

# Spawn Timing and Location of Radio-tagged Hatchery and Wild Steelhead and Spring Chinook Salmon in the Klickitat River



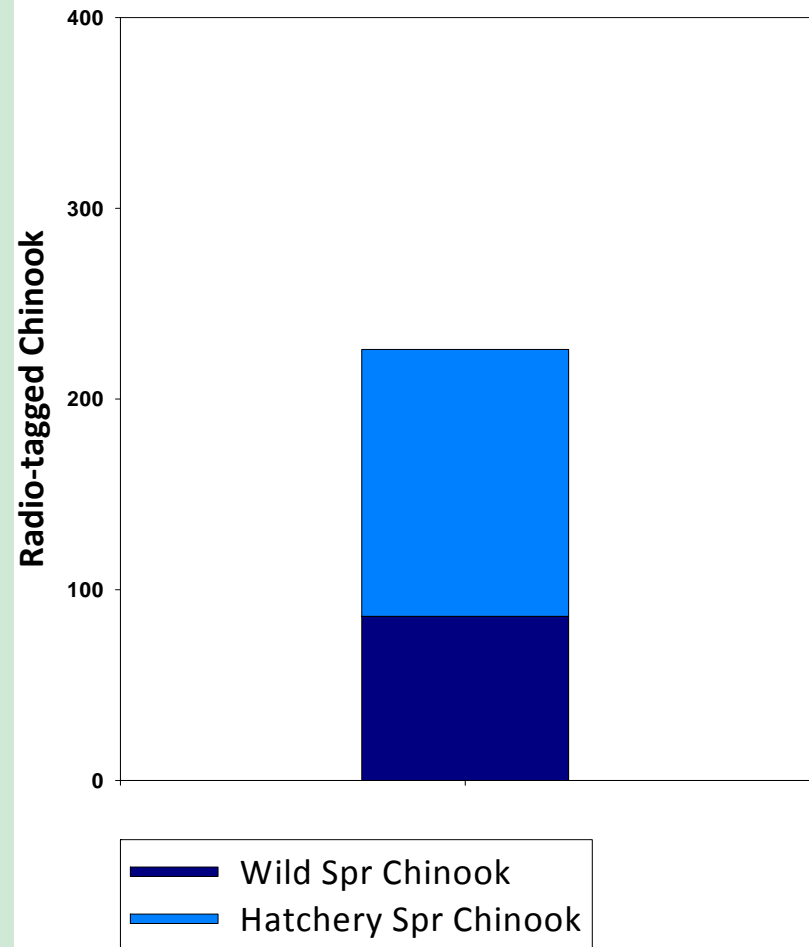
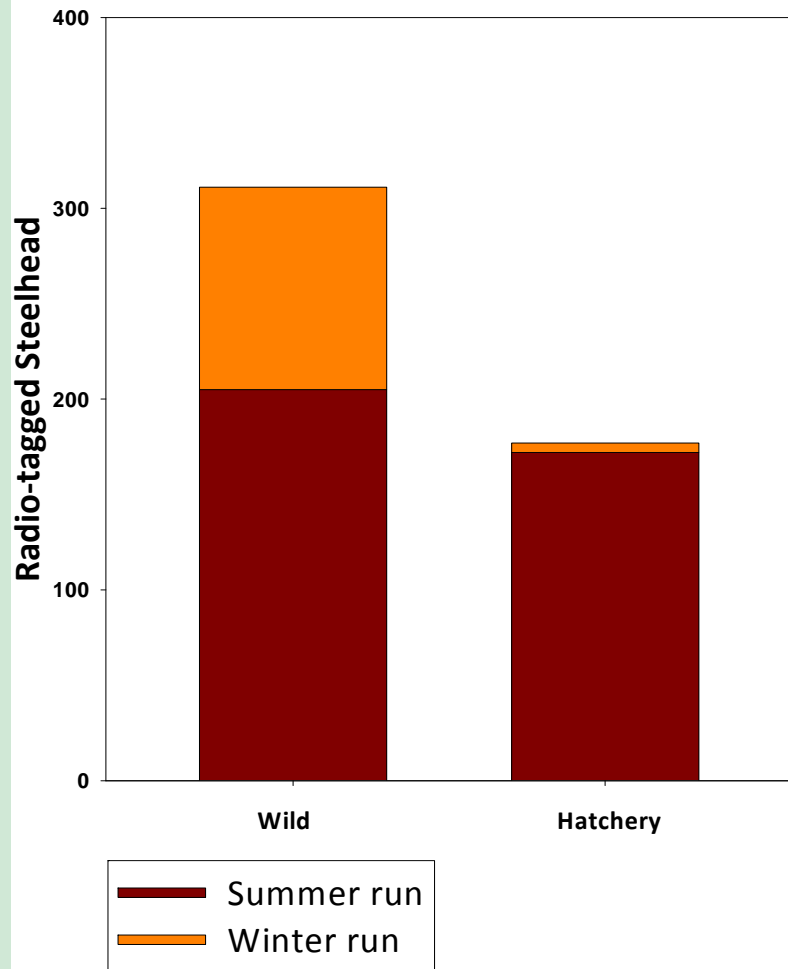
