

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

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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)

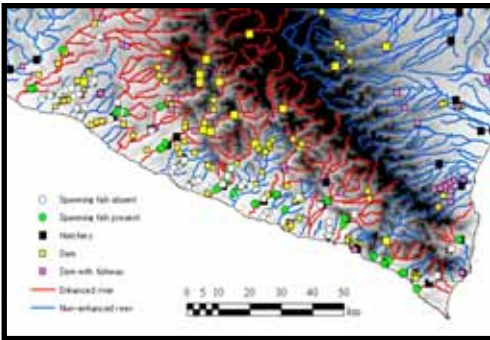
- Hatchery program: a total of 56.6 thousand spanners captured in 7 rivers, a total of 52.9 million fry stocked in 10 rivers

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.

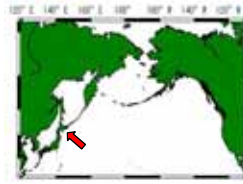
Results:

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

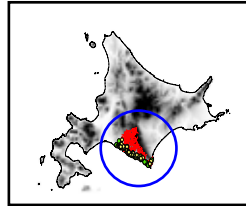


Summary of naturally-spawning chum salmon populations, 2006-2008

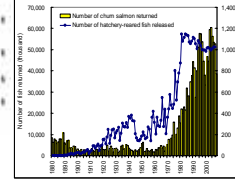
Category	Hatchery release	Capture for broodstock	Number of rivers		
			Total	Spawning fish present	Spawning fish absent
Yes	Yes (Weir)	3	3	0	
Yes	Yes (Hatchery)	4	4	0	
Yes	No	3	3	0	
Terminated	No	3	3	0	
No	No	12	4	8	
Total			25	17	8



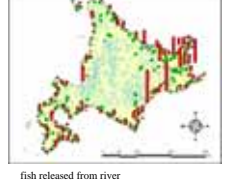
Location of the Hidaka region in Hokkaido



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 derived into raceways of the hatchery

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

4: Nakanbetsu R.
Hatchery-reared fry are stocked, but returning adults are not captured

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

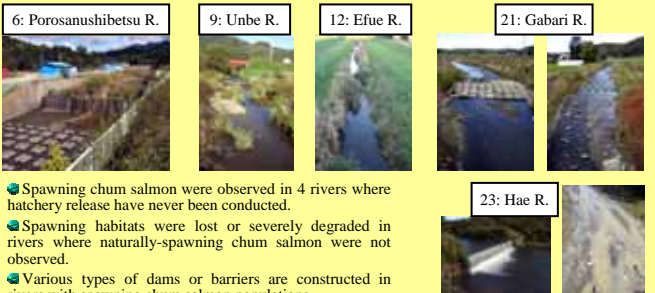
River	Length (km)	History of stock enhancement activities				Status of naturally spawning fish			
		Capture of adults for broodstock		Stocking of hatchery-reared fish	Number of fish released (million)				
		Beginning	End		Beginning	End	2006	2007	2008
1 Saru	22.1	1951	present	Hatchery	1952	present	Pr	Pr	Pr
2 Uabetsu	13.0	1952	present	Weir	1953	present	6.8	Pr	Pr
3 Abeyaki	19.1	1981	1989		1981	1990	6.2	Pr	Pr
4 Nakanbetsu	13.4	1965	1994		1966	present	3.5	Pr	Pr
5 Horoman	24.8	1971	1989		1969	1990		Pr	Pr
6 Porosanushibetsu	8.9							Ab	Ab
7 Moibetsu	8.2							Ab	Ab
8 Nemuro	25.3	1977	1990		1967	present	1.3	Pr	Pr
9 Unbe	8.5							Ab	Ab
10 Hidaka-Horobetsu	36.9	1922	present	Weir	1923	present	7.6	Pr	Pr
11 Mokuobetsu	17.2							Pr	Ab
12 Efue	11.4	1924	1954		1957	present	2.5	Pr	Pr
14 Kerimai	33.2	1964	1964					Pr	Pr
15 Masuishi	31.6	1923	present	Hatchery	1924	present	5.0	Pr	Pr
16 Betsu	13.6							Ab	Ab
17 Moibetsu	18.1							Pr	Pr
18 Shizunai	68.0	1909	present	Hatchery	1928	present	10.0	Pr	Pr
19 Nikauppu	77.3	1922	present	Hatchery	1937	present	4.0	Pr	Pr
20 Anabetsu	42.8	1946	1949		1955	2004		Pr	Pr
21 Gabari	11.8							Ab	Ab
22 Kozonai	16.3							Ab	Ab
23 Hae	22.8							Ab	Ab
24 Hidaka-Moibetsu	33.5							Ab	Ab
25 Saru	103.8	1924	present	Weir	1955	present	4.3	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

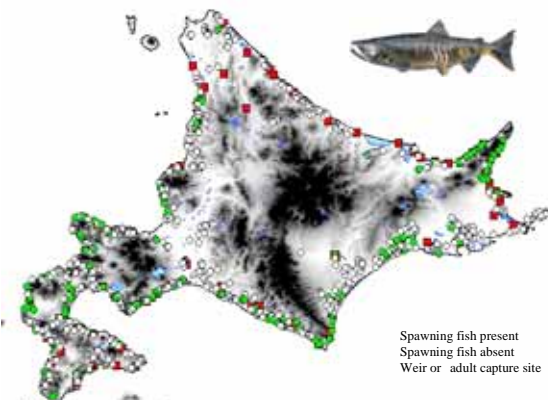


Rivers where naturally-spawning chum salmon were not observed



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

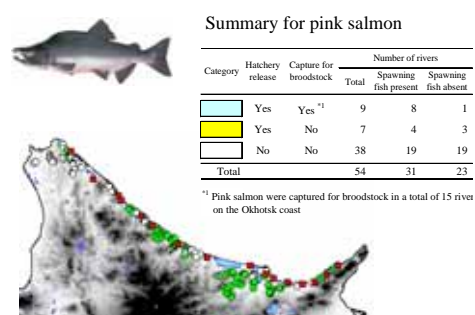


Summary for chum salmon

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

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