

Symposium on British Columbia's Non-game Freshwater Fish Species at Risk

March 25th, 2009

Michael Smith Laboratories, room 101

SCHEDULE

Opening Remarks: Introduction and Context, 8:50 – 9:00	
9:00 – 9:20	Chad Ormond , UBC Environmental determinants of threespine stickleback (<i>Gasterosteus aculeatus</i>) evolution and continued persistence
9:20 – 9:40	Michael Jackson , Acroloxus Wetlands Consultancy Ltd. Aquatic macrophyte surveys of Priest and Paxton Lakes: 2007 – 2008
9:40 – 10:00	Gerrit Velema , UBC Investigating the role of an invasive crayfish in the collapse of the Enos Lake threespine stickleback species pair – research in progress
10:00 – 10:20	Adam Batty , SFU Examination of speckled dace (<i>Rhinichthys osculus</i>) ecology and abundance in Canada
10:20 – 10:40	Rick Taylor , UBC Do “hotsprings” populations of lake chub qualify as “designatable units” within <i>Couesius plumbeus</i> ? Integrating phylogeography and physiology.
Coffee Break, 10:40 – 11:00	
11:00 – 11:20	Damon Nowosad , UBC The genetic relationships of brassy minnow (<i>Hybognathus hankinsoni</i>) in BC, and distribution in the Lower Mainland
11:20 – 11:40	Ross Peterson , Chair Enos Lake Stickleback RIG Enos Lake stickleback studies: 2007 – 2008
11:40 – 12:00	Patricia Woodruff , UBC Conservation genetics of the Cultus Lake pygmy sculpin (<i>Cottus</i> sp.)
12:00 – 12:20	Don McPhail , UBC The native sculpins (<i>Cottus</i>) of British Columbia: problems with their taxonomy and biology that may impinge on their biodiversity status and recovery plans
Lunch Break, 12:20 – 1:20	
1:20 – 1:40	Mathias Herborg , MOE Status of alien aquatic species in BC and proposed approaches to manage their introduction and spread
1:40 – 2:00	Dick Beamish , DFO Rethinking the relationship of the Morrison Creek lamprey
2:00 – 2:20	Mike Pearson , Pearson Ecological Update on the populations and potential critical habitat of Salish sucker (<i>Catostomus</i> sp.)
2:20 – 2:40	Mike Pearson , Pearson Ecological Update on the populations and critical habitat of Nooksack dace (<i>Rhinichthys cataractae</i> ssp.)
Closing Remarks: Insights and Conclusions, 2:40 – 2:50	

Titles and abstracts

(in alphabetical order by presenter)

Title: Examination of speckled dace (*Rhinichthys osculus*) ecology and abundance in Canada

Presenter: Adam Batty

Abstract: Across Canada the Species at Risk Act (SARA) maintains biodiversity by protecting a wide variety of species that are endangered or at risk of extinction. The speckled dace (*Rhinichthys osculus*) is one such species; it is a minnow living in western North America. The northernmost tip of the speckled dace distribution extends into south-central British Columbia in the Kettle and Granby rivers and is isolated from areas downstream by Cascade Falls. The speckled dace is considered endangered by both COSEWIC and the British Columbia Ministry of Environment due to the limited extent of the species within Canada. In addition, it is being considered for listing under Schedule 1 of the Species At Risk Act (SARA). Despite these classifications, there is limited information in regards to the Canadian population. The objective of this research is to improve knowledge of the Canadian speckled dace ecology, specifically examining abundance, distribution, and habitat use. Preliminary analysis shows that the abundance is approximately 102 000 individuals (SE 25000) within Canada. However, does not yet take into account maturity, as required by the SARA. The range covers most of the Kettle River watershed within the BC. Habitat use is primarily associated with low velocity (< 0.39 m/s) and shallow depth (< 0.54 m), as well as gravel and cobble substrate. Once completed, these analyses and information can be used for future decisions under the SARA.

Contact: adam_batty@sfu.ca

Title: Rethinking the relationship of the Morrison Creek lamprey

Presenter: Dick Beamish

Co-author: Joy Wade

Abstract: The Morrison Creek lamprey was originally described as a potentially parasitic derivative of *Lampetra richardsoni*. The specimens of the Morrison Creek lamprey collected from Morrison Creek are not *L richardsoni*. *L richardsoni* is present in the creek and spawns earlier and at a much smaller size. We re-examined several thousand specimens of lamprey collected from Morrison Creek in the past and will present a new interpretation of the taxonomy of the Morrison Creek lamprey. We also will describe the critical habitat of the Morrison Creek lamprey.

