

## Residence Description for the Atlantic Salmon (*Salmo salar*), inner Bay of Fundy population in Canada

### Additional Information:

For more information on the *Species at Risk Act* (SARA), or for additional information on species at risk, please visit the [SAR Public Registry](#).

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## Residence statement

A spawning redd is a residence for Atlantic Salmon, inner Bay of Fundy population (iBoF Salmon). The redd has the structural form and function of a nest and is used for salmon egg incubation, hatching, and the early rearing of hatchlings (alevins). One redd can contain hundreds to several thousands of eggs from a single female salmon. The female salmon constructs the redd during spawning and invests energy in its creation. A redd is typically occupied from October until late June.

## Definition of residence and prohibition against its damage or destruction

The Species at Risk Act (SARA) defines residence as: “a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating.” [s. 2(1)].

For aquatic species, the residence concept applies when:

1. there is a discrete dwelling-place that has a structure and functions similar to a den or nest
2. an individual of the species has invested (energy and/or time) in the creation and/or modification of the dwelling-place
3. the dwelling-place enables the successful performance of essential life-cycle functions (e.g., spawning and rearing)
4. the dwelling-place is occupied by one or more individuals during all or various parts of their life cycle

SARA states that “No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.” [s. 33].

The prohibition against the damage or destruction of a residence comes immediately into effect upon the listing of a species under SARA when the concept applies, and it applies wherever residence of the species is found and remains in effect as long as an individual uses the residence.

The information that follows on the location, structure, form, investment, occupancy and life-cycle function of redds for iBoF Salmon comes from various Atlantic Salmon DFO documents (Amiro et al. 2008, DFO 2008, Bowlby et al. 2014, Gibson et al. 2014, Marshall et al. 2014) and other sources as indicated in the Reference section.

## **Location**

iBoF Salmon redds may be located in any of the rivers or streams within the inner Bay of Fundy distribution (Figure 1) that have suitable habitat characteristics for the species and are accessible to spawners.

Atlantic Salmon rivers and streams typically have a gradient of 0.2 to 1.5%; bottom substrates composed of assorted gravel, cobble and boulder; and low (less than 0.02%) silt loads. Spawning occurs in fresh water at temperatures of 4 to 11°C. The optimal pH for spawning is 5.4 or greater and the optimal dissolved oxygen content is 4.5 mg/L or greater (Davis 1975). Redds are typically located at the tail of pools on the upstream side of riffles over gravel substrate (0.6 to 6.4 cm diameter) at sites with relatively high water velocity and upwelling or downwelling flow. Redds are typically constructed in water depths ranging from 17 to 76 cm and water velocities between 25 and 90 cm/s. Females bury the eggs to depths ranging from 7.3 to 25.0 cm below the gravel surface.

Specific locations of redds in any particular river or stream within the iBoF distribution may vary from year to year depending on the suitability of local freshwater habitat characteristics during spawning.

