The following supplement accompanies the article

Delayed mortality effects in the early marine life history of Columbia River Basin yearling Chinook salmon

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Supplement. Additional data

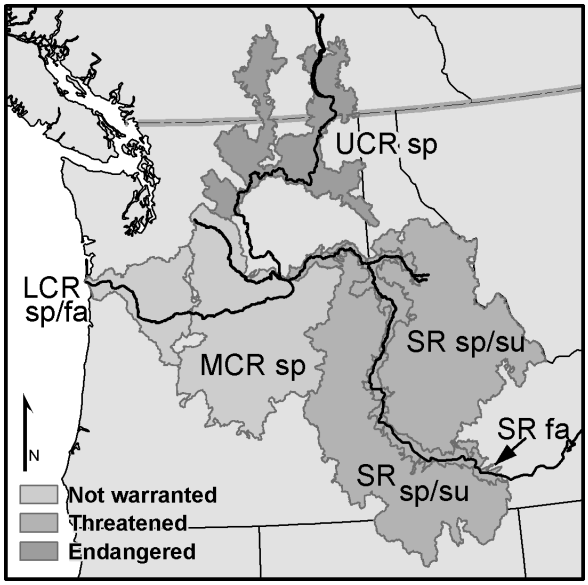

Fig. S1. *Oncorhynchus tshawytscha*. Historical range of Chinook salmon evolutionarily significant units (ESUs) within the Columbia River Basin and US Endangered Species Act (ESA) classification. Coarse-scale reporting groups used in this study generally correspond with ESUs, except the Snake River fall (SR fa) ESU, which is a component of the interior Columbia River reporting group. LCR sp/fa: lower Columbia River spring/fall, MCR sp: middle Columbia River spring, UCR sp: upper Columbia River spring, SR sp/su: Snake River spring/summer

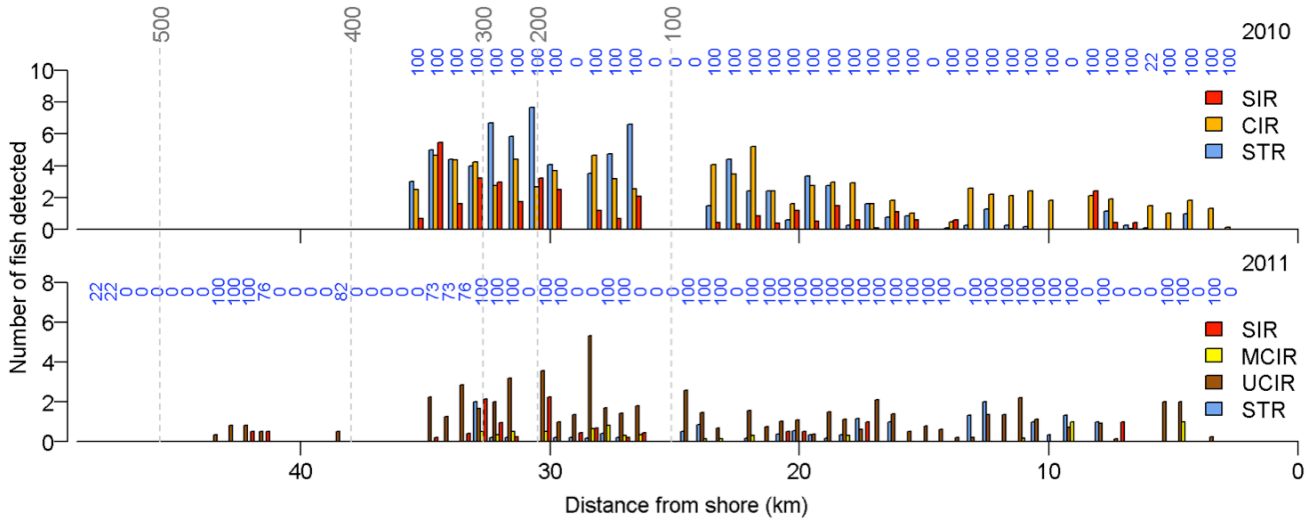

Fig. S2. *Oncorhynchus tshawytscha*. Cross-shelf distribution of acoustic-tagged yearling smolts on the Willapa Bay sub-array. If a fish was detected at >1 receiver, an equal proportion was allocated to all receivers detecting that fish, e.g. if an ID code was detected on 2 receivers, each receiver was assigned a value of 0.5 for that fish. The sub-array extended 35 km offshore in 2010, and 48 km offshore in 2011. Receivers were not deployed within 3 km of shore because shallow depths resulted in acoustic nodes washing ashore within weeks of deployment in previous years. The blue values above the bars indicate the proportion of time each receiver was operational during the migration period. In most cases where % operational was 0, the receiver was displaced by fishing activity. The grey values and vertical dashed lines indicate the bottom depth (m). Note that in 2011, 2 of 5 the smolts detected on offshore receivers (>35 km) were also detected on receivers <35 km from shore. SIR: Snake in-river, CIR: Columbia in-river, STR: Snake transported, MCIR: mid-Columbia in-river, UCIR: upper Columbia in-river

