Studies on Sea Trout from River Tungulaekur

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New studies in River Tungulaekur

In 2005 Thorarinn Kristinsson, the owner of River Tungulaekur and Johannes Sturlaugsson the owner of the research company Salmon and Trout Research (Laxfiskar in Icelandic), started co-operation to carry out extensive sea trout research. The main research aim is to improve the knowglegde on sea trout (anadromous brown trout - *Salmo Trutta*) and at the same time to improve sea trout enhancement by better stocking and angling arrangement for sea trout. The research on the sea trout from River Tungulaekur is based on combining new technology and methods as well as using new approach based on traditional methods. The research tasks are directed both toward juvenile and adult stage of the sea trout. The studies have being ongoing since 2005 and because of long term monitoring parts of these studies they will be continued annually the coming years.

This summary is meant to serve as brief introduction to the studies that are carried out in River Tungulaekur. That will be followed up by news on some of the interesting findings based on the data sampled. The informations given here on the research setup and environment are not meant to be complete. The outlines given are though enough to show how circumstances and technology are used in the studies to sample for practical use new interesting information on the life habits of sea trout during different stages of their life.

The study site and its stocks

Tungulaekur is a small spring fed river in the central south of Iceland. It is one of the tributaries to the glacial river Skafta (Fig. 1). River Tungulaekur enters River Skafta approximately 20 km from the estuary where River Skafta opens into sea. Therefore sea trout from River Tungulaekur have annually to migrate trough that glacial water when heading for their feeding grounds in sea and again when returning from sea during their migrations to River Tungulaekur prior to spawning and overwintering.

Fig. 1. The mouth of River Tungulaekur where it opens into the glacier river Skafta. The mysterious forms of lava field is embracing the river mouth and in distance Glacier Vatnajokull can be seen. The bridge over the river is the top of the counter facility unit.

The sea trout in River Tungulaekur is a wild stock. Fish that are native remnants of the sea trout that came from British Isles following last ice age inhabiting Icelandic rivers. The sea trout in River

Tungulaekur get very big, up to 100 cm in length and are weighing up to 23 pounds. Some of the sea trout are also quite old, up to 16 years old, as was shown when the life history written in the sea trout scales was examined. Many of these fish had participated in many sea migrations and spawning migrations, with as many as eleven runs to sea and up to nine years taking part in spawning.

The sea trout stock in River Tungulaekur is numerous. The high abundance of sea trout can partly be explained by successful stocking and moderate fishing pressure. But the basic factor for the high abundance, fast growth and big fish in River Tungulaekur is the ideal natural circumstances, both in the river system and the feeding grounds of those sea trout along the shores of S-Iceland. The hatchery used to raise juveniles for stocking is on the bank of Haedarlaekur, a small tributary to Tungulaekur. It has being operated by the owner of River Tungulaekur since 1964 to enhance the Tungulaekur runs by releasing sea trout smolts. The hatchery station and related facilities were rebuilt during the years 2004-2008 and equipped with new equipments of best quality. Because of the natural condition, the hatchery facility, fish counter facility, PIT tags counter facility and other special facility the River system of Tungulaekur enables unique circumstances to study sea trout. In addition to sea trout, Tungulaekur has run of Atlantic salmon (*Salmo salar*), stationary type of brown trout i.e. stationary within freshwater, stationary Arctic charr (*Salvelinus alpinus*) as well as little bit of sea-running Arctic charr.

Improving knowglegde on unmature sea trout

The information most needed for the unmature stage of sea trout, is on their survival rate, during their first and second sea journey. The scarse information on survival of sea trout smolts is something to think about, because comparable data on survival of salmon smolts in general are enormous and has being sampled annually for long time. In order to improve our understanding on the sea trout smolt survival, a massive tagging has being carried out annually in Tungulaekur since 2006. Altogether tens of thousands of smolts have being tagged with coded wire tag (microtags placed internally in the snout) in order to get the survival range recorded, partly by recapture but fully with use of the photographic counter mentioned here below that enables to verify all tagged fish (adipose fin has been removed). That survival informations will serve as frame of reference, not the least for further progress in fish enhancement by stocking smolts. Here it should be mentioned that these smolts are derived directly from natural sea trout from River Tungulaekur. Both fish that anglers donate to this fish stocking program and fish captured early winter after the annual fishing season has ended. All spawners that are used for that purpose are released again in River Tungulaekur (Fig. 2).

Fig. 2. A small male spawner in the hand of Johannes Sturlaugsson just before release in River Tungulaekur in December. The male was released after performing a stocking service along with few hundreds counterparts in order to meet the Annual need of fertile eggs for the hatchery to hatch in order to have enough smolts to use in River Tungulaekur stocking program.

The smolts are hatched at the bank within the river system and reared in spring fed water for rougly 2 years before release. In addition to these basic information the new counter and use of electronic tags are bringing up to surface new information from unmature sea trout, partly on individual basis.