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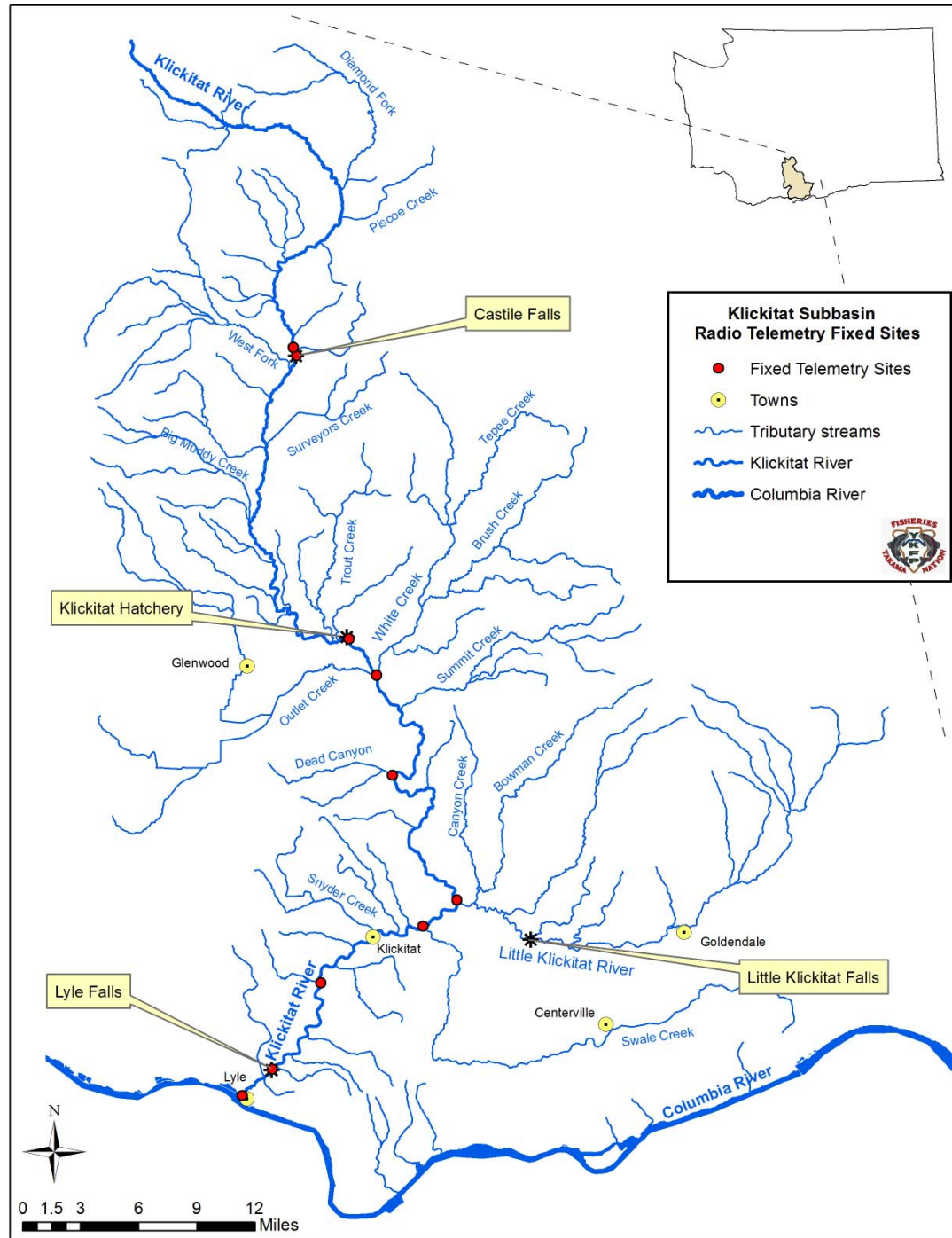
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U.S. Geological Survey

