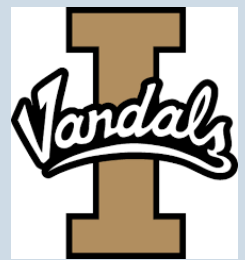




# Transport and Release of Yakima and Snake River Origin Steelhead Kelts to the lower Columbia River 2004-2011.



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<sup>1</sup> Columbia River Inter-Tribal Fish Commission, <sup>2</sup> Yakama Nation Fisheries Program, <sup>3</sup> University of Idaho, <sup>4</sup> Nez Perce Tribal Fisheries

# Acknowledgments

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- WDFW (Green and White Sturgeon)
- NOAA (Mary Moser)
- Shawn Young
- Yakama Nation juvenile bypass crew @ Chandler juvenile bypass facility
- USACE juvenile bypass crew @ Lower Granite Dam
- Englunds Marine
- Bowpicker

- Why the research was started

1. All steelhead populations above Bonneville Dam are listed under ESA.



**ESU Name**

**Listing Status<sup>1</sup>**

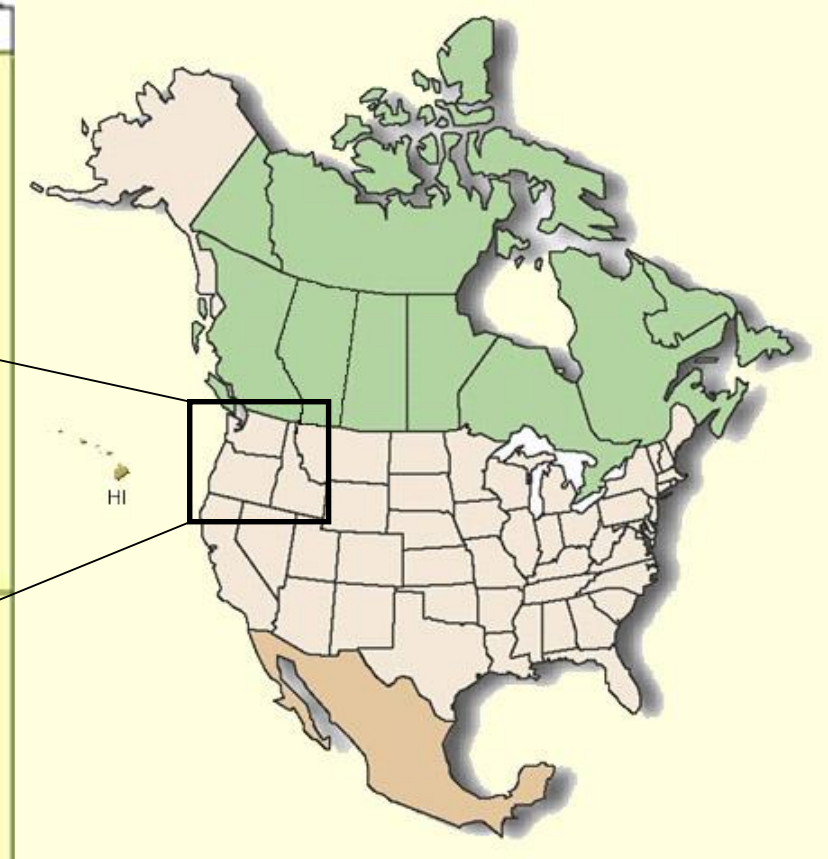
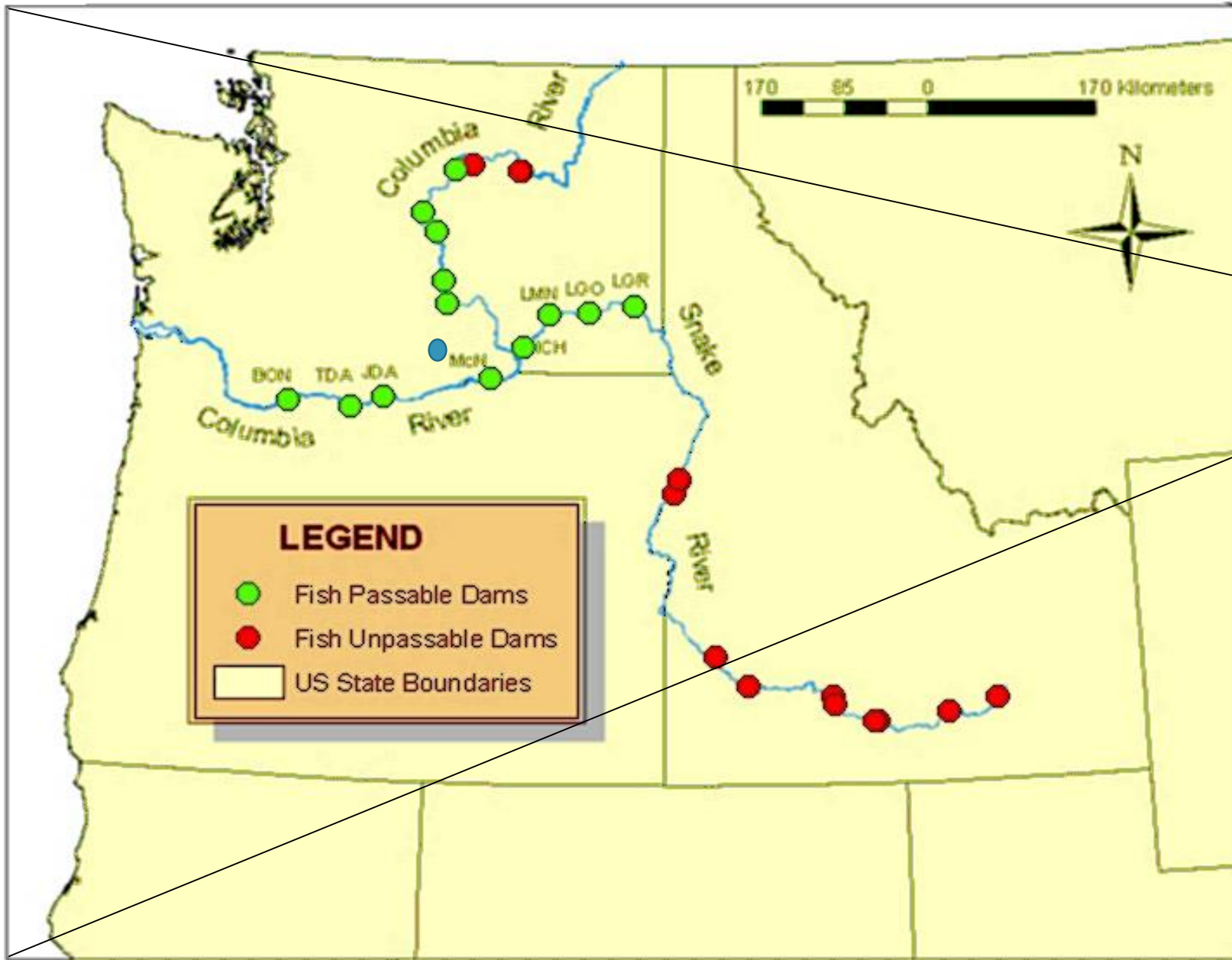
- Upper Willamette River Threatened
- Middle Columbia River Threatened
- Southern California Endangered
- South-Central California Coast Threatened
- Central California Coast Threatened
- Upper Columbia River Threatened
- Snake River Basin Threatened
- Lower Columbia River Threatened
- Central Valley, California Threatened
- Northern California Threatened
- Klamath Mountains Province Not Warranted
- Oregon Coast Species of Concern
- Southwest Washington Not Warranted
- Olympic Peninsula Not Warranted
- Puget Sound Not Warranted

