

Histologic Effect of Coded Wire Tagging in Chum Salmon

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Abstract.—Half-length (0.5-mm-long) coded wire tags were implanted in the snouts of juvenile chum salmon

Oncorhynchus keta (1,500 fish/kg). Histological examination revealed substantial damage to one of the main-stem olfactory nerves in 18 of 44 fish. Such damage should be of particular concern because of the well-documented role olfaction plays in salmonid behavior.

The standard length (1.0 mm long \times 0.25 mm in diameter) binary-coded wire tag (CWT) described by Jefferts et al. (1963) has been used successfully for more than 20 years to specifically identify various experimental groups and populations of Pacific salmon *Oncorhynchus* spp. and steelhead *Salmo gairdneri*. In recent years, the need to tag large numbers of fry and emergent migrating

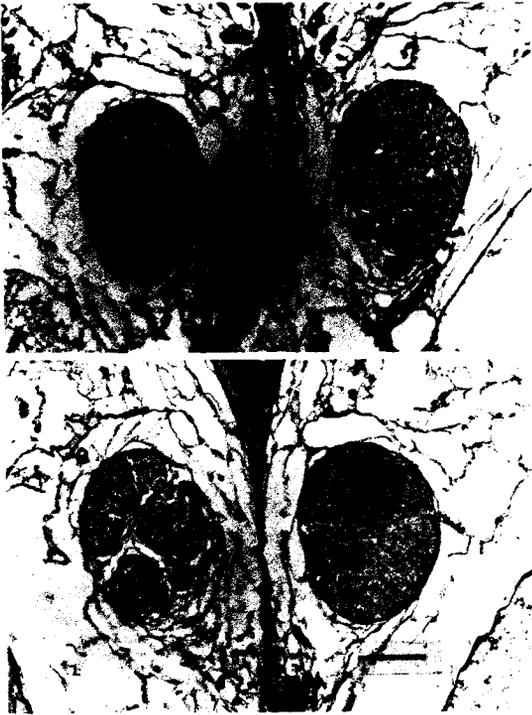


FIGURE 1.—Photomicrographs of the paired olfactory nerves from two chum salmon that had been tagged in the snout with coded wire tags. The upper photo shows undamaged nerves. The lower photo depicts a nerve (left) that has atrophied, presumably as a result of incorrect tag placement. Bar = 100 μ m.

salmonids has promoted the development of the half-length CWT (0.5 mm \times 0.25 mm). Reports of successfully tagging pink salmon *Oncorhynchus gorbuscha* as small as 4,000 fish/kg have been described (Thrower and Smoker 1984), yet the use of the half-tag appears most satisfactory when fish are 1,100–1,300 fish/kg or larger (Moberly et al. 1977; Blankenship 1981; Opdycke and Zajac 1981). In this paper, we report on the histologic effects of half-length CWTs implanted in the snouts of chum salmon *Oncorhynchus keta*.

In early April 1985, chum salmon at a size of about 1,500 fish/kg were tagged with half-length CWTs in a typical production tagging situation at the Tulalip Tribal Salmon Hatchery, Marysville, Washington. They were sampled for histologic examination 1, 4, 7, 11, 14, 22, and 28 d after tagging. Ten fish were collected on each sampling day. An untagged control group also was sampled on day 1. All specimens were processed by standard histologic methods and embedded in paraffin. Tags were carefully dissected from paraffin-embedded

snouts with microdissecting knives and forceps under a microscope. Tag placement was noted and a sketch was made. After the tags had been carefully removed, 5- μ m-thick sections were cut, stained with hematoxylin and eosin, and examined microscopically.

Histologic examination revealed that the tagging caused an initial, physically induced injury accompanied by hemorrhage. This was followed by an inflammatory response in the tagged area. By approximately 10 d after tagging, the inflammatory response usually subsided. This response is a normal host response to injury and, in itself, should be of little concern. However, in 41% of the fish examined (18 of 44), substantial mainstem olfactory nerve damage was identified. This was evidenced by degeneration and atrophy of one of the paired olfactory nerves (Figure 1). (Many small nerves originating in the olfactory sensory epithelium join to form the bilateral mainstem olfactory nerves.) In all cases, the observed nerve damage corresponded directly with tag placement; i.e., if the left mainstem olfactory nerve was damaged, the tag was recovered from the left side of the snout.

The mainstem olfactory nerve damage observed in these tagged chum salmon demonstrated impairment that should be of particular concern because of the well-documented role of olfaction in salmonid behavior (Hoar and Randall 1971; Hasler and Scholz 1983; Døving et al. 1985). Observations made by us on coded wire tagged chinook salmon *Oncorhynchus tshawytscha* (2,600 fish/kg) suggest that nerve damage probably is related more to tagging technique (i.e., to tagger experience) or to mechanical adjustments of the equipment (headmold fit, tag-implanting depth) than to the overall unsuitability of equipment for tagging small fish.

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