# Project Overview:

- Objectives
  - Identify spatial and/or temporal overlap of spawning habitat use by hatchery and wild fish
  - Quantify “dip-in”, harvest, pre-spawn mortality, and “wild spawn” rates
  - Identify/evaluate passage obstructions (waterfalls, fishways, Klickitat hatchery weir)
- Methods
  - Radio tagging, PIT tagging at Lyle Falls fishway (river mile 2), Fall 2009 – Spring 2014
  - 10 fixed-site radio receivers at key locations (fishways, tributary stream confluences, Klickitat hatchery) from river mile 0-64
  - Mobile radio tracking (river-adjacent road/highway, raft, aircraft)
  - Data analyzed to determine “final fate”, spawn location, spawn time

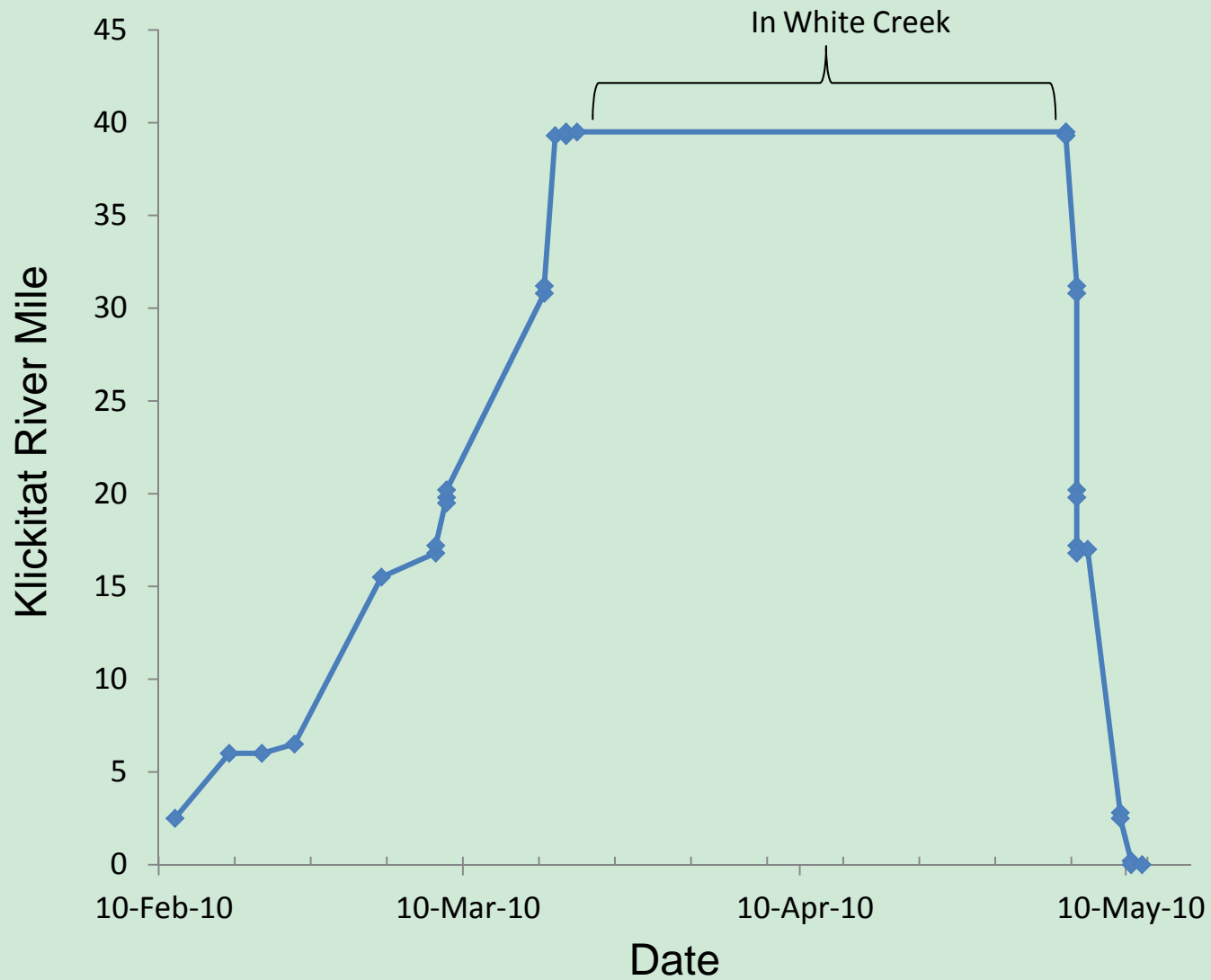
# Radio-tagged totals by species, origin, run time



