



Alaska Mariculture Report
Alaskan Shellfish Growers Association Newsletter
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ASGA's development priorities

- Fund annual operational costs of Alutiiq Pride Shellfish Hatchery
\$150,000 per year
- Support construction of geoduck nursery in Ketchikan
\$600,000
- Build shellfish processing plant in Naukati
\$1,025,000
- Study creation of shellfish financing program using a mixture of public and private funds
\$100,000
- Complete development of Oceans Alaska's marine research program
\$4,000,000
- Implement strategies designed to lower entry costs, such as a graduated tidelands lease program
- Support development of training programs for entrepreneurs and employees
- Fund DEC programs to support development of new farms
- Review Alaska's permitting program and application packets

ASGA development goals set

What the government can do to help

John Sund thinks the state and federal governments should play major roles in recruiting new shellfish farmers.

The former legislator and seafood processor has been championing the development of shellfish farming in Alaska for the past four years. Sund says the industry can support 200-400 jobs with an annual production valued at \$30-50 million.

The public benefits are clear: economically and environmentally sustainable small businesses and jobs in rural Alaska. Since each farmer will have to invest \$200,000 in creating these businesses, they need to know if the government is there as a partner.

"The one overriding factor is the common property ownership of the land, water and animals by the State of Alaska or the Federal government," Sund said. "In Alaska the private sector cannot begin to invest or create viable shellfish industry without permission of the government. This level of common property ownership and control of the water and land creates a different type of hurdle and business risk."

"There are many activities and policies that can be adopted by the government that reduce the risk or improving the chances for a private individual farm to succeed."

ASGA took the message to heart at its November 6-7 annual meeting in Anchorage by developing a specific list of actions the

government can take to help the industry develop. The development priorities closely parallel those adopted at a recent "shellfish summit" in Ketchikan and in a 2006 session chaired by then-"fisheries czar" Alan Austerman.

ASGA's list of priorities was later adopted as the legislative agenda of the newly formed Southeast Shellfish Coalition and delivered to the staff of Gov. Sean Parnell.

Preliminary results of oyster bag trials

(Following is a summary of the first phase of a project designed to test the feasibility of transferring bag culture technology of oysters in Alaska. A full copy of the Preliminary Results of Oyster Bag Culture Trials in Alaska is available at: <http://seagrant.uaf.edu/map/aquaculture/shellfish/index.html>)

Finding oyster culture technologies that will lower operating costs while increasing crop yields and reduce capitalization costs has been a top priority of the Alaskan Shellfish Growers Association (ASGA) for nearly a decade. ASGA teamed with the Marine Advisory Program (MAP) and the Alaska Soil and Water Conservation District in 2009 to test two bag culture systems. MAP aquaculture agent Ray RaLonde secured a \$5,000 budget from Sea Grant to



Tending floating bags in Maine



Intertidal bags at Blue Starr Oyster Co.

purchase gear and equipment, and AKSWCD provided a matching grant to purchase spat. The trials won't be complete until the end of the 2010 growing season, and this report is designed to provide some preliminary information to growers.

Floating bag culture is used widely in New England and the Canadian Maritimes where farmers grow eastern oysters in the bags for the first growing season. The oysters then generally are transferred to bags without flotation and moved to the intertidal zone for final grow-out. Flotation is attached to two sides of each bag, and a line running through the bags is attached to parallel longlines on each side, making it easy to flip the bags to control fouling. (See photo below.)

The intertidal bag technology was developed by John Lentz at his Puget Sound shellfish farm. The bags are attached to a taut wire fence held up by posts buried in the substrate. Flotation is attached to the other end of the bags, allowing the bags to rise and fall with each tide.

The two systems basically are designed to use the power of the ocean to do much of the culturing labor provided by farmers using suspended culture systems (lantern net and tray technology). In addition to lowering labor costs, the two systems also appear to offer a

lower capitalization requirement than tray or lantern net culture.