Using new technology to map the mysterious migration of sea trout

For the older unmature fish and the mature fish, the research are focusing on detailed information of the migration patterns of sea trout. Both the sea migration and the migrations within the river system e.g. between the glacier river and River Tungulaekur. The behaviour during the sea migration is mapped using various types of data storage tags (DSTs) from Star-Oddi. Those DSTs also gives exact timing of movements between sea and freshwater in addition to information on fish depth and the water temperature migrated through, together with various additional information when extra sensors such as salinity sensors are used. In order to get more overall information of the run the most advanced type of fish counter available on the market was established in mouth of Tungulaekur where it opens into the glacier river Skafta (Fig. 3).

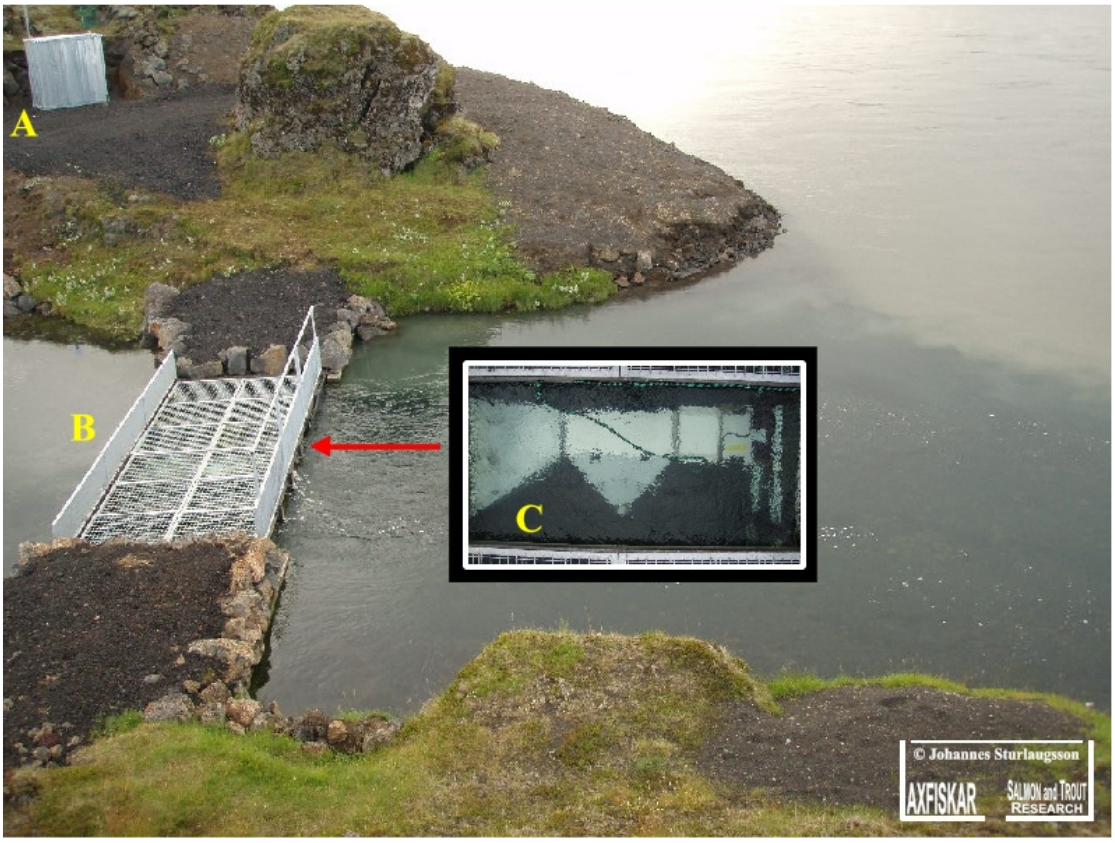

Fig. 3. The counter facility unit in the mouth of River Tungulaekur where it opens into the glacier river Skafta. The little building (A) is for storing computers and other equipments for the counter and the PIT-system. The counting facility unit (B) is blocking the river mouth so that all fish moving into or out of Tungulaekur goes through the Vaki counter (C) and the two PIT antennas that are placed below and above the counter. The photo shows that few meters below the counter facility the crystal clear spring water of River Tungulaekur is flowing into the muddy water of glacier river Skafta.

By use of the fish counter from Vaki the total run of fish in and out of the river is recorded, including timed data file for each fish including information on its size (length) and corresponding video clip showing the species involved (sea trout, salmon arctic char). The images part of the counter data in this crystal clear river also enables additional observations for useful classifications, e.g. to discriminate the stationary brown trout and char that migrate just into the glacier river from those majority of fish that migrate all the way to sea to feed (Fig. 4).

