

Supplementary material 1

Relevant historical information about initial salmonid introductions

(Synthesized from Basulto 2003)

Brown trout (*Salmo trutta*)

- **1865:** First documented effort to introduce a salmonid in Chile. They were released in Rio Chivilongo (37°S) from Scotland.
- **1903:** The first free-living salmonid captured in Chile.
- **1905:** First hatchery built in Chile (Rio Blanco hatchery) was motivated by the salmon canning industry. A total of 400,000 eggs of brown trout, rainbow trout, and Atlantic salmon were transplanted from Germany to Rio Blanco hatchery (33°S).
- **1907:** Extensive juvenile brown trout propagation started with more than 10,000 juvenile released across streams from Santiago (33.4°S) south to Valdivia (39.8°S).
- **1910:** A new hatchery started operating near Puerto Varas (41°S). A total of 280,000 eggs arrived from Germany.
- **1912:** First report of free-living trout captured by anglers occurred near the Rio Blanco hatchery (some trout were over 50 cm TL).
- **1916:** The Lautaro hatchery was built to increase the salmonid propagation in Chile. A prohibition to capture salmonids by anglers from 1916-1919.
- **1927-1928:** A total of 800,000 eggs of brown trout and Atlantic salmon were released in southern Patagonia and Tierra del Fuego (45-54°S); similar amount of individuals released again in 1941 and 1943.

- **1930:** Brown trout was considered to be one of the most successful introduced species in Chile with hatcheries producing enough eggs to transplant around South America including Peru, Argentina, Colombia, Ecuador and Bolivia.
- **1940-1960:** Although it is not well documented, anglers were involved in extensive releases of brown trout to supplement recreational fisheries. Several hundreds of barrels containing around 10,000 juvenile trout each were propagated across rivers and lakes in central and southern Chile.
- **1960 to present:** There is a lack of information available about further attempts to introduce brown trout in Chile likely due to their rapid success in establishing self-sustaining populations. Some re-stocking efforts have been made sporadically.

Rainbow trout (*Oncorhynchus mykiss*)

- **1905:** Similar to brown trout, eggs of rainbow trout were transplanted from Germany to the Rio Blanco hatchery.
- **1907:** Extensive propagation of juvenile trout occurred. A total of 30,000 juvenile trout were released from Santiago south to Valdivia.
- **1910:** The hatchery near Puerto Varas received 50,000 eggs from Germany.
- **1912:** Similar to brown trout, anglers reported the capture of adults near the Rio Blanco hatchery.
- **1930:** Rainbow trout was also considered one of the most successful species and eggs were supplied to many countries in South America.
- **1940-1960:** Although it is not well documented, anglers were involved in extensive releases of rainbow trout to supplement recreational fisheries releasing several hundreds

of barrels containing around 10,000 juvenile trout across rivers and lakes in central and southern Chile.

- **1970-1980:** First attempts to cultivate rainbow trout in net-pens occurred in Lake Llanquihue (41°S).
- **1980-to present:** Intensive aquaculture production has led to new introductions of rainbow trout as escapees from aquaculture facilities in lakes and estuarine areas (Soto et al. 2001; Arismendi et al. 2009; Sepúlveda et al. 2009). In addition, some re-stocking efforts have been made sporadically.

Chinook salmon (*O. tshawytscha*)

- **1885-1901:** Several attempts to acclimate and naturalize Chinook salmon from eggs produced in the Aquarium du Troncadero in Paris, but were originally from Sacramento River, California stock. All of them were reported as failures.
- **1921 and 1930:** A total of 200,000 eggs and juveniles were released from stock on the river McCloud (Sacramento River, CA).
- **1931 and 1961:** Some reports of successful captures in estuarine areas after massive releases eight years earlier.
- **1960-1971:** Motivated by the efforts made in New Zealand, Russia, and North America to propagate Pacific salmonids using extensive ranching efforts new attempts to introduce Chinook salmon from Oregon and Washington occurred in the southern part of Chile (south of 42°S).
- **1968-1971:** Approximately 1.1 million eggs were transplanted from Washington, USA to Chile.

- **1976-1990:** Smolts from Washington were released in two areas: 400,000 smolts to Curaco de Velez, Chiloe Island (42.4°S) and 340,000 smolts to Puerto Natales (51.7°S). There were returns after two years, but they decreased later.
- **1980-to present:** Intensive aquaculture industry started, and Chinook salmon is the species with the lowest proportion of the total salmonid production. Thus, Chinook salmon escapees should be the lowest propagule pressure among salmonids from aquaculture (Soto et al. 2001; Arismendi et al. 2009; Sepúlveda et al. 2009).

