FISH BREEDERS OF IDAHO INC.
HAGERMAN, IDAHO

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Geo-Heat Center

LOCATION

The aquaculture facility is located along the Snake River, approximately 30 miles northwest of Twin Falls, Idaho and near the town of Hagerman. There are also several greenhouse operations, hot springs spa/resorts and residential heating within about three miles in either direction along the river. Elevation is about 3,800 ft ASL and average annual temperature about 50°F. The operation began in 1973 after drilling the first well.

RESOURCES

The resource is known as the Banbury Hot Springs area. Most of the wells are in an area about 10 miles long by one mile wide. The occurrence of thermal water in the area appears to be fault controlled. The better (higher flow and temperature) wells occur on the downthrown side of the fault. Temperatures range from 77 to 162°F. Water quality is generally good– pH 7.9 - 9.5, total dissolved solids 230 - 420 mg/l with higher temperature fluids having higher pH and TDS. Artesian heads range from slightly above, to 360 ft above, land surface. Based on heat flow data, depth of circulation to attain the highest temperatures in the wells is about 4400 ft and since most wells are only 420 - 700 ft deep, convective transport along faults is indicated. Probable maximum temperature based on geothermometers is about 195°F.

Fish Breeders of Idaho utilizes eight wells with temperatures ranging from 90 - 95°F. Most of the wells are about 500 ft deep–one at 1,100 ft hit the main flow at 500 ft, which increased very little in flow or temperature beyond that depth. Wells have shut-in pressure of about 40 psi (92 ft). Total flow is 6,000 gpm, but has declined to about 4,000 gpm as more wells have been drilled in the area. Seven of the wells are fairly high in the river canyon–the deeper 1,100 ft one being at the lowest elevation and has the lowest flow–only 200 gpm. It may have been drilled through the fault and into less fractured formation below the 500 ft depth.

UTILIZATION

This site is ideal for warm water species. The wells (expect one) are neat the top of the canyon; so, water flows down a quarter mile with an 80 ft drop. Raceways are interspersed with rocky brook-like channels that help add oxygen utilized by the fish.

Stocking starts with the water flow at the top with channel catfish, followed by lower oxygen tolerant blue catfish (350,000 - 400,000 lb/yr combined), to even more tolerant tilapia (100,000 - 200,000 lb/yr) near the bottom, then to settling ponds where solid waste is removed. More oxygen is added and water cooled in the rocky brook on its way to the river. Starting in 1994, in the lower portion, water is diverted to alligator houses (1,000 6-footers/yr) and outdoor ponds for 1,000 lb 10 - 14 ft breeding stock. The alligators are fed dead fish from this site and from the numerous nearby cold water fish farms (trout). Since the fish are cleaned on site, the alligators are also fed the entrails.

In winter, about 1,000 gpm of cold water from shallow springs is mixed with geothermal to maintain correct growing temperatures. In summer, 4,000 - 5,000 gpm is obtained from an irrigation canal.

Fish Breeders of Idaho also has a fish processing plant and a cold water fish farm that raises a million pounds of trout and 200,000 lb of sturgeon annually at another location. It is planned to move some of the sturgeon to the geothermal site for faster growout in the warmer water.

OPERATING COST

There are no pumps, pipes, heat exchangers, valves, etc. Operating cost is zero for the geothermal system.

Assuming a 50 °F temperature increase if river water was used, at current natural gas rates, the cost to maintain optimum growing temperatures would be about a half a million dollars per month. Using the geothermal water, the estimated capacity is 8.8 MWt and annual use is 210 billion Btu.

REGULATORY/ENVIRONMENTAL ISSUES

During the late-1970s and early-1980s, there was a large increase in the number of wells in the area. As a result, artesian heads and flows decreased. The Idaho Water Resources Department instituted a "Ground Water Management Area" in 1983 meaning that no new commercial well water rights will be issued.

There have been concerns voiced about geothermal uses thermally polluting the Snake River. Most of the users discharge relatively cool effluent so nothing has come of the concerns to date. This may become a problem in the future that all the geothermal users in the area are aware of.

As with most confined animal operations (i.e., feed lots, dairies and fish farms), run off or effluent contains elevated phosphorous levels. This is another future problem for Fish Breeders of Idaho–as well as all other confined animal operations. Fish Breeders is investigating the use of certain varieties of barley that contain less phosphorous as a substitute for the fish meal. They are also looking for ways to remove the phosphorous from the effluent.

PROBLEMS AND SOLUTIONS

As noted above, there have been problems with resource decline and the potential problems of thermal pollution and phosphorous.

Well pressures and flow seem to have stabilized somewhat since the water management area was instituted. The past several years of drought in the region has undoubtedly had some effect; so, restrictions on increased water use are difficult to access.

