clam Bay, an arm of Puget Sound near Seattle.*

The state of Washington has not been unresponsive to such concerns. In 1986 the state comissioned University of Washington oceanographer Donald Weston to study the environmental effects of salmon farming. Weston's report was used to draw up guidelines for issuing salmon farming permits. And a state-ordered environmental impact report on salmon farming was completed just last month. Both Weston and the impact report argue that careful management of salmon farms can avert damage.

Weston believes poor siting—in shallow water without sufficient current flow—has been responsible for most of the environmental impact of salmon farms around the world. Deep water sites with ample current should allow farm discharge to be flushed away and diluted before it can do harm. Such siting is easy in Puget Sound, Weston says: "Puget Sound is a fjord environment. The bottom drops right off. You can go a couple hundred yards from shore and you're in over 100 feet of water."

The impact report minimizes some other concerns. Antibiotic resistance might not be a threat, it claims, because transfer of resistance may be a laboratory phenomenon that does not occur in the wild. Likewise it labels importation of exotic diseases as unlikely, due to current quarantine and disinfection measures. But the report and Weston advocate development of a regional brood stock—a move that would eliminate the need to import salmon eggs.

The environmentalists are not convinced. Last year the Sierra Club Legal Defense Fund, representing a consortium of local environmental groups, threatened to sue the U.S. Environmental Protection Agency for not insisting that Washington State treat the salmon farms as point sources for pollution and require discharge permits—as mandated by the Clean Water Act. The EPA pressured the state to do just that.

But the activists remain dissatisfied. They say the process of granting permits is too lenient. "The state has been pushing [salmon farming] awfully hard and is tending to write off the negative factors as sort of marginal impacts that don't really account for much," says John Brookbank, a retired biologist from the University of Florida who lives near a proposed farm site.

State officials believe salmon farming should continue. The next step, says Freeman, is to use information in the impact report to develop a general management plan to minimize environmental damage. Input will be accepted from any concerned group, but the state is unlikely to be sympathetic to scenarios for which there is no hard evidence. When hard facts do not exist, Freeman says, "all you can do is talk to the researchers who know the most about the area." And the state feels it has already done that. ■ MARCIA BARINAGA