Four Southeast oyster farms participated in the growth trials: Pearl of Alaska, located in Rocky Pass south of Kake; Blue Starr Oyster Farm, located in Tokeen Bay near Naukati; Tenass Pass Shellfish, located north of Naukati; and the Metlakatla Indian Community on Annette Island.

A final report will be compiled at the end of the 2010 growing season, and will include an analysis of labor and capital costs, in addition to covering growth and survival rates of each form of bag culture compared to controls at each farm.



Barnacle fouling on Wyatt's bag gear

The project was planned to begin the first week of May, but logistical problems and funding delays resulted in each farm having a different starting dates. These disparities will make it difficult to compare growth rates from each site, but normal growth rates vary so much from site to site that such comparisons are problematic anyway. The real test will be the comparison against controls at each farm and whether the participating farmers integrate the new technology into their commercial farming operations.

The biggest challenge with the intertidal bag system was constructing a "fence" to withstand the differing conditions at each farm site. Lentz drives steel fence posts three feet into the beach substrate. Two farms (Pearl of Alaska and Metlakatla) opted for this approach and the other two (Blue Starr and Tenass Pass) developed a different system, as shown in the following illustration by MAP agent Ray RaLonde.

Tenass Pass attached aquaculture floats to the outside of the bags, but neglected to calculate the additional flotation value and the first tide promptly pulled all the posts out of the substrate. The flotation was so strong that it again pulled out the reburied posts despite the addition of hundred of pounds of boulders on top of the concrete footings. Since alternative flotation was not easily available, Tenass Pass abandoned the system and switched its efforts to the floating bags.

Wyatt at Blue Starr added turnbuckles at each end post, used lighter flotation, and had no problems with fence stability.

Henderson with Pearl of Alaska oriented his fence perpendicular to the tidal currents at his farm site, but this proved to be a mistake as masses of bull kelp got tangled on the lines and strong tidal currents knock down the fence. After reorienting the fence parallel to the currents Henderson's system worked well and had no problems with debris. Metlatkatla reported no problems with its fence, but the gear had a limited test at that site.

Fouling problems were limited to heavy barnacle set at the Blue Starr farm and Henderson's encounter with bull kelp. All three farms that tested the intertidal bag system were happy

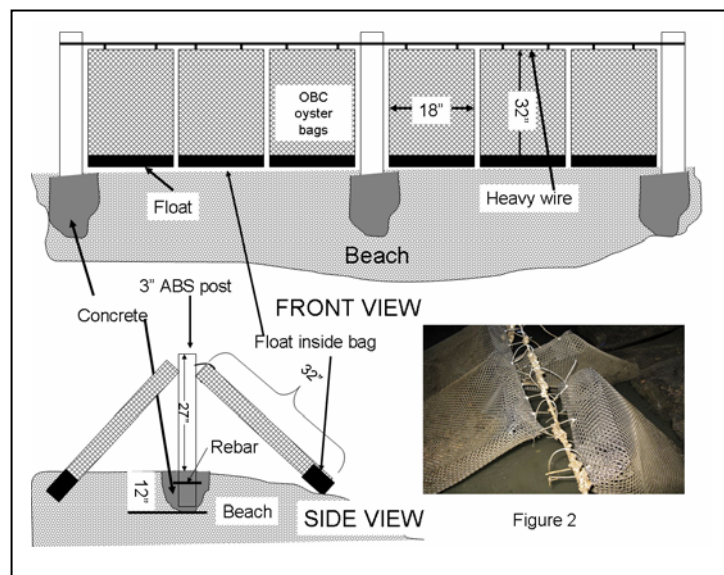


Figure 2



Tom Henderson's gear after encounter with bull kelp

with the results. Shell shape was good and the system was easy to maintain. All three were interested in completing a second year with the system before deciding whether to incorporate it into their commercial operations.

