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BSc (Biology), Université de Sherbrooke (QC), 2014

DEPARTMENT OF BIOLOGY

TITLE OF THESIS: THE POST-SPAWNING ECOLOGY OF ITEROPAROUS SALMONIDS: BASIS OF VARIABILITY IN MIGRATORY BEHAVIOUR AND SURVIVAL, ECOLOGICAL IMPORTANCE AND CONSERVATION IMPLICATIONS

TIME/DATE: 1:30 pm, Thursday, September 12, 2019

PLACE: Room 3107, The Mona Campbell Building, 1459 LeMarchant Street

EXAMINING COMMITTEE:

Dr. Ian A. Fleming, Department of Ocean Sciences, Memorial University of Newfoundland (External Examiner)

Dr. Frederick G. Whoriskey, Ocean Tracking Network, Department of Biology, Dalhousie University (Reader)

Dr. Jan G. Davidsen, NTNU University Museum, Norwegian University of Science and Technology (Reader)

Dr. Christophe Herbinger, Department of Biology, Dalhousie University (Reader)

Dr. Ramón Filgueira, Marine Affairs Program, Dalhousie University (Reader)

Dr. Glenn T. Crossin, Department of Biology, Dalhousie University (Supervisor)

DEPARTMENTAL REPRESENTATIVE: Dr. Alastair Simpson, Department of Biology, Dalhousie University

CHAIR: Dr. Michael Hymers, PhD Defence Panel, Faculty of Graduate Studies

ABSTRACT

The overarching objective of my thesis is to shed light on a poorly understood life history stage of salmonid fish species, by quantifying spatio-temporal variation in the ecological importance of iteroparity (i.e. repeated breeding), as well as the factors influencing the movement ecology and survival of post-spawners, in freshwater, estuaries, and at sea. To do so, I used a variety of methods, including the analysis of long-term empirical data series, in addition to acoustic telemetry and physiological sampling, which I applied at various spatial and temporal scales and for two different but related iteroparous salmonid species – Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*). The work identified some of the potential causes of inter-individual variation in migratory decisions and success, as well as the consequences for population-level processes. Throughout my studies, I consistently observed that, after spawning, nutritionally depleted (i.e. low body condition factor and/or plasma triglyceride concentration) or highly stressed individuals (i.e. high plasma cortisol and glucose concentrations) opted for riskier migratory tactics, which might reflect their higher energetic requirements and the necessity to accept greater risks in trying to offset these and recondition for future spawning attempts. While I showed that post-spawning migratory decisions, survival, and ultimately the degree of iteroparity are at least partly mediated by endogenous constraints related to the costs of reproduction, I also documented the consequences of additional anthropogenic stressors that are likely limiting repeat spawning potential in some regions. Collectively, my thesis provides valuable biological insights into the factors currently limiting repeat spawning ability and highlights the potential for increases in iteroparity to occur when anthropogenic threats are mitigated, with quantified benefits to population resilience. Moreover, considering that iteroparity is a bet-hedging strategy allowing individuals to spread the risk of reproductive failure over multiple years, addressing these issues is of particular importance for the management of declining salmonid populations, especially under increasing environmental variability associated with climate change.