Estimates of smolt equivalents leaving the tributary for four populations of Grande Ronde Spring Chinook.

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ODFW Example – smolt equivalents to LGD for Grande Ronde populations

At the rotary screw traps (RST), we count and tag fish passing the traps in the fall (early migrants) and then in the spring (late migrants). Using a mark-recapture model total emigrants passing the trap for each group are estimated. We then estimate survival to Lower Granite Dam (LGD) for both groups. From these values we can calculate smolt equivalents to LGD.

100 pre-smolt passing the trap in the fall (early migrants) * 0.2 survival to LGD = 20 smolt equivalents (from the early migrant group) arriving at LGD.

80 smolts passing the trap in the spring (late migrants) * 0.4 survival to LGD = 32 late migrant smolt equivalents arriving at LGD.

20 + 32 = 52 smolt equivalents arriving at LGD.

ODFW Example – smolt equivalents passing trap (often called “leaving trib”)

To estimate smolt equivalents passing the trap, we need to account for the overwinter mortality that the early (fall) migrant fish experience, *after* they have already passed the trap and have been counted and PIT-tagged. We make the simplifying assumption that the relative difference in survival between the early migrants (fall) and the late (spring) migrants (S_{early}/S_{late}) estimates the overwinter survival rate experienced by both groups. For the late (spring) migrants, the number of smolt equivalents passing the trap is the same as the estimated abundance passing the trap since they have already experienced overwinter mortality before being counted, tagged and passing the trap.

For the early (fall) migrant group, to get the number of estimated smolt equivalents passing the trap in the spring we take the number of fish estimated to have passed the trap in the fall and adjust it by the estimated overwinter survival:

100 fish * (0.2 / 0.4) = 50 early migrants smolt equivalents passing the trap + 80 spring migrants (considered smolts as they pass the trap) = 130 smolt equivalents passing the trap

(** note this is actually an estimate of smolt equivalents passing the trap, not necessarily the number leaving the tributary as is the language often used in our reports, calculations, and examples. For the next calculation step to “leaving the trib” see next slides).

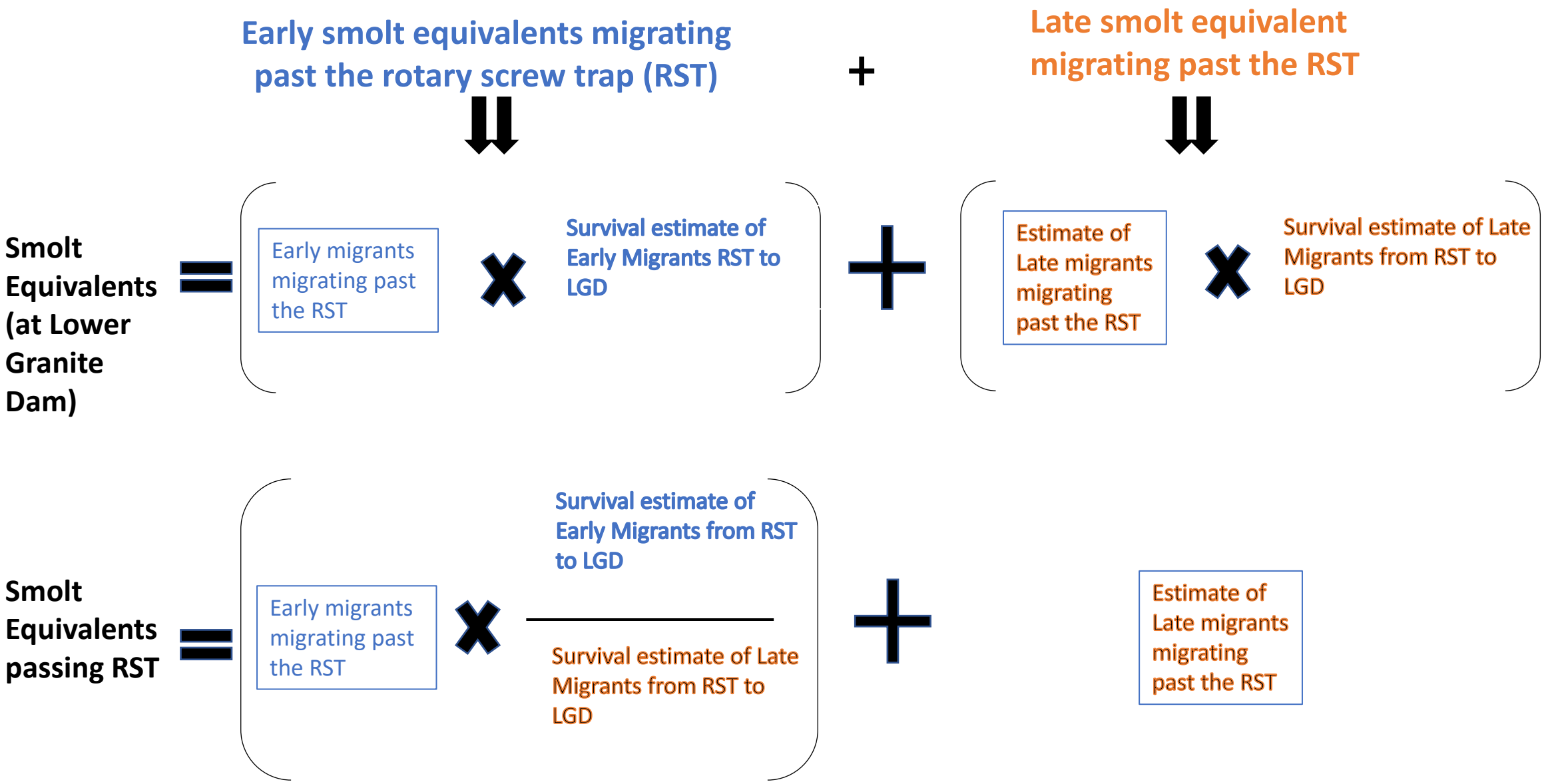
ODFW Example – smolt equivalents leaving tributary

