

## “Young Frankenfisch,” a 2013 remake of the classic, “Young Frankenstein,” but this time it’s for real!

Last November's election had many interesting and complex issues decided by California voters. One that was particularly interesting was Proposition 37. Had it passed, California would have required that all genetically engineered (GE) food products would require mandatory labeling and prohibit labeling those foods as organic. Initially, polls showed Prop 37 passing. However, by November 3, the food and chemical industry and spent over \$45.6 million on its "No on 37" campaign. The "Yes on 37" group had \$8.7 million for its campaign and they lost. This was California's attempt to have its citizens know what they are eating. With the loss of Prop 37, you will not have any idea if you are eating GE or naturally produced foods. Up until now, only plants have been available as a GE food. That will probably change on the last week February.

On February 26, the Food and Drug Administration (FDA) will end its public input session and make its decision whether or not to allow [Aquabounty Technologies](#) (AT) to raise, farm and sell Atlantic salmon. Farming salmon is not

new idea; it has been done successfully for years. AT salmon are, however, not your typical hatchery, farm-raised salmonid. They are a genetically engineered product. In fact, they will be the first GE animal produced for food in the history of the United States. AT is a biotechnology firm from Massachusetts started in 1991 and is interested in the huge potential profit from improving the production of aquatic species for sale. The commercial aquaculture industry is the fastest growing part of the world's food industry. At present, the aquaculture products are valued at \$86 billion.

### A Super Salmon or a Frankenfisch?

Why genetically engineer a fish?

According to AT some of the advantages are:

- . Genetically engineered Atlantic salmon will grow twice as fast and reach maturity much faster than natural fish.

- . They are as safe to eat as natural fish and biologically identical, containing the identical nutrients as



*It's alive! It's alive!*

Atlantic salmon.

- . They will reduce the decline of natural fish due to over-fishing.
- . The Frankenfisch will all be female and sterile. They will not in-



terbred and hybridize native fish.

- . Their production will relieve stress on our natural fisheries environment.

Some of their claim are however, open to serious question.

Those opposed to a genetically engineered Frankenfisch are concerned because:

- . Despite AT claims, not all eggs treated in their triploid process are sterile. If cross-breeding oc-

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*A Frankenfisch vs. a normal Atlantic Salmon.*

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 curs it could be a disaster for the natural fish and the environment

. There is a possible allergic effect on the human autoimmune system. No research has been done on this issue.

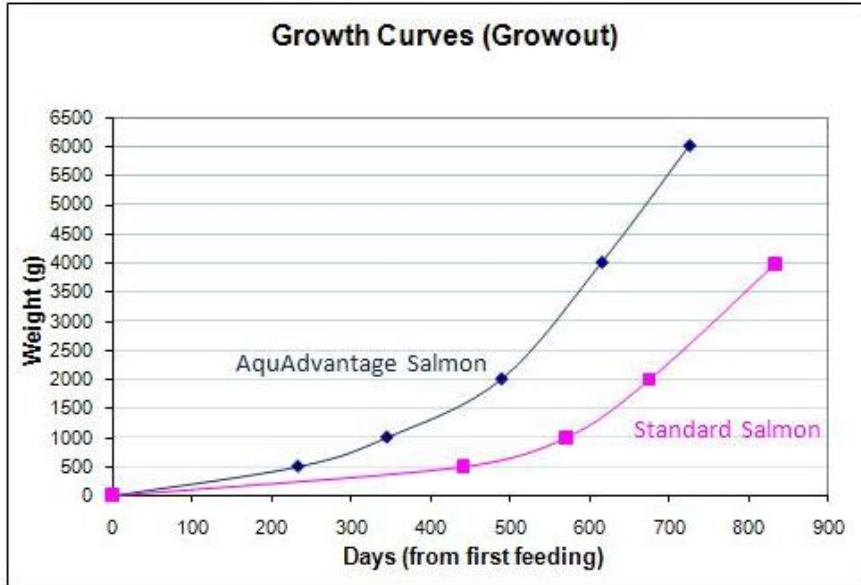
. If these fish do escape, their effect of the natural food supply for native fish is a potential disaster.

**So let's make a Frankenfish.....**

Salmonids are diploids. That is they have two chromosomes. A fe-



male salmonid has two chromosomes (2n) and a male one (1n). After the egg is fertilized initially, it has three chromosomes (3n). In the early stages for cell division, one chromosome is removed from the egg to leave a diploid egg, which produces the salmonid of which we are familiar. Frankenfish are triploids. They have three chromosomes. These fish are not clones. Clones are copies of the same species. In the Frankenfish, the DNA has been altered to produce desirable traits such as rapid growth and sterility. The gene for



growth was taken from a Chinook salmon and another gene was taken from another fish, the ocean pout. The pout's gene acts to inhibit the salmonids reproductive cycle. In a normal salmon, growth and reproduction both require metabolic energy. With the inclusion of the pouts gene, the metabolic energy is directed solely for growth.

To commercially produce triploid trout, the eggs, sperm, and water are placed in a pressure chamber. The pressure in the chamber is increased to 7,000 psi for 40 minutes, and the water temperature is 49 degrees F. What you get from this process is a triploid trout, the so-called Frankenfish.

Soon the FDA will decide if the triploid is to be made available for food production. If this occurs, the Atlantic salmon will be the first GE animal in America. In watching the process unfolding this will probably hap-

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pen.

**The Frankenfish among us**

In 2006 I received several e-mails from friends on the BOD of NCCFFF discussing the implications of a lawsuit against the Dept. of Fish and Game (DFG). [The Center for Biological Diversity \(CBD\)](#) and [Pacific Rivers Council \(PRC\)](#) brought an action against DFG because they had not done the research required to see if their

stocking fish program complied with California's Environmental Quality Act (CEQA). Most of us in Delta Fly Fishers were angry with the suit because it would interfere with our fishing, especially our still water fishing since some of our local



lakes would not be stocked. At first I did not understand the reason for this suit. In talking with Dan McDaniel, he correctly pointed out that Delta Fly Fishers needed to "take the high road" on this issue. When the facts became known and understood it was clear Dan that was right. The DFG's stocking program has been responsible for hybridized native trout to the point some no longer exist and some species of amphibians are now threatened with extinction.

Because of the actions initiated by CBD and PRC, we are going to have a chance to see just how successful the triploid trout-stocking

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program will be in the west. In during research for this article I spoke Jose Setka (chief biologist for East Bay Mud) and Eric Barrow from the Mokelumne River Fish Hatchery. They both told me that at this point no triploid trout have been planted in our river systems, currently the planting is limited to lakes. Locally you can catch Frankenfish at both Lake Camanche and Lake Amador.

As of last March, in Washington state, 117 lakes have been stocked with 47,300 triploids weighing approximately 1.5 pounds each.

In order to prevent further hybridization of their three native strains of cutthroat, Idaho is stocking streams with self-sustaining cutthroat populations. However, the triploids are now being stocked

in lake waters across the state.

In ten years of farming fish in British Columbia, it is estimated that a minimum of 400,000-farmed salmon have escaped. The actual

less than an exact science and that non-sterile females are produced and can escape, their effect on our fisheries is still an unanswered question.

A man listening to his marine radio at Lake Camanche heard another angler say that he had just caught one of those "tri-tip" fish. It seems we have a lot to learn about triploid trout.

Ron Forbes  
Conservation Chair



*The endangered California Red Legged Frog.  
Photo courtesy of the National Park Service.*

number is probably closer to one million. Given the fact that the commercial process of triploidy is