

Researchers seek better ways to farm popular Pacific fish

Aquaculture can relieve some pressure

By PHUONG LE
Associated Press

PORT ORCHARD, Wash. — The dark gray fish prized for its buttery flavor live deep in the ocean, so researchers keep their lab cold and dark to simulate ideal conditions for sablefish larvae.

A biologist shines his dim red headlamp and uses an ultrasound to scan the belly of an anesthetized sablefish about the length of his forearm to tell if it's female and has eggs to collect. He gently squeezes out hundreds of tiny, translucent eggs into a glass beaker.

After the eggs are fertilized externally, they'll grow in large indoor tanks and some in floating net pens in Washington state's Puget Sound to be used for research.

At this federal marine research station near Seattle, scientists are studying sable-

fish genetics and investigating ways to make it easier and more efficient to commercially grow the fish.

It is part of a larger effort by the National Oceanic and Atmospheric Administration to support marine aquaculture as a solution to feed a growing demand worldwide for seafood.

People are consuming more fish than in previous decades, with average worldwide per capita consumption hitting 43 pounds a year, according to the Food and Agriculture Organization of the United Nations. Fish consumption is expected to grow even more in coming years.

NOAA says aquaculture can relieve pressure on fishing populations and promote economic growth.

Black cod or butterfish

Fishermen along the U.S. West Coast, mostly in Alaska, catch millions of pounds of wild sablefish each year but no commercial sablefish net-pen farming exists in the U.S.

Sablefish, also known as black cod or butterfish, are



Bill Fairgrieve, a fisheries research biologist with the National Oceanic and Atmospheric Administration, holds a sablefish in March at a research facility in Manchester, Wash.

long-lived species that is native to the northeast Pacific Ocean and highly valued in Asia for its beneficial nutrients and delicate flavor. The fish are grilled, smoked, poached, roasted or served as sushi.

Michael Rubino, who directs the NOAA aquaculture program, noted that practices

for farming fish in the U.S. meet very strict environmental regulations.

But some critics worry large-scale farms could harm wild fish stocks and ocean health, and some commercial fishermen worry about potential competition.

"This would be a big threat for us," said Robert Alverson, executive director of the Fishing Vessel Owners' Association, a Seattle-based group that represents about 95 commercial fishermen in Alaska, Oregon, Washington state and California.

In 2015, fishermen harvested about 35 million pounds of sablefish worth \$113 million in the United States, all along the U.S. West Coast.

Of that, nearly two-thirds, or about 23 million pounds, were caught in Alaska, with smaller amounts in Oregon, Washington state and California. Nearly half of the sable-

fish caught in the United States is exported, with a majority going to Japan.

"Our fear is that science isn't going to stay in the U.S., and it will be exported to a Third World country where people work for a few bucks a day," Alverson said. "They'll raise it with low-valued labor and use our science to undercut our commercial fishery and coastal communities."

Alaska law prohibits finfish farming.

Complement each other

Rubino and others say wild harvests and aquaculture can complement each other, particularly during months when there are lower catch limits for wild sablefish.

"You always have this yin-yang problem between fisheries and aquaculture," Rick Goetz, who leads the marine fish and shellfish biology program at the Manchester

Research Station, across Puget Sound from Seattle. "The big problem is allaying the fears of people that you can have both. You can have both of those things working, particularly because this fish is such a high-value product."

In recent years, NOAA Fisheries scientists have worked to reduce potential barriers to sablefish aquaculture. They have developed techniques to produce all-female stocks of sablefish that grow faster and much bigger than males in about 24 months. Ideal market size is roughly 5½ pounds.

They've also studied different ways to reduce the costs of feeding juvenile fish, increase larval survival rates and decrease deformities.

One research project is replacing more expensive algae with clay that is used to help sablefish larvae better find their prey. Another looked at finding the optimal temperature to increase larval growth.

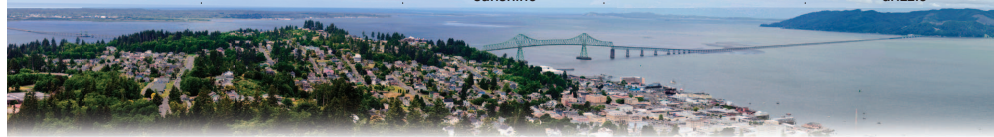
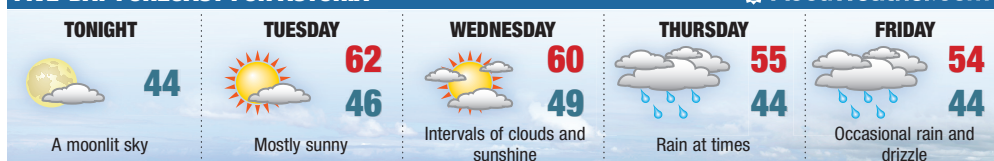
Wild fish are caught off the Washington coast and used to develop captive brood stocks, or mature fish that are used for breeding.