Since there is spawning (and juvenile production) below the screw traps, we need to estimate for smolt equivalents produced below the trap, but never counted/captured in the trap. We do this by calculating the proportion of redds above the screw trap then expand the smolt equivalent estimate for smolt equivalents produced from redds below the screw trap.

130 smolt equivalents passing the trap / 0.95 (proportion of redds above the screw trap) = 137 smolt equivalents leaving the tributary.

***We are making large and sweeping assumptions with this expansion, as you can imagine. We do not know if the redds below the trap produce the same number of smolt equivalents as the redds above trap. We are assuming that survival and outmigration time (as an early or late migrant) is the same as those smolts equivalents produced from redds above the trap. We assume that the juveniles below the trap stay below the trap and do not move above (and thus could be counted in the trap).

The Lostine population on average has the largest proportion of redds below the screw trap – 0.16. On average, for the Grande Ronde and Catherine Creek populations, the proportion of redds below the trap is 0.04. For the Minam all redds have been counted above the screw trap.


Early smolt equivalents migrating past the rotary screw trap (RST)
+
Late smolt equivalent migrating past the RST
Smolt Equivalents (at Lower Granite Dam)
=
Early migrants migrating past the RST
x
Survival estimate of Early Migrants RST to LGD
+
Estimate of Late migrants migrating past the RST
x
Survival estimate of Late Migrants from RST to LGD
Smolt Equivalents passing RST
=
Early migrants migrating past the RST
x
Survival estimate of Early Migrants from RST to LGD
Survival estimate of Late Migrants from RST to LGD
+
Estimate of Late migrants migrating past the RST

	$\widehat{N}$ *number of fish passing trap during the season*	$\widehat{S}$ *survival to LGD*	$\widehat{Q}_{trib}$ *smolt equivalents passing trap in spring *often labeled as "leaving trib"*	$\widehat{Q}_{LGD}$ *smolt equivalents arriving at Lower Granite*
Early migrants (fall trapping season):	**100** pre-smolt $\widehat{N}_{early}$	**0.2** $\hat{S}_{early}$	**50** $\hat{Q}_{trap,early}$	**20** $\hat{Q}_{LGD,early}$
Late migrants (spring trapping season):	**80** smolt $\widehat{N}_{late}$	**0.4** $\hat{S}_{late}$	**80** $\hat{Q}_{trap,late}$	**32** $\hat{Q}_{LGD,late}$
TOTAL:	**180** smolt $\widehat{N}_{total}$		**130** $\hat{Q}_{trap,total}$	**52** $\hat{Q}_{LGD,total}$

$\widehat{Q}_{trib}$ *smolt equivalents leaving tributary in spring*

130

$\hat{Q}_{trap,total}$

$\Big\backslash$

$p_{reddsAboveTrap}$ *Proportion of redds above the screw trap*

0.95

$\hat{p}_{reddsAboveTrap}$

$=$

$\widehat{Q}_{trib}$ *smolt equivalents leaving tributary in spring*

137

$\hat{Q}_{trib,total}$