Spatial and temporal interactions between hatchery and wild spring Chinook salmon spawning and effects of hatchery acclimation sites

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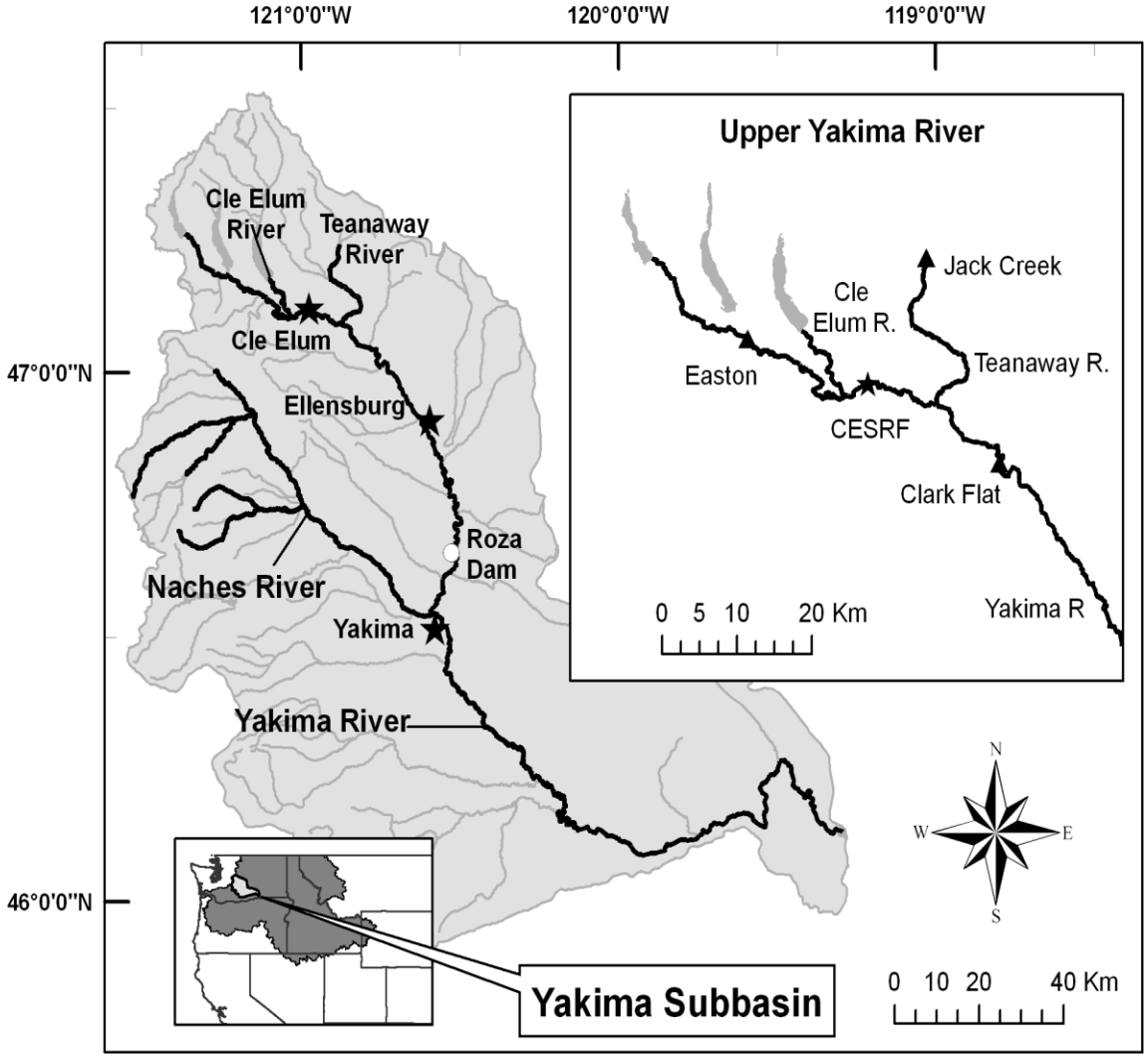
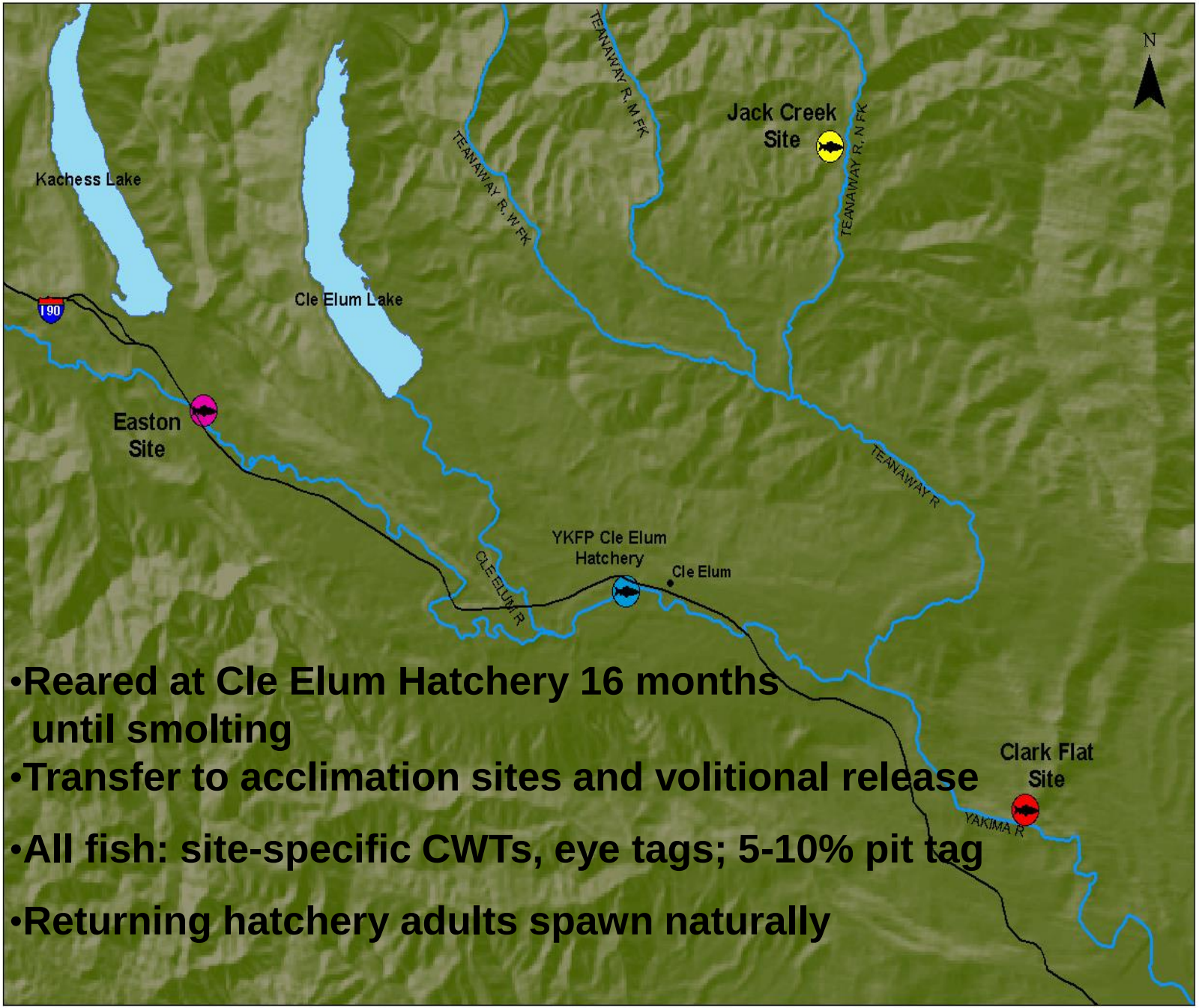
Outline

- Yakima-Klickitat Fisheries Program - Spring Chinook
- Distribution of hatchery and wild fish
- Overlap of hatchery and wild fish
- Effects of acclimation/release location
- Temporal overlap of hatchery and wild fish

Yakima River Spring Chinook Salmon Supplementation Program



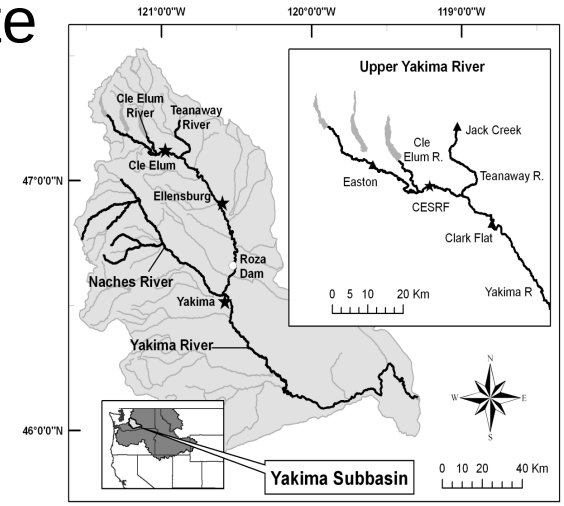
YKFP Spring chinook supplementation research program

