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# *Proposed Thermal Marks for Salmon from British Columbia for Brood Year 2001*

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## Summary of British Columbia thermal marking programs

This is the second in a series of papers outlining the proposed thermal marking to be conducted in British Columbia.

The primary use of thermal marking in British Columbia is to distinguish hatchery-origin chum and chinook salmon from wild salmon in terminal fisheries and in spawning populations. For chum salmon the use of thermal marks has replaced finclips as a means for marking fish at some hatcheries. Thermal marks are also being used to validate information on the harvest and survival of chinook salmon based on coded-wire tag studies. Hatchery sockeye salmon released into lakes in the Canada-Alaska transboundary area have been thermally marked in cooperation with the Alaska Department of Fish and Game. These studies are designed to evaluate the survival of fry released in different lake systems. Sockeye salmon from Rivers Inlet and Smith Inlet in the central coast region are being thermally marked to enable monitoring of migration, timing and contribution to fisheries, during the rebuilding of these stocks. In addition, thermal marking has been used to compare the success of different hatchery release strategies including size of fish at release, timing of release and location of release, to identify hatchery fish in studies on early marine distribution and survival, and the interactions between hatchery and wild salmon.

The proposed thermal marking program for salmon in British Columbia for the 2001 brood year is shown in Table 1. The proposed program for 2000 (Till, J. and T. Perry 2000) saw some last minute modifications due to operational constraints. The 2001 proposed program is similar to the marking that was ultimately conducted in the 2000 brood year program and it is expected that most facilities will apply similar marks to those in 2000. The only notable change is that Owikeno early sockeye will have a new mark to distinguish it from Thuya lake releases from the Canadian/Alaskan transboundary program. In addition, Smiths Inlet sockeye may have to be assigned a post hatch mark depending on weather/temperature conditions.

The notation used in Table 1 is the RBr system (Munk and Geiger 1998). However, note that the delimiter '+' is used only to separate the thermal bands and is not an indicator of the magnitude of spacing between the bands.

A summary of thermal mark releases for chum, chinook and sockeye salmon in British Columbia for brood years 1992 to 2000 is provided (Table 2). Information regarding the thermal marking program in British Columbia is available from Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo.

### Reference

Munk K.M.and Geiger, H.J. 1998. Thermal Marking of Otoliths: the "RBr" Coding Structure of Thermal Marks (NPAFC Doc. 367). Alaska Department of Fish and Game, Juneau Alaska 99801-5526 19p.

Till, J. and T. Perry. 2000. Proposed thermal marks for salmon from British Columbia for brood year 2000. (NPAFC Doc. 509) 4 p. Fisheries and Oceans Canada, Nanaimo, British Columbia , Canada V9R 5K6.

**Table 1 Proposed Thermal Mark Releases from British Columbia for 2001 Brood Year**

| Brood Year | Species | Facility | Release Site | Proposed Thermal Mark : RBr Code |
|---|---|---|---|---|
| 2001 | Chinook | Chilliwack River Hatchery | Chilliwack River | 2: 1.7 |
| 2001 | Chinook | Conuma River Hatchery | Conuma River | 2: 1.5 |
| 2001 | Chinook | Conuma River Hatchery | Sucwoa River | 2: 1.3 |
| 2001 | Chinook | Conuma River Hatchery | Tlupana River | 2: 1.3 |
| 2001 | Chinook | Conuma River Hatchery | Zeballos River | 2: 1.3 |
| 2001 | Chinook | Nitinat River Hatchery | Nitinat River | 2: 1.2 + 2.3 + 3.2 |
| 2001 | Chinook | Nitinat River Hatchery | Sarita River | 2: 1.3 + 2.2 + 3.3 |
| 2001 | Chinook | Nitinat River Hatchery | Cheanna seapens (Pedder Bay) | 1: 1.4 |
| 2001 | Chinook | Nitinat River Hatchery | Esquimault Harbour | 1: 1.4 |
| 2001 | Chinook | Nitinat River Hatchery | Sooke | 1: 1.4 |
| 2001 | Chinook | Nitinat River Hatchery | Toquart River | 1: 1.4 |
| 2001 | Chinook | Robertson Creek Hatchery | Stamp River | 1: 1.3 |
| 2001 | Chinook | Robertson Creek Hatchery | Henderson Lake | 1: 1.5 |
| 2001 | Chinook | Robertson Creek Hatchery | Nahmint River | 1: 1.3 + 2.2 |
| 2001 | Chinook | Quinsam River Hatchery | Quinsam/Campbell River | 2: 1.2 + 2.2 + 3.2 |
| 2001 | Chinook | Quinsam River Hatchery | Seapen off Campbell Estuary | 2: 1.2 + 2.2 |
| 2001 | Chinook | Quinsam River Hatchery | Egg Outplants to incubation boxes in Elk | 1: 1.3 + 2.4 |
| 2001 | Chinook | San Juan Enhancement Soc. | San Juan River | 2: 1.4 + 2.2 |
| 2001 | Chum | Conuma River Hatchery | Conuma River | 2: 1.4 |
| 2001 | Chum | Conuma River Hatchery | Conuma Estuary (seapen) | 2: 1.5 |
| 2001 | Chum | Conuma River Hatchery | Canton River | 2: 1.2 + 2.2 |
| 2001 | Chum | Conuma River Hatchery | Deserted River | 2: 1.2 + 2.2 |
| 2001 | Chum | Conuma River Hatchery | Sucwoa River | 2: 1.2 + 2.3 |
| 2001 | Chum | Conuma River Hatchery | Tlupana River | 2: 1.2 + 2.3 |
| 2001 | Chum | Nitinat River Hatchery | Nitinat River (early release) | 3: 1.5 + 2.3 |
| 2001 | Chum | Nitinat River Hatchery | Nitinat River (late release) | 1: 1.5 |
| 2001 | Sockeye | Nimpkish RiverHatchery | Woss Lake | 2: 1.3 + 2.2 |
| 2001 | Sockeye | Snootli River Hatchery | Rivers Inlet (Owikeno Lake stocks) | 1:1.3+2.5 |
| 2001 | Sockeye | Snootli River Hatchery | Rivers Inlet (Owikeno Lake **early** stocks) | 2: 1.4 + 2.2 |
| 2001 | Sockeye | Snootli River Hatchery | Smiths Inlet (Long Lake stocks) | 1: 1.3 + 2.6 **or** 2: 1.4 + 2.4 |
| 2001 | Sockeye | Ouilet Creek Hatchery | Sakinaw Lake | 1: 1.3 |
| 2001 | Sockeye | Shuswap River Hatchery | Upper Adams River | 2: 1.3 |

