



Still Waters Run Deep:

AGRICULTURE UNDER THE SEA

STORY AND PHOTOS BY
PATRICIA MORRISON COATE

Aquaculture is a high-tech, by-the-tides business of biology, bays and babies — and Washington shellfish producers leave Mother Nature trailing in their wake by scientifically creating the ideal milieu to propagate the fragile mollusks. This isn't your great-granddad's clam dig anymore.

Although shellfish farming isn't in the forefront on the Olympic Peninsula, a handful of companies here harvest and ship millions of pounds of adult clams, geoducks, mussels and oysters worldwide and generate billions of shellfish larvae and seeds for commercial growers.

Several local sea-farming operations are like their agricultural mega-farm cousins in building their business models on vertical integration — they own everything from the brood stock and formulated algae (input) to the processed shellfish on grocery store shelves or in chefs' kitchens (output). When left to her own devices, Mother Nature loses many of her wild-set clams, geoducks and oysters to predators or weather extremes — warm summers and cold winters — and the vagaries of tidal currents. Like other agricultural commodities, the odds of produc-

ing enough marketable shellfish start with genetic selection and progresses through to highly controlled growing environments.

Taylor Shellfish Farms, Inc., of rural Quilcene, began in the 1880s, harvesting from the wild, native Olympia oysters. Descendants envisioned a state-of-the-art shellfish company in the 1960s and today, Taylor is the largest Manila clam producer in the United States, marketing some 3 million pounds of shellfish a year. Coast Oyster Company, based in Bellevue, was founded in 1946, originally harvesting from natural beds. In 2007, it is the largest oyster producer in the nation with an annual marketable production of more than 80 million oysters. In 1978, the company built an advanced technology oyster hatchery/nursery near Quilcene, with the capacity to provide 20 billion oyster larvae per year.

Others on the peninsula are small operations like their family farm counterparts — Port Discovery Seafarms of Discovery Bay, owned and managed by Tom Madsen, and Discovery Bay Shellfish, the family business of Peter and Robin Downey of rural Port Townsend. One young upstart in the shellfish



Above: Quilcene High School students helped plant clams and help clean the planted beaches for Big Quil Enterprises.

business on the peninsula is Big Quil Enterprises, a hands-on, student-managed business project in the process of growing 1 million clams and 30,000 oysters.

Dr. Peter Becker, chairman of the Pacific Aquaculture Caucus Inc., knows the industry inside and out, having established Little Skookum Shellfish Growers in Shelton in the 1970s. The company, which he manages on the go from Port Angeles, is a shellfish wholesaler, producing 1.5 million pounds of Pacific, Olympia, Kumamoto and Belon oysters and Manila clams annually. Becker buys some of his fingernail-sized seed from Taylor and/or Coast nurseries, but the competition among shellfish producers is friendly. For the past 30 years, Becker has been one of a few pioneers in the industry, meticulously researching the entire life cycle of a variety of shellfish, from spawning to their optimal nutritional and growing environments.

“Today most production is in hatchery shellfish in the Brinnon and Quilcene area for worldwide production,” Becker said. “Historically, shellfish sets in the wild have been less reliable. If the ova are fertilized in a tank, after 11 weeks there’s an 80-percent to 90-percent survival rate for the tiny oysters.” Becker said research has indicated that oyster seeds, or “babies” as they’re known in the industry, prefer attaching to old oyster shells over other surfaces. A larva becomes a seed when it becomes too “heavy” to swim

in its developing shell.

“You also need the right number of seeds on a shell — neither too many nor too few — and with tanks, you can have exactly the right number (for viable baby oysters),” Becker said.

All commercial shellfish growers are licensed by the Washington State Departments of Health and Fisheries and the state requires that their product be hand-harvested and ready-to-eat on the beach. Large and small producers are very sensitive to water quality issues on their own and leased tidal lands as well as

“HISTORICALLY, SHELLFISH SETS IN THE WILD HAVE BEEN LESS RELIABLE. IN A TANK, THERE’S AN 80 PERCENT TO 90 PERCENT SURVIVAL RATE.”

- DR. PETER BECKER

those of other growers. “We say we are the canaries in the coal mine,” Becker said. “When there’s a decline in the water quality, we are the first to know because we get shut down by the Department of Health.”

TAYLOR SHELLFISH FARMS, INC.

“We go way beyond what Mother Nature provides,” said Ed Jones, manager of the up-to-date

Quilcene hatchery/nursery. “This facility was built in 1989 for Taylor’s own (production) use and also to sell our larvae and seed. We can strip spawn with controlled breeding experiments. Brood stock can be selected for different characteristics such as shell shape, color, disease resistance, meat content and shell strength. We pick out a trait and work toward that.”