While floating bag culture is common in New England it is employed by only a handful of farms on the West Coast. Two former Maine oyster farmers, Greg and Weatherly Bates, conducted a limited test of floating bags in Kachemak Bay in 2008, and found the bag raised oysters grew faster and were better shaped than controls raised a FLUPSY. According to a



Fouling on Eric Wyatt's floating bag gear.

presentation at the 2008 ASGA meeting, spat planted at 10 mm in June grew to 40 mm by October, while the FLUPSY raised oysters averaged only 28 mm.

The floating bag systems are relatively time-consuming to prepare, but, like the intertidal bags, may not require much more initial preparation than other forms of culture, such as laying out longlines and attaching buoys and lantern nets or

building a raft and preparing stacks of trays for use. One of the biggest problems initially encountered by project organizers was what kind of flotation would work and is available on short order. Foam pipe insulation was available in local hardware stores and was purchased after other leads fizzled out.

The flotation is attached to the sides of the bags by cable ties and a line is run through the bags and attached to parallel lines, as shown in the illustration of the following page. The design allows the bags to be flipped easily with an oar or pole, which is necessary to control fouling on the bags. Exposure easily kills most fouling.

Experience with floating bags varied. Tenass Pass had no problems with the bags, except for collecting fragments of cedar leaves. Blue Starr reported similar problems, as well as eel grass and miscellaneous debris. Metlakatla had trouble keeping its bags properly afloat.

The two farms (Blue Starr and Metlakatla) doing both bag treatments clearly favored the intertidal system as producing a higher quality oyster and lower labor requirements. Tenass Pass owner/operator Rodger Painter thought the floating bags would outperform lantern nets with a lower labor requirement.

The growth trials will continue through the 2010 growing season, although farmer's will follow individual farm needs, such as shifting culture sites to more suitable locations, modifying gear and overwintering the crop. Additional information on labor requirements, gear performance, fouling and other issues also will be gathered and analyzed.

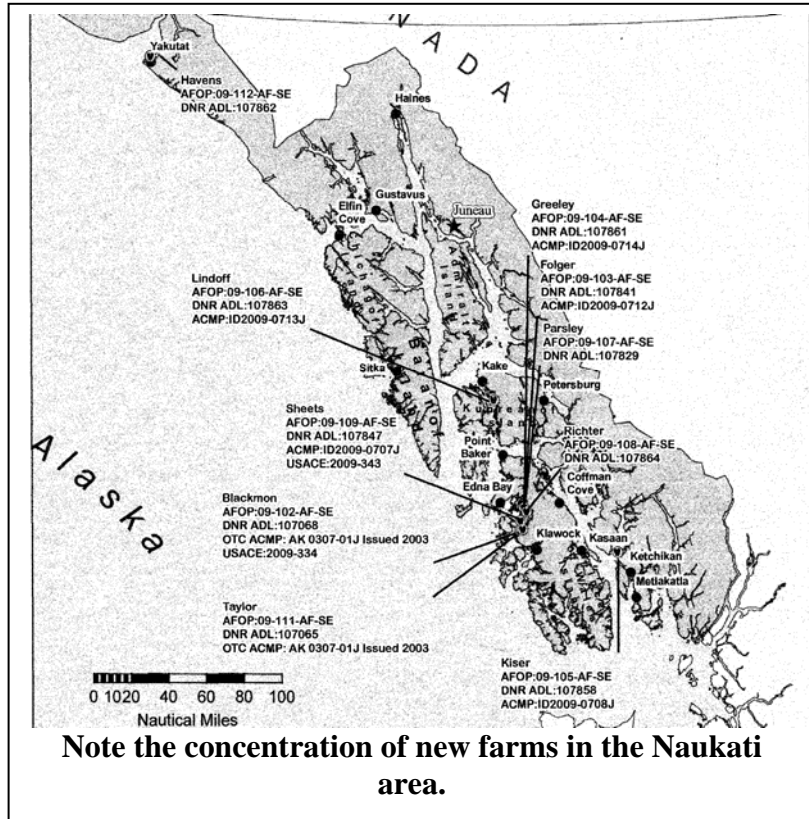
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Rebirth of Southeast Oyster Industry

