

SunFish

Solar water heating at a British Columbia tilapia farm

By MORGAN McDONALD

Tilapia are tropical fish with a mild flavour and lean, white flesh similar to sole. Best known as the miraculously multiplying meat from the bible story of the loaves and fishes, tilapia are also gaining in popularity in modern times. In Canada tilapia are cultivated coast to coast and sold primarily to Asian restaurants and food stores, and now the non-Asian market is also getting hooked.

As a tropical species, tilapia require warm water to live and grow. Temperatures are typically maintained at 26-28°C with natural gas or propane boilers. Satisfying this need for energy could be seen as an economic and environmental barrier, but at least one new operation has overcome this obstacle by using renewable energy. Thanks to a new solar heating system at the Redfish Ranch tilapia farm in Courtenay, BC, some fish are getting free heat from the sun, offsetting

the cost of propane and bringing land-based aquaculture one step closer to environmental sustainability.

The aquaculture industry has been criticized on many fronts for its environmental impacts. The reality is that both wild and farmed fisheries have positive and negative impacts, and it is important to look at both in more detail to understand what's good and what needs improvement. Within both wild and culture fisheries innovators are bringing quality fish to the marketplace while minimizing the harmful side effects of their operations. By sharing these success stories and pursuing the long-term goal of sustainability the industry as a whole can prosper.

The environmental benefits of farming tilapia should encourage conscientious consumers to discover and support this industry. Tilapia are grown in land-based tanks, which significantly reduces contamination of local ecosystems. Growers in BC are required to provide assurances that the fish cannot escape and threaten native salmon stocks. Tilapia can also be fed a vegetarian diet, unlike many farmed fish species whose carnivorous diets rely on meal and oil from wild fish. At least two farms in Canada use tilapia in closed-loop aquaponics operations, where aquaculture is combined with hydroponics to grow plants while purifying the wastewater.

Redfish Ranch is the first tilapia farm in British Columbia. Owner Barry Sjostrum began operations in the fall of 2000. The fish achieve market size in eight months and are sold live, primarily in Greater Vancouver. With demand far greater than his supply, Sjostrum already has plans for expansion.

The initial plan for a solar heating system arose from a feasibility study funded by Natural Resources Canada (NRCan). Taylor Munro Energy Systems developed the design to be cost-effective and reliable. The economics looked promising and the project went ahead shortly thereafter.

Solar water heating is one of the most cost-effective forms of renewable energy; it is an economical choice for many commercial and residential buildings both as a retrofit and in new construction. Even though the sun does not always shine, water can be pre-heated by solar energy, then topped up to the desired temperature with a conventional boiler. The modest temperature requirements for on-land commercial aquaculture operations make them ideal applications for solar water heating. Operators save on energy costs while reducing pollution and greenhouse gas emissions. Reduced boiler run-time also prolongs equipment longevity and postpones costly replacements.

YSI 5200 Recirculating System Monitor and AquaManager Software integrate measurement and control of water quality, feeding, alarming, and data management into one product.

Multiparameter
Multi-instrument networking
Event logging
Dosing and control
and much more
to keep your operation...

Healthy, Wealthy and Wise

937.767.7241
www.YSI.com

Y S I Environmental

Solar water heating is distinctly different from solar photovoltaics, or PV, which uses semiconductors to convert solar energy into electricity. The solar collectors at Redfish Ranch are made from UV-stabilized polyolefin (a polyethylene/polypropylene blend) and filled with water. The collectors are 20 ft (6.1 m) long, 4 ft (1.2m) wide, and take up much of the hatchery's south-facing roof. Each collector has nearly 200 tubes with an inside diameter of 3/16" (5 mm) running from top to bottom. Acting like a radiator in reverse, the array uses all that surface area to pick up heat and then pipes it to an insulated storage tank. The heat is transferred to the fish tanks by way of a heat exchanger, keeping the solar water and the fish water separate.



Solar water heating at the Rosewall Creek salmon hatchery on Vancouver Island, BC. (Photo courtesy Taylor Munro Energy Systems)

A south-facing roof is ideal for solar systems in the Northern Hemisphere, though east- and west- facing arrays can be quite effective. This hatchery building was specifically designed to accommodate solar collectors, so the roof slope and orientation are perfectly suited for the job. The cleats and straps that secure the collectors to the roof are also made with UV-inhibited materials that will last for many years. The manufacturer offers a 12-year warranty and their equipment has been known to perform for up to 25 years before needing replacement. Based on the computer model, the tilapia solar system will displace over 21,000 litres of propane annually. The whole project (design, materials, and installation) has a pay-back time of less than five years.

photo) in Fanny Bay, BC, a short drive south of Redfish Ranch on Vancouver Island.

There are more opportunities for using solar heating in the sustainable culture of other species such as catfish, which, like tilapia, can be raised on a vegetarian diet. As we close the loop on food, water, and energy requirements in all farming operations – aquaculture and otherwise – we can see that a sustainable future is attainable. With industry and consumers working together, supply and demand for sustainable food sources will multiply, and can put good food on the table without any miracles.

Morgan McDonald is an energy specialist at Taylor Munro Energy Systems. For more information contact him by phone at: +604 946-4433; by email at info@taylormunro.com, or browse the website: <http://www.taylormunro.com>.

Sjostrum is impressed by the performance of the system and finds it easy to use. "It's awesome. I love it and understand it completely. Once you understand it there's really nothing to it."

Along with the proposed hatchery expansion, there are opportunities to add on to the solar heating system. More solar collectors and more storage will even further offset Sjostrum's propane costs.

Solar water heating works in a variety of aquaculture applications. In 1997 Taylor Munro installed a system at the Rosewall Creek salmon hatchery (see



Finding your place in the Aquaculture Industry



Finding a job in the aquaculture and marine science sector is now fast, easy and just a click away. Whether you're a manager, research director or farm technician, you will find the most up-to-date advertisements available in our industry today.

Search specific fields within the industry to find your match.

Aquaculture Employers

Here is a new and easy way to fill your staffing needs. Use the Post a Job link to advertise a job today. Post online and pay online. Aquaculturejobs.com is a marketplace for aquaculture employers to fill jobs and for would-be employees to find jobs. We deal only with the international aquaculture industry and are the only web site designed exclusively for this purpose.