

Current status of naturally spawning chum salmon populations in the Hidaka region, Hokkaido, northern Japan

Yasuyuki Miyakoshi¹, Hirokazu Urabe¹, and Mitsuhiro Nagata²

¹ Hokkaido Fish Hatchery, Eniwa, Hokkaido 061-1433, Japan (miyakoshiy@fishexp.pref.hokkaido.jp)

² East Research Branch of Hokkaido Fish Hatchery, Nakashibetsu, Hokkaido 086-1164, Japan



Background: To support commercial fishery for chum salmon *Oncorhynchus keta*, intensive hatchery programs are conducted in Hokkaido, northern Japan; a total of ~one billion hatchery-reared fish are annually stocked. It is considered that the major portion of chum salmon returning to Japan are currently hatchery-origin; however, information on naturally-spawning chum salmon is extremely lacking. We started a program to assess the status of naturally-spawning chum salmon populations in the Hidaka region, southern Hokkaido in 2006.

Study Area: Hidaka region (sub-prefecture)

- **Population:** 82 thousand, - **Area:** 4,811 km²

- **Fishery production:** 15 billion yen (Kombu (kelp):24%, chum salmon: 29%, octopus :12%)

- **Salmon catch:** 2.6 million fish (in 2008) (6.7% of total return to Hokkaido)

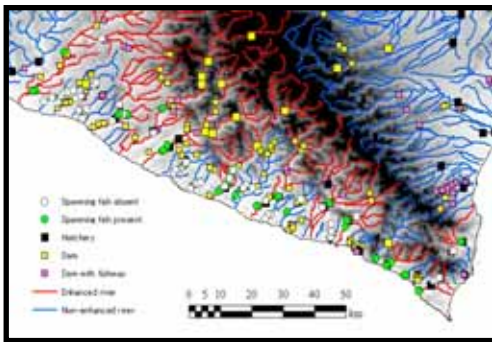
- **Hatchery program:** a total of 56.6 thousand spanners captured in 7 rivers, a total of 52.9 million fry stocked in 10 rivers

Methods:

- 1) Twenty-five rivers longer than 8 km were chosen
- 2) Visual surveys were conducted in 1-8 accessible sites in each river.
- 3) Numbers of spawners, carcasses, and redds were recorded.
- 4) Stream conditions (water temperature, pH, substrate, dam) were recorded.

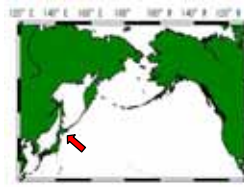
Results:

Locations of rivers, survey sites, hatcheris, dams, and status of naturally-spawning chum salmon

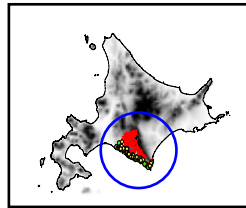


Summary of naturally-spawning chum salmon populations, 2006-2008

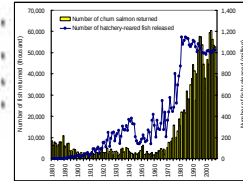
Category	Hatchery release	Capture for broodstock	Number of rivers		
			Total	Spawning fish present	Spawning fish absent
Yes	Yes (Weir)		3	3	0
Yes	Yes (Hatchery)		4	4	0
Yes	No		3	3	0
Terminated	No		3	3	0
No	No		12	4	8
Total			25	17	8



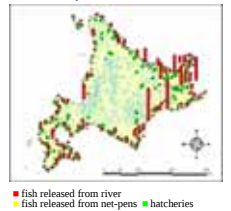
Location of the Hidaka region in Hokkaido



Historical number of chum salmon returned and released in Hokkaido



Location and number of chum salmon fry released in Hokkaido

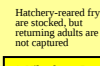


Capture of adult for hatchery broodstock in the Hidaka region

18: Shizunai R.
Returning adults are delivered into raceways of the hatchery



25: Saru R.
A weir is installed in the downstream reach



River length, history of hatchery programs, and status of naturally-spawning chum salmon in the Hidaka region, 2006-2008