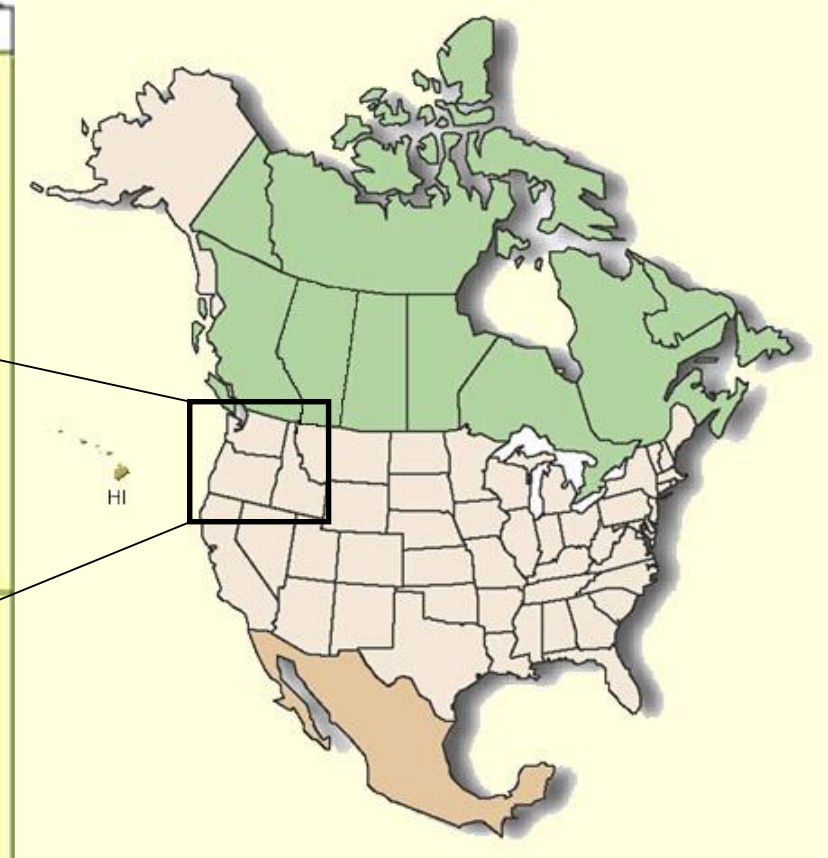
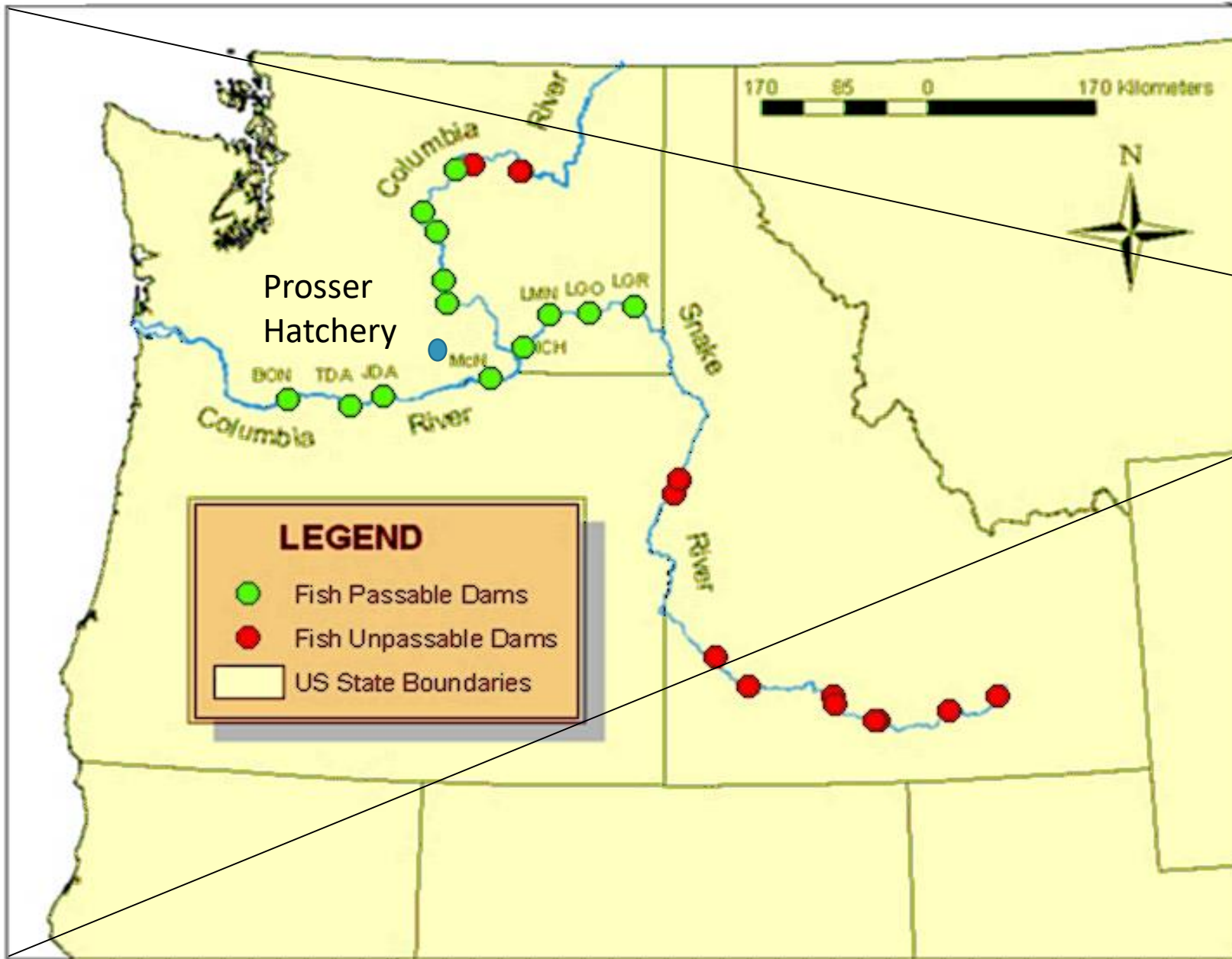
**Prespawn steelhead (maiden)**