## Table 2 Release Numbers for Thermally Marked Chinook, Chum and Sockeye in British Columbia

**Chinook**

| Hatchery Facility: | Robertson | Robertson | Nitinat | Nitinat | Conuma | Conuma | Conuma | Chilliwack | Quinsam |
|---|---|---|---|---|---|---|---|---|---|
| Release Site(s): | Stamp River | Nahmint River & Seapens | Nitinat River & Lake | Sarita River | Conuma River & Seapens | Tlupana River | Sucwoa River | Chilliwack River | Quinsam River, Campbell River & Seapens |
| **Broodyear:** | | | | | | | | | |
| 1992 | 8,400,429 | | 500,000 | 156,632 | | | | | |
| 1993 | 6,939,205 | 134,594 | 6,195,122 | 210,776 | | | | | |
| 1994 | 7,272,539 | | 6,353,525 | 237,979 | 663,691 | | | | |
| 1995 | 8,273,553 | | 4,073,259 | 7,086 | 390,040 | | | 813,089 | |
| 1996 | 8,451,699 | 21,807 | 7,474,233 | 58,469 | 507,047 | 22,635 | 13,959 | 2,055,821 | 3,628,008 |
| 1997 | 8,927,415 | 5,539 | 6,341,195 | 307,914 | 176,496 | | | 1,921,522 | 2,712,900 |
| 1998 | 7,575,588 | | 4,908,227 | 462,165 | 2,439,247 | 55,945 | | 1,807,651 | 3,559,730 |
| 1999 | 7,676,568 | 412,614 | 3,513,460 | 447,777 | 2,832,300 | | | 1,226,873 | 4,662,299 |
| 2000 | 4,971,646 | | 3,321,199 | 175,196 | 2,398,963 | | | 1,004,683 | 4,267,332 |

**Chum**

| Hatchery Facility: | Nitinat | Conuma | Conuma | Conuma | Conuma | Conuma | Conuma |
|---|---|---|---|---|---|---|---|
| Release Site(s): | Nitinat River & Lake | Conuma River | Conuma Estuary | Tlupana River | Sucwoa River | Canton River | Deserted River |
| **Broodyear:** | | | | | | | |
| 1993 | 28,363,894 | | | | | | |
| 1994 | 30,831,080 | | | | | | |
| 1995 | 24,649,925 | | | | | | |
| 1996 | 31,941,437 | | | | | | |
| 1997 | 34,830,668 | | | | | | |
| 1998 | 35,455,056 | 1,105,067 | 3,686,051 | 1,234,402 | 1,998,626 | 1,340,117 | 2,058,209 |
| 1999 | 23,721,507 | 525,964 | 1,369,785 | 1,103,714 | 1,883,722 | 1,071,147 | 1,822,476 |
| 2000 | 5,153,902 | 543,511 | 1,296,654 | 998,400 | 139,090 | 1,009,746 | 269,284 |

**Sockeye**

| Hatchery Facility: | Shuswap | Shuswap |
|---|---|---|
| Release Site(s): | Upper Adams River | Adams Lake |
| **Broodyear:** | | |
| 2000 | 970,000 | 972,100 |