Current status of hatchery and naturally spawning chum salmon in Hokkaido

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Number of hatchery-reared fish released and returning fish in Hokkaido

### Number of hatchery-reared fish released and returning fish in Hokkaido

- **Number of hatchery-reared fish released (thousand):**
  - 40,000
  - 50,000
  - 60,000
  - 70,000
  - 800,000
  - 1,000,000
  - 1,200,000
  - 1,400,000

- **Number of returns (thousand):**
  - 0
  - 10,000
  - 20,000
  - 30,000
  - 40,000
  - 200,000
  - 400,000
  - 600,000
  - 800,000

**Graph:**
- **Number of returns** vs **Number of juvenile released**
- **Legend:**
  - Yellow bars: Number of returns
  - Blue line: Number of juvenile released

**Time Periods:**
- 1870 to 2000

**Data Year References:**
Locations of salmon hatcheries

A total of one billion fry are reared at 114 hatcheries and released in spring. Hatchery-reared juveniles are released from 140 rivers and 70 fishing ports.
1983-2003 anomaly time series of chum salmon return rates in five coastal regions in Hokkaido

- **Sea of Japan**
- **Okhotsk Sea**
- **Western Pacific**
- **Eastern Pacific**
- **Nemuro**
Return rate of chum salmon released from Hokkaido, Honshu*, and Korea

* Return rates were estimated by number of returns divided by number of fish released 4 years ago.
* Data resource: National Salmon Resources Center (http://salmon.fra.affrc.go.jp)
Recent shift of spring SST in coastal area of Hokkaido and release timing from hatcheries ( )
Assessment of naturally spawning chum salmon populations (2008~)

Izari River
Distribution of naturally spawning of chum salmon in Hokkaido, 2008

- Spawning fish present
- Spawning fish absent
- Weir or adult capture site

Summary of naturally spawning chum salmon, 2008

<table>
<thead>
<tr>
<th>River category</th>
<th>Number of rivers</th>
<th>Natural spawning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Present</td>
</tr>
<tr>
<td>Brood stock collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhanced River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducted</td>
<td>39</td>
<td>31</td>
</tr>
<tr>
<td>Not-conducted</td>
<td>55</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
<td>77</td>
</tr>
<tr>
<td>Hatchery release history</td>
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<tr>
<td>Non-enhanced River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present *1</td>
<td>53</td>
<td>22</td>
</tr>
<tr>
<td>Absent *2</td>
<td>153</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>206</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>142</td>
</tr>
</tbody>
</table>

*1 Hatchery fish had been stocked but the program terminated
*2 Hatchery fish have never been stocked
Comparison of lengths of enhanced- and non-enhanced rivers

The graph shows the frequency distribution of total lengths (in km) for non-enhanced rivers (N=206) and enhanced rivers (N=94). The data is grouped into different length categories, with frequencies plotted on the y-axis and total lengths on the x-axis. The bars for each category are color-coded, with blue for non-enhanced rivers and red for enhanced rivers.
Rivers where naturally spawning chum salmon were observed

Kerimai River

Abeyaki River

Horoman River
Rivers where naturally spawning chum salmon were not observed

Hae River

Kenomai River

1.6km from rive mouth

Gabari River

Porosanushibetsu River

Unbe River
Summary

Hatchery Program

 grö Hokkaido chum salmon stocks are supported by intensive hatchery programs.
 grö Numbers of chum salmon returns have increased, but a large difference in return rates has been observed among regions.
 grö The different fluctuation pattern of return rate may be related to coastal environment.

Naturally spawning populations

recht Naturally spawning chum salmon were observed in 65 rivers where hatchery fish are not stocked.
recht Strategies to conserve healthy and diverse populations are necessary in Hokkaido.