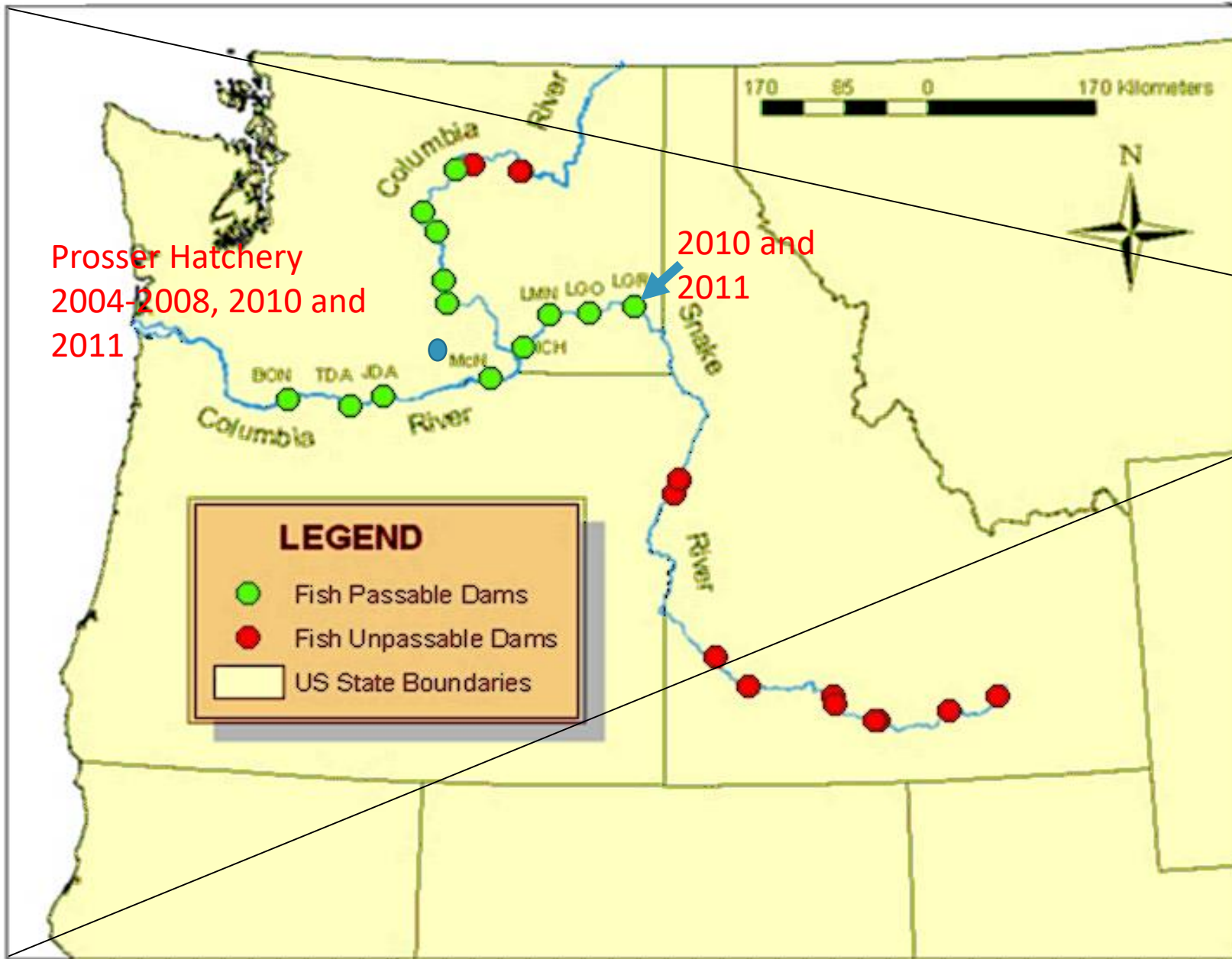


**Post spawn steelhead (kelt)**

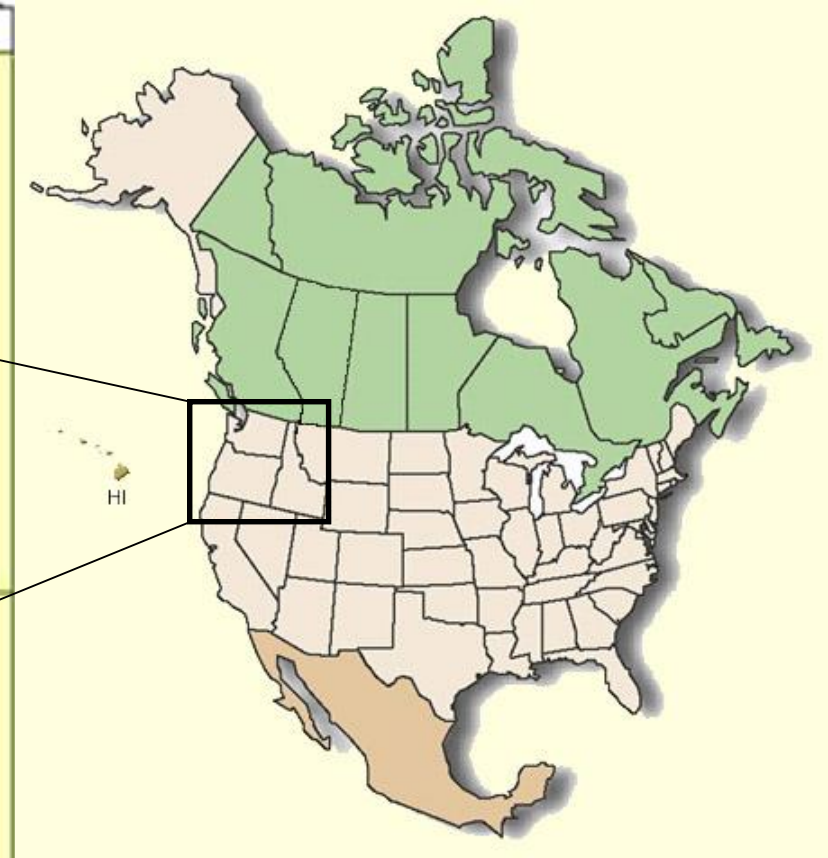








Prosser Hatchery  
2004-2008, 2010 and  
2011



Prosser Dam



Lower Granite Dam





# Management Strategies

1. Direct Release (capture & release in-river @ Prosser, WA) (no hydro acoustic tagging)\*
2. Non-Fed (capture, transport via truck & release below Bonneville Dam)
3. Fed (feed 4-8 weeks, transport & release below Bonneville Dam)
4. Long-term (feed 7-9 months & release above Prosser, WA (no-hydroacoustic tagging)



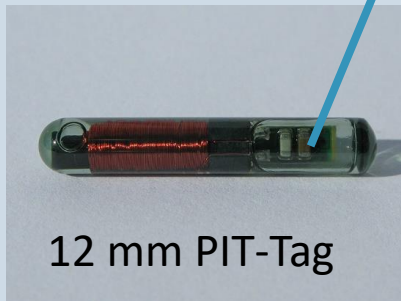
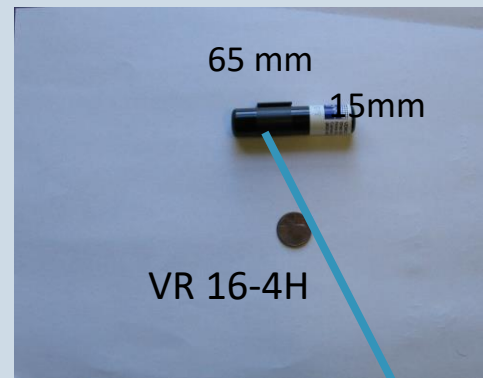
### Treatments:

- Anti-biotic (Oxytetracycline)
- Anti-parasitic (Ivermectin)
- Anti-Fungal (Formalin)
- Feed (Krill) Fed group only