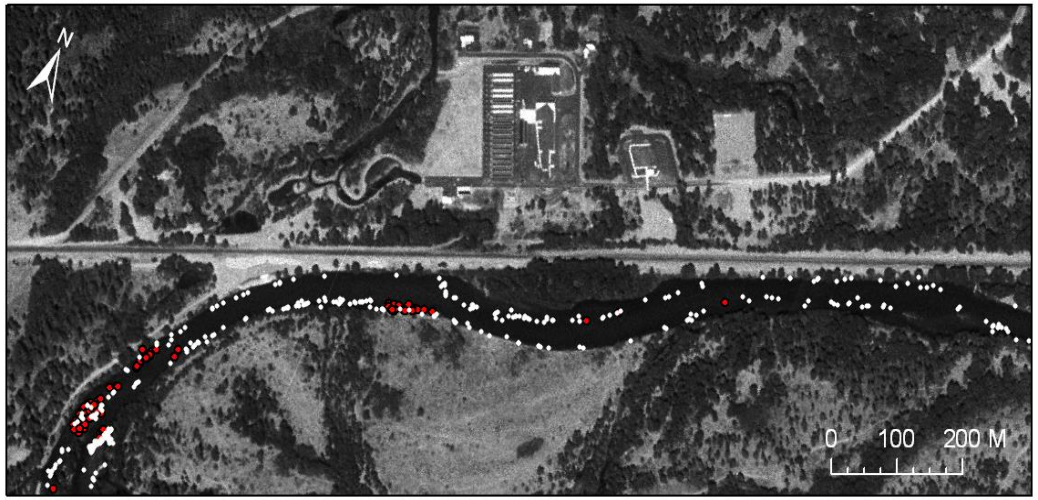


- Reared at Cle Elum Hatchery 16 months until smolting
- Transfer to acclimation sites and volitional release
- All fish: site-specific CWTs, eye tags; 5-10% pit tag
- Returning hatchery adults spawn naturally

Comprehensive carcass and redd surveys of upper Yakima Basin (2002-2009)

-GPS location (3 m accuracy); date
-hatchery/wild
-male/female; jack, precocious
-length, scale, dna, otolith
-tag location, recovery
-egg retention; disease





Outline

- Yakima-Klickitat Fisheries Program - Spring Chinook
- **Distribution of hatchery and wild fish (2009)**
- Overlap of hatchery and wild fish
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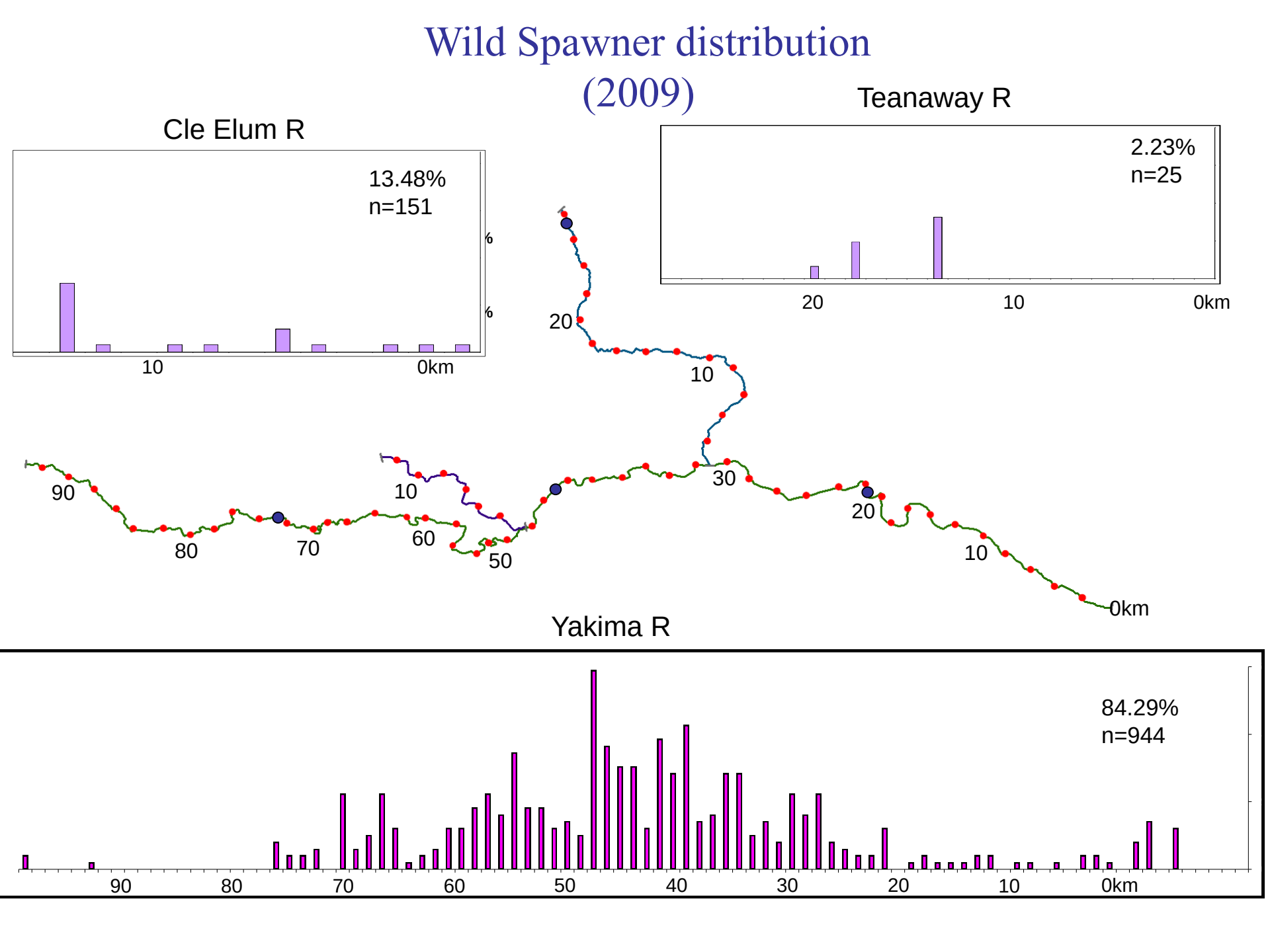
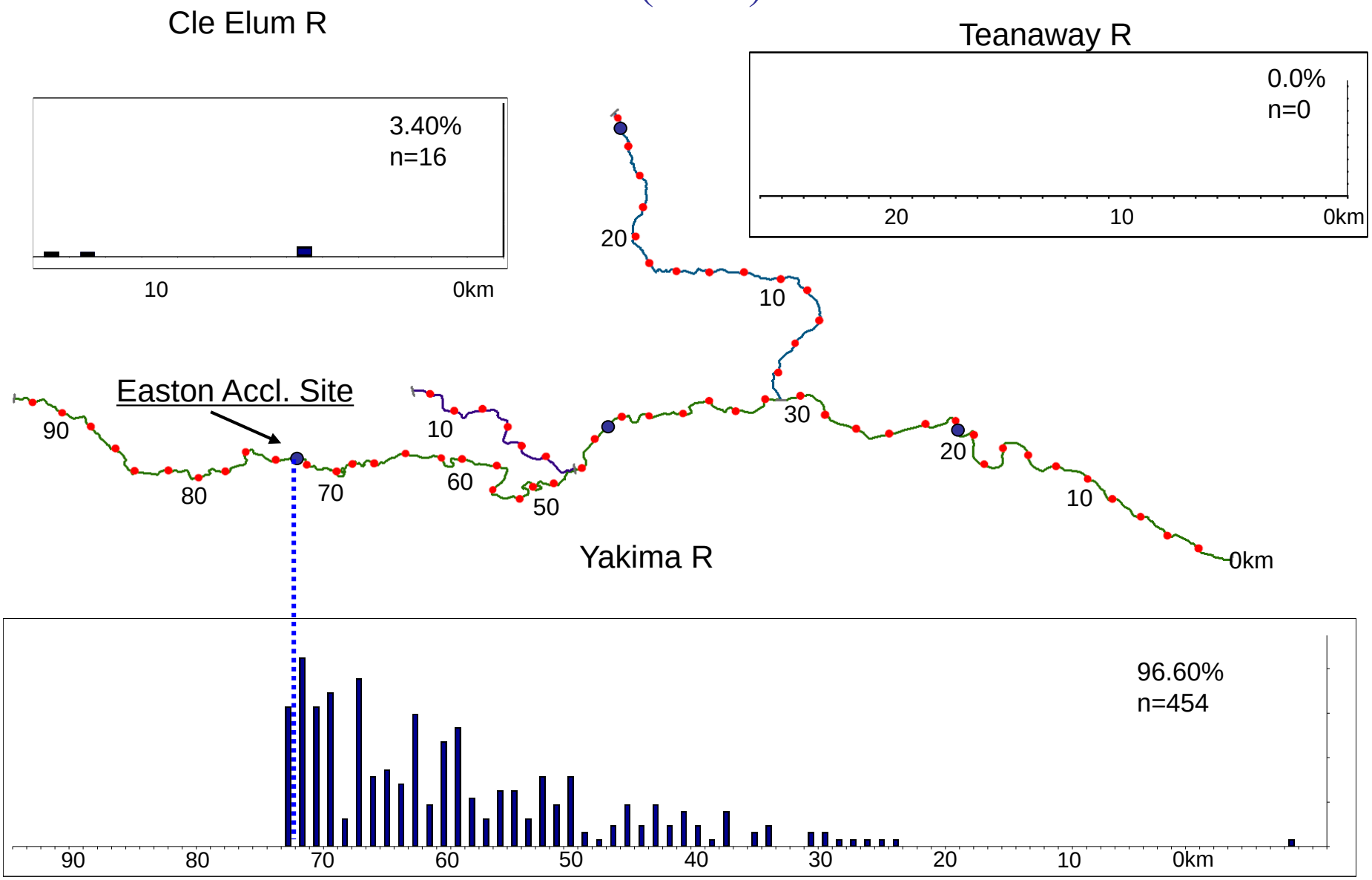
Summary data

