

RIVERWATCHER

V O I C E

HERTING

The latest member of the expanding Riverwatcher family in Sweden is the Double Tandem Camera Riverwatcher in the Herting fishway. Designed by our Sweden partners of many years, Fiskevardsteknik.



Herting is the lowest power plant in River Atran, which is situated close to the sea at Falkenberg. It's source is in Västergötland, at a height of 332 m above sea level and reaches Kattegat 240 km later. River Artan is the home of several fish species such as salmon, sea trout, eel and lamprey all of which survival depends on free migration routes.



The new Riverwatcher of Herting is not only a state of the art Fish Counter for scientists but also an interesting tool for education and knowledge for the local (and not so local) people. The system broadcasts live the migration numbers and videos of the fish going both up and down river.



CANADA

In the rural arctic Canada of Hope Bay, two Riverwatchers work hard in the Koignuk River every summer to do what researchers did before in these extreme climatic conditions where challenges to human safety due to weather, bears and wolves can be a big issue, not to mention the ever enthusiastic mosquitos that seem to be very fond of biologists.

The Riverwatchers are flown up to the remote Doris North Mine in the spring, where they are installed to gather important data about fish migration in this sensitive wildlife that bursts in the short bright summer.

The mean annual temperature at that station is approximately -10.6°C with a summer mean of 6.9°C (June to September) and a winter mean of -19.4°C (October to May). The ground is covered in snow most years, lakes are ice-covered from October to June with ice thickness reaching depths of 2.0m. Arctic char is found in the region, in lakes and rivers, and along the coasts in some areas. Char is important to the traditional diet of Inuit, for sport fishing, and for commercial fishing.

Other fish species that are common in the hundreds of lakes and streams in the region include lake trout and Arctic grayling.

REPPAFJORD RIVER NORWAY

The Camera Riverwatcher in Reppafjord River in Northern Norway has been watching the river since it was installed in 2009, providing interesting and valuable results. Following the introduction of the spawning goals in rivers in Norway with stricter requirements for documenting the spawning stock in waterways.

The Riverwatcher has made this challenge a much easier task. For example, the 2013 season was characterized by poor fishing but the Riverwatcher was able to document a record population increase. If this had not been monitored, all fishing in Reppafjord River would have been banned. Furthermore, there is a video of every single fish in the river linked to data and measurements which helps to identify other species such as Arctic char, sea trout and the adverse Pink Salmon.



FRANCE

When the first Riverwatcher was installed in Chateauponsac in south France, in cooperation with our French partners Fish-Pass, there was a reception with presentations from several stakeholders and both local and domestic authorities.

Everybody involved expressed interest in the project but concern as well that we might not get usable pictures in the dark waters of this inland forest area. Since then the Riverwatcher in Chateauponsac and the latest one in Auchy have pleased many with not only accurate statistics about fish migration, but nice videos of salmon and trout that are endangered and threatened in these rivers.



INCREASED INTEREST FROM CHINA

VAKI and FISHBIO have teamed up as a sell and service team in North America that also provide technical support, including, but not limited to installation, on-site training, troubleshooting and assistance with data analysis. A group of Chinese researchers contacted FISHBIO seeking information about the Riverwatcher.

FISHBIO were happy to host their visiting delegation for a consultation. The visiting researchers were searching for solutions to monitor multiple target species of concern that may pass through fish ladders being constructed at new dams.

After providing an overview of the capabilities of the Riverwatcher at FISHBIO office, they sat down for a discussion with the group about the advantages of the unit over traditional video monitoring, such as reduced labor needs and more reliable fish identification in turbid conditions thanks to the infrared recording of fish silhouettes.



FISHBIO pointed to several other facilities, such as Daguerre Point Dam on the Yuba River and the Robles Fish Passage Facility on the Ventura River, that have had success using the Riverwatcher to monitor fish passage through their own ladders. In addition, they described their use of portable resistance board weirs in combination with the Riverwatcher to identify and easily differentiate between multiple targets.

After further discussions about the other monitoring services they provide, the research team continued on with their American tour, heading to additional sites along the coast to investigate other monitoring installations along the way.

A NEW REPRESENTATIVE IN CHINA

VAKI and Generule Int'l Holdings Ltd. have joined forces in China. There is a strong push for increased hydroelectric power in China. According to China's development plan for 2011-2015, the country plans to increase its renewable energy consumption to 11.4% of total consumption by the end of 2015. In fact, half of the hydropower in the world installed in 2012 was in China, which has more installed renewable energy capacity than anywhere else in the world (both including and excluding hydroelectric power).

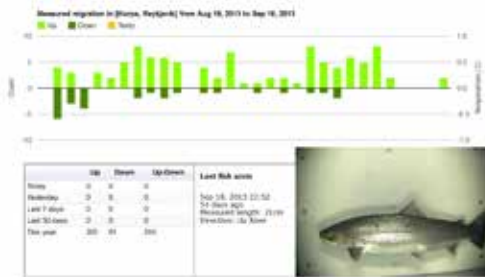
With more than 85,000 dams estimated to exist in China and hundreds more in the works, monitoring migrating fish populations at these structures is becoming more important than ever.