VR2 and VR2W

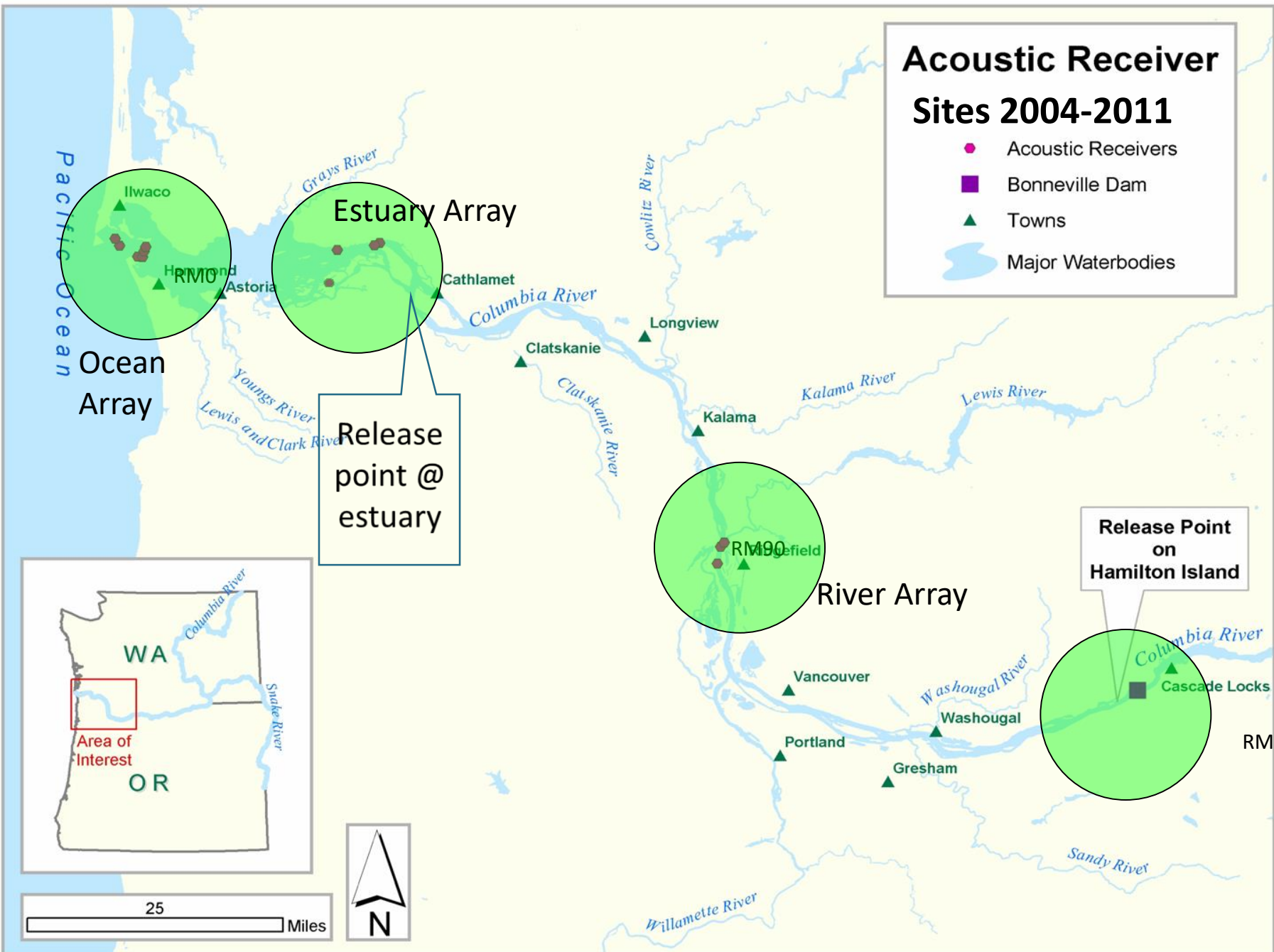


12 mm PIT-Tag



### Acoustic Receiver Sites 2004-2011

- Acoustic Receivers
- Bonneville Dam
- ▲ Towns
- ▭ Major Waterbodies



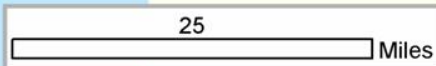
**Ocean Array**

**Estuary Array**

Release point @ estuary

**River Array**

Release Point on Hamilton Island



RM145

Release Type	Fish Origin	Transport Method	Years	Month Range	Number of Releases	River Kilometer Release	Total Number of Fish in Release	Number of Acoustic Tags Deployed
Fed	Yakima River	Truck	2004-2008	April-July	7	233 (Hamilton Is)	360	214
Non-Fed	Yakima River	Truck	2004-2008, 2010, 2011	April-May	11	233 (Hamilton Is)	565	324
Non-Fed	Yakima River	Truck	2010, 2011	April-May	2	72 (Estuary)	172	107
Non-Fed	Snake River	Truck	2010, 2011	April-May	4	233 (Hamilton Is)	61	27
Non-Fed	Snake River	Barge	2010, 2011	April-June	9	233 (Hamilton Is)	374	129
Non-Fed	Snake River	Truck	2010, 2011	April-May	2	72 (Estuary)	112	57
						<b>Total Release</b>	<b>1644</b>	<b>858</b>

# Tests

- Annual variance exists in length within populations.
- No significant differences in length between Yakima and Snake River populations.
- Significant difference in weight between Yakima and Snake River populations.
- Temperature and Flow at release sites did not appear to have impact on migration timing and survival (exception of July Release)



# Hamilton Island Releases

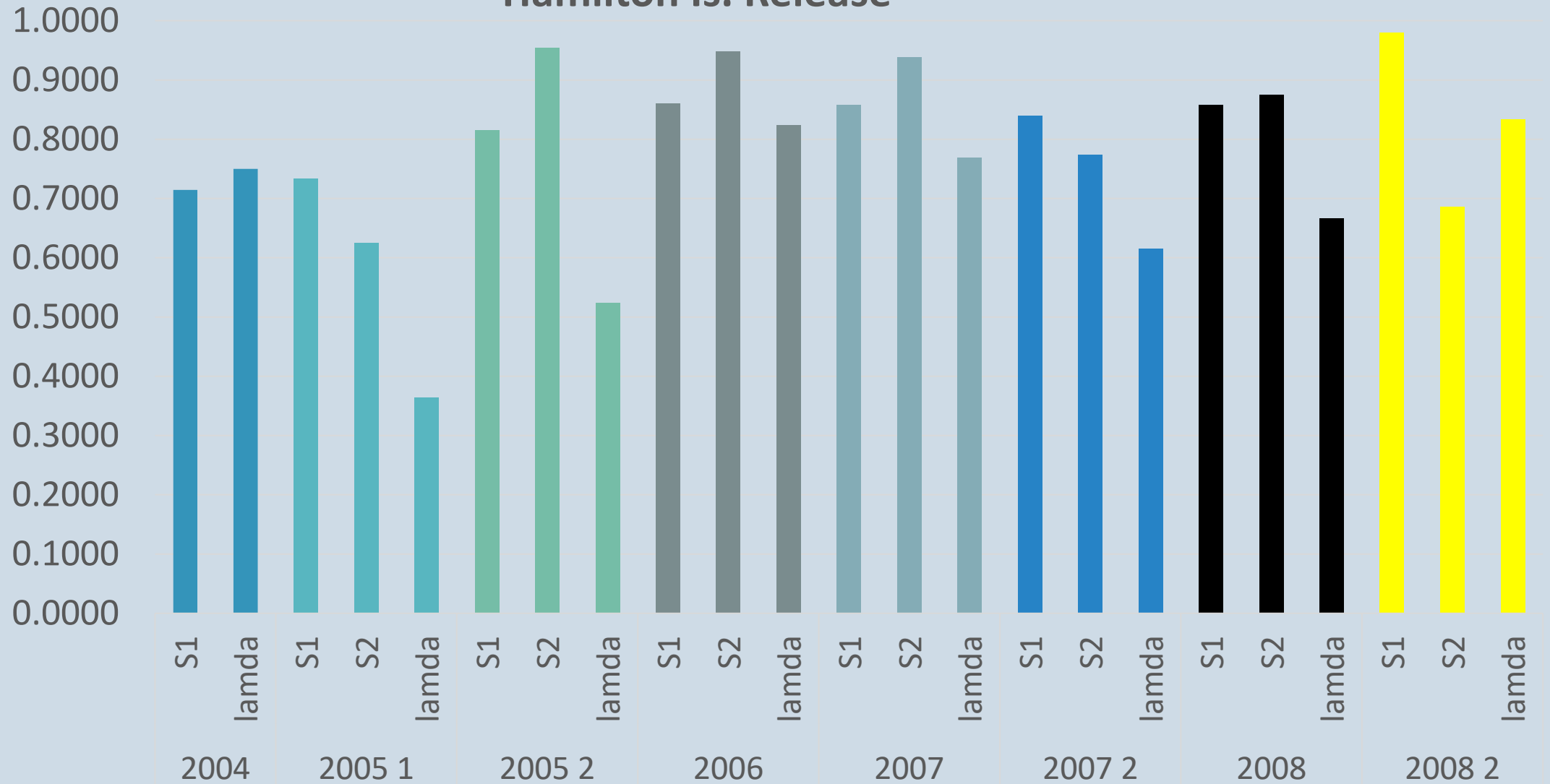