	Year							
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total Run	8091	3258	10187	5717	3235	2295	4651	**7672**
Wild*	395	162	1982	1348	492	259	307	**835**
Easton	404	96	177	52	139	130	318	**470**
Clark Flat	608	192	397	47	135	116	262	**314**
Jack Creek	324	138	298	187	188	117	237	**413**
Total Sampled	1731	588	2854	1634	954	622	1320	**2317**
(% run)	(21.4)	(18.1)	(28.0)	(28.6)	(29.5)	(27.1)	(28.4)	**(30.2)**

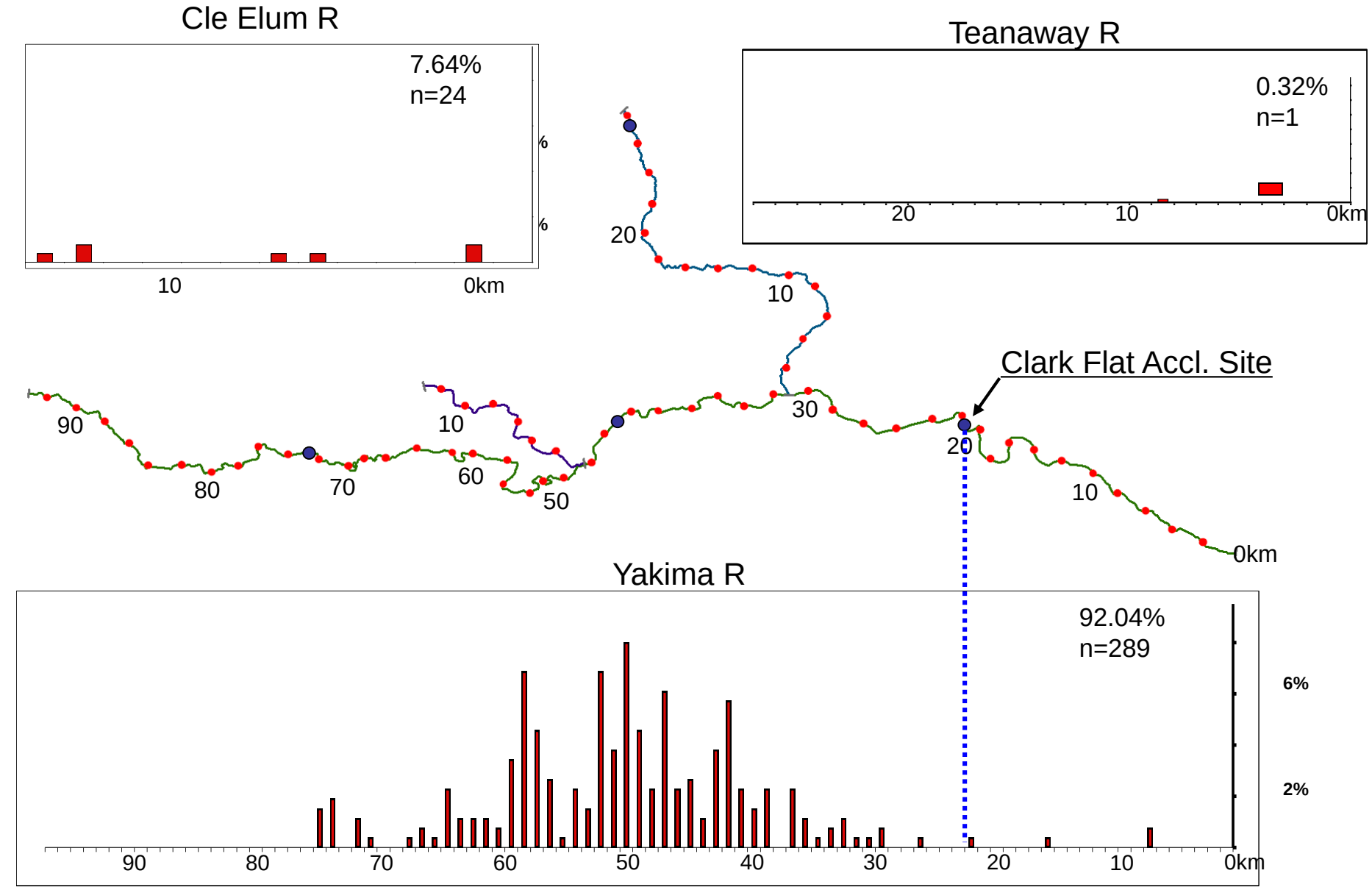
Wild Spawner distribution (2009)



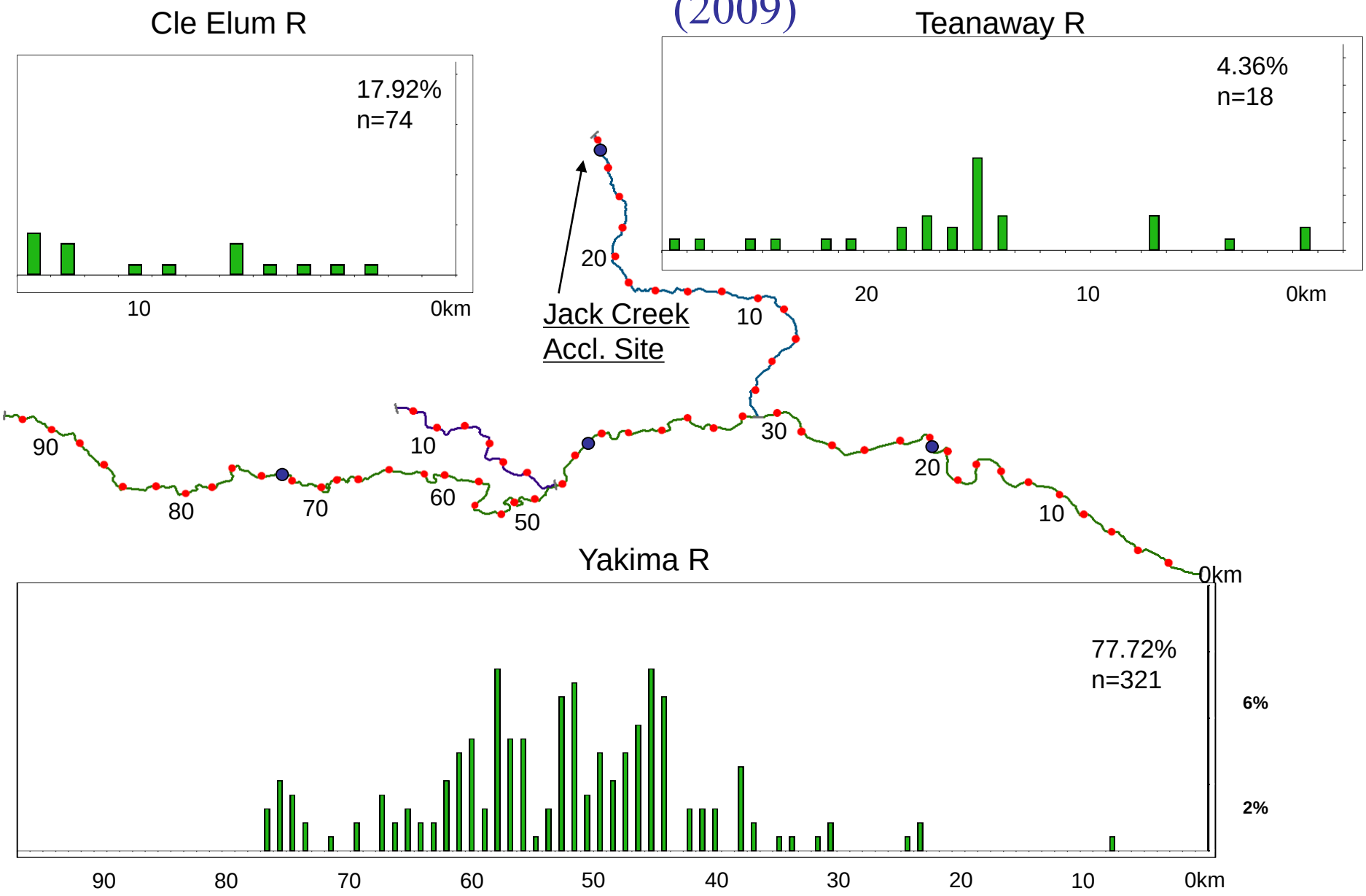
Easton Spawner distribution (2009)



Clark Flat Spawner distribution (2009)



Jack Creek Spawner distribution (2009)



2009

-Patterns of homing and spawning site selection remained remarkably consistent with previous years

-In general, all salmon spawned higher in the mainstem Yakima R.