Contact: richard.beamish@dfo-mpo.gc.ca

Title: Status of alien aquatic species in BC and proposed approaches to manage their introduction and spread

Presenter: Mathias Herborg

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Title: Aquatic Macrophyte Surveys of Priest and Paxton Lakes – 2007-08

Presenter: Michael Jackson

Co-author: Jen Gow

Contact: acroloxus@dccnet.com

Title: The native sculpins (*Cottus*) of British Columbia: problems with their taxonomy and biology that may impinge on their biodiversity status and recovery plans

Presenter: Don McPhail

Abstract: There are eight, maybe nine, species of *Cottus* in British Columbia. Of these, there are unresolved taxonomic problems in six or seven of the species. I'll try to outline the taxonomic problems with each species (in alphabetical order) and summarize what we know, or don't know, about these problems. Generally, however, they're all pretty straightforward taxonomic problems. All that is required to resolve them are money and effort, but the answers to some of the questions will require information from outside the province.

The problems involving the biology of the species are more difficult. There is an almost complete lack of the quantitative field observations, enclosure experiments, and laboratory physiological studies that have proven to be indispensable in establishing critical habitat requirements of other stream fishes (e.g., the salmonids). Yet recovery plans require these kinds of data. Modern techniques like micro-pit tags will make obtaining data on adult habitat use, ontogenetic habitat shifts, seasonal movements, and population structure a lot easier to gather. Again all that is required is money and effort.

Contact: jdmcp@shaw.ca

Title: The genetic relationships of brassy minnow (*Hybognathus hankinsoni*) in BC, and distribution in the Lower Mainland

Presenter: Damon Nowosa

Contact: nowosad@zoology.ubc.ca

Title: Environmental determinants of threespine stickleback (*Gasterosteus aculeatus*) evolution and continued persistence.

Presenter: Chad Ormond

Abstract: Species pairs of threespine stickleback (*Gasterosteus aculeatus*) are found in several lakes in southwestern British Columbia. I have measured several environmental parameters (water chemistry, macrophyte abundance, resource abundance, physical parameters) of both species pair and non-species pair lakes and intend to do a comparison between these lake groups to determine the role these variables may have had on the evolution and persistence of these species pairs. Although analysis has not yet been completed, I will present some preliminary findings.

Contact: ormond@zoology.ubc.ca

Title: Update on the populations and critical habitat of Nooksack dace (*Rhinichthys cataractae* ssp.)

Presenter: Mike Pearson

Abstract: Critical habitat for Nooksack dace has been identified under *SARA*, as originally proposed by the Recovery Team. A Critical Habitat Protection Statement has been released by Fisheries and Oceans Canada. Major habitat enhancement works are proposed in Nooksack dace critical habitat in the Brunette River (Burnaby) in partial compensation for the upgrading of Highway 1. Constructed riffles will be used to replace concrete weirs and raise the incised main stem channel increasing its connection to former channel meanders and the floodplain. Nooksack dace habitat in Pepin Creek (Langley) may have been improved by a major January 2009 flood event (involving the temporary capture of part of neighbouring watershed). The area of riffle habitat appears expanded and the prevalence of coarse rocky substrate increased. Recent data on Nooksack dace density in portions of the affected habitat will be used as a baseline for monitoring to begin in summer 2009.

Contact: mike@pearsonecological.com

Title: Update on the populations and potential critical habitat of Salish sucker (*Catostomus* sp.)

Presenter: Mike Pearson

Abstract: A significant concentration of Salish sucker has been found in a headwater wetland complex of Bertrand Creek on Department of National Defence lands in Aldergrove. Fifty-six individuals representing a number of year classes were captured. The site was also inhabited by Oregon spotted frog (*Rana pretiosa*; *SARA* listed) until recently, but intensive effort has found only one adult there since 2006. The wetland appears to be in excellent condition overall, but water conductivity suddenly increases (<50 μ S to >1300 μ S) immediately downstream of it and an introduced bullfrog (*Rana catesbeiana*) population is well established. Reach scale riparian and in-stream habitat restoration projects have been completed or underway in Pepin Creek, the Salmon River, Agassiz Slough, and Mountain Slough.

Contact: mike@pearsonecological.com

Title: Enos Lake stickleback studies: 2007 – 2008

Presenter: Ross Peterson

Abstract: Work was undertaken by the Enos Lake RIG in 2007 and 2008 to provide a description of the physical and chemical condition of Enos Lake, to attempt to confirm that the introduced signal crayfish is the cause of the stickleback pair collapse into a hybrid swarm, and to determine whether repeated trapping is an effective means of removing enough crayfish to return the lake to conditions suitable for the recovery of the stickleback pairs.

This presentation will highlight the study results and describe the difficulties encountered in drawing firm conclusions on the role of the crayfish because of the lack of historic information on lake conditions.

In addition, several stewardship projects were undertaken to provide public information and education programs (to advise on the stickleback's importance and the dangers of introducing alien species), to develop a rainwater management plan and work with the property owner to ensure measures are taken to protect the integrity of the lake and its ecosystem.