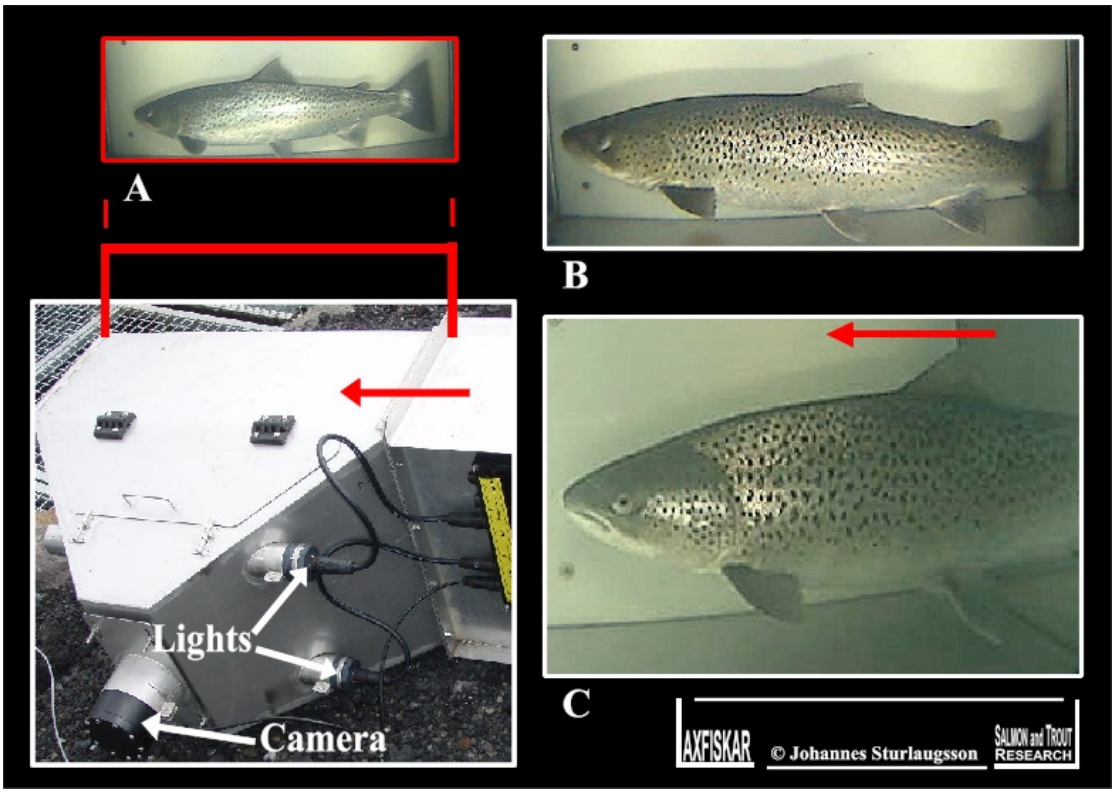

Fig. 4. The figures shows that part of the Vaki counter unit where photos/videos are sampled by use of automatic camera and light system. The red lines indicates that side of the camera–box that is outlining the video/photo background. Above that is corresponding lenght (80cm) of this background wall with a sea trout in the foreground (A). In figure B sea trout with conventional external numbered T-bar tag (Floy) is shown. That fish entered the counter 2nd of August and due to internal PIT tag he could be recognized on individual basis enabling to reveal his former known history (size/year, age etc). In figure C sea trout is shown that is roughly half way into the camera box along with arrow line drawn on the photo that is corresponding in placement and direction to another such symbol shown on the camera unit.

Sea trout individuals monitored troughout life

In order to get still more insight to the life history of the mysterious sea trout Salmon and Trout Research has with help from expert from USA, added special sensors to the Vaki counter that enables to follow up the movements of individual fish in and out of River Tungulaekur. The sensors are detecting special miniature electronic tags so called PIT tags (passive integrated transponders) that includes the fish indentification code. The beaty about this setup of combined Vaki counter and PIT sensors is that it enables to follow up movements and growth of individuals for years without capturing the fish. Giving unique possibility to use informations from these fish to improve what are already known on the life cycle and growth of sea trout. As well as using these information with reference to the angling capture pattern of those PIT tagged fish to form a guideline of strategy to follow when deciding and/or advicing on appropriate fishing pressure not the least in cases where “catch and release” are used in sea trout angling. Since the studies started in 2005, hundreds of sea trout have being tagged with tradititional conventional tags in River Tungulaekur but now the PIT tagging is taking over. To give example of the magnitude of these tagging, Salmon and Trout Research tagged 220 springers with PIT tags in River Tungulaekur in spring 2008

Further news coming up soon

Following this introduction on studies carried out on sea trout from River Tungulaekur it is the plan to give further insight into the research by series of news. There we will look more closely into the various parts of these studies and their results, not the least the behavioural part both in freshwater and sea.