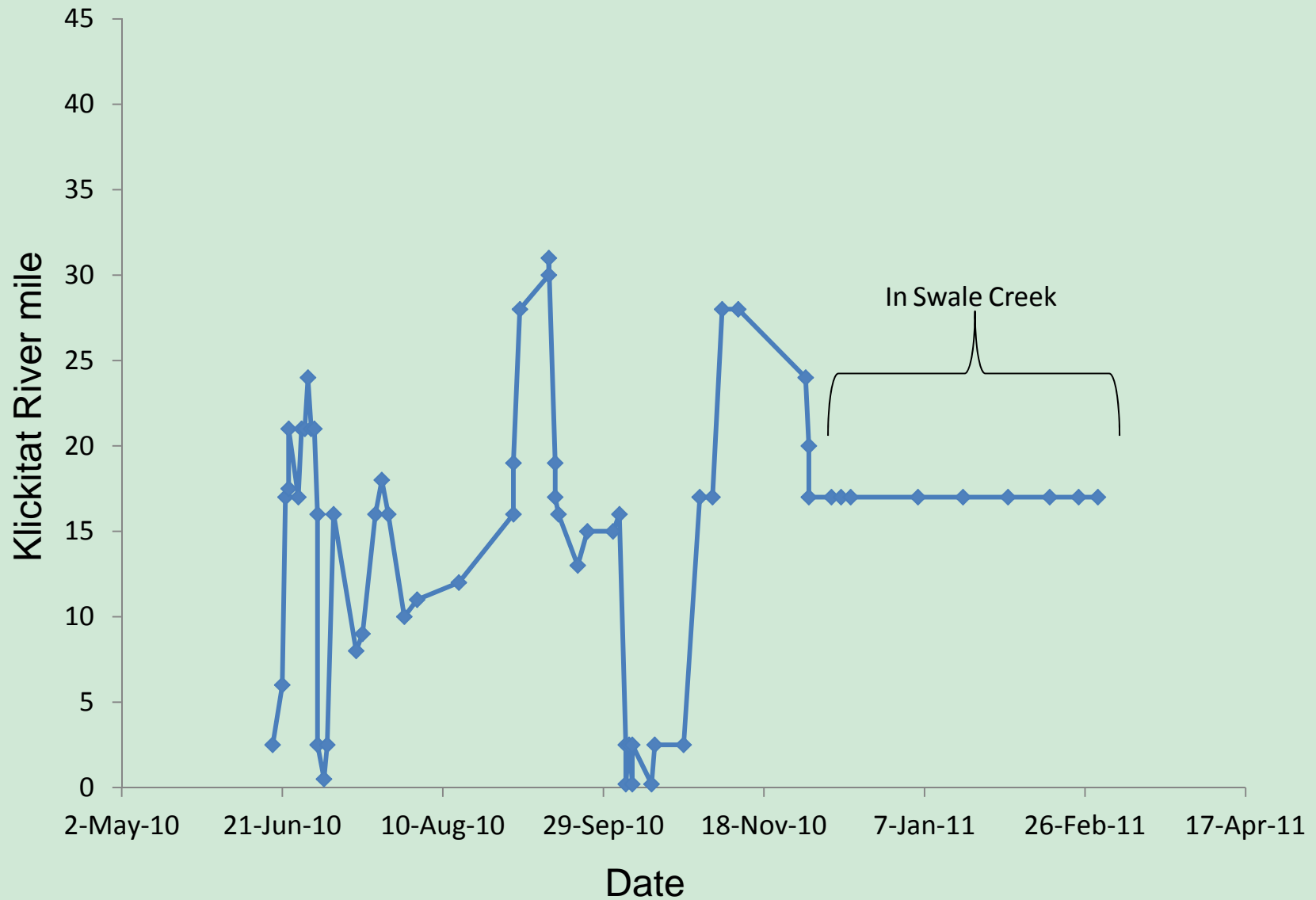


CHCODE	RDATETIME	WATERSHED	R_M	DATETIME	POWER	RCVR	ANT	LOCAT	AREA	PROOF1	SPECIES
36027	11FEB2010:10:00:00	KLICK	2.5	11FEB2010:10:00:00			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	6	16FEB10:08:15:30			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	6	19FEB10:09:43:45			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	6.5	22FEB10:08:51:00			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	15.5	02MAR10:15:31:26			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	16.8	07MAR10:19:29:41	54	U03	1	U03_1	WAHKIACUS: DN	F3	stlhd
36027	11FEB2010:10:00:00	KLICK	17.2	07MAR10:20:21:18	54	U03	3	U03_3	WAHKIACUS: UP	L3	stlhd
36027	11FEB2010:10:00:00	KLICK	19.8	08MAR10:06:28:02	95	U04	1	U04_1	LITTLE KLICK: DN	F4	stlhd
36027	11FEB2010:10:00:00	KLICK	19.5	08MAR10:12:34:15			O			M	stlhd
36027	11FEB2010:10:00:00	KLICK	20.2	08MAR10:14:57:26	56	U04	3	U04_3	LITTLE KLICK: UP	L4	stlhd
36027	11FEB2010:10:00:00	KLICK	30.8	17MAR10:00:34:43	181	U05	1	U05_1	DEAD CANYON: DN	F5	stlhd
36027	11FEB2010:10:00:00	KLICK	31.2	17MAR10:00:49:27	199	U05	3	U05_3	DEAD CANYON: UP	L5	stlhd
36027	11FEB2010:10:00:00	KLICK	39.3	18MAR10:23:22:17	66	U06	1	U06_1	WHITE CREEK: DN	F6	stlhd
36027	11FEB2010:10:00:00	KLICK	39.3	19MAR10:20:51:43	71	U06	1	U06_1	WHITE CREEK: DN	L6	stlhd
36027	11FEB2010:10:00:00	WHITE	39.5	19MAR10:20:51:51	91	U06	2	U06_2	IN WHITE CR	FT6	stlhd
36027	11FEB2010:10:00:00	WHITE	39.5	20MAR10:16:51:35	91	U06	2	U06_2	IN WHITE CR	LT6	stlhd
36027	11FEB2010:10:00:00	WHITE	39.5	04MAY10:21:13:55	150	U06	2	U06_2	IN WHITE CR	FT6	stlhd
36027	11FEB2010:10:00:00	WHITE	39.5	04MAY10:21:25:06	78	U06	2	U06_2	IN WHITE CR	LT6	stlhd