Atlantic salmon (*Salmo salar*)

- Atlantic salmon has been a main species to have concentrated introduction efforts in Chile.
- **1905:** The Rio Blanco hatchery received around a few hundred thousand Atlantic salmon eggs from Germany.
- **1907:** Extensive salmonid propagation occurred with 20,000 juvenile Atlantic salmon released across streams from Santiago south to Valdivia.
- **1910:** The hatchery near Puerto Varas received 800,000 eggs from Europe.
- **1912:** An apparent lack of success is reported for Atlantic salmon.
- **1927-1928:** Approximately 400,000 eggs were released in southern Patagonia and Tierra del Fuego. This was a new attempt to introduce the landlocked form of Atlantic salmon likely from a hatchery in Argentina and originally from Maine, USA.
- **1916-1938:** It is estimated that there is a total production of nine million Atlantic salmon eggs in Chile.

- **1938:** The Lautaro hatchery stopped the production of Atlantic salmon mentioning reasons related to competition with other salmonids, lower adaptation, lower genetic diversity, and other environmental factors.
- **1980-to present:** Intensive aquaculture industry use Atlantic salmon as the species with the highest proportion of the total production in Chile; likely the highest magnitude of escapees as well (Soto et al. 2001; Arismendi et al. 2009; Sepúlveda et al. 2009).

Coho salmon (*O. kisutch*)

- **1901, 1910, and 1930:** Coho salmon eggs (225,000) were transported from Washington, USA to an unknown destination in Chile.
- **1960-1970:** New attempts to introduce coho salmon from Oregon and Washington occurred in the southern part of Chile (south of 42°S).
- **1968:** Surviving juveniles from 30,000 coho salmon eggs were released in the Estero La Zorra (41.4°S).
- **1968- 1971:** Approximately 1.1 million eggs were transplanted from Washington and Oregon to Chile.
- **1976:** A cooperative agreement with Japan allows the construction of a new hatchery in Coyhaique (45.5°S). Over a period of 17 years 500,000 juvenile coho were released that originated from Hokkaido, Japan.
- **1976 and 1990:** A total of 200,000 juveniles were released around Curaco de Velez and Puerto Natales.
- **1980-to present:** Aquaculture industry uses coho salmon as an intermediate proportion of the total production from the industry in Chile. It is expected to have an intermediate

magnitude of escapees compared to other salmonids (Soto et al. 2001; Arismendi et al. 2009; Sepúlveda et al. 2009).

Brook char (*Salvelinus fontinalis*)

- **1907:** 20,000 eggs were transported from Argentina to Laguna del Inca (33°S).
- **1910:** The hatchery near Puerto Varas received 50,000 eggs from Germany. Juvenile were released in Lake Todos Los Santos (41°S).
- **1913-1914:** Eggs were produced in the Rio Blanco hatchery. Anglers reported free-living fish inhabiting Rio Blanco. It is also mentioned that brook trout seem to be only locally present to those water bodies where they were released.

Lake char (*Salvelinus namaycush*)

- **1930:** A total of 200,000 eggs were transplanted from USA to an unknown destination in Chile.

Cherry salmon (*O. masou*)

- **1972:** A total of 85,000 juvenile were released near Coyhaique around Rio Simpson (45.4°S). New releases of smolts occurred in 1982 and 1984 in the same area. These individuals were from Hokkaido, Japan accounting for almost one million individuals.

Chum salmon (*O. keta*)

- **1974 and 1976:** Approximately four million juveniles were released near Coyhaique in Rio Claro (44°S) from Hokkaido, Japan.

- **1977-1978:** More than eight million juveniles (most likely near 11 million) were released near Coyhaique in Rio Simpson from Hokkaido, Japan.

Pink salmon (*O. gorbuscha*)

- **1972-1978:** Three million juveniles were released near Coyhaique.

Overall, most of the cherry, chum, and pink salmon introductions were reported as unsuccessful. The expected returns were very low even though there was great effort made to detect them. In 1986, only seven chum salmon returned to the Puerto Natales area. In 1989, 600 cherry salmon were detected around Puerto Ibáñez (46.2°S). In addition, in 1989, few coho salmon returned to the Coyhaique hatchery.

Sockeye salmon (*O. nerka*)

- **1924 and 1930:** 200,000 and 114,000 eggs were brought to Chile from USA.

Arctic char (*Salvelinus alpinus*)

- **2006:** Some efforts have been made to introduce this species for aquaculture purposes.

References

Basulto S (2003) El largo viaje de los salmones. Una crónica olvidada. Maval Editorial. Santiago de Chile