River	Length (km)	Capture of adults for broodstock		Stocking of hatchery-reared fish		Status of naturally spawning fish		
		Beginning	End	Beginning	End	2006	2007	2008
1 Saru	22.1	1951	present	Hatchery	1952 - present	Pr	Pr	Pr
2 Unbetsu	13.0	1952	present	Weir	1953 - present	Pr	Pr	Pr
3 Abayaki	9.8	1981	1989			Pr	Pr	Pr
4 Nakanetsu	13.4	1965	1994	1966	1995	Pr	Pr	Pr
5 Horoman	24.8	1971	1999	1969	1990	Pr	Pr	Pr
6 Porosanushibetsu	8.0					Ab	Ab	Ab
7 Monbetsu	8.2					Ab	Ab	Ab
8 Nemuro	22.3	1977	1990	1967	present	Pr	Pr	Pr
9 Unbe	8.5					Ab	Ab	Ab
10 Hidaka-Horobetsu	36.9	1922	present	Weir	1923 - present	Pr	Pr	Pr
11 Nakashibetsu	17.2					Pr	Pr	Pr
12 Efue	11.4					Ab	Ab	Ab
13 Nemuro	35.5	1928	1954	1957	present	Pr	Pr	Pr
14 Kerimai	33.2	1964	1964			Pr	Pr	Pr
15 Misawaishi	31.6	1923	present	Hatchery	1924 - present	Pr	Pr	Pr
16 Rishi	13.6					Ab	Ab	Ab
17 Monbetsu	18.1					Pr	Pr	Pr
18 Shizunai	68.0	1989	present	Hatchery	1928 - present	Pr	Pr	Pr
19 Nishikawa	77.3	1922	present	Hatchery	1937 - present	Pr	Pr	Pr
20 Anabetsu	42.8	1946	1949			Pr	Pr	Pr
21 Gabari	13.8					Ab	Ab	Ab
22 Konmami	16.3					Ab	Ab	Ab
23 Hae	22.8					Ab	Ab	Ab
24 Hidaka-Monbetsu	33.5					Pr	Pr	Pr
25 Saru	103.8	1924	present	Weir	1955 - present	Pr	Pr	Pr

Pr: naturally spawning fish present
Ab: naturally spawning fish absent
~: Spawning redds were only found

Rivers where naturally-spawning chum salmon were observed

3: Abeyaki R.



5: Horoman R.



17: Monbetsu R.

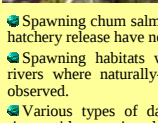


14: Kerimai R.

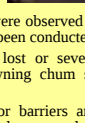


Rivers where naturally-spawning chum salmon were not observed

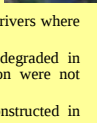
6: Porosanushibetsu R.



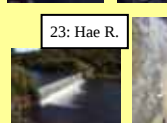
9: Unbe R.



12: Efue R.



21: Gabari R.



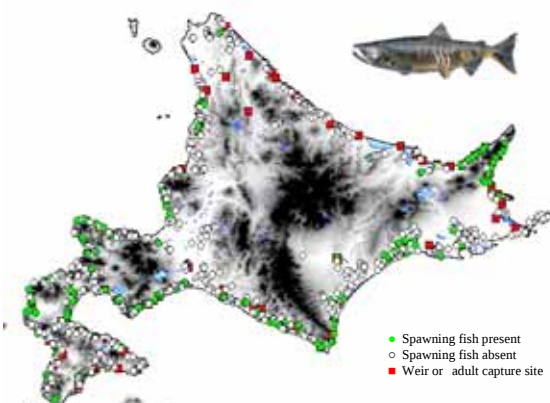
- Spawning chum salmon were observed in 4 rivers where hatchery release have never been conducted.
- Spawning habitats were lost or severely degraded in rivers where naturally-spawning chum salmon were not observed.
- Various types of dams or barriers are constructed in rivers with spawning chum salmon populations.

23: Hae R.



In 2008, a new program was begun to survey naturally-spawning chum salmon populations in the entire Hokkaido

A) Distribution of naturally-spawning chum salmon in 2008

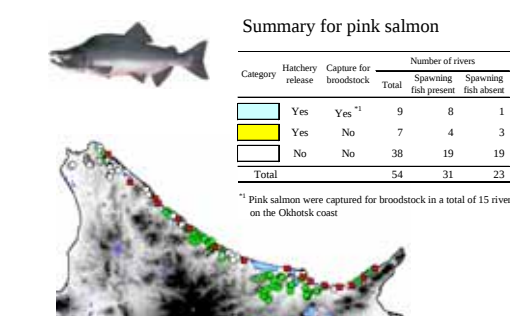


Summary for chum salmon

Category	Hatchery release	Capture for broodstock	Number of rivers		
			Total	Spawning fish present	Spawning fish absent
Yes	Yes ¹⁾		39	31	8
Yes	No		53	46	7
No	No		208	65	143
Total			300	142	158

¹⁾ Chum salmon are captured for broodstock in a total of 79 river

B) Distribution of naturally-spawning pink salmon in 2008



Summary for pink salmon

Category	Hatchery release	Capture for broodstock	Number of rivers		
			Total	Spawning fish present	Spawning fish absent
Yes	Yes ¹⁾		9	8	1
Yes	No		7	4	3
No	No		38	19	19
Total			54	31	23

¹⁾ Pink salmon were captured for broodstock in a total of 15 river on the Okhotsk coast

Acknowledgments: We thank D. Ando, M. Fujiwara, H. Hayano, M. Miyamoto, Y. Shinriki, T. Aoyama, H. Saneyoshi, H. Sakamoto, K. Kasugai, H. Omori, K. Sugiwaka, M. Kobayashi, K. Takeuchi, for the field survey.