36027	11FEB2010:10:00:00	KLICK	39.3	04MAY10:21:36:07	58	U06	1	U06_1	WHITE CREEK: DN	L6	stlhd
36027	11FEB2010:10:00:00	KLICK	39.3	04MAY10:23:00:00			PIT			PIT	stlhd
36027	11FEB2010:10:00:00	KLICK	31.2	05MAY10:00:20:20	171	U05	3	U05_3	DEAD CANYON: UP	F5	stlhd
36027	11FEB2010:10:00:00	KLICK	30.8	05MAY10:00:23:46	163	U05	1	U05_1	DEAD CANYON: DN	L5	stlhd
36027	11FEB2010:10:00:00	KLICK	20.2	05MAY10:20:13:20	75	U04	3	U04_3	LITTLE KLICK: UP	F4	stlhd
36027	11FEB2010:10:00:00	KLICK	19.8	05MAY10:20:36:03	157	U04	1	U04_1	LITTLE KLICK: DN	L4	stlhd
36027	11FEB2010:10:00:00	KLICK	17.2	05MAY10:23:33:41	64	U03	3	U03_3	WAHKIACUS: UP	F3	stlhd
36027	11FEB2010:10:00:00	KLICK	16.8	05MAY10:23:36:38	191	U03	1	U03_1	WAHKIACUS: DN	L3	stlhd
36027	11FEB2010:10:00:00	KLICK	17	06MAY10:01:18:01	117	U03	0	U03_0	WAHKIACUS	L3	stlhd
36027	11FEB2010:10:00:00	KLICK	2.8	09MAY10:23:05:29	180	U02	5	U02_5	LYLE FALLS: UP	F2	stlhd
36027	11FEB2010:10:00:00	KLICK	2.5	09MAY10:23:09:16	72	U02	0	U02_0	LYLE FALLS	L2	stlhd
36027	11FEB2010:10:00:00	KLICK	0.2	10MAY10:02:20:25	135	U01	2	U01_2	LYLE: UP	F1	stlhd
36027	11FEB2010:10:00:00	KLICK	0	10MAY10:02:22:03	184	U01	1	U01_1	LYLE: DN	L1	stlhd
36027	11FEB2010:10:00:00	COLUMBIA	0	11MAY10:03:36:00			PIT			PIT	stlhd
36027	11FEB2010:10:00:00	COLUMBIA	11	MAY10:23:00:00			PIT			PIT	stlhd

# Spawning migration of fish #36027 (wild, winter Steelhead)



# Spawning migration of fish #56136 (hatchery, summer Steelhead)

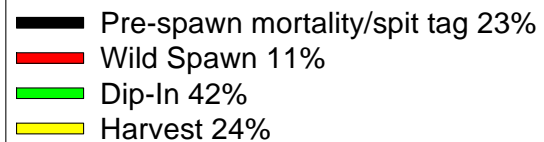
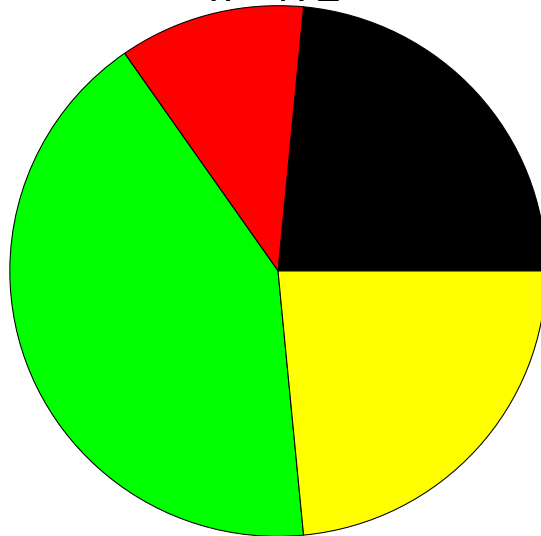


# Steelhead Final Fates by %

\*For relative comparison only; fates other than pre-spawn mortality/spit tag are likely higher than represented