Release Date	Release Type/Origin	Rel to River	Rel to Upper Estuary	Rel to Ocean
5/3/2004	Non Fed Yakima River (Truck)	NA	82:30:05	115:03:38
05/11/04	Fed Yakima River (Truck)	NA	105:29:01	140:05:27
4/22/2005	Non Fed 1 Yakima River (Truck)	113:52:00	174:15:30	144:06:00
5/13/2005	Non-Fed 2 Yakima River (Truck)	42:45:00	85:03:00	96:00:00
5/13/2005	Fed 1 Yakima River (Truck)	46:48:02	76:59:19	83:00:27
7/1/2005	Fed 2 Yakima River (Truck)	47:08:26	ND	ND
4/24/2006	Non Fed 1 Yakima River (Truck)	58:31:13	83:00:33	116:05:25
5/15/2006	Non-Fed 2 Yakima River (Truck)	66:03:56	90:43:25	96:51:39
5/15/2006	Fed 1 Yakima River (Truck)	39:01:17	64:59:26	101:25:45
06/27/06	Fed 2 Yakima River (Truck)	32:33:18	59:21:37	81:20:31
4/23/2007	Non Fed 1 Yakima River (Truck)	96:52:02	90:47:23	155:41:26
5/30/2007	Non-Fed 2 Yakima River (Truck)	35:15:50	79:19:06	90:55:49
5/30/2007	Fed Yakima River (Truck)	36:08:19	68:32:22	96:37:13
4/25/2008	Non Fed 1 Yakima River (Truck)	125:43:33	150:50:39	197:13:51
5/12/2008	Non-Fed 2 Yakima River (Truck)	47:50:57	88:26:42	128:28:13
4/25/2008	Fed Yakima River (Truck)	104:02:42	171:17:06	206:57:10
5/12/2010	Non Fed Yakima River (Truck)	39:54:41	73:54:15	146:29:04
5/6-5/27/2010	Non-Fed Snake River (Truck) (Agg)	33:09:45	67:47:17	67:42:08
4/24-6/17/2010	Non-Fed Snake River (Barge) (Agg)	27:36:28	52:05:40	81:32:54
4/27/2011	Non Fed Yakima River (Truck)	96:07:24	126:01:35	209:44:04
4/28/2011	Non Fed Snake River (Barge)	62:56:18	49:28:31	75:10:19