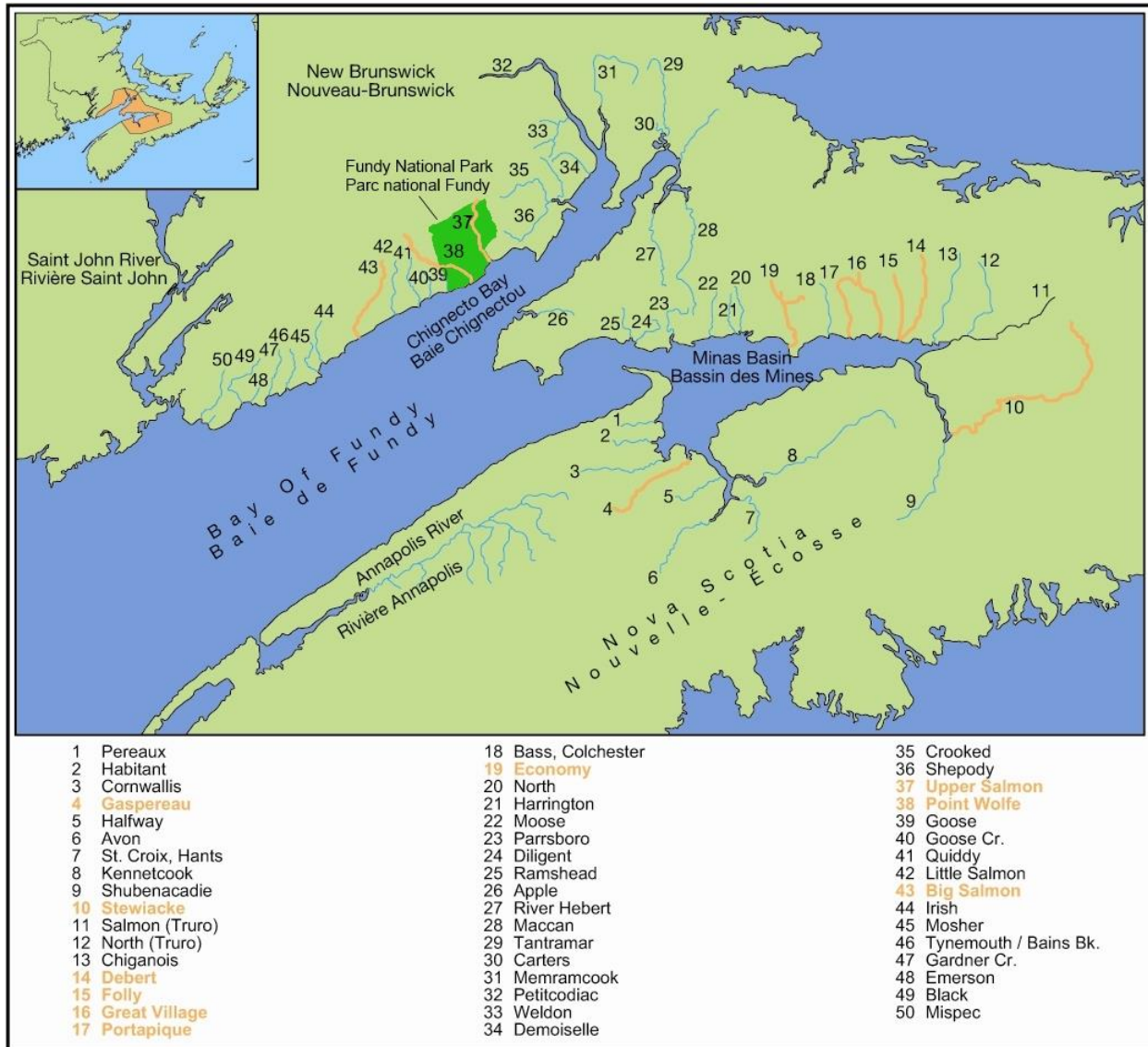


Figure 1. Approximate location of the 50 named rivers within the inner Bay of Fundy Atlantic Salmon distribution shown and numbered. This does not represent all rivers and tributaries in the area and only the main stem of the named rivers are shown. Orange denotes rivers containing critical habitat as identified in the published Recovery Strategy (DFO 2010). The darkened green parcel represents the location of Fundy National Park.

## Structure, form and investment

An Atlantic Salmon redd is an excavated depression in the streambed in which a female salmon deposits her eggs. A redd is a continuous portion of the streambed which a female has disturbed or altered by her reproductive activity, appearing as a clear, homogenous zone of cleaned gravel particles (i.e., fine sediments removed by females). The surface area of a redd ranges from 2.3 to 5.7 m<sup>2</sup>, and consists of a raised mound of gravel or dome under which most of the eggs are located, and an upstream depression or 'pot'. Figure 2 illustrates a typical

Atlantic Salmon redd in profile view and the downstream flow of water through the gravel and over the buried eggs.

Figure 3 provides an annotated photograph of a typical Atlantic Salmon redd. The structure of a redd promotes high permeability in the gravel substrate and increased water exchange rates which may be associated with increased survival. The flow of water through the redd increases oxygen and removes wastes.

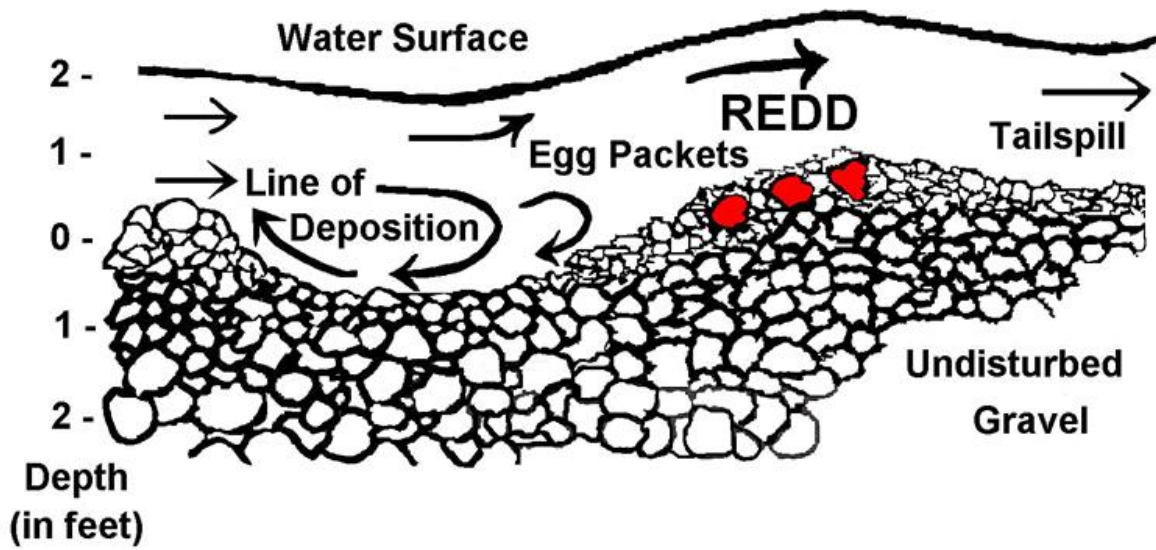


Figure 2. Typical Atlantic Salmon redd in profile view illustrating the flow of water (arrows) upstream to downstream through the gravel and over the buried eggs packets (shown in red). Tailspill is the area of a redd where substrate excavated upstream by the female is deposited downstream. (Image courtesy of Washington State Department of Fish and Wildlife).

