

6. Aquaculture

Aquaculture is the production and sale of aquatic plants and animals in confined ponds or raceways. Geothermal aquaculture uses naturally occurring warm water to accelerate the growth of fish, shellfish, reptiles, amphibians, and aquatic plants. Aquaculture is a high potential development area for low-temperature geothermal resources, including areas in Montana. Geothermal aquaculture facility owners in the United States grow alligators, bass, catfish, giant fresh water prawns, goldfish, koi, lobster, snails, sturgeon, tilapia, tropical fish, trout, turtles, and water lilies. There are currently at least four dozen geothermal aquaculture operations in 11 western states. Rearing fish in controlled year-round temperatures can boost growth rates by 50 to 100 percent, dramatically increasing the number of harvests possible each year.

The use of geothermal water for aquaculture depends on the water temperature and the water chemistry. Some geothermal water in Montana, including the very salty hot brines that emerge from the oil wells in the eastern part of the state, contains minerals that make it unsuitable for direct use in aquaculture. However, geothermal water that is too toxic for direct use in aquaculture can be run through a heat exchanger, where the hot water transfers its heat to more potable water that can then be used in aquaculture facilities. Aquaculture usually needs a constant water temperature of 60 to 90 degrees F, depending on the species, so many of Montana's geothermal resources are hot enough for this purpose. Water quality and flow availability may be limiting factors to aquaculture operations.

Although Montana has little experience with aquaculture facilities, aquaculture is big business in neighboring Idaho. Over a dozen geothermal aquaculture facilities are currently operating in Idaho, with continued growth expected.



Tilapia are often raised in geothermal aquaculture operations in the western United States.

Source: NREL Photographic Exchange

6. Aquaculture - *continued*



Alligators are raised in ponds heated with geothermal energy in Colorado.

Source: NREL Photographic Exchange