At the facility, the fertilized eggs grow in silos in dark, cold rooms before being moved to other indoor tanks where they're fed a steady diet of brined shrimp and other food. Large circular tanks hold fish in different growth stages.

The facility produces about 10,000 all-female fingerlings, or juveniles about an inch long, each year.

It has sent some fish to a Texas company that uses land-based recirculation tanks to grow fish, as well as others interested in sablefish aquaculture.

FIVE-DAY FORECAST FOR ASTORIA



ALMANAC

Astoria through Sunday.
Temperatures
 High/low 59°/43°
 Normal high/low 59°/44°
 Record high 83° in 1987
 Record low 33° in 1985
Precipitation
 Sunday 0.00"
 Month to date 1.16"
 Normal month to date 0.88"
 Year to date 42.40"
 Normal year to date 30.92"

SUN AND MOON

Sunset tonight 8:33 p.m.
 Sunrise Tuesday 5:50 a.m.
 Moonrise today 6:28 p.m.
 Moonset today 5:15 a.m.



UNDER THE SKY

Tonight's Sky: Cor Caroli, the brightest star of Canes Venatici the Hunting Dogs, will not be far inside the curve of the Big Dipper's handle.

Source: Jim Todd, OMSI

TOMORROW'S TIDES

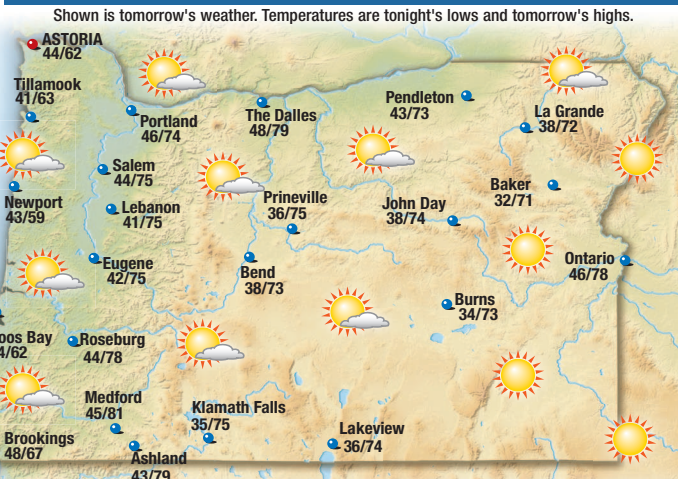
Astoria / Port Docks
 Time High Time Low
 12:59 a.m. 8.8 ft. 7:36 a.m. -0.1 ft.
 1:43 p.m. 7.6 ft. 7:30 p.m. 1.6 ft.

NATIONAL CITIES

City	Today	Tues.
Allanta	78 59 s 86 63 pc	
Boston	55 40 pc 53 42 pc	
Chicago	57 40 s 53 42 sh	
Denver	73 47 t 66 45 t	
Des Moines	85 65 t 82 57 t	
Detroit	57 35 s 60 42 pc	
El Paso	86 57 s 78 53 t	
Fairbanks	61 43 pc 63 43 c	
Honolulu	85 73 sh 85 74 pc	
Indianapolis	62 49 s 67 53 t	
Kansas City	85 62 pc 85 64 s	
Las Vegas	79 61 pc 75 57 t	
Los Angeles	72 56 pc 69 59 pc	
Memphis	83 62 s 86 63 s	
Miami	87 69 s 87 70 s	
Nashville	78 60 pc 87 63 pc	
New Orleans	82 61 s 82 62 s	
New York	59 46 pc 61 48 pc	
Oklahoma City	87 60 s 80 63 pc	
Philadelphia	62 43 pc 63 44 pc	
St. Louis	82 64 pc 86 66 pc	
Salt Lake City	69 52 c 74 55 pc	
San Francisco	70 51 s 71 52 pc	
Seattle	65 46 s 69 48 s	
Washington, DC	62 44 pc 67 50 pc	

Weather (W): s-sunny, pc-partly cloudy, c-cloudy, sh-showers, t-thunderstorms, r-rain, sf-snow flurries, sn-snow, i-ice.

