

**CHANGES IN THE ENERGY METABOLISM AND MOBILIZATION OF ENERGY
DEPOTS DURING THE SPAWNING RUN OF EARLY STUART SOCKEYE: A
CONSEQUENCE OF THE DUAL FUNCTION OF WHITE MUSCLE AS
CONTRACTILE ORGAN AND PROTEIN DEPOT.**

Kiessling, A.

Departments of Aquaculture and Food Science, Swedish University of Agricultural Sciences, S-751 07 Uppsala,
Sweden. Phon ++46 18 672116, Fax ++46 18 672995.

Kiessling, K-H.¹⁾ and Lindahl-Kiessling, K.²⁾

¹⁾Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, Uppsala,
Sweden. ²⁾Department of Zoophysiology, Uppsala University, Uppsala, Sweden.

Early Stuart sockeye was monitored from the Strait of Juan de Fuca until they reached their spawning grounds in side creeks to Middle river. This means a climb of nearly 3000 feet during a distance of 1000 miles, from cessation of feeding in the sea (Gilhousen, 1980). During this run close to 60% of the muscle protein is utilized for gonad formation and energy metabolism (Mommsen et al., 1980).

Single enzymes, representing the major energy metabolic pathways, was followed in different ventral-dorsal as well as cranial-caudal locations in both red and white muscle. These muscle samples were taken according to the geometric arrangement of the muscle fibres within the somatic muscle (Alexander, 1969). Changes in lipid as well as in protein content, including muscle fibre shrinkage and fibre size distribution, was measured in all muscle and adipose tissue samples (intestinal, dorsal and subcutaneous).

Marked changes in enzyme activities, muscle fibre sizes and chemical composition were found between locations within the muscle as well as between different adipose tissues. These changes related to distinct geographic parts of the run: sea, river mouth, Fraser canyon, Middle river and actively spawning fish in the upper part of the creek. The results are interpreted as an adaptation in the somatic muscle in order to maintain optimal swimming capacity during the spawning run besides a simultaneous function as a major protein depot.

Alexander, R. McN. 1969. The orientation of muscle fibres in the myomeres of fishes. *J. Mar. Biol. Assoc. U.K.* 49: 263-289.

Gilhousen, P. 1980. Energy sources and expenditures in Fraser river sockeye salmon during their spawning migration. *Int. Pac. Salmon Com. Bull.* XXII. 51 pp.

Mommsen, T.P., French, C.J. and Hochachka, P.W. 1980. Sites and patterns of protein and amino acid utilization during the spawning migration of salmon. *Can. J. Zool.* 58: 1785-1799.