

# **Releases of Thermally Marked Salmon from Japan in 2002**

by

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## **Abstract**

From February to July 2002, approximately 44.5 million chum, 2.6 million pink, and 32.9 thousand masu salmon (2001 brood year) with one of fourteen thermal mark patterns were released from five hatcheries in Japan. All chum salmon released from Chitose and Shizunai Hatchery were thermally marked. The aim of thermal mark programs is to provide information for the ocean migration and survival of each regional salmon stock in Japan. Computer-based water temperature control systems were used to produce thermal marks in the otoliths of salmon. Two rings as base mark were adopted to distinguish Japanese salmon from other stocks. To increase available thermal mark patterns, we employed narrow rings, which were formed at 12 h intervals. To establish the international database of thermal mark releases, this document provided information of Japanese thermal marks releases, including release site, date, number, and mark patterns with images.

## **Introduction**

Mass marking of hatchery salmon using otolith thermal marks is an effective tool for stock identification of salmon in high seas (Ignell et al., 1997; Kawana et al., 1999; Urawa et al., 1999) and coastal waters (Hagen et al., 1995; Farley and Munk, 1997; Farley et al., 1999).

In Japan, the aim of thermal mark programs is to provide information for the ocean migration and survival of each regional salmon stocks, combining with coastal and high-seas salmon researches. Thus we are planning to increase the number of thermal mark releases from hatcheries (Urawa et al., 2000).

## Methods

Computer-based water temperature control systems were used to produce thermal marks in the otoliths of chum, pink, and masu salmon. The systems were installed at Chitose, Shizunai, Ichani, Tokushibetsu, and Katagishi Hatchery.

Few mark patterns are available when ring number is limited (Hagen, 1999). To increase available patterns, we employ narrow ring spacing, which is formed at 12 h intervals by computer-based water temperature control systems. At Katagishi Hatchery, all thermal rings are formed at 12 h intervals because water temperature is high (11 °C). The RBr and Hatch code notation is used to describe thermal patterns (Munk and Geiger, 1998; Hagen et al., 2000). Two rings as base mark were adopted to distinguish Japanese salmon from other stocks.

## Releases of 2001 Brood Year Stocks

From February to July 2002, approximately 44.5 million chum, 2.6 million pink, and 32.9 thousand masu salmon (2001 brood year) with one of fourteen thermal mark patterns were released from five hatcheries in Japan (Table 1). All chum salmon released from Chitose and Shizunai Hatchery were thermally marked. The qualities of these thermal marks were good except for two poor marks: Tokushibetsu01chum and Tokushibetsu01chum-tr which narrow rings were faint and unclear.

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