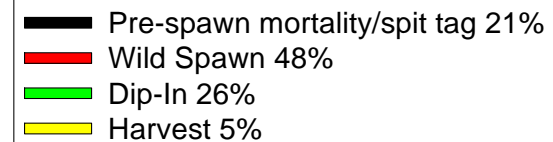
Hatchery Steelhead

n= 172



Wild Steelhead

n= 311



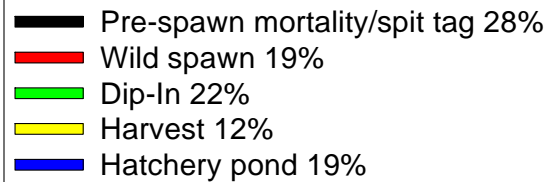
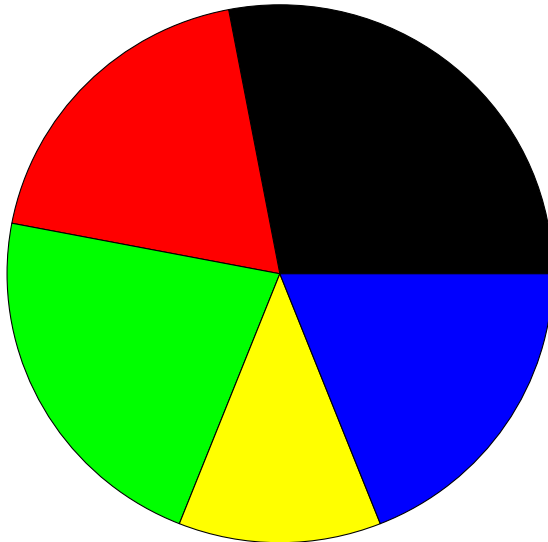


# Spring Chinook Final Fates by %

\*For relative comparison only; fates other than pre-spawn mortality/spit tag are likely higher than represented

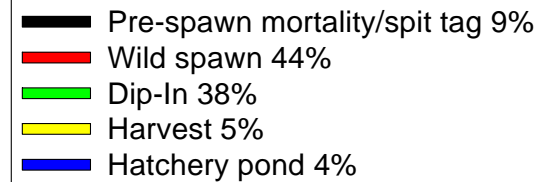
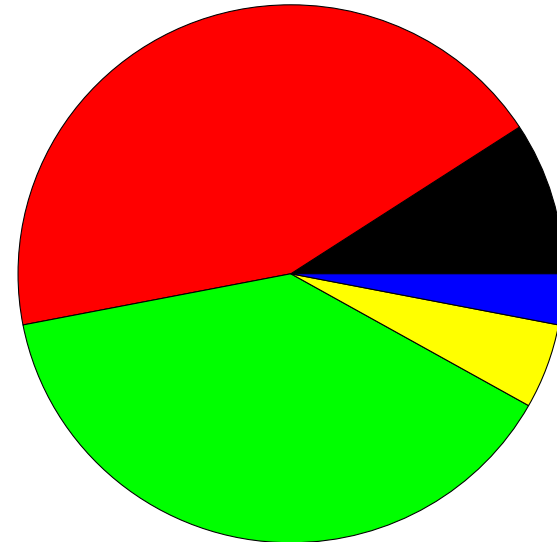
## Hatchery Spring Chinook