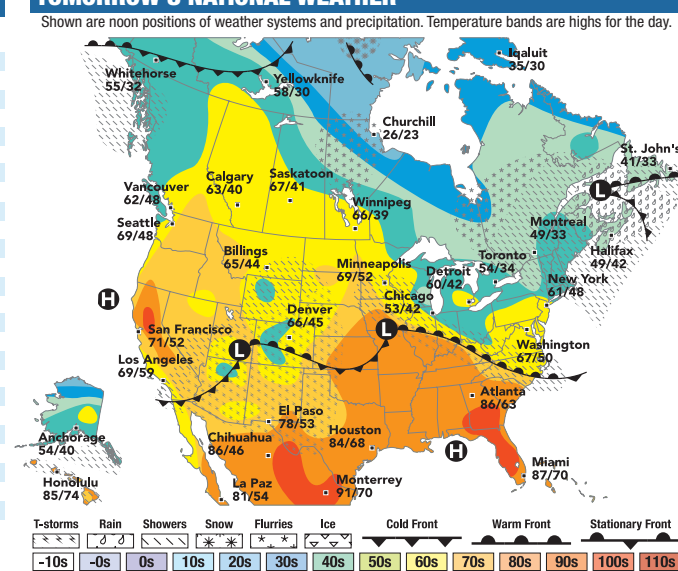
REGIONAL WEATHER



REGIONAL CITIES

City	Today	Tues.
Baker City	65 32 s 71 35 s	
Bend	68 38 s 73 43 s	
Brookings	63 49 s 64 48 s	
Eugene	71 42 s 75 43 s	
Ilwaco	57 46 pc 58 48 s	
Klamath Falls	70 35 s 75 40 s	
Medford	76 45 s 81 51 s	
Newberg	71 44 s 74 46 s	
Newport	57 43 pc 59 45 s	
North Bend	60 45 s 62 47 s	
Olympia	67 39 s 70 42 s	
Pendleton	68 43 s 73 47 s	
Portland	70 46 s 74 49 s	
Roseburg	73 44 s 78 48 s	
Salem	72 44 s 75 45 s	
Seaside	59 45 pc 60 47 s	
Spokane	65 43 pc 70 47 pc	
Springfield	72 42 s 75 45 s	
Vancouver	69 45 s 73 48 s	
Yakima	75 44 s 78 46 s	

TOMORROW'S NATIONAL WEATHER



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ON THE RECORD

Harassment

• At 2:13 p.m. Thursday, Paul Richard Shoop, 46, of Ilwaco, Washington, was arrested by the Astoria Police Department at 750 Commercial St. for harassment and second-degree criminal mischief. Shoop allegedly broke a window at the post office the day before. He then allegedly hit a post office employee who followed him

away from the scene. Shoop was seen walking near the post office the next day and was arrested soon after.

DUII

• At 1:23 a.m. Monday, Devon Robert George Campbell, 28, of Wilsonville, was arrested by the Clatsop County Sheriff's Office on U.S. Highway 101 near Ninth Avenue in Seaside for driving under the influence of intoxicants.

BIRTH

April 20, 2017
 TATE, Krista and Randy, of Hillsboro, a girl, Taylor Nicole, born at Providence St. Vincent in Portland. Grand-

parents are Becky and Bill Varner of Astoria and Karen and Bill Tate of Portland. Great-grandparent is Charmaine Campbell of Svensen.

DEATH

May 2, 2017
 PRAUS, Linda Alison, 70, of Astoria, died in Asto-

ria. Caldwell's Luce-Layton Mortuary of Astoria is in charge of the arrangements.

PUBLIC MEETINGS

MONDAY
Cannon Beach Rural Fire Department Board, 6 p.m., Fire-Rescue Main Station, 188 Sunset Ave.
Seaside City Council, 7 p.m., City Hall, 989 Broadway.

5:30 p.m., work session, City Hall, 163 E. Gower St.
Warrenton City Commission, 6 p.m., City Hall, 225 S. Main Ave.
Warrenton-Hammond School Board, 6 p.m. budget meeting, 7 p.m. regular meeting, Warrenton High School library, 1700 S. Main Ave.
Clatsop Community College Board, 6:30 p.m., Columbia Hall Room 219, 1651 Lexington Ave.
Lewis & Clark Fire Department Board, 7 p.m., main fire station, 34571 Highway 101 Business.

TUESDAY
Clatsop County Budget Committee, 9 a.m., Judge Guy Boyington Building, 857 Commercial St., Astoria
Seaside Budget Committee, 3:30 p.m., City Hall, 989 Broadway.
Cannon Beach City Council,

OBITUARY POLICY

The Daily Astorian publishes paid obituaries. The obituary can include a small photo and, for veterans, a flag symbol at no charge. The deadline for all obituaries is 9 a.m. the business day prior.

Obituaries may be edited for spelling, proper punctuation and style. Death notices and upcoming services will be published at no charge. Notices must be submitted by 9 a.m. the day of publication.

Obituaries and notices may be submitted online at www.dailyastorian.com/forms/obits, by email at ewilson@dailyastorian.com, placed via the funeral home or in person at The Daily Astorian office, 949 Exchange St. in Astoria. For more information, call 503-325-3211, ext. 257.

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