# Upper Estuary Releases

<b>Release Date</b>	<b>Release Type/Origin</b>	<b>Rel to River</b>	<b>Rel to Upper Estuary</b>	<b>Rel to Ocean</b>
4/14/2010	Non Fed Yakima River (Truck)	NA	29:45:17	214:33:58
4/30/2010	Non-Fed Snake River (Truck)	NA	23:21:33	56:58:00
5/5/2011	Non Fed Yakima River (Truck)	NA	50:51:08	136:20:56
5/5/2011	Non-Fed Snake River (Truck)	NA	24:30:35	98:25:19



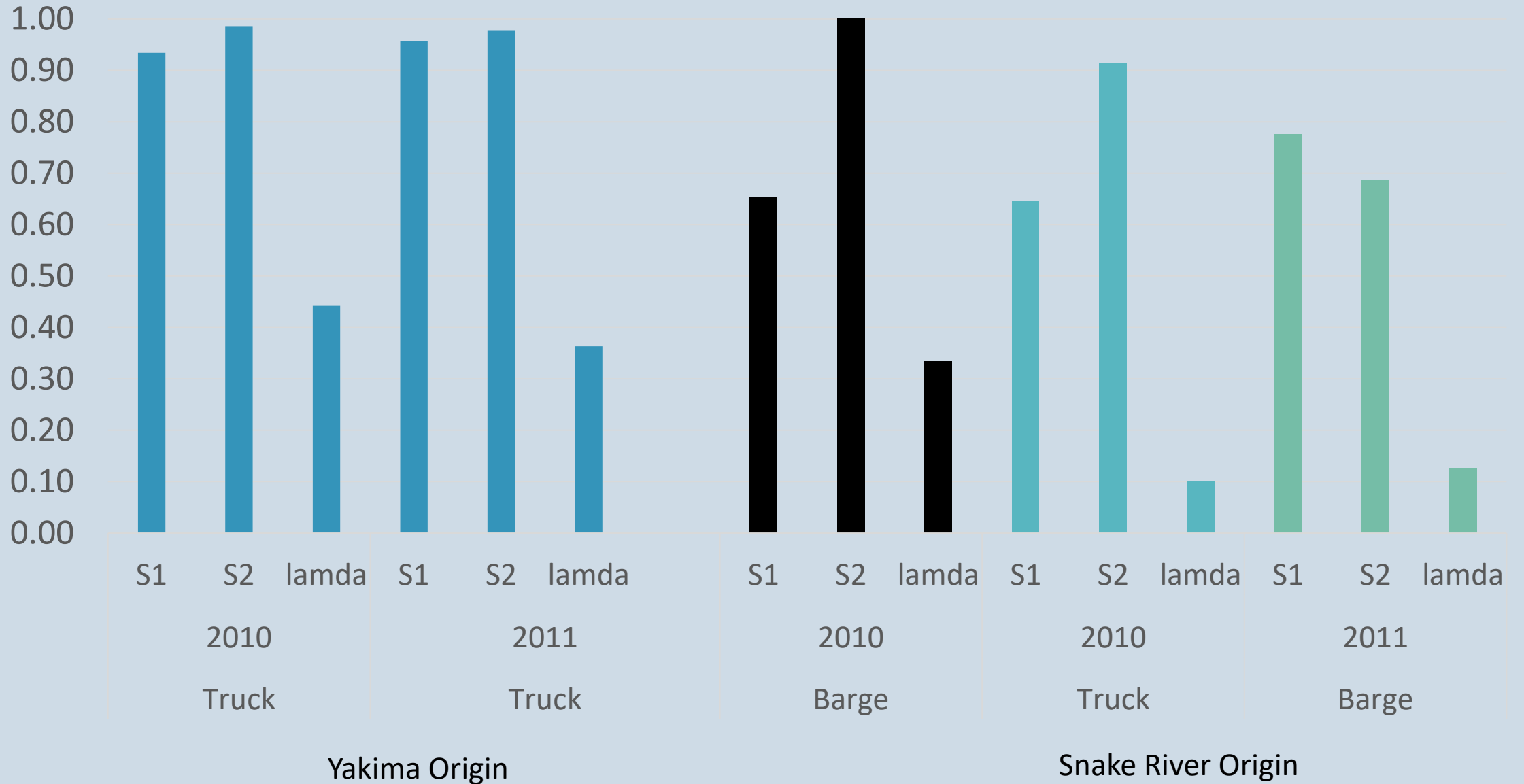
## Non Fed Yakima River Origin (Truck) Survival Estimate, Hamilton Is. Release



