Tables

Table 1. Candidate explanatory variables, descriptions, and hypotheses used to explain mortality occurring during translocation of Spring-run Chinook Salmon from dams to upstream outplanting locations in the Willamette River basin, Oregon.

Predictor	Description and hypothesis
	Truck and translocation occasion conditions
Loading time (min)	How long it took to load fish. **Hypothesis**: longer loading durations increase the probability of mortality events.
Hauling Time (min)	How long it took to transport fish to outplant location. **Hypothesis**: longer travel durations increase the probability of mortality events.
Total time handling (min)	How long it took to load and transport fish. **Hypothesis**: longer trip durations increase the probability of mortality events.
Trip number for the day	Number of trips conducted in a day. **Hypothesis**: this metric integrates the number of fish trapped and a rate of trapping (sort of). Probability of mortality events increase with the number of daily hauls, later hauls may have a higher probability of mortality
Truck volume (m^3)	The volume of the transport tank. **Hypothesis**: Trucks with larger volumetric capacity decreases probability of mortality events.
Number of fish transported	The number of fish transported in a single trip. **Hypothesis**: higher numbers of fish transported increases the probability of mortality events.
Number of fish per truck volume (fish/m^3)	The density of fish in the truck (fish/truck volume). **Hypothesis**: higher densities increase the probability of mortality events
Difference in temperature between collection facility and tank (C)	Difference between collection facility water temperature and transport tank water temperature. **Hypothesis**: fish are more likely to experience mortality events if stressful water temperature differences are experienced.
Difference in tank water temperature over trip (C)	Difference between transport tank water temperature at the start and end of transport event. **Hypothesis**: fish are more likely to experience mortality events if stressful water temperature differences are experienced.
Day of the year transported	Day of year of hauling event. **Hypothesis**: Fish from the middle of the run will experience higher mortality due to environmental conditions (e.g., temperatures below dam, water quality) conditions that may peak mid-run.
	Daily weather and trap conditions
Number of fish in trap	Cumulative number of fish captured in the trap. **Hypothesis**: high numbers of fish in the trap may increase stress, which may increase the probability of mortality events.
Water temperature	Temperature at collection facility at time of hauling. **Hypothesis**: fish

at collection facility (C)	collected from higher water temperature are more likely to experience mortality events
Maximum daily air temperature (C)	Maximum air temperature when loading and transporting. **Hypothesis**: Exposure to elevated air temperatures increase the probability of mortality.
Average number of days since last trap tending	Average number of days between trap tending occasions (cumulative). **Hypothesis**: increased time in the trap increases stress, which may increase the probability of mortality events.
Cloud cover index	Daily cloud cover when loading and transport. **Hypothesis**: Exposure to sunlight increases the probability of mortality
	Annual conditions
Run size	Number of fish escaping Willamette Falls. **Hypothesis**: density dependent factors (e.g., horizontal disease transmission) increase probability and magnitude of a mortality event
Day of the year 50% of run passed Willamette Falls	Day of 50% passage of immigrating spring Chinook at Willamette Falls. This variable is intended to characterize the potential effects of run timing. **Hypothesis**: as transport mortalities increase in years where the run timing is earlier and therefore fish are likely to have higher exposure in the migratory corridor.
Degree days from first fish (C)	Number of accumulated degree days from the first fish ascending Willamette Falls to the first fish captured at Dexter dam. **Hypothesis**: the probability of mortality increases with the accumulated degree days
Degree days 50% fish (C)	Number of accumulated degree days from 50% passage of immigrating spring Chinook at Willamette Falls to the 50% passage of fish at Dexter Dam. **Hypothesis**: the probability of mortality events increases with increasing degree days.
Mean daily discharge first (m^3/s)	Average discharge at dam from the first fish ascending Willamette Falls plus travel time to the first fish captured at each dam. **Hypothesis**: the probability of mortality decreases with increased flows
Mean daily discharge 50% fish (m^3/s)	Average discharge at dam from 50% passage of immigrating spring Chinook at Willamette Falls plus travel time to the 50% passage of fish at each dam. **Hypothesis**: the probability of mortality decreases with increased flows.
	Response variable
Mortality	The proportion of dead and moribund fish (i.e., mortalities) for each outplanting event estimated assuming a binomial distribution of the number of mortalities to total number of fish translocated by individual truck.

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Table 2. Summary of responses and candidate predictor variables used to evaluate the factors related to Chinook Salmon transport mortality in the Upper Willamette Basin.