-Percentage of fish spawning in the Cle Elum R. increased (especially JC fish)

-More wild than hatchery fish in Teanaway for first time

-Large percentage of large jacks

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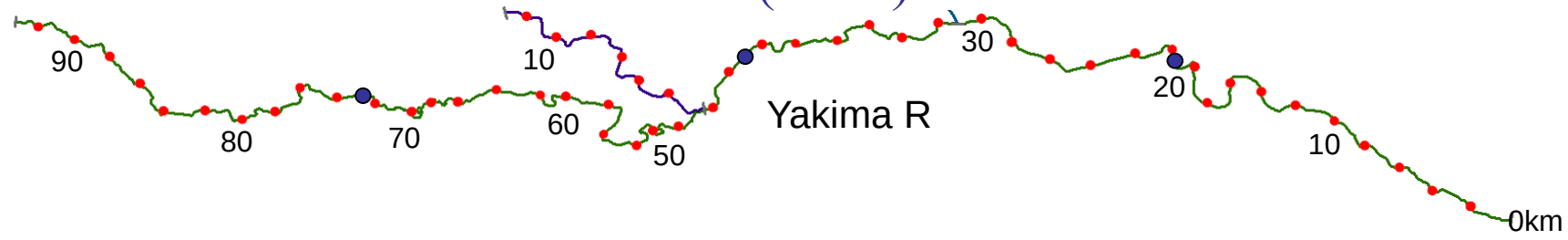
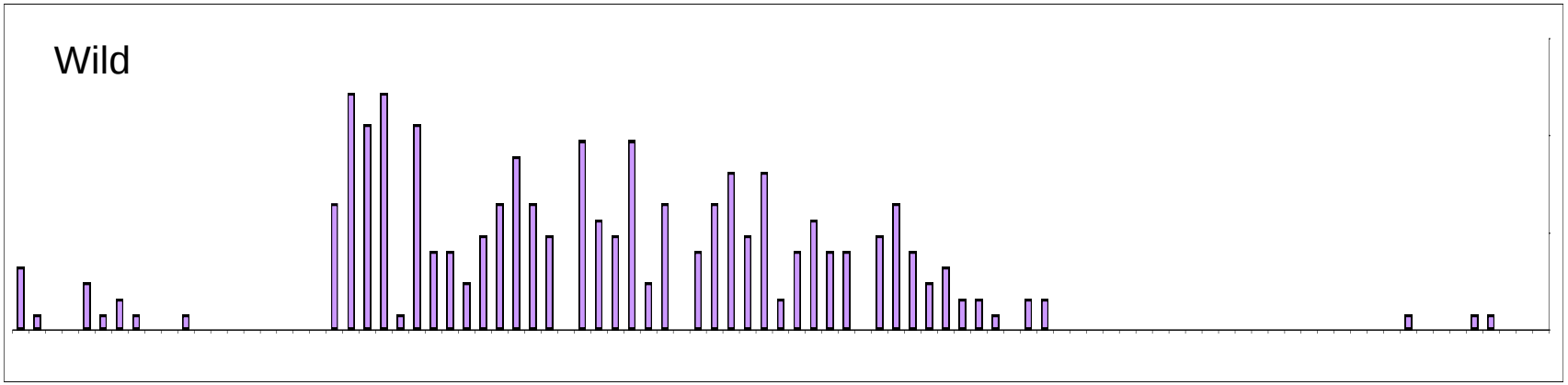
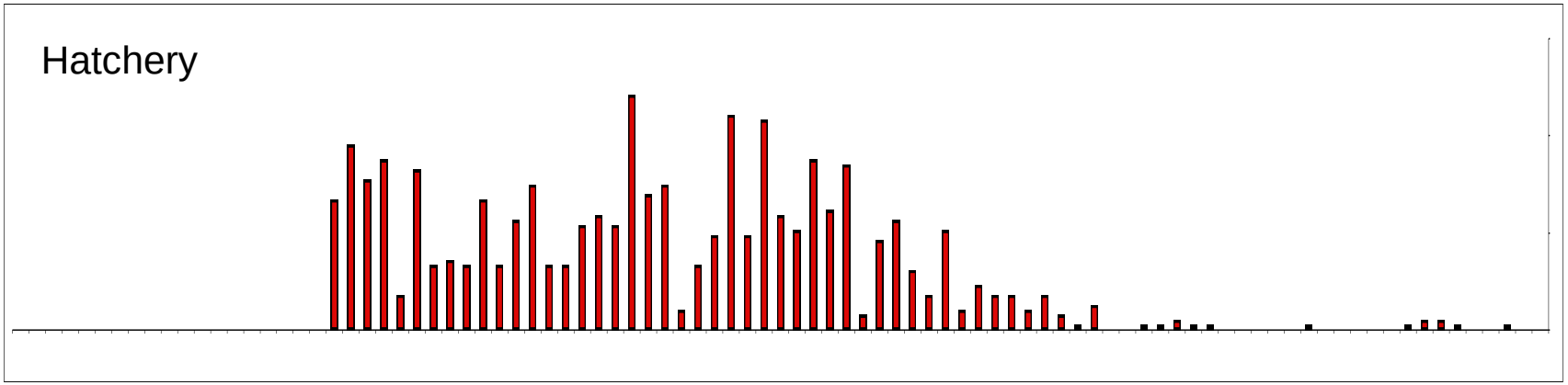
Hatchery vs. Wild Spatial Distribution (2009)