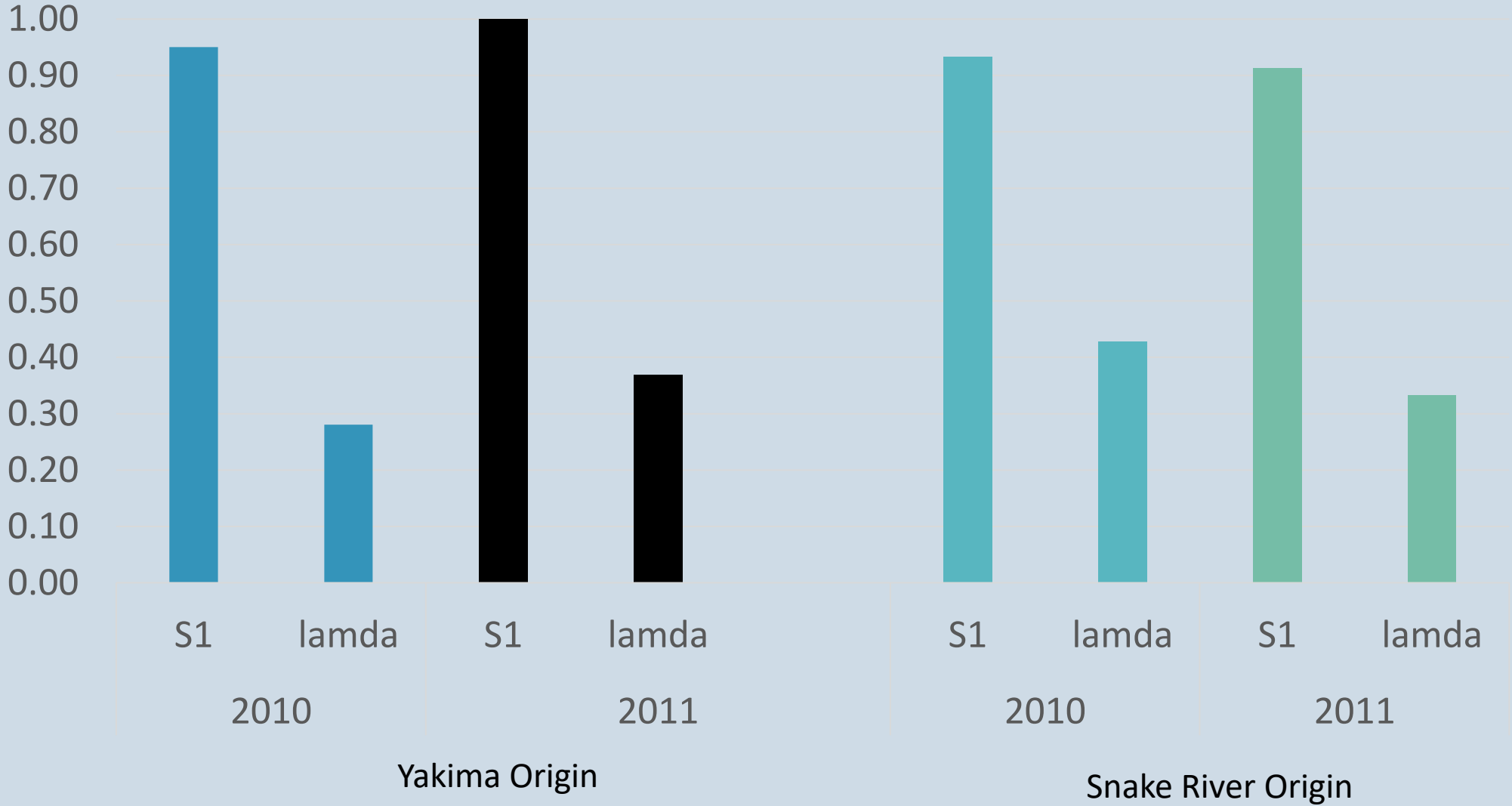
## Fed Yakima River Origin (Truck) Survival Estimate, Hamilton Is. Release