After years of declining production, oyster farms in Southeast Alaska appear poised to significantly increase sales over the next few years. Consider these recent developments:

- Long-time grower Tom Henderson entered into a joint venture with Sealaska Corporation, one of the state's largest Native corporations. Henderson said his farm, Pearl of Alaska, has been producing 5,000-9,000 dozen oysters per year and he now projects sales topping 40,000 dozen by 2013.
- Naukati's "weekend warrior" program has five new farmers participating and a waiting list of three new participants. Seven new farms in the Naukati area are awaiting final state approval; another farm was approved in 2008. The state's second oyster farming cooperative was recently formed in the Naukati area by five growers.
- An important new coalition of Native organizations, growers and other groups has been formed to promote the development of shellfish farming in the Panhandle. The Southeast Shellfish Coalition includes Sealaska, Yak-Tat Kwaan (Yakutat), Shaan Seet (Craig), the newly formed Alaska Oyster Cooperative, Oceans Alaska, Organized Village of Kake and Central Council of Tlingit and Haida Indian Tribes of Alaska.
- Sealaska and Yak-Tat Kwaan have signed a joint venture agreement to develop an oyster farming operation in Yakutat, and Sealaska has applied for an additional site in Kake near Henderson's farm. PWS oyster farmer Jim Aguiar built a 4 million spat capacity FLUPSY for Sealaska as part of the company's joint venture with Pearl of Alaska.
- Construction of Oceans Alaska's shellfish research and training facility in Ketchikan should be completed by late 2010. Oceans Alaska will be partnering with the University of Alaska Southeast-Ketchikan and Marine Advisory Program on training for entrepreneurs and employees.



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UA research aims to boost oyster shelf life

By Scott Bowlen published in the Ketchikan Daily News 11/14

The testers worked with thoughtful deliberation in the hushed room, inhaling deeply, observing closely, recording the results. Was this a professional wine tasting at a French vineyard? No, it was oyster research at the University of Alaska, Ketchikan campus.

The testers were several local volunteers who'd gathered at the UAS Ketchikan's Roberts on Building on Monday afternoon for the last of a series of testing sessions. UAS Fisheries Tech Barbara Morgan had prepared a number of test stations, each of which had two test oysters. Some of the oysters were "control" oysters, quite fresh from the Blue Starr Oyster Co. farm at Tokeen Bay in Sea Otter Sound. The other oysters had been harvested earlier. They'd been cooled quickly in refrigerated seawater and stored at about 33 degrees for a period of days.

(Wyatt told a gathering at a "shellfish summit" sponsored by UAS that he started with

Rebirth...Continued from Page 5

- Two of Ketchikan's top legislative budget requests from the legislature involve shellfish farming: construction of a geoduck nursery and support for Oceans Alaska's shellfish research and training center.

While most of these developments won't result in an immediate increase in Southeast oyster production, some increases in production should register in 2010. Many of the new farms in Naukati have crops that should be marketable next year, thanks to the Weekend Warrior program.

See the attachment labeled "success stories" by John Sund of Oceans Alaska for additional information on these developments.

refrigerated seawater to lower enzymatic degradation of meat quality. The oysters were then transferred to dry holding in a converted refrigerator. The oysters were held for up to three weeks during numerous treatments.)

The testers "sampled" all of the oysters by sight and scent. The volunteers didn't actually eat the oysters, but the fundamental question of the experiment was whether they would if they could.

"It basically comes down to whether or not you would eat it," Morgan said quietly as the volunteers worked. "You can smell nit and look at it and break it down to the different categories, but the bottom line is, would you eat this oyster?"

If the answer was yes, that meant a particular method of chilling oysters could prolong their shelf life. That means potentially lower shipping costs for Southeast Alaska's oyster growers, allowing for barge shipments rather than transport by air.

"If you could minimize those costs, then it creates the economic benefit to the grower,"

said Kate Sullivan, assistant professor of fisheries technology at UAS Ketchikan.