	Foster Dam			Dexter Dam		
Variable	Mean (SD)	Minimum	Maximum	Mean (SD)	Minimum	Maximum
			Response variable			
Moralities	0.28 (0.81)	0	4	2.98(15.2)	0	147
Proportion mortality	0.008 (0.03)	0	0.375	0.01 (0.03)	0	0.21
			Predictors			
Loading time (min)	122.78 (68.39)	20.00	300.00	43.53 (27.77)	10.00	135.00
Hauling Time (min)	37.37 (17.98)	0.00	120.00	77.28 (20.86)	45.00	130.00
Total time handling (min)	160.16 (66.99)	65.00	345.00	120.82 (37.55)	65.00	235.00
Trip number for the day	1.35 (0.62)	1.00	4.00	2.13 (1.46)	1.00	8.00
Truck volume (m^3)	2.8 (2.1)	1.14	5.68	9.27 (1.72)	5.68	10.22
Number of fish transported	33.4 (24.22)	1.00	144.00	149.81 (72.34)	18.00	387.00
Number of fish per truck volume (fish/m^3)	12.31 (8.59)	0.18	57.24	17.01 (7.34)	1.76	37.86
Difference in temperature between collection facility and tank (C)	0.84 (1.19)	-1.11	3.89	-0.18 (1.18)	-3.89	2.22
Day of the year transported	199.2 (36.28)	128.00	276.00	206.27 (19.83)	177.00	255.00
Number of fish in trap	250.39 (191.64)	0.00	715.00	569.91 (287.43)	26.00	1108.00
Water temperature at collection facility (C)	10.55 (1.06)	6.67	12.22	14.07 (1.71)	10.56	16.11
Difference in tank water temperature over trip (C)	0.2 (0.42)	0.00	2.78	-0.01 (0.91)	-3.68	2.22
Maximum daily air temperature (C)	25.37 (4.77)	12.78	37.78	27.32 (3.73)	19.44	33.89
Average number of days since last trap tending	4.59 (2.99)	1.00	14.00	4 (3.85)	0.00	20.00

Cloud cover index	0.34 (0.37)	0.00	1.00	0.37 (0.29)	0.00	1.00
Run size	40995.92 (15660.29)	14149.00	65293.00	40262.18 (14851.96)	14149.00	65293.00
Day of the year 50% of run passed Willamette Falls	144.61 (10.02)	134.00	164.00	143.41 (9.9)	132.00	164.00
Degree days from first fish (C)	5163.48 (1395.19)	2836.70	7381.40	7874.73 (624.45)	6946.65	8573.05
Degree days 50% fish (C)	4810.05 (656.22)	3839.14	5724.34	4937.75 (1189.98)	3134.40	6830.88
Mean daily discharge first (m^3/s)	3580.31 (135.07)	3413.34	3956.36	3041.61 (186.12)	2791.83	3603.25
Mean daily discharge 50% fish (m^3/s)	1884.99 (259.96)	1281.62	2193.30	3465.55 (425.01)	2667.08	3966.73

Table 3. Candidate models and model selection criteria for the confidence model set for adult spring-run Chinook Salmon translocation mortality. All models contained an intercept and a random effect of sample in addition to the variable being evaluated.

Model	AICc	ΔAICc	Model likelihood	Model weight
Dexter Dam				
Number of fish per truck volume (no./m^3)	801.9	0.000	1.000	1
Foster Dam				
Loading time (min)	312.3	0.000	1.000	0.638
Total time handling (min)	314.7	2.387	0.303	0.193
Mean daily discharge first (m^3/s)	316.3	3.996	0.136	0.086
Degree days from first fish (C)	318.5	6.255	0.044	0.028

Table 4. Parameter estimates and 95% confidence limits of fixed and random effects for best approximating model of adult Chinook Salmon translocation mortality. Random effects are variance components.

Model	Parameter	Estimate	95% Confidence limits	
			Lower	Upper
	Dexter Dam			
Number of fish per truck volume (no./m^3)	Intercept	-7.002	-9.215	-6.645
	Random effect of outplant occasion	3.113	2.264	4.571
	Effect of umber of fish per truck volume (no./m^3)	1.707	0.819	2.845
	Foster Dam			
Loading time (min)	Intercept	-7.002	-8.958	-5.864
	Random effect of outplant occasion	2.162	1.292	3.964
	Effect of loading time (min)	1.173	0.593	1.947
Total time handling (min)	Intercept	-7.175	-9.320	-5.954
	Random effect of outplant occasion	2.342	1.393	4.404
	Total time handling (min)	1.117	0.505	1.918
Mean daily discharge first (m^3/s)	Intercept	-7.164	-9.526	-5.878
	Random effect of outplant occasion	2.329	1.344	4.598
	Mean daily discharge first (m^3/s)	-1.428	-2.740	-0.508
Degree days from first fish (C)	Intercept	-7.107	-9.623	-5.801
	Random effect of outplant occasion	2.487	1.390	5.186
	Degree days from first fish (C)	0.934	0.284	1.725