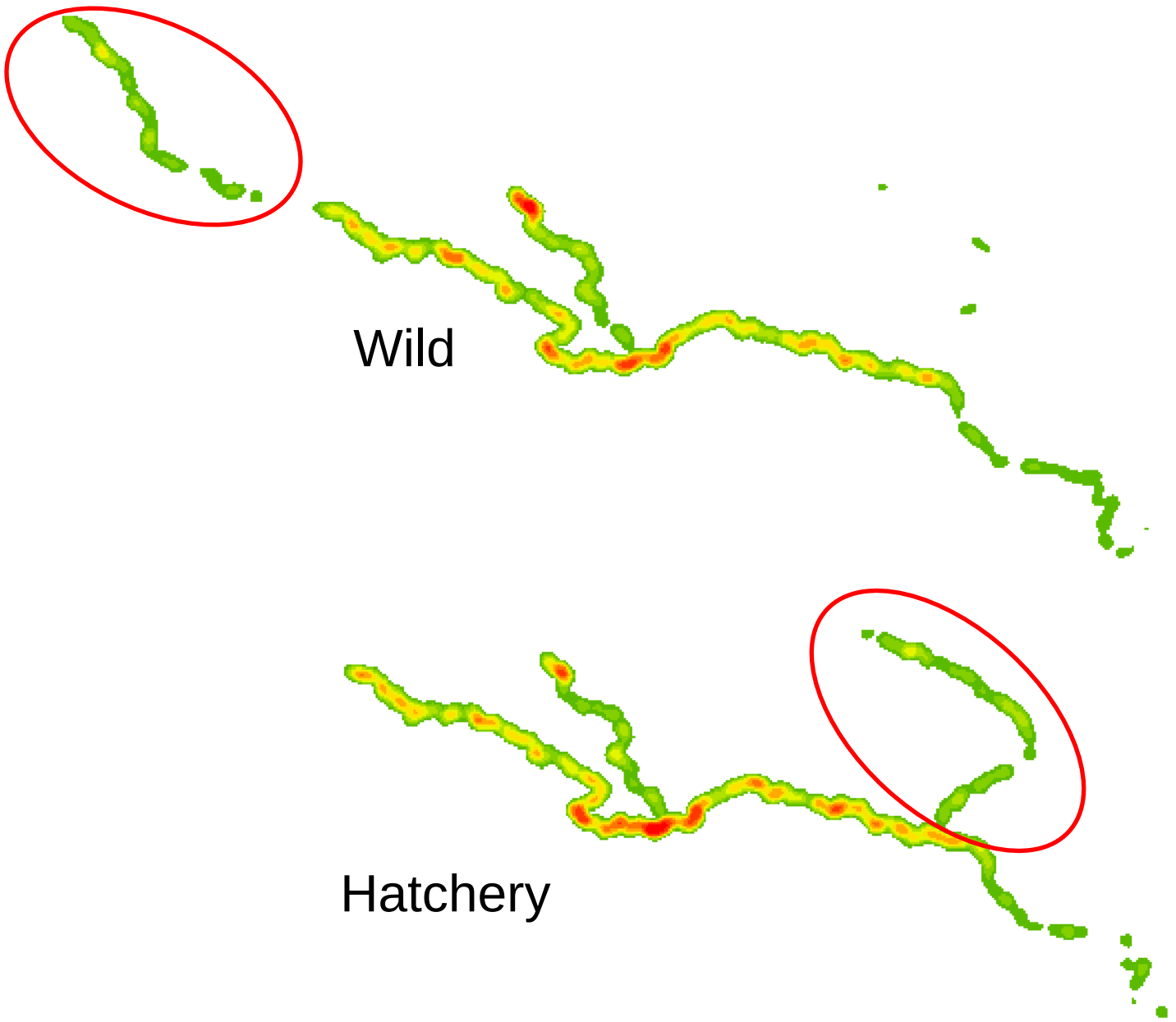






90 80 70 60 50 40 30 20 10 0km

Spatial overlap of hatchery and wild salmon



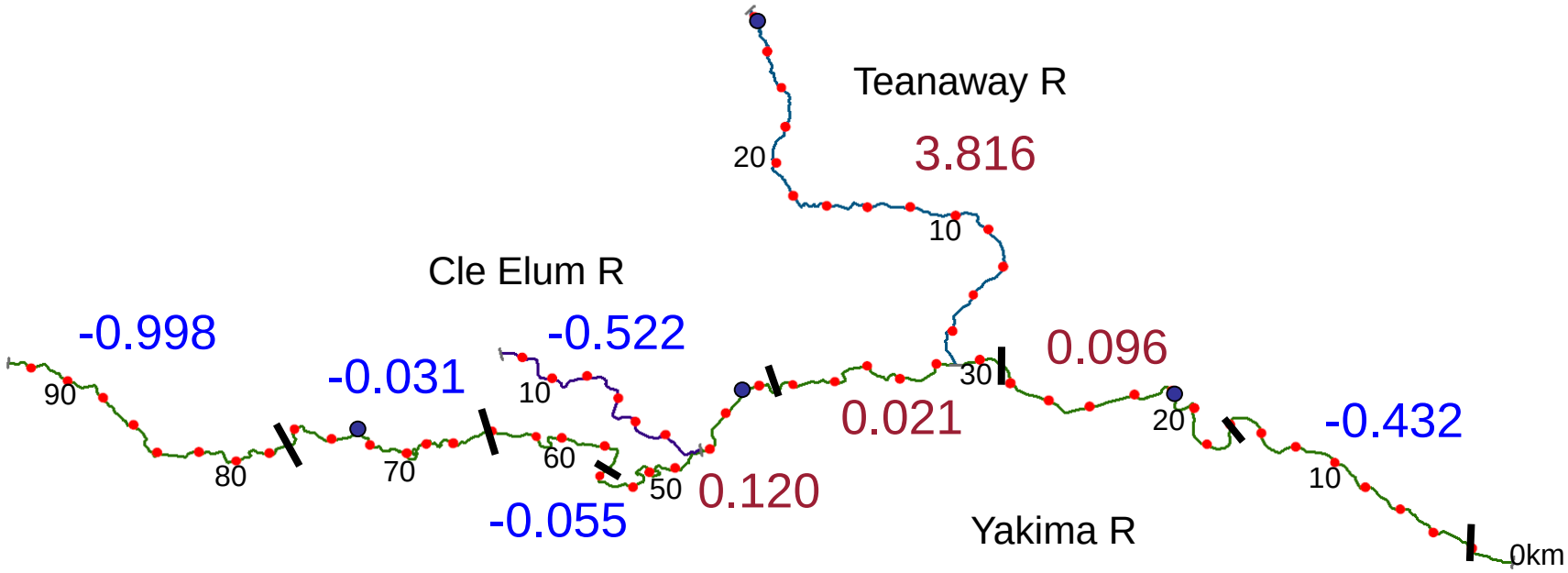
Spatial Index of hatchery/wild interaction

$SI = ((SH_{reach}/SN_{reach})/(SH_{total}/SN_{total})) - 1$

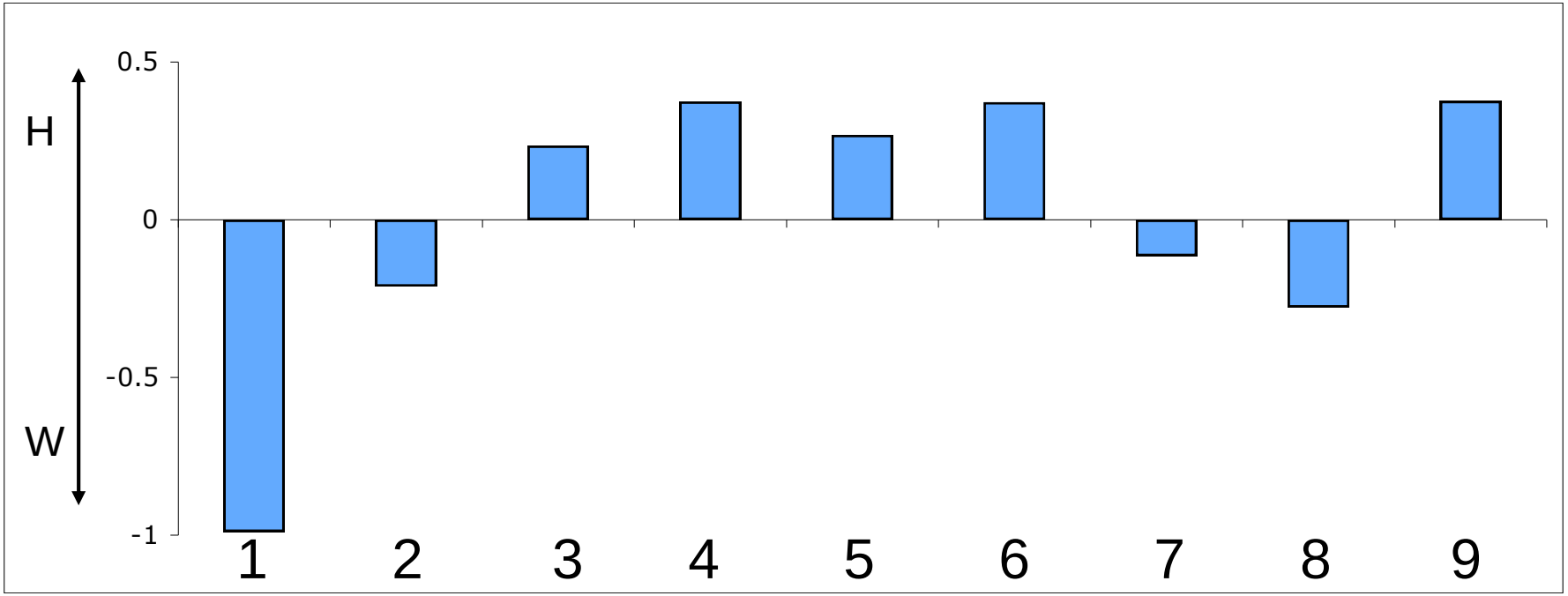
SI = 0 Complete integration

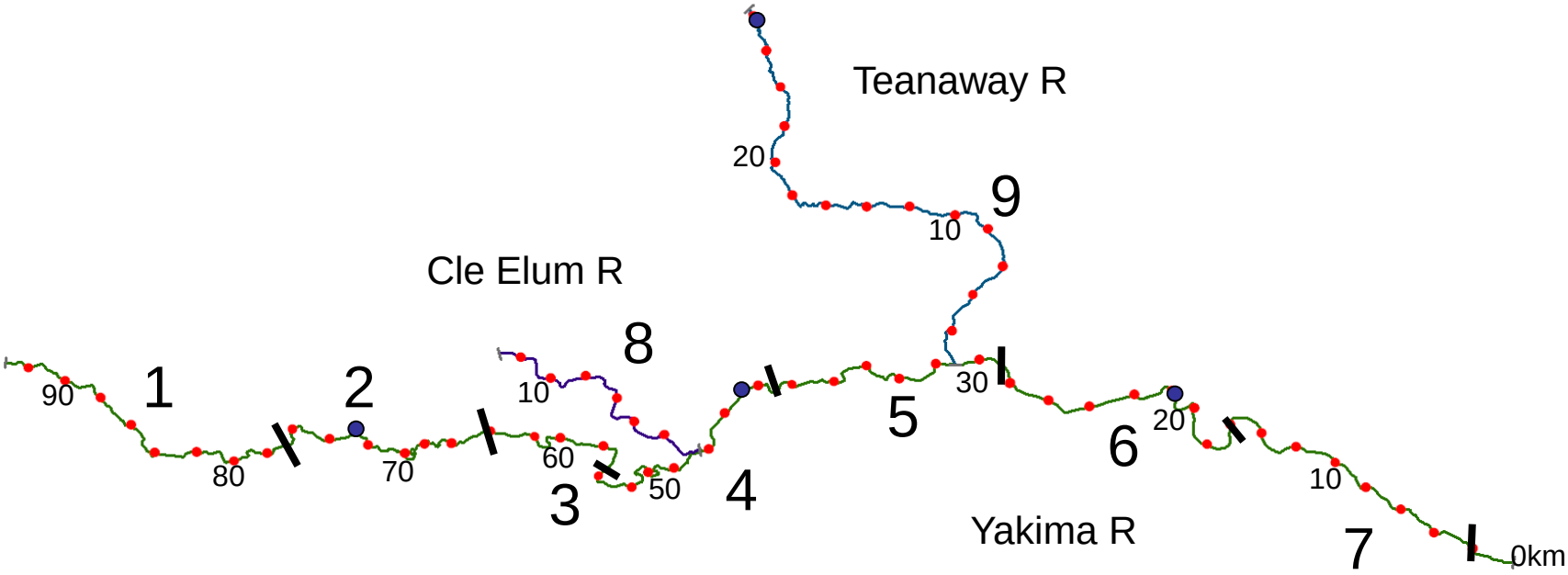
SI > 0 greater than expected hatchery influence

SI <0 less than expected hatchery influence



Current Release Program





What role does acclimation/release site play in regulating hatchery/wild interactions?