### Non-fed Release at Hamilton Is. 2010 and 2011



# Non-Fed Estuary Release 2010 and 2011



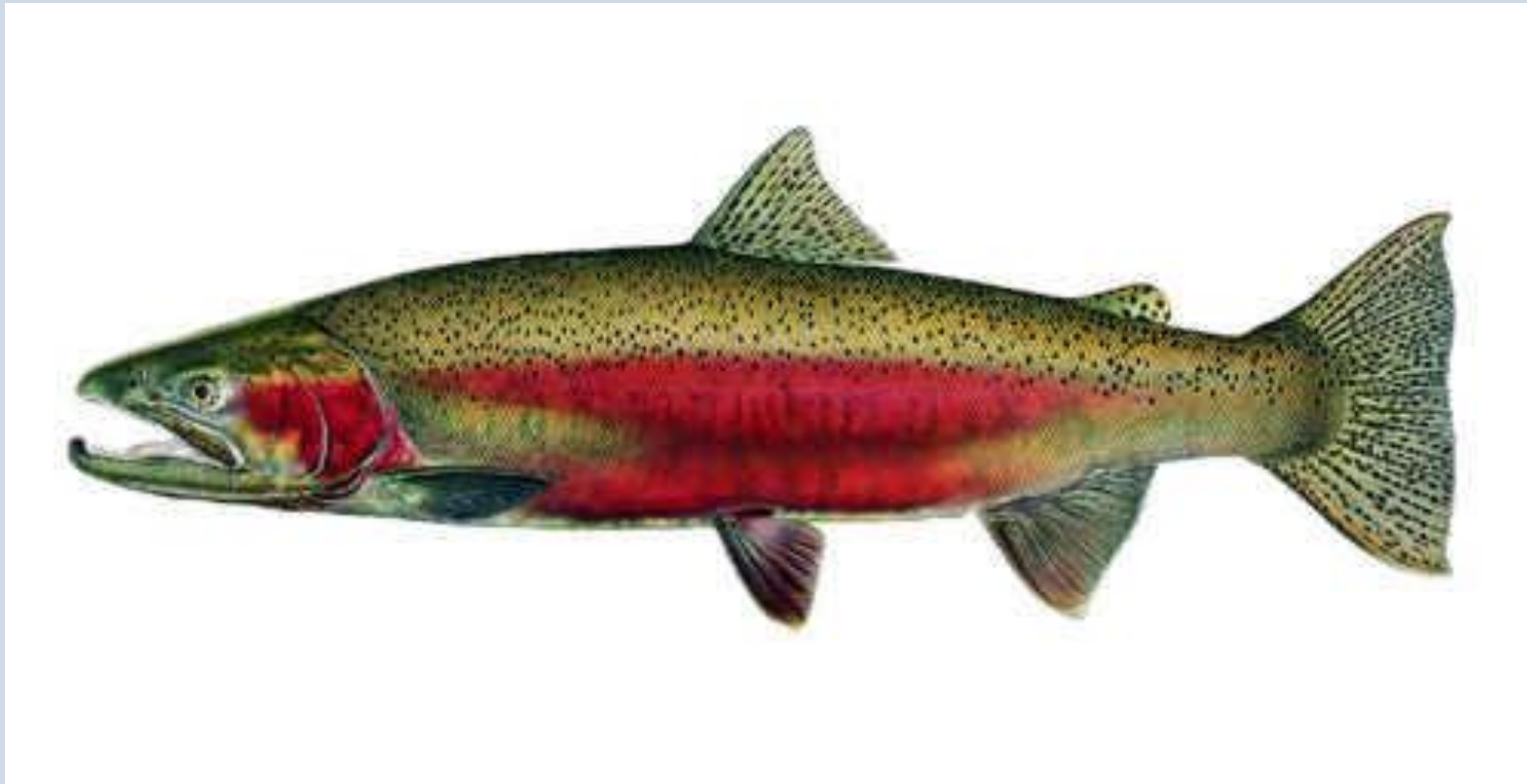
ReleaseYear	Origin	Treatment	Released	Location	# Return			LGD
					Bonn	MCN	PRO	
2004	Yakima	Non-Fed	54	Hamilton Is.	3	3	1	NA
2004	Yakima	Fed	85	Hamilton Is.	3	3	3	NA
2005	Yakima	Non-Fed	95	Hamilton Is.	0	0	0	NA
2005	Yakima	Fed	96	Hamilton Is.	0	0	0	NA
2005	Yakima	In-River	67	Yakima River	3	3	3	NA
2006	Yakima	Non-Fed	49	Hamilton Is.	2	2	1	NA
2006	Yakima	Fed	61	Hamilton Is.	0	0	0	NA
2006	Yakima	In-River	52	Yakima River	1	1	1	NA
2007	Yakima	Non-Fed	36	Hamilton Is.	0	0	0	NA
2007	Yakima	Fed	35	Hamilton Is.	1	1	0	NA
2007	Yakima	In-River	53	Yakima River	3	1	1	NA
2008	Yakima	Non-Fed	98	Hamilton Is.	14	9	6	NA
2008	Yakima	Fed	103	Hamilton Is.	8	6	1	NA
2008	Yakima	In-River	88	Yakima River	4	4	4	NA
2010	Yakima	Non-Fed	91	Estuary	1	1	1	NA
2010	Yakima	Non-Fed	99	Hamilton Is.	2	1	1	NA
2010	Yakima	In-River	155	Yakima River	2	1	1	NA
2010	Snake River	Non-Fed	374	Hamilton Is.	0	0	NA	0
2010	Snake River	Non-Fed	112	Estuary	0	0	NA	0
2010	Snake River	In-River	1399	Snake River	5	4	NA	4
2011	Yakima	Non-Fed	83	Estuary	1	2	1	NA
2011	Yakima	Non-Fed	151	Hamilton Is.	0	0	0	NA
2011	Yakima	In-River	85	Yakima River	3	3	1	NA
2011	Snake River	Non-Fed	264	Hamilton Is.	0	0	NA	0
2011	Snake River	Non-Fed	90	Estuary	0	0	NA	0
2011	Snake River	In-River	1613	Snake River	3	3	NA	3

# Lessons Learned

- Kelts migrated quickly after release to ocean (3-8.5 days).
- Survival estimates have estuary as place for most mortality occurring for in-river migration (predation, delayed mortality from stress/handling/transport).
- Short-term feeding regime did not positively impact kelt returns from Ocean.
- Pacific ocean is where most mortality is occurring.
- Transport further downstream did not offer positive benefit for kelts.
- Transport does not appear to offer much benefit to kelts over leaving fish in river.
- Long-term Reconditioning so far offers greatest benefit to steelhead kelts.

# Questions?

E-Mail: [brar@critfc.org](mailto:brar@critfc.org)



## Long Term Reconditioning Remature Releases

Year	Origin	Rematured Reconditioned Kelts
2004	Yakima	166
2005	Yakima	56
2006	Yakima	56
2007	Yakima	145
2008	Yakima	177
2010	Yakima	101
2011	Yakima	120
2011	Snake	50