

# DNA shows that salmon hatcheries cause substantial, rapid genetic changes

By David Stauth

Oregon State University science writer

CORVALLIS – A new study on steelhead trout in Oregon offers genetic evidence that wild and hatchery fish are different at the DNA level, and that they can become different with surprising speed.

The research, published Feb. 17 in *Nature Communications*, found that after one generation of hatchery culture, the offspring of wild fish and first-generation hatchery fish differed in the activity of more than 700 genes.

A single generation of adaptation to the hatchery resulted in observable changes at the DNA level that were passed on to offspring, scientists reported.

The research was conducted at Oregon State University in collaboration with the Oregon Department of Fisheries and Wildlife. Scientists say the findings essentially close the case on whether wild and hatchery fish can be genetically different.

Differences in survival and reproductive success between hatchery and wild fish have long offered evidence of rapid adaptation to the hatchery environment. This new DNA evidence directly measured the activity of all genes in the offspring of hatchery and wild fish. It conclusively demonstrates that the genetic differences between hatchery and wild fish are large in scale and fully heritable.

“A fish hatchery is a very artificial environment that causes strong natural selection pressures,” said Michael Blouin, a professor of integrative biology in the Oregon State University College of Science. “A concrete box with 50,000 other fish all crowded together and fed pellet food is clearly a lot different than an open stream.”

It’s not clear exactly what traits are being selected for, but the study was able to identify some genetic changes that may explain how the fish are responding to the novel environment in the hatchery.

“We observed that a large number of genes were involved in pathways related to wound healing, immunity and metabolism, and this is consistent with the idea that the earliest stages of domestication may involve adapting to highly crowded conditions,” said Mark Christie, lead author of the study.

Aside from crowding, which is common in the hatchery, injuries also happen more often and disease can be more prevalent.

The genetic changes are substantial and rapid, the study found. It’s literally a process of evolution at work, but in this case it does not take multiple generations or long periods of time.

“We expected hatcheries to have a genetic impact,” Blouin said. “However, the large amount of change we observed at the DNA level was really amazing. This was a surprising result.”

With the question put to rest of whether hatchery fish are different, Blouin said, it may now be possible to determine exactly how they are different and work to address that problem. When the genetic changes that occur in a hatchery environment are better understood, it could be possible to change the way fish are raised in order to produce hatchery fish that are more like wild fish. This research is a first step in that direction.

The work was performed using steelhead trout from the Hood River and was supported by the Bonneville Power Administration and the state Department of Fish and Wildlife. ■

# Saluting success



Photos by Michelle Alaimo

**Naomi Haller shakes hands with Mercedes Reeves, Tribal curriculum/academic specialist, while being honored for having a 95 percent or higher attendance record for the first semester of the 2015-16 school year during the first K-12 Native Student Success Night held at the Tribal Community Center on Wednesday, Feb. 17. About 120 Willamina and Sheridan elementary, middle and high school students received awards for having cumulative GPAs of 3.5 to 4.0 or 3.0 to 3.4 and attendance of 95 percent or higher for the first semester. Also two students from each grade category were acknowledged for their leadership and/or significant improvements with their academics. The students received certificates and gift cards.**

**Kady Smith receives her certificate for 95 percent or higher attendance from Tribal Youth Education Program Manager Tim Barry.**



Visit the Tribe's facebook page to see more photos.

# Groups form Helping Hands

The Clothes Closet, iskam məkʰmək haws and A Cause For Paws have started an ad hoc group called Grand Ronde Helping Hands and are inviting community members to join the effort of supporting local families.

“The goal is to bring those of us together who are supporting families in Grand Ronde to share the services and resources we provide and create a resource guide we can all use,” said Food Bank Coordinator Francene Ambrose.

The next meeting will be held at 10 a.m. Tuesday, March 8, at the Food Bank, 9675 Grand Ronde Road.

“If you provide any type of services to families in our community, please consider attending,” Ambrose said. “We are looking for meal site calendars, food box sites, clothes closets, showers and laundry services. We are asking churches, church groups, departments and support groups to share with us.”

In addition, a collection day will be held at the Food Bank from 10 a.m. to 2 p.m. Saturday, March 12. Donations of children’s birthday kit items, school supplies and pet items are being sought.

If you are interested in joining the effort, contact Ambrose at 503-879-3663 or at fambrose@marionpolkfoodshare.org. ■

**free class! gentle yoga**

Join us for a 10-week gentle yoga class.  
Starts Thursday, March 17, 2016  
5:30 – 6:30 P.M.  
Adult Education Bldg.

Class Instructor: Marivel Ortiz

To sign up, please contact:  
Carmen Mercier: 503-879-1304  
or  
Anne Falla: 503-879-1660

Limited space  
Open to the community