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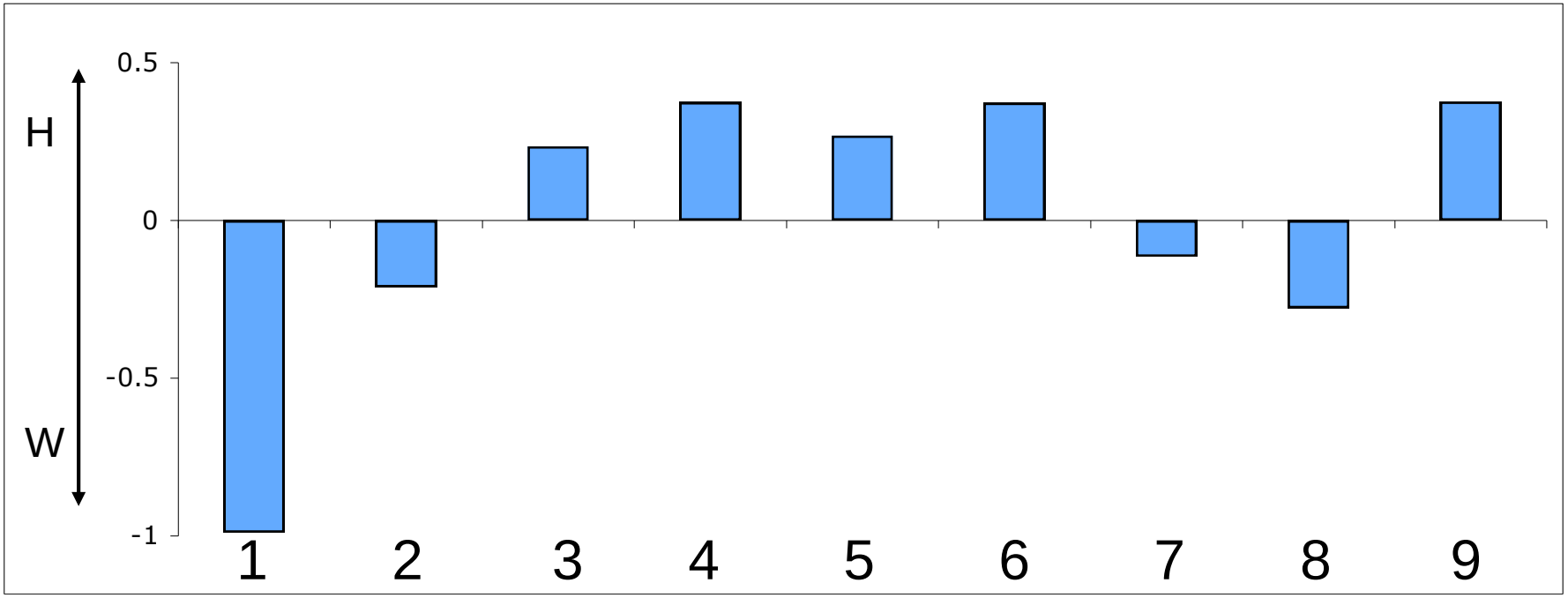
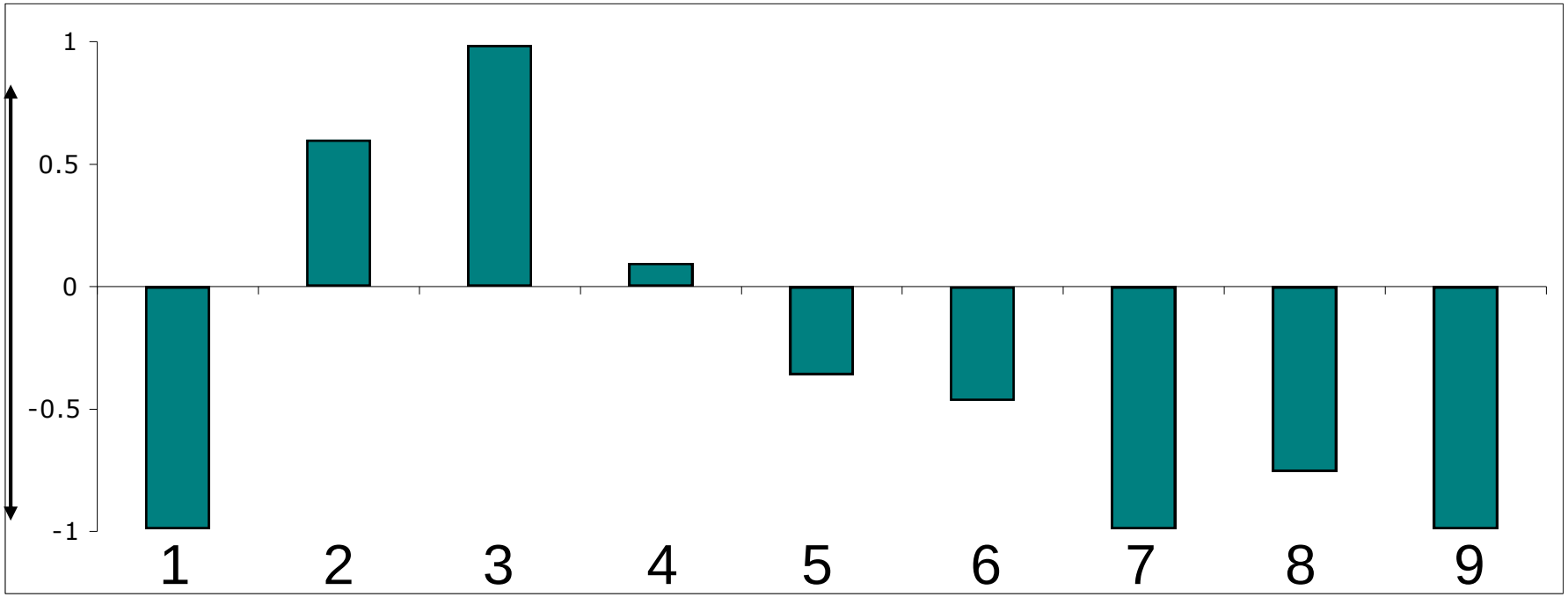
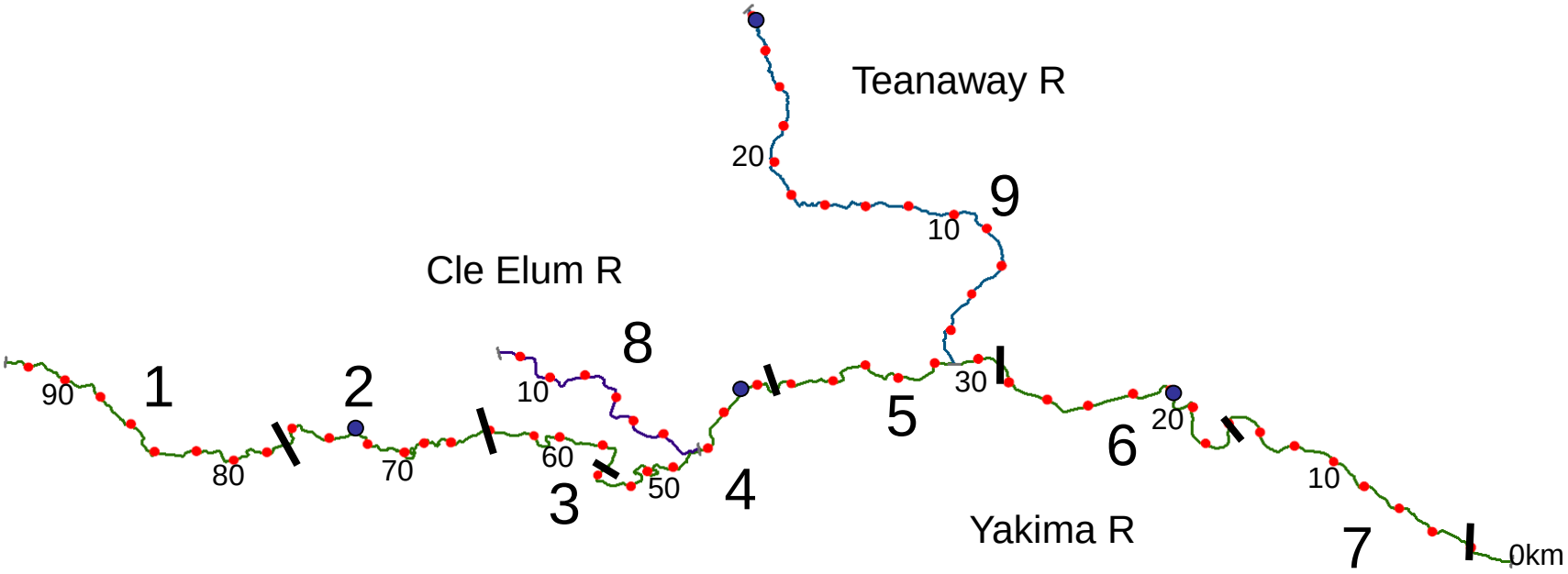
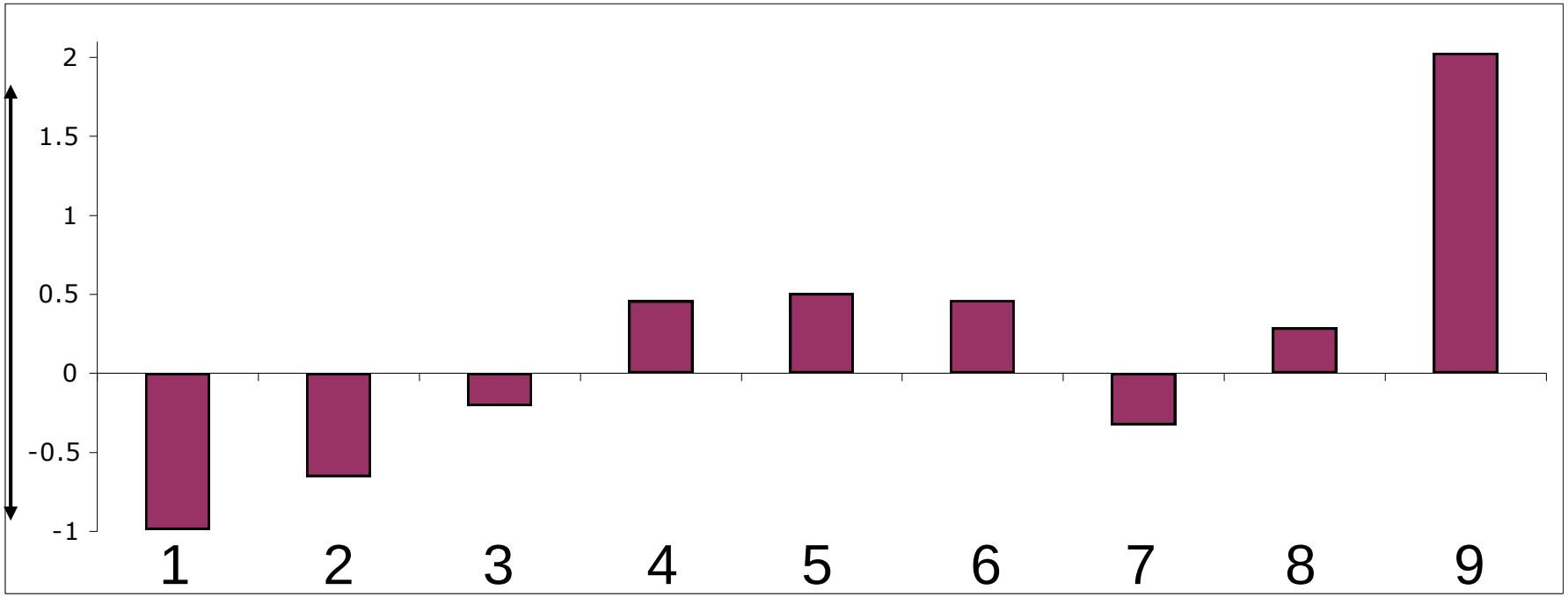