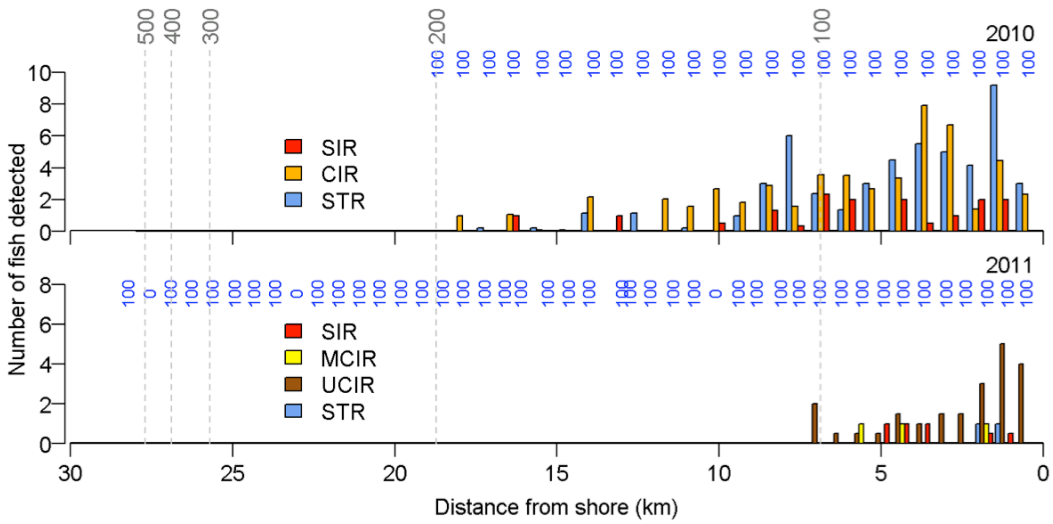

Fig. S3. *Oncorhynchus tshawytscha*. Cross-shelf distribution of acoustic-tagged yearling smolts on the Lippy Point sub-array. If a fish was detected at >1 receiver, an equal proportion was allocated to all receivers detecting that fish, e.g. if an ID code was detected on 2 receivers, each receiver was assigned a value of 0.5 for that fish. The sub-array extended 18.5 km offshore in 2010, and 28 km offshore in 2011. The blue values above the bars indicate the proportion of time each receiver was operational during the migration period. The grey values and vertical dashed lines indicate the bottom depth (m). SIR: Snake in-river, CIR: Columbia in-river, STR: Snake transported, MCIR: mid-Columbia in-river, UCIR: upper Columbia in-river

Table S1. *Oncorhynchus tshawytscha*. Estimated detection probability ($\hat{p}$) of acoustic sub-arrays. SIR: Snake in-river, CIR: Columbia in-river, STR: Snake transport, MCIR: mid-Columbia in-river, UCIR: upper Columbia in-river. LAB: Lake Bryan, WAL: Lake Wallula, LAC: Lake Celilo, MCG: McGowans Channel, CRI: Crims Island, AST: Astoria, SDI: Sand Island, WIL: Willapa Bay, LIP: Lippy Point, All: all treatment types combined, NA: not applicable. Data from all treatment types were used to estimate 1 detection parameter at WIL in 2010, and at all detection sites in 2011. Detection probability was fixed at LIP in both years ([a]assumed $\hat{p}$ based on Welch et al. 2011). LAB, WAL, LAC, MCG and CRI sub-arrays were not deployed in 2011

Year	Treatment type	Sub-array	$\hat{p}$	SE ($\hat{p}$)	95% CI
2010	SIR	LAB	1	0	0.98-1
		LAW	0.99	0.01	0.97-1
		LAC	0.33	0.04	0.25-0.41
		MCG	0.33	0.04	0.25-0.41
		CRI	0.23	0.04	0.16-0.31
		AST	0.86	0.04	0.78-0.92
		SDI	0.72	0.07	0.59-0.84
	CIR	LAC	0.42	0.02	0.38-0.47
		MCG	0.53	0.02	0.48-0.57
		CRI	0.25	0.02	0.22-0.29
		AST	0.76	0.02	0.72-0.81
		SDI	0.54	0.04	0.45-0.62
	STR	CRI	0.26	0.03	0.21-0.31
		AST	0.80	0.03	0.74-0.85
		SDI	0.43	0.03	0.37-0.49
	All	WIL	0.44	0.05	0.35-0.53
	All	LIP	0.67[a]	NA	NA
2011	All	AST	0.82	0.02	0.78-0.85
	All	SDI	0.78	0.03	0.73-0.84
	All	WIL	0.70	0.08	0.52-0.84
	All	LIP	0.67[a]	NA	NA

Table S2. *Oncorhynchus tshawytscha*. Summary of yearling Chinook salmon detections. SIR: Snake in-river, CIR: Columbia in-river, STR: Snake transport, MCIR: mid-Columbia in-river, UCIR: upper Columbia in-river

		No. of fish detected										
Treatment type	No. of fish released	Lake Bryan	Lake Wallula	Lake Celilo	McGowans Channel	Crims Island	Astoria	Sand Island	Willapa Bay	Cascade Head	Lippy Point	Graves Harbor
2010												
SIR	383	377	237	137	116	33	107	79	37	-	16	0
CIR	790	-	-	634	586	160	398	247	91	-	53	0
STR	406	-	-	-	-	100	243	131	81	-	51	3
2011												
SIR	80	-	-	-	-	-	51	51	11	1	4	-
MCIR	59	-	-	-	-	-	45	42	7	1	3	-
UCIR	386	-	-	-	-	-	257	240	60	4	21	-
STR	200	-	-	-	-	-	135	121	16	0	2	-

LITERATURE CITED

Welch DW, Melnychuk MC, Payne JC, Rechisky EL and others (2011) In situ measurement of coastal ocean movements and survival of juvenile Pacific salmon. Proc Natl Acad Sci USA 108:8708–8713