



Valid From: 02-Apr-2013

Expiry Date: 01-Oct-2013

This permit is issued to the person(s) listed below under the authority of the Minister of Fisheries and Oceans pursuant to section 73 of the Species at Risk Act (SARA), and authorizes them, subject to the following terms and conditions, to engage in scientific research activities (described below) that relate to the conservation of the affected species identified below or benefit the said species or are required to enhance its (their) chance of survival in the wild. This permit is granted as a privilege, not property, and is issued at the Minister's discretion and may be revoked or amended to ensure the survival or recovery of a species.

Period of Activity:

Stickleback will be collected at Priest Lake and Paxton Lake on Texada Island on southeastern Vancouver Island periodically between April 2 and October 1, 2013.

Licence Holder:

FIN: 121909

Schluter, Dolph

Contact Number: 604-822-2387

Fax Number: 604-822-2416

University Of British Columbia Dept Of Zoology 6270 University Blvd.
Vancouver BC V6T 1Z4

Individuals or groups assisting with the authorized activity:

Ms. Monica Yau - Research Assistant, Diana Rennison, Seth Rudman and Sara Miller - Grad students, Thor Veen and Matt Arnegard - Post Docs and several undergraduate students from UBC.

Species, Quantity of Fish, Area(s) and Gear:

Species: limnetic and benthic Threespine Stickleback (*Gasterosteus aculeatus*)

Gear: minnow traps set from a non-motorized water craft, Seine and dip nets, buckets, 100-litre aquariums (in the lab) and MS222 (1 part MS222 per 20 000 part water, buffered using sodium bicarbonate).

Area of Activity:

Priest Lake and Paxton Lake on Texada Island, BC.

Anticipated Mortalities: Paxton Lake: 63 benthic and 63 limnetic females, 60 benthic and limnetic males, 105 benthic and 105 limnetic juveniles. Vananda Creek: 53 benthic and 53 limnetic females, 53 benthic and 53 limnetic males, 105 benthic and 105 limnetic juveniles.

Reporting Requirements:

Final Report

Due Date 31-Dec-13

Summary report of the 2013 Research activities on the benthic and limnetic forms of stickleback within Priest Lake and Paxton Lake.

Additional Information:



Rationale:

The overall goal of our stickleback research is to understand the causes of the origin and persistence of species. Research in 2013 will continue studies of behavioural differences between limnetics and benthic species and their genetic basis, especially differences in: schooling and shoaling behaviour; boldness under different ecological circumstances (presence/absence of predator); depth preference; traits involved in mate preference; and colour vision.

Methodology:

Capture Technique: Minnow traps will be used to capture fish in benthic areas. Traps will be set for a maximum of 12 hours. Seine and dip nets will be used to capture fish in open water.

Method of Handling: The fish will be gently decanted from the minnow trap or net into a bucket of aerated, fresh lake water. No more than 20 fish will be placed into a single pail at the same time.

Maintaining fish in the lab: Fish are raised and kept in stand-alone 100-litre aquariums with filtration and aeration. Fish are fed twice daily with live and frozen food.

Traits underlying assortative mating: The phenotypic basis of assortative mating of female limnetic and benthic stickleback will be evaluated using high-definition, computer-enhanced video images of displaying males. The idea is that while we are able to test the role of body size differences between species by experimental manipulations of size using food rationing, computer manipulation of males will allow us to test other components of assortative mating, especially colour, behaviour, and shape.

To ensure independence of trials (required for statistical analysis) we will need as many males to produce the video images as there are females.

Colour vision: Gene expression of opsin genes in the eyes of benthic and limnetic stickleback raised in a common garden will be measured using rtPCR.

Morphological measurements: Live fish are placed for a brief period in a thin glass wafer that allows us to take high resolution photographs of lateral views. Photo images are digitized using a series of landmarks (x and y coordinates) to measure fish shape. Shapes are analysed using conventional geometric morphometric methods.

Preserved fish are stained with alizarin red and similarly photographed after removing some tissue for DNA extraction.

Method of Euthanasia and Disposal: Fish are killed with MS222 (1 part MS222 per 20 000 part water, buffered using sodium bicarbonate). In the rare event of animal injury, the fish will be immediately euthanized with an overdose of MS222 and preserved in pure ethanol. These fish will still be useful for morphological study. Fish are preserved in ethanol for genetic analysis.

Terms and Conditions:

1. All works and activities will be undertaken in accordance with the Guidelines for the Collection and In Situ Scientific Study of Stickleback Pairs (*Gasterosteus* spp.) set by the Recovery Team for Non-Game Freshwater Fish Species in BC (2008).
2. This permit is only valid for the activities described above. It (or a copy) must be carried by a member of the field crew and be made available to a Fishery or Conservation Officer upon request.
3. This permit does not replace any other scientific or collecting permits required under provincial or federal legislation.
4. The death of any individual of the affected species identified above, resulting from activities authorized by this permit, other than the anticipated mortalities as described above, shall be reported immediately to the regional coordinator identified below.
4. By December 31, 2013 a comprehensive summary report must be filed detailing the activities undertaken subject to this permit. The report shall include a number of individuals captured (as well as those released or harmed during sampling activities), the sex and age class captured, as well as a brief explanation of the studies undertaken and any preliminary results of the findings. The completed report shall be sent to:

Tracey Sandgathe
SARA Regional Manager



Fisheries & Oceans Canada
Suite 200 - 401 Burrard Street
Vancouver, B.C., V6C3S4
Telephone: 604-666-0395
sara@pac.dfo-mpo.gc.ca

121909	Dolph Schluter		2013-04-04
FIN	Licence Holder - Print Name	Signature	Date

Issued by: Tracey Sangathie, SARA Regional Manager Fisheries and Oceans Canada		APR 04 2013	Date
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Licence Issued: 02 April 2013

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