"Then...growers could be more successful and maybe more (people) will see it as a good source of a livelihood in the region."

The idea for the research came from Eric Wyatt of the Blue Starr Oyster Co., who approached the university about two years ago.

"Right now the only way that oysters really travel is via float plane service, then Alaska Airlines," Wyatt said. "Although that works fine for small volumes, we need to have other options."

By air, it takes less than a week (editor's note: 1-2 days) for oysters produced in the Prince of Wales Island area to reach Anchorage, one of the primary markets. The oysters

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typically need to be consumed with 10 days of harvest, Wyatt said. He questioned whether it might be possible to double the shelf life. Wyatt said an extensive literature search turned up no research on the issue for Pacific oysters.

Sullivan said the university was interested in the project and submitted a grant proposal to the US Department of Agriculture. USDA funded the project which involves Wyatt, Art King of the Naukati Shellfish Nursery and the Fisheries Industrial Technology Center (FITC).

The super-cooling experiment was designed to simulate holds in refrigerated vans.

“The freezer vans, refrigerated vans that’s what we’re looking towards,” Wyatt said. “If we can keep the temperatures low until the point that they’re put on a jet, or as they go onto a barge, and they stay that way – controlled – then we’ll be able to have a lot longer shelf life.”

The research is separated into two parts: (1) the “organoleptic” rating with volunteers in Ketchikan and Naukati; and (2) testing of frozen oysters by FITC for bacteria content and glycogen levels.

“If the oysters are using up all the muscle sugars (glycogen) on the way to market, it’s not going to be as desirable a product,” Morgan said. “We’re hoping to be able to see if this method is to prolong the shelf life of the oyster and allow them to get to market in good shape – even though they might take longer to get to market.”

Wyatt said he was trying to look down the road with the project to the time when growers are producing larger volumes of product.

“You could see there are big bottlenecks if there’s any volume,” he said. “We can’t get to profitability like salmon fishermen without some degree of volume.”

Why you should invest \$75 a year in ASGA

If you are a grower, the answer is obvious: are you ready to track every movement of the regulatory agencies (think paying \$125/PSP sample or deciphering new regulations), advocate before the legislature, secure research and development grants, conduct generic marketing programs, etc. on your own?

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Ocean Acidification: Not an immediate threat to Alaska

by Raymond RaLonde, Alaska Sea Grant Marine Advisory Program

The effects of climate change in Alaska are clear: retreating glaciers, flooding, an eroding coastline, a shrinking ice cap, and shifting marine ecosystems. Unfortunately, a barrage of information in the media has not provided a clear picture of what the impact might be on our marine environment.

The most recent and complex aspect of climate change with implications for shellfish aquaculture success in Alaska is ocean acidification caused by excess dissolved carbon dioxide in marine waters. In the northern hemisphere, the Arctic ocean is most effected because the retreating ice cap enables greater exposure of surface water to carbon dioxide gas from the atmosphere, colder water concentrates more dissolved gases, and the increasing plankton productivity generates more organic material that sinks to deeper water where decomposition adds even more carbon dioxide. Recent evidence appears to show that Arctic ocean acidification is progressing faster than projected.

A major good news story is that through shellfish hatcheries, even located in areas experiencing acidification problems, provide the capacity to adapt to the ocean acidification problems.

The Bering Sea has acidification problems similar to the Arctic, but not quite as acute, but impacts to lucrative fisheries can be enormous. The coastal areas of the North Pacific are a different matter where ocean acidification occurs in deep water and is often seasonal, caused by downwelling of carbon dioxide rich waters, decomposition of organic matter increasing carbon dioxide and achieving higher saturation values associated with the high pressures and cold temperatures found in deep water. Surface waters of the Pacific coast become more acidic when upwelling

transports the deeper more acidic water to the surface.