RIVERWATCHER DAILY

Imagine in the future, that you could open any computer or mobile device and see what is going on in the river in real time, check out pictures of the fish and get automatic migration reports... oh wait! We already got this!

The Riverwatcher Daily is a new addition to the Riverwatcher product line. It makes it easier to access statistics, silhouettes and videos of all fish in the river. Users can view real-time information from anywhere and see what is going on in the river at any time. The data is securely stored and accessible on a private web account. Users of RWD have



told us how much they appreciate being able to log in from anywhere to get the latest results and get the automatic reports without having to download any data or software.

For example, in 2014, when we thought the season was over in River Gljufura in Iceland and nothing had been going on for many days, a record migration of 55 fish on September 15th brought a big smile on the fisher-



men who had taken the chance of buying the late season license. Without RWD they would not have known of the increased chance.

RWD makes life easier for stakeholders and makes fishing more fun for anglers.

Oh and did we tell you that older systems are easily upgradable to Riverwatcher Daily?

NEW FEATURES FOR THE RIVERWATCHER

We've had quite a few new additions to the Riverwatcher recently, such as the time lapse video feature and Riverwatcher Daily.

Furthermore, our engineers have been busy working with some of our partners and this year we are announcing three new models of the Riverwatcher with some really exciting additions that we would like to inform you about:

1 Turbidity Riverwatcher: Some rivers, such as glacial waters, might have a pretty clear visibility for video recording one day but turn very turbid and milky the next, making it impossible to record usable videos with normal settings. This new version includes a turbidity sensor that indicates when camera settings need to be changed for better videos and a back lighting system that gives usable video silhouettes in conditions where normal front light would only reflect back to the camera. Furthermore this system has a narrow section in the tunnel that forces the fish to swim as close to the camera as possible.

2 Pit-Tag Riverwatcher: For optimal ichthyology, many of our customers use other methods of monitoring fish such as using Pit-Tags. This gives the researcher very specific information about that individual and behaviour, while the fish counter is more useful to tell the number of fish and their migration patterns as a group. As the Riverwatcher measures every single fish in the group, being able to identify them would be the Holy Grail for many researchers. This is why Vaki and BioMark have joined forces to develop a Riverwatcher that can also read Pit-tags and incorporate this information with the Riverwatcher software to identify individuals within the group. This means that a researcher can go through the data and get an indication and identification for a tagged fish and connect this information with other data generated by the Riverwatcher. The first Pit-Tag Riverwatcher is to be installed in Mörrum, Sweden.

3 Multi-Sensor Riverwatcher: Until now, the Riverwatcher has only measured the temperature of the water and incorporated that with fish migration data. Using other data was subject to manual comparison and using different software. The all new Multi-Sensor Riverwatcher now records actual and specific conductivity, salinity, total dissolved solids, resistivity and density, dissolved oxygen, ORP, pH, temperature, water level and water pressure. Comparing migration patterns with different data will give a better understanding of fish behaviour and the new Multi-Sensor Riverwatcher makes this comparison easier than ever before.

We hope you can use some of these features for your future projects and/or update current models you have for optimal use. Feel free to contact us if you would like more information on any of these additions, or all of them for that matter.

GERMANY

High environmental concern has made the German speaking market a very important one for the Riverwatcher as it often is used to monitor the impact of man-made structures on fish migration. Vaki recently joined forces with I AM HYDRO, a young and upcoming company, to represent the Riverwatcher in Germany, Switzerland and Austria.



Several installations have been made over the years, with the first basic Riverwatcher in river Lachsbad, Rathmannsdorf, followed by camera Riverwatchers in river Aller, Markelndorf, river Sieg, Muisdorf and Main Kastheim. In Koblenz a double height video Riverwatcher watches over the river Mosel and monitors all movement in the fish ladder at the Mosellum visitor center all year round.



Berlin fisheries authority set up a camera system in December 2013 and were very happy with the results. At the same time Wupperverband installed a camera Riverwatcher in river Dhunn, Leverkusen.

NISQUALLY TRIBE

A BETTER UNDERSTANDING OF RUN MIGRATION

HISTORY: The Alder Dam was built in the 1940's without a fish ladder. In the early 1960's the vertical slot fish ladder was added. Water depth of the fish ladder varies from 3-9'. The Nisqually River is a glacial river, flowing off 14,000 ft. Mount Rainier (a volcano) located in southern Puget Sound (fiord) in Washington State USA. Due to the glacial characteristic visibility is limited for 4-6 months per year. The Nisqually runs 5 of the 6 species of Pacific Salmon. (Chinook, Coho, Chum, Pink, Steelhead).

The Nisqually Tribe (Native Americans) have relied on the returning salmon for sustenance for time immemorial. They are fishing people. The Nisqually's signed a treaty with the US govt. in 1854 during the USA western expansion of Europeans relieving "deed" to nearly all the lands within their "usual and accustom" area, They granted the "rights" to fish for salmon in the 1970's after many legal challenges. The tribe became "co-managers" with the State fish & wildlife agency, of the resource of salmon and were allocated 50% of the harvestable runs. The Nisqually Tribe currently has a Natural Resource staff 45, of which have a degree. The tribe fishes primarily with gill nets from small boats for commercial sale and personal use.