The hatchery/nursery raises clam, geoduck, mussel and oyster larvae to seed size in special tanks and ships them from Quilcene or the company’s Kona, Hawaii, hatchery or to one of its rearing facilities (shellfish beds) to cultivate marketable products. Even though it “cooks” its own algae in an armada of 30,000- to 40,000-liter vats, Jones said both Taylor and Coast share the same self-limiting problem — the amount of food they can grow to get billions of voracious larvae to the seed stage. Food production for the tiny tyrants consumes much of the lab’s space and energy in research and maintenance. A large part of the hatchery’s business also is taking brood stock from other growers to spawn and raise offspring until they reach the seed stage.

“They get water and food 24/7 and we can grow larvae much more efficiently,” Jones said, explaining that Taylor’s flow-type hatchery tanks balance water purity/temperature and food for ideal conditions to yield 20,000 million oysters from each washer-sized tank.

“We deal in microns with the larvae and we ▷



Above: Ed Jones, manager of the Quilcene hatchery/nursery owned by Taylor Shellfish Farms, Inc., scoops up a handful of geoduck seeds maturing in large outdoor tanks before they're seeded on the beach.

Inset at right: Geoduck larvae wriggle around in a petri dish at the Quilcene hatchery of Taylor Shellfish Farms.

COAST OYSTER COMPANY

Like Taylor's, Coast Oyster Company maintains an extensive lab near Quilcene, but Coast focuses solely on creating and cultivating the perfect oyster from spawn to half-shell. As such, its 26 employees operate the largest oyster hatchery in the world with 38 billion shellfish larvae, including clams and mussels, spawned annually.

Judy Edwards, assistant manager, explains that algae production is a critical part of the equation. "It grows like sourdough — one flask becomes 16,000 liters in eight days. It grows exponentially but it's touchy to grow. When it's ready, we pump it to the set-

ting tanks and the larvae tanks — They eat a lot!" Jones explained, "so we can control the amount of algae to the larvae very precisely. Larvae don't like to be overfed and we don't want to waste algae."

Taylor's is a \$16 million dollar business, exporting much of its mature product to China.

ting tanks and the larvae tanks — They eat a lot!"

A dime-sized smear on a microscope slide reveals up to 1,000 2-day-old wriggling oyster larvae, minuscule shells and all. In two to three weeks, a larva as small as a grain of pepper will have grown to setting size — about one-eighth of an inch — then advancing to the nursery. A million larvae weigh approximately one ounce.

"Oysters want to set on their own shells, so after shells return from the shucking factory (in South Bend) we clean them up and store them for six months to be sure they're sterile," Edwards explained. "Our beach has to be health-certified every year so we don't have any oyster-killing diseases" that could endanger the industry.

Coast has more than 20,000 owned and operated acres of state-certified tidelands ranging from Washington to California for its grow operations. Coast is a division of Hilton's, selling fresh shucked oysters by the case or by the jar. The company developed the triploid oyster, a larger, sweeter, firmer and more versatile product than the diploid variety.

Below: Judy Edwards, assistant manager of Coast Oyster Company's hatchery in Quilcene, displays an oyster shell with clusters of oyster "babies."



'MA AND PA KETTLE GO TO THE OCEAN'

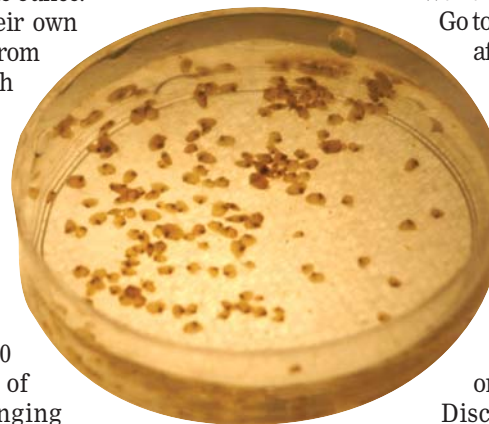
As defined by Taylor and Coast, Tom Madsen's Port Discovery Seafarms is a small operation, in business since the late 1980s and selling about 70,000 dozen oysters annually under the Snow Creek Oysters brand. But his company's manageable size is just what Madsen wants.

"We're kind of like 'Ma and Pa Kettle Go to the Ocean' around here," the affable Madsen quipped. "I just wanted to be out of the way because aquaculture is approved of in principle, but people don't want to see it, so we've done our best to stay out of sight."

With a tiny crew and a lot of owner sweat equity, Madsen grows out oyster seed for one to three years on 3,000 feet of beach along Discovery Bay, specializing in products for restaurants such as Snow

Creek, Pacific, European flat varieties, which are exported all over the world. The planting is done at high tide by submerging oyster flats that have mesh to keep the oysters in and predators out.

"I do what it takes to get what the customer ▷





wants — mostly the size. When I started the business, it was really easy, but over the years the chefs have gotten pickier about shelf-life and shape. I sell the shell for as much as the oyster and ours tend to be tiny in the marketplace — petite or extra-small, about two and a half to three and a half inches,” Madsen said. Other standard sizes are small, market, premium and oversize, the latter being a favorite for the barbeque grill.