n= 140

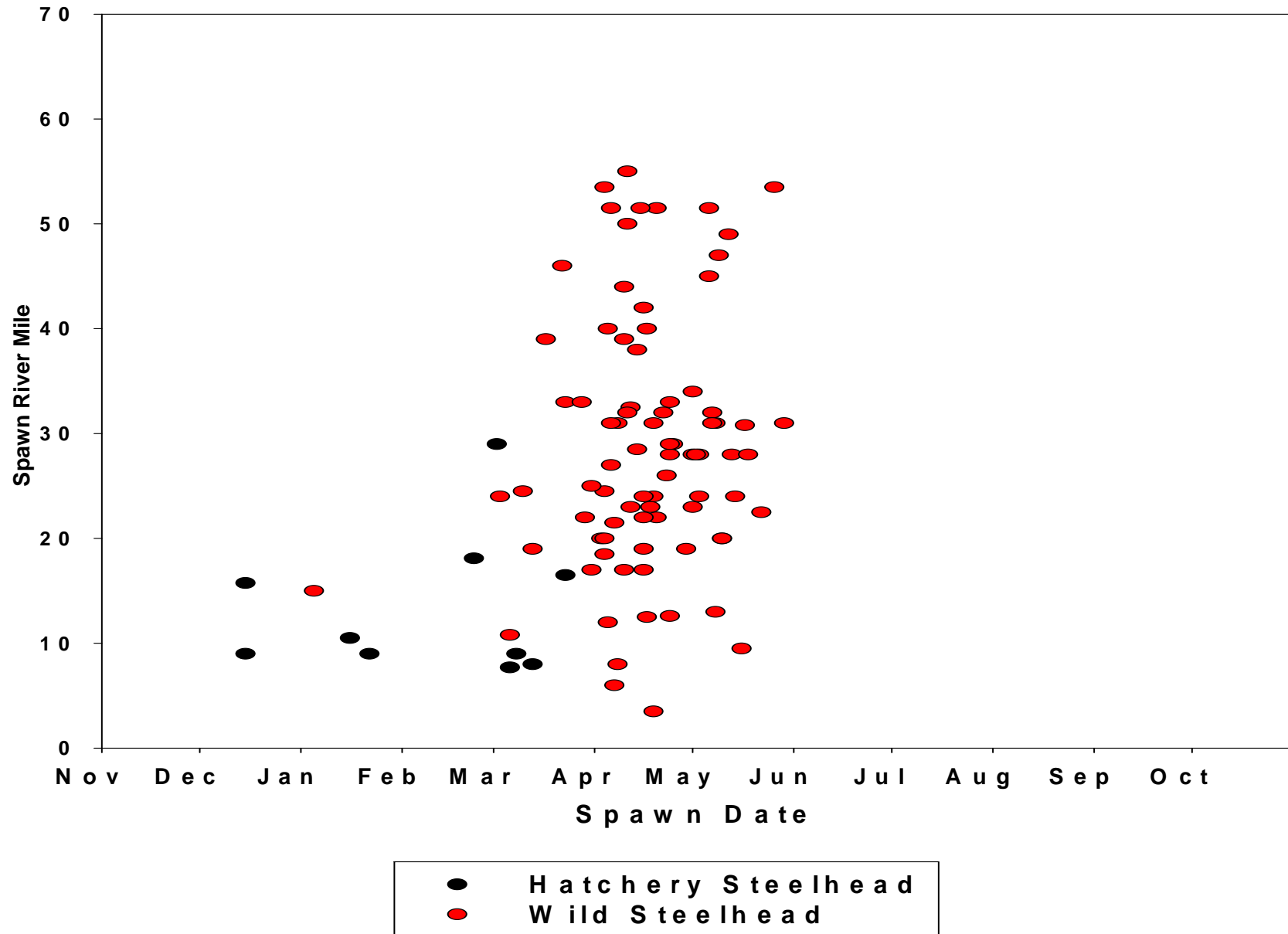


## Wild Spring Chinook

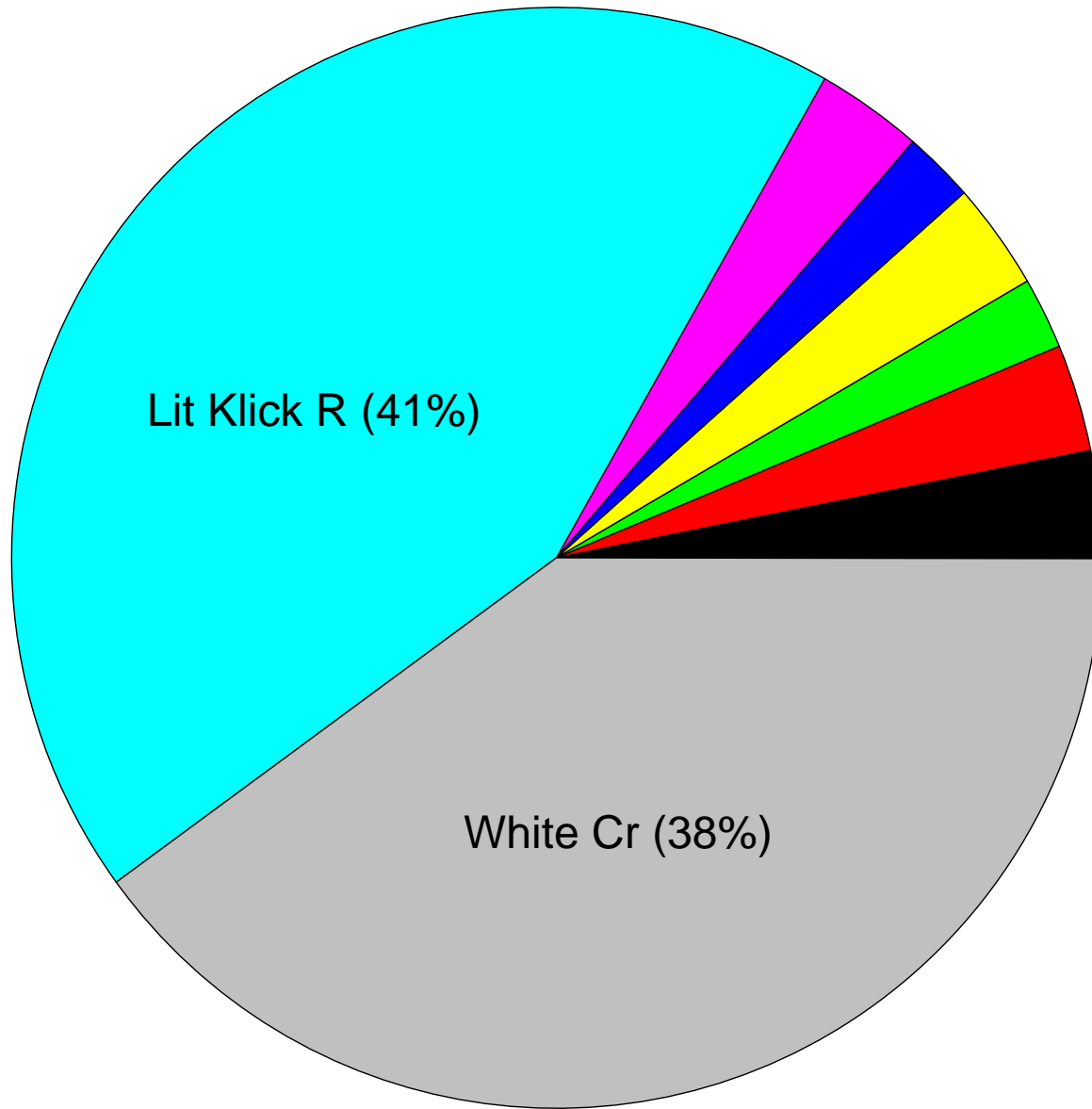
n= 86



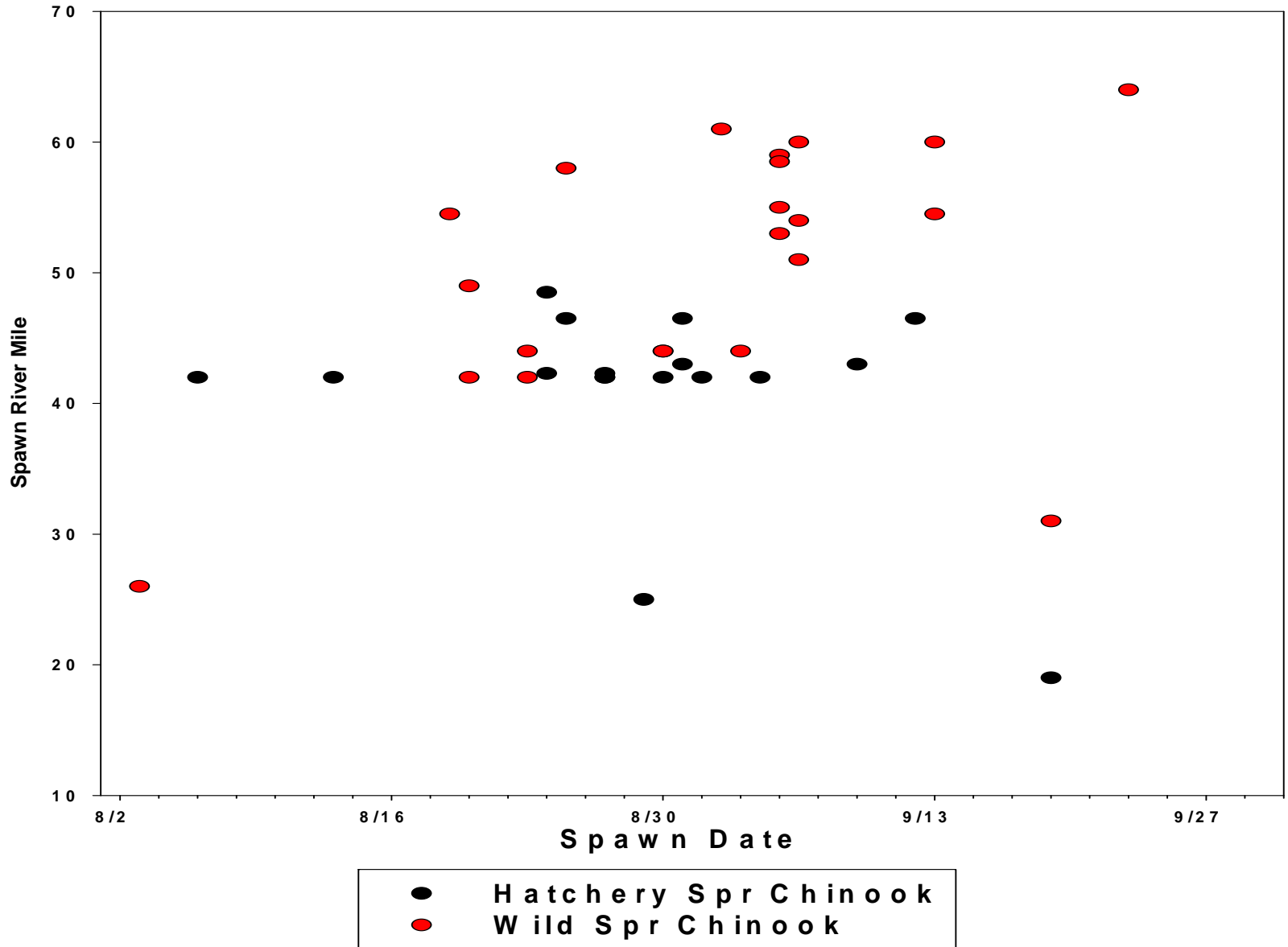
# Steelhead mainstem spawn locations and timing



# Steelhead tributary spawning by % (n= 61)



# Spring Chinook mainstem spawn locations and timing



# Results and Conclusions

- “Higher than anticipated” Dip-In rates for all species
  - Some tagging effects (especially wild Chinook....)
- No indications of passage obstruction
  - Klickitat hatchery weir
  - Lyle Falls
- Spawning locations (time and space)
  - “Greater than expected” spawning (Steelhead) in Little Klickitat River
  - Relatively little spawning “in the wild” by hatchery Steelhead
  - Hatchery Steelhead spawn earlier *and* lower in the basin than wild Steelhead (good separation between Wild/Ad-clipped spawners)
  - Potential overlap, in time *and* space, of wild and hatchery Chinook (little separation between Wild/Ad-clipped spawners)

# Acknowledgements

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