As a first point of clarification, the oceans are not becoming acid and not causing any corrosive activity in shellfish association with an acid. The fact is that the pH of the ocean is dropping, caused by excess carbon dioxide that chemically converts to carbonic acid rather than the carbonate ion that occurs in more basic pH conditions. The carbonate ion is essential for the synthesis of calcium carbonate that forms the shells of bivalve shellfish. Only a modest drop in pH from 8.1 to 7.8 causes high mortality in oyster larvae. It is noteworthy that these values are basic not acidic being above a neutral pH of 7.0.

What does all this mean for Alaskan shellfish aquaculture? The bad news is that ocean acidification is a reality, but the good news is that in the Northeast Pacific acidification is localized and seasonal, at least to date. A major good news story is that through shellfish hatcheries, even located in areas experiencing acidification problems, provide the capacity to adapt to the ocean acidification problems.

As the story goes, the oyster larva setting problem in the northwest United States began three years ago when Willapa Bay, Washington experienced a dramatic decrease in the natural set Pacific oysters. In synchrony with the wild set failures, Whiskey Creek Shellfish Hatchery near Netarts, Oregon, experienced disastrous oyster larva set failures within the hatchery.

Initial investigations tied the failures to shellfish disease caused by *Vibrio tubiashii* that infested the coastal water via upwelling of deep water. Further investigation affirmed a more complex problem that implicated low pH of hatchery water as a possible reason for poor larval survival. To test the impacts of the low pH problem, the hatchery changed its practice to only spawn and culture larvae through their first week of early life-stage development only when upwelling ceased and pH values were above 8.0. As a practical matter, upwelling occurs when the wind blows from the north. So the hatchery practice further simplified to “spawn like mad when the wind blows from the south.” The result was a bumper crop of oyster seed production from Whiskey Creek in 2009.

What else can we glean from our new knowledge about ocean acidification and Alaska shellfish aquaculture? Here are a few important points.

1. **Alaska has no record of surface ocean acidification in the North Pacific** cause by excess atmospheric carbon dioxide or upwelling. However, research has been directed at deeper water, and near shore upwelling events such as those off Oregon and Washington would not be detected. If upwelling of acidic water does occur, it will likely be a localized seasonal event.
2. The Alutiiq Pride Shellfish Hatchery does **NOT** have a problem
3. **There is no evidence** of concern that acidification in the North Pacific can affect shell formation in adult shellfish.

The University of Alaska School of Fisheries and Ocean Sciences and Alaska National Oceanic and Atmospheric Administration have an active program for measurement and monitoring of ocean acidification. If you would like more information climate change in on Alaska’s marine environment log on to: <http://www.cgc.uaf.edu/publications.html>

Causes of oyster seed mortality remains mysterious

From PCSGA’s October Newsletter

The mysteries surrounding oyster seed survival and the link to environmental conditions only deepened over the past few months. Whiskey Creek Hatchery, ‘ground zero’ in the oyster seed arena, experienced only relatively mild mortality events this year – which correlated directly to the few upwelling events that occurred. This was good news for oyster seed supply, but bad news as far as research in how the Molluscan Broodstock Program would fare in times of “bad water.” The MPB larvae appear to have slightly higher survival rates, but suffered significant mortalities after upwelling events. Despite being able to reliably predict the upwelling events, the hatchery was unable to offset the effects of upwelling by water treatment. Meanwhile, three natural sets of oyster larvae in Willapa Bay failed to grow and survive, with only a few spat surviving at less than a “commercial” level. A late fourth set appeared to be faring better. Taylor Hatchery had larval survival rates about half of historic levels. While water chemistry appeared “normal,” level of *Vibrio tubiashii* were extremely high, which appears to explain mortality rates that were as bad as last year or slightly higher. Taylor currently is considering the installation of different water treatment options for their larval production that will help correct water chemistry, and techniques that can lower the bacterial load. Some remote setting experienced good results.

ASGA sets development priorities

The rebirth of Southeast's oyster industry

Preliminary results from bag trials

'Super Chilling' of Alaska oysters

**Ocean Acidification:
What's in store for Alaska?**

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