STOCK SPECIFIC DIFFERENCES IN THE SWIMMING ABILITY, METABOLIC RATES AND POST-EXERCISE METABOLIC RECOVERIES OF FRASER RIVER SOCKEYE (*ONCORHYNCHUS NERKA*), PINK (*O. GORBUSCHA*) AND COHO SALMON (*O. KISUTCH*) IN RELATION TO MIGRATION DISTANCE ANDTEMPERATURE

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Pacific salmon do not feed during spawning migration and rely on body reserves for all the energy requirements associated with locomotion, gamete maturation and spawning behaviours. Inappropriate allocation of energy due to inefficient migration limits the amount available for gamete production and could significantly reduce reproductive fitness. Evidence suggests that selection imposed by migration distance and difficulty results in improved swimming performance and energetic efficiency of longer distance migrators versus their shorter distance migrating counterparts.

To assess the swimming abilities of different populations of Fraser River salmon, the prolonged swimming performance and energetics of several stocks of sockeye *(O. nerka)*, pink *(Oncorhynchus gorbuscha*), and coho salmon (*O. kisutch*) were examined over two field seasons. Sockeye have traditionally been considered the strongest swimmers of all the Pacific salmon species, while pink are assumed the weakest and coho of intermediate ability. Selected stocks included early Stuart sockeye, Seton/Thompson pink, Seton sockeye, Weaver sockeye and Chehalis coho. The respective spawning grounds are located in tributaries of the Fraser, at distances from the ocean ranging from 150 to 1200 km.

Two large mobile Brett-type swim tunnel respirometers were used to evaluate critical swimming speed (Ucrit), routine and active oxygen consumption (MO_2), and recovery ability of sexually mature salmon on their spawning migration. Fish performed modified ramp, repeat Ucrit tests at temperatures in the range of ambient river temperature ± 5°C. Video analyses of swim trials by early Stuart sockeye and Seton/Thompson pink salmon allowed the determination of tail beat frequency (TBF) and stride length at various temperatures and swimming speeds.

We found that stocks migrating at warmer temperatures or those which traverse longer or more difficult migration routes may be better adapted for aerobic swimming. Each stock shows a distinct temperature optimum where performance is maximized. Pink salmon performed better than expected and demonstrated Ucrits similar to sockeye and higher than coho. Results indicate that routine Mo2 is dependent on temperature and is independent of stock or species. The rate of recovery is driven by temperature and metabolic scope.

Management of fishes has commonly been based on the physiology or behaviour of a given species. We show that swimming abilities and energetics are as variable between stocks as they are between species of Pacific salmon. The effects of changing temperature are also differential with respect to stock. Therefore management plans should be customized for each stock of interest in order to reflect these differences.