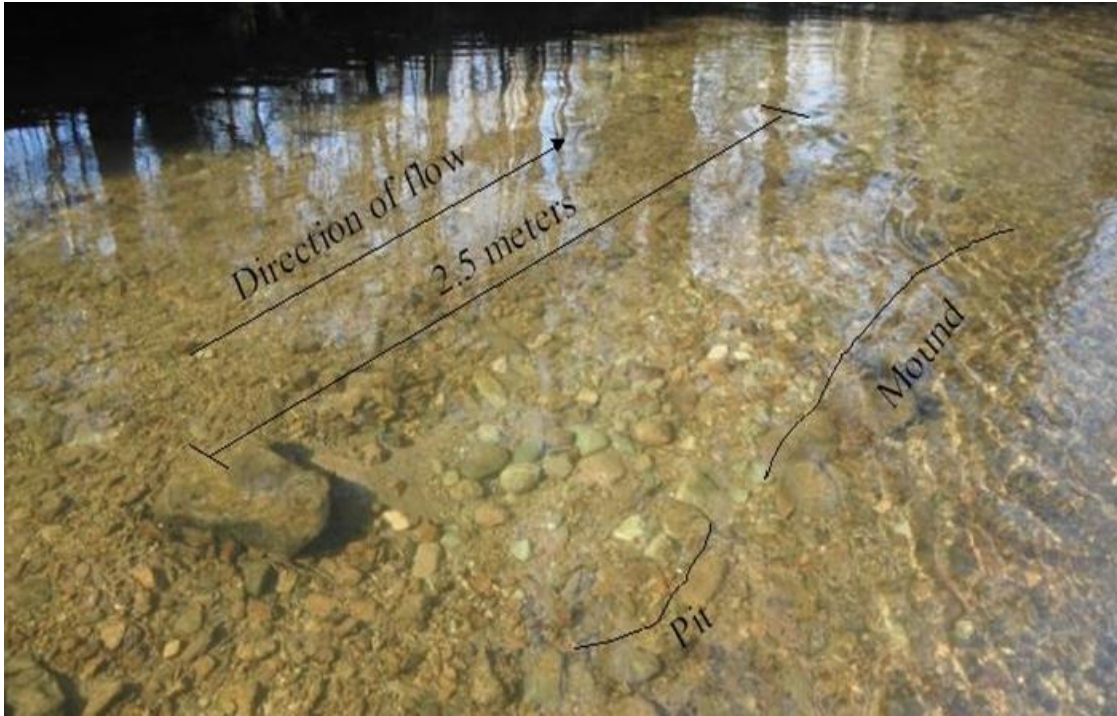


Figure 3. Photograph of a typical Atlantic Salmon redd viewed from above indicating the direction of flow and some of the structure's key features. (Image courtesy of the Fort Folly First Nation Habitat Recovery Program). The redd is the approximate 2.5 m long oblong area of lighter coloured gravel in the center of the photograph.

Female Atlantic Salmon actively construct redds by excavating depressions in the streambed. They do this by turning on their side and rapidly beating their tails while pressing down and lifting up from the gravel surface. This process is often referred to as 'digging'. Once excavation of a redd is completed, the female deposits eggs in the depression and is immediately joined by the attending male or males which release sperm to fertilize the eggs. Immediately following egg deposition and fertilization, the female covers the eggs with gravel through another bout of digging along the upstream edge of the redd.

This redd construction process continues until the female has deposited all of her eggs. The number of redds constructed increases with female body size, and multiple redds may be constructed by a single female each year. The time it takes a female to construct a single redd ranges from approximately one to two days (R. Jones, DFO Science, personal communication), with the entire nesting process, including all redd constructions, occurring over approximately three to six days. Unlike Pacific Salmon, female Atlantic Salmon do not defend their redds following spawning.

## Occupancy and life-cycle function

Redds are constructed by adult female Atlantic Salmon during spawning for egg incubation and for early rearing of hatchlings (alevins). Appendix II of the Recovery Strategy provides a general



summary of the life cycle of Atlantic Salmon. Redds protect eggs and alevins from predation, disturbance (e.g., ice scour, bedload transport, physical impact by debris), displacement by currents, and changing water levels.

Considering all relevant life stages, a redd may be occupied by iBoF Salmon from October through late June. The spawning period for iBoF Salmon, during which redd construction takes place, is typically October and November. Both female and male spawners leave the redd after spawning is complete. Eggs incubate in the redds over winter and begin hatching as alevins in April. Alevins remain in the gravel substrate of a redd living off yolk sacs until late May or late June. When the alevins emerge from the gravel and leave the redd as free-swimming young fish known as parr, the redd is no longer occupied.

## References

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