AQUACULTURE IS APPROVED OF IN PRINCIPLE, BUT PEOPLE DON'T WANT TO SEE IT, SO WE'VE DONE OUR BEST TO STAY OUT OF SIGHT.”
- TOM MADSEN

From his beach, Madsen expertly pops open a Snow Creek flat oyster with a pen knife. A glistening creamy white disk, it goes down easily despite the seawater brine. He offers a larger Snow Creek triploid, extolling its sweetness — and he's right. After the brine dissipates there is a pleasing sweet aftertaste. Madsen's product is on the menu at Anthony's, Elliott's Oyster House and the Brooklyn Café, all in Seattle.



“The oysters sell about as fast as we can grow them, but all I count is what I sell,” Madsen said. “In the end, that's all that counts. You tell the guy (customer) you're going to be there and you make it happen every day and do it again.”

Peter and Robin Downey of Discovery Bay Shellfish are raising a mollusk that resembles nothing else around — the world's largest burrowing clam — the geoduck. Having planted 5,000 square feet of fragile seed in 2004, Peter Downey said, “We're still waiting to harvest. It takes five or six years, so it's a long-term commitment. We expect our first harvest in 2008 and our first really big harvest in 2009-2010.”

Robin Downey is executive director of the Pacific Shellfish Growers Association. PCSGA works on behalf of its members on a broad spectrum of >

Above: Tom Madsen's Port Discovery Seafarms is a small operation, in business since the late 1980s and selling about 70,000 dozen oysters annually under the Snow Creek Oysters brand.

Above left: Madsen expertly pops open a Snow Creek flat oyster with a pen knife.



issues, including environmental protection, shellfish safety, regulations, technology, and marketing.

Geoducks need four things to proliferate in the wild — high salinity, deep sandy sediment, pure water and the right amount of food — and the Downeys have those requisites on their 4,000 feet of Discovery Bay tidelands. Their beach also has naturally growing or wild-set adult geoducks that they harvest for brood stock to make “babies.”

“We take the wild brood stock from the beach and send them to a hatchery. Hopefully, we can get two or three spawns (from a pair) — geoducks don’t like living in hatcheries — they’re sensitive animals,” Downey explained. After four weeks, the larvae morph into seeds of 250-500 microns or about half the size of the period in this sentence. Once 3-10 millimeters, Downey takes the seeds, sinks row upon row of 4-inch PVC pipe into the sand, deposits three seeds per tube and hopes for 50-percent survival. About



30,000 animals can be planted on three acres.

“The tubes protect the animal so it can get deep and away from predators. Within one or two years they’re down 12-18 inches and can protect themselves by pulling their siphons in,” Downey said. “Geoducks are very sensitive animals — they die. It’s all a numbers game so you can get enough for survival. It’s like any other farming — you take your risks. It takes a lot of patience and work.”

Downey said in mid-spring he pulls the tubes away from the older geoducks and plants more, staggering his crop. When harvest season comes, it could be a bonanza, although start-up and input costs are quite high, too. In an ideal world, 30,000 2-pound market animals selling at \$10 per pound could bring in \$600,000 . . . in an ideal world.

“Every shellfish farmer is an environmentalist and we’re all very proud of what we do,” Downey said. “It’s a sustainable industry that’s been around since the 1850s and it’s a huge industry in Jefferson and Clallam counties — but a largely unknown one. People doing it are stewards of the land.” □

Left: Two young geoducks squirt water in tandem as Peter Downey opens their protective tubes.

Above: Peter Downey of Discovery Bay Shellfish shoves a hydraulic hose and an arm deeply into the sand to bring up a large geoduck.



BIG QUIL ENTERPRISES

The future of shellfishing in Jefferson County is in a pioneering program at Quilcene High School. In 2002 the district received a “High Tech High” grant from the Bill and Melinda Gates Foundation to involve and empower youth and strengthen community networks. In collaboration with the foundation, school district and Washington State University Extension-Jefferson County, Big Quil Enterprises was established.

Joe and Joy Baisch of Brinnon have been the paid coordinators of the project on Discovery Bay for the past three years.

“Our job was to identify community assets that would sustain a community coordinator position outside the school,” Joe Baisch said. “Our hope is that when we harvest our beach products, there will be a good part-time job for a community member.”

Big Quil Enterprises isn’t sustainable as a business yet. Baisch said it needs to upgrade its oyster organization and continue to plant clams, but he believes there will be produce for the local market in a couple of years.

“We currently have 1 million clams and 30,000 oysters in purses (protective cases) in our outdoor classroom and business project. Students helped plant clams and help clean the planted beaches. The revenue from this beach will be divided among the kids who work the beach. For every hour they work, they get stock in the company and get what they earned.”

By Patricia Morrison Coate