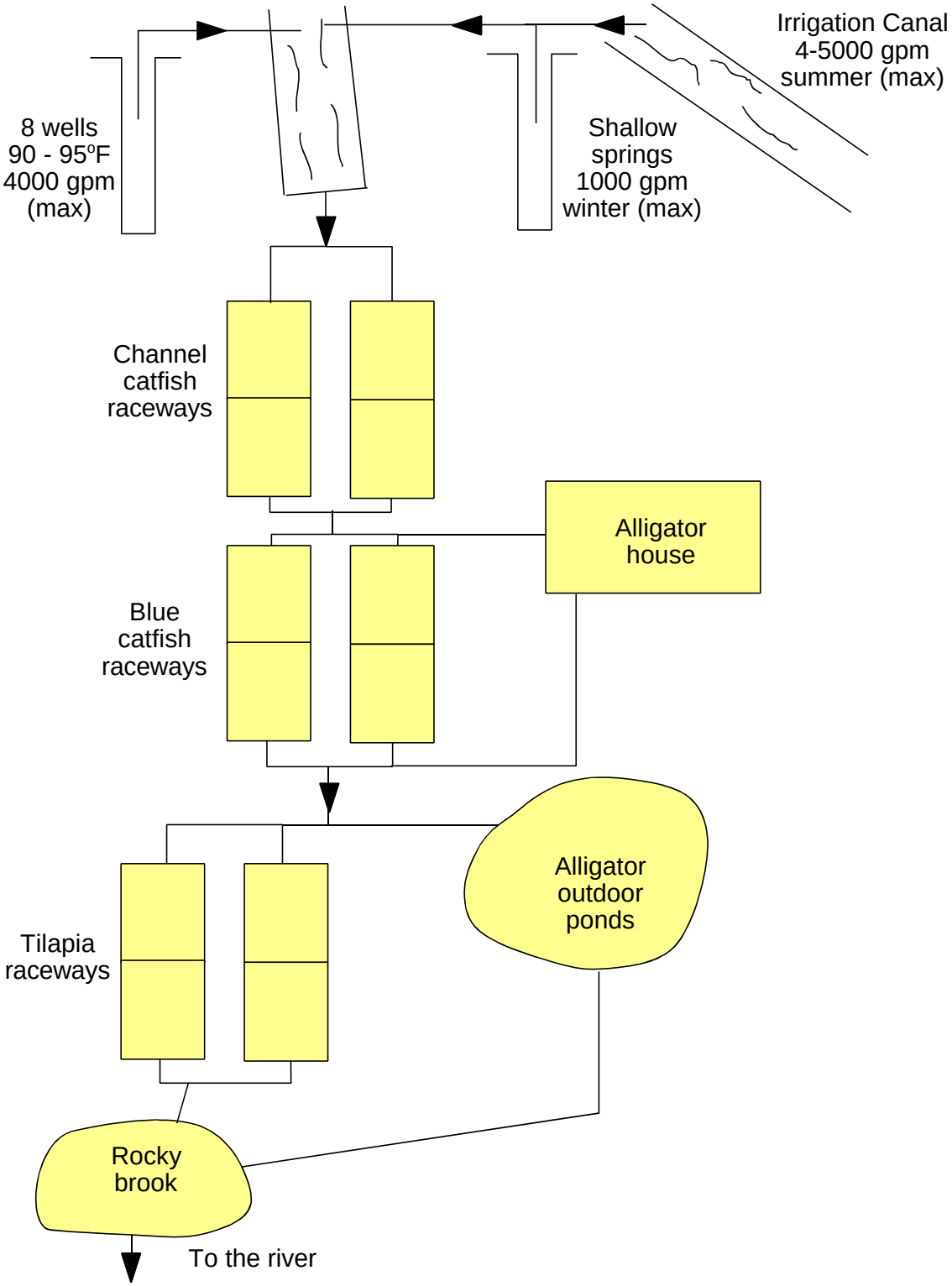
They are aware of the potential for thermal pollution and elevated phosphorous and are attempting to solve the problems before legal restrictions are enacted.

CONCLUSIONS

This is an ideal site with both good quality warm artesian and cold water available up slope providing simple and economical design and operation. This combined with the operator's knowledge, experience and business acumen have combined to make a very successful operation.

REFERENCES

Clutter, Ted, 2002. "Gators in the Sage," *Geo-Heat Center Quarterly Bulletin,* Vol. 23, No. 2 (June), Klamath Falls, OR, pp. 8-10.


Irrigation Canal
4-5000 gpm
summer (max)
8 wells
90 - 95ºF
4000 gpm
(max)
Shallow
springs
1000 gpm
winter (max)
Channel
catfish
raceways
Alligator
house
Blue
catfish
raceways
Alligator
outdoor
ponds
Tilapia
raceways
Rocky
brook
To the river