The tribe operates two hatcheries rearing and releasing 4 million Chinook and 600,000 Coho. The hatcheries are both located below river mile 9. Two species of Chinook (1999) and Steelhead (2007) are listed as threatened under USA Endangered Species Act and populations region wide are in a very depressed state. The dam is located at river mile 26 and about 1/2 of the spawning ground habitat is upstream. Traditional spawning ground surveys (fish, live & dead) and red counts are difficult due to river clarity because of the glacial origin, high annual rainfall and the cost of funding this labor intensive activity.

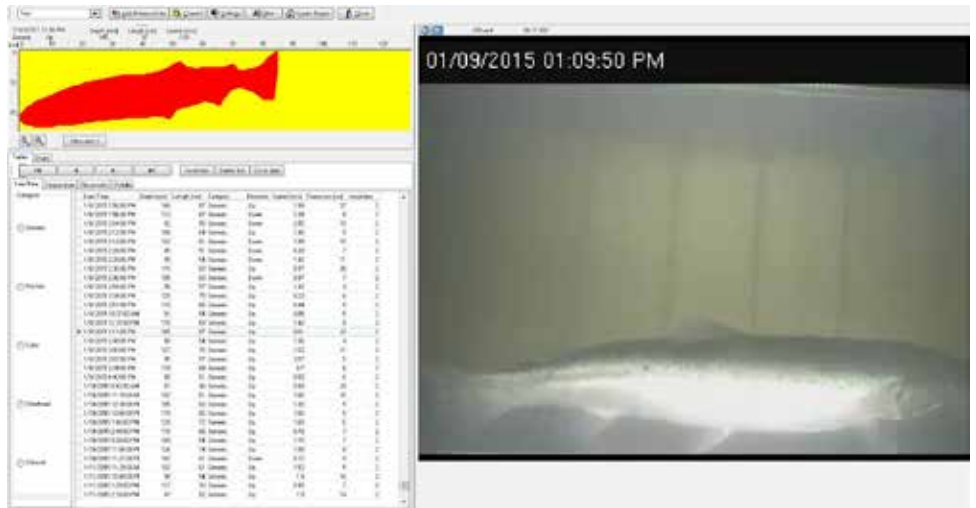
Unique installation

We asked Bill St. Jean about his experience:

Prior to the Riverwatcher system we were surveying ~20% by walking boats, having to expand out for the entire river system. The last 3 months we have counted and identified over 120 Steelhead and we do not think we have seen the peak of the run yet. Steelhead is the species of greatest concern as the population has crashed from estimated 20,000 in the early 1980's to current estimates of less than 700 in recent years.

The Riverwatcher system is now allowing the Nisqually Tribe to count and determine species for what we hope is year round. It was invaluable to get Gulli, Vaki production manager, on site to set up and work through our technical issues. Since Gulli's visit the system has worked flawlessly and we are amazed and delighted with the data we are gathering. The Riverwatcher is creating counts that allow us to have a better idea of run migration timing and maturity (bright silver versus dark) we are also being able to assign male/female ratios. This system is gathering critically important data.

Due to the nature of vertical slot fish ladders the Riverwatcher is in a deep cement chamber with 3-9' of water year round. I had a frame built with an electric winch to lift the system in and out of the fish ladder. Pickets were built



with 1" picket 1" gap with a minimum 14" of picket above the waterline.

The Riverwatcher and the pickets are framed into a three points mounting to the walls of the fish ladder. The winch system can pull out the Riverwatcher as well as the picket system for cleaning and maintenance as needed. Fabrication and installation was done out

of aluminum by J. Nelson Enterprises, a local fabricator and avid angler. This application forces all fish to swim through the Riverwatcher system without increasing water velocities to levels that fish cannot migrate through. Debris will be a challenges in the fall when the deciduous trees lose their leaves but such is the nature of fisheries.

SOURCE: Bill St. Jean, Enhancement Program Manager with Nisqually Tribe.

AUSTRIA AND SWITZERLAND

The Riverwatcher in Austria installed close to Wennis at river Pitze and a new Riverwatcher in Switzerland at river Aare in Unterseenen.

"We are confident that we can service the German speaking market better with local presence and look forward to more projects there in the years to come." Says Magnús, Vaki Riverwatcher consultant.

The Riverwatcher is a monitoring system which is able to deliver high value monitoring data for the customer. The data ascertained by the riverwatcher cannot be reproduced with another system, only with the combination of different technologies and a significant increase of work and money. This makes the Riverwatcher a very effective tool which has a continuous increasing list of references in Germany, Austria and Swit-



zerland. The diversity different installations shows the variety of the applications, the Riverwatcher can be used for. The opportunity to access live data online from a specific Riverwatcher brings the advantage that interested persons can have access to the data and can see if public projects out of tax money are successful or not. In addition the hydropower is able to show that their fish passes work and use the Riverwatcher as a proof of their willingness to take care of the fish.