Contact: grpeter1@shaw.ca

Title: Do “hotsprings” populations of lake chub qualify as “designatable units” within *Couesius plumbeus*: integrating phylogeography and physiology?

Presenter: Rick Taylor

Co-authors: Charles Darveau and Patricia Schulte

Abstract: The lake chub, *Couesius plumbeus*, is a widespread minnow in Canada, ranging from northwestern Yukon to Nova Scotia. Across this range, the species occurs in a number of “hot spring” habitats, particularly in northwestern Canada (BC and Yukon Territory). Within the Laird Hot Springs (northcentral BC) water temperatures range from 18-50°C year round, while those within the Atlin Lake Warm Springs (northwestern BC) range from 27-28°C year round. Based on the assumption that lake chub from such habitats possess unique physiological traits that act as adaptations to warm water, “hot springs” chub have been proposed as “designatable units” (DUs) for status assessment by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC). We assessed the DU status of lake chub by testing: (i) the hypothesis that lake chub from Atlin and Laird warm/hot springs perform better physiologically at warm water temperatures relative to a population from a non-hot spring habitat (Green Lake, central interior of BC), and (ii) for the presence of two or more distinct phylogeographic lineages of lake chub collected from across its range, the presence of which can also be used to establish DUs. When examining CT_{max} (the maximum temperature at which fish can maintain equilibrium), warm springs chub did not exhibit greater performance than Green Lake chub. When assaying CT_{min} (the minimum temperature at which a fish can maintain equilibrium), however, fish from the stenothermal Atlin Lake population showed a markedly poorer performance at acclimation temperatures of between 10 and 25°C. In addition, warm/hot springs chub were not phylogenetically distinct from other lake chub; rather major eastern (NS, NB, QC, Ont, LAB, MI) and western (BC, Alta, YT, NWT, WY) lineages were resolved that differed from each other by about 2.7% mtDNA sequence divergence. Rather than two DUs (hot springs and non-hot springs chub), our work suggests a more complex DU structure within *C. plumbeus*. At a minimum these include DU1 = eastern lake chub, DU2 = western lake chub (warm/hot spring populations), DU3 = western lake chub (non-warm/hot spring populations).

Contact: etaylor@zoology.ubc.ca

Title: Investigating the Role of an Invasive Crayfish in the Collapse of the Enos Lake Threespine Stickleback Species Pair – Research in Progress

Presenter: Gerrit Velema

Co-authors: Jordan Rosenfeld and Rick Taylor

Abstract: The rare populations of stickleback species pairs (*Gasterosteus aculeatus* complex) found only in British Columbia have been of immense importance to the study of speciation. These fish have also been shown to be susceptible to the impacts of invasive species. The recent collapse of the stickleback species pair in Enos Lake, Vancouver Island, roughly co-incided with reports of the invasive American signal crayfish (*Pacifastacus leniusculus*) in this lake. Given the known tendency of many crayfish to destroy aquatic vegetation, and the suspected importance of vegetation as a cue for the maintenance of assortative mating in sticklebacks, crayfish have been suspected as a leading factor driving the Enos Lake collapse. For my MSc. thesis research, I am investigating the possibility that crayfish disrupt pre-zygotic reproductive isolation between benthic and limnetic sticklebacks through de-vegetation of the breeding grounds (direct effects) and/or through the harassment of nesting males (indirect effects).

Contact: velema@zoology.ubc.ca

Title: Conservation genetics of the Cultus Lake pygmy sculpin (*Cottus* sp.)

Presenter: Patricia Woodruff

Abstract: The Cultus Lake pygmy sculpin (*Cottus* sp.) is a provincially red-listed species, as its range is restricted to one heavily utilised lake. The pygmy sculpin has been assumed to represent a designatable unit (DU, essentially a distinct “wildlife species”) separate from the coastrange sculpin by Committee for the Status of Endangered Wildlife In Canada (COSEWIC). Further, the pygmy sculpin is legally listed under the federal Species at Risk Act (SARA) on Schedule 1 as a threatened species, which means that recovery planning and critical habitat protection are mandatory. However, the only studies on this fish were conducted by Ricker in 1932-37 (Ricker 1960) and the status reports of COSEWIC (e.g. Taylor 2007); there have been no new studies on this fish since Ricker’s original work, and none of its life history is known. My objectives are to determine any taxonomic distinction between the pygmy sculpin and its presumed parental species, the coastrange sculpin (*C. aleuticus*), using mtDNA and microsatellite loci; to identify the critical habitat of the pygmy sculpin for conservation purposes; and to determine whether there are any differences in behaviour between the lake-dwelling pygmy sculpin and its supposed parent species, which is found in riffle habitat in streams.

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