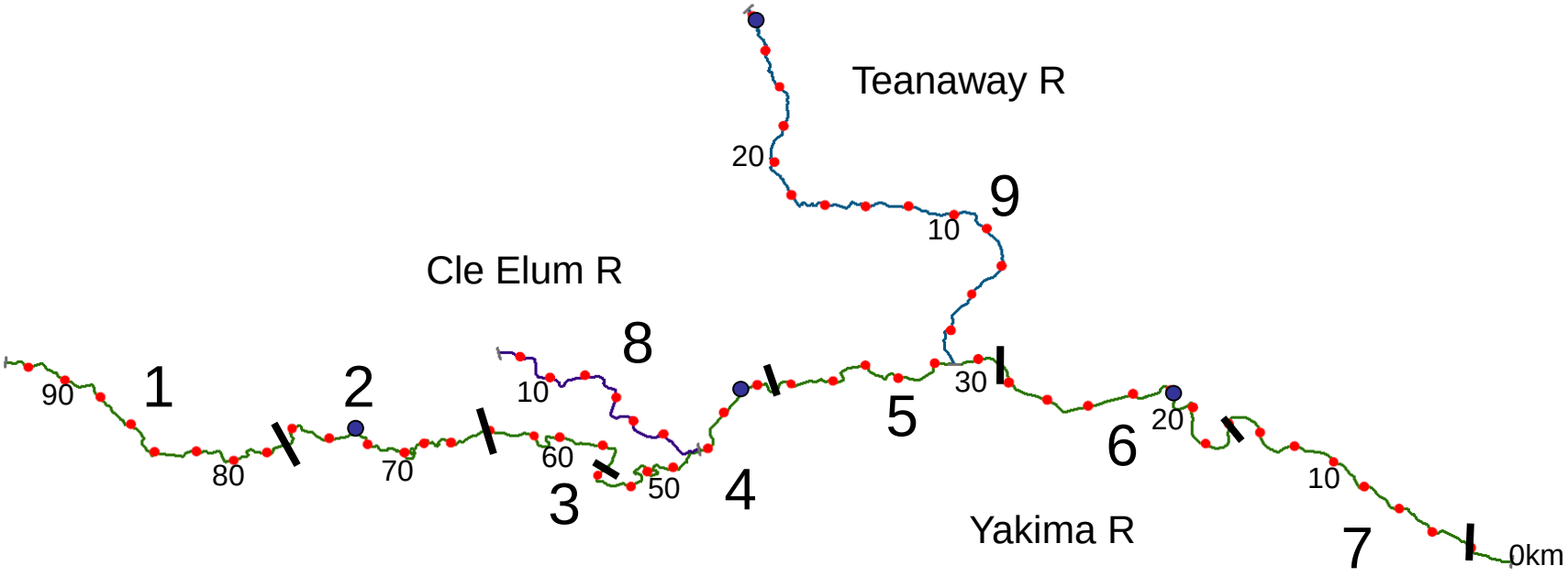
All Easton Release



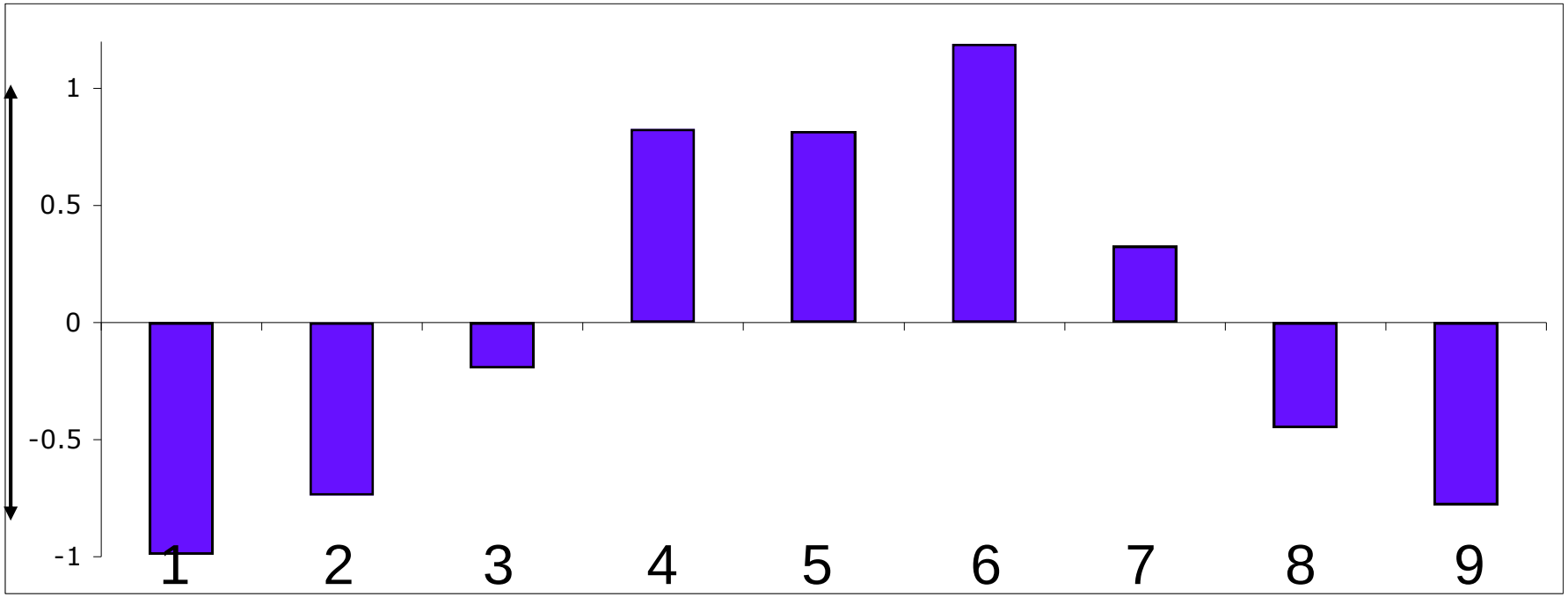


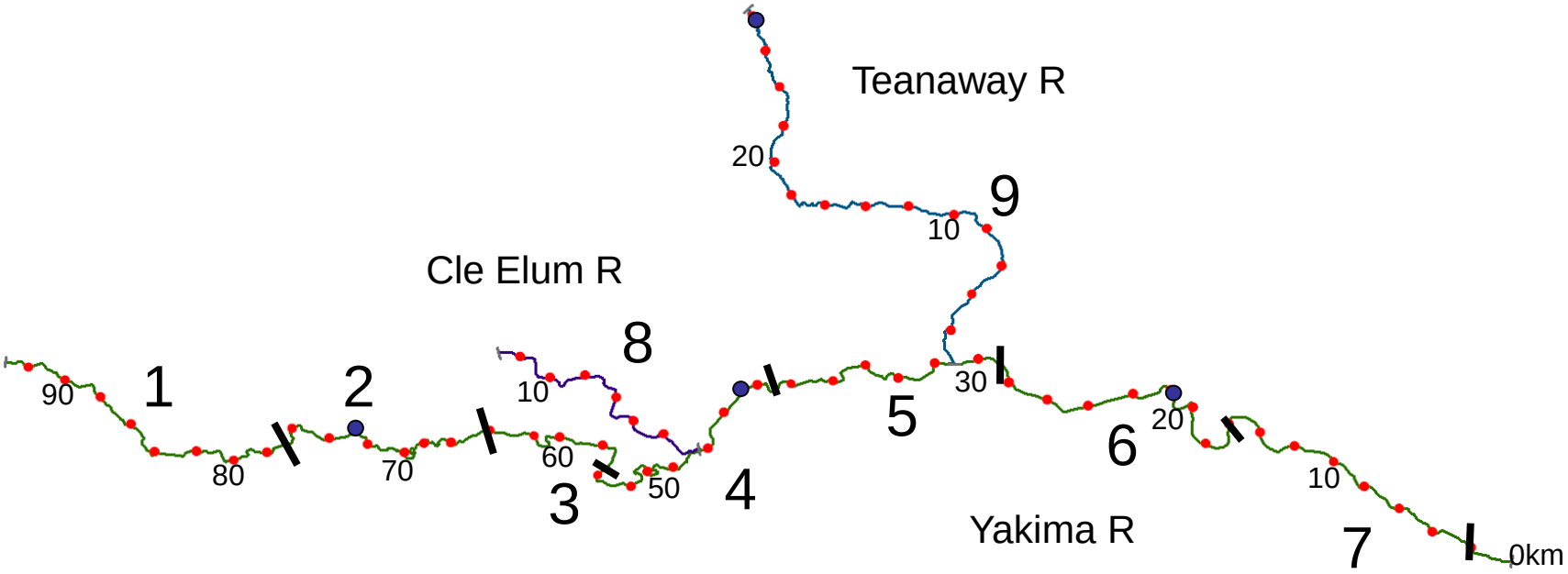
All Jack Creek Release





All Clark Flat Release





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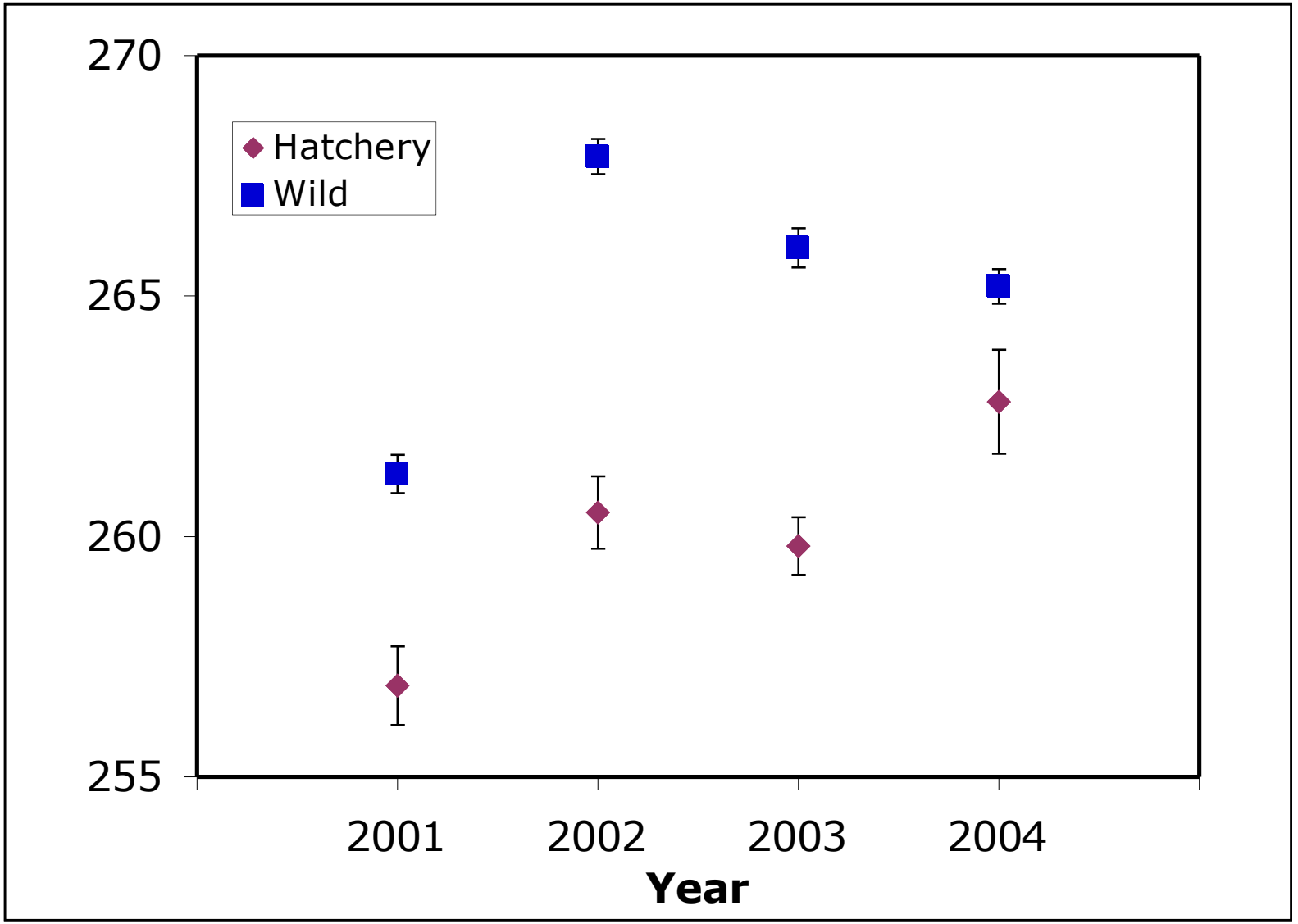
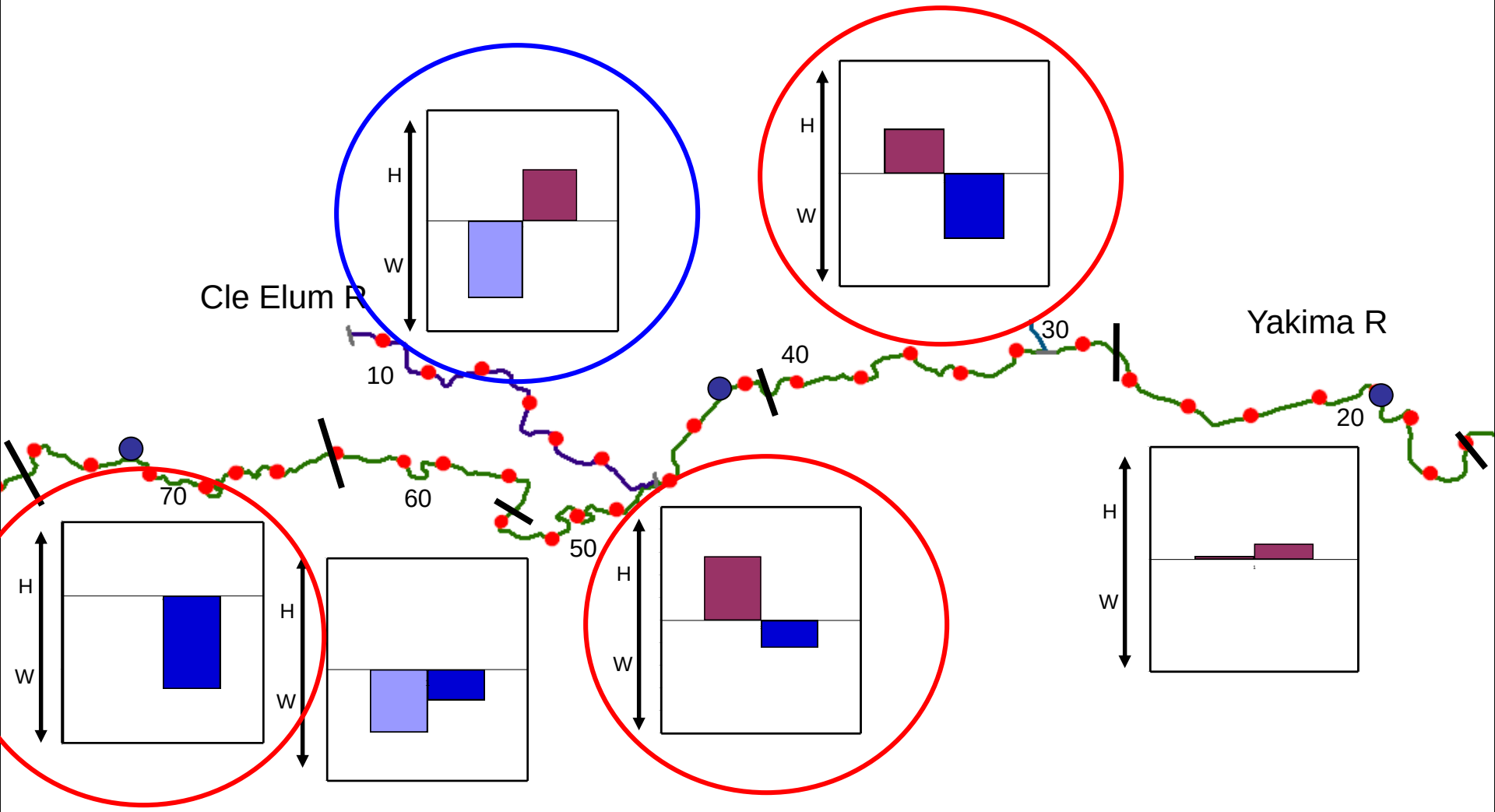
Temporal effects on Hatchery/Wild Interactions



Data from Knudsen et al. 2006. TAFS. 135:1130-1144

Temporal effects on Hatchery/Wild Interactions



Conclusions

•Distribution of spawners involves tradeoffs between homing and habitat selection. Release location influences but doesn't control spawning site.

•Potential interactions between hatchery and wild adults vary considerably within a watershed and may have implications for reproductive success.

•Phenotypic differences between hatchery and wild fish (spawn timing, size) may contribute to degree of overlap and interaction.

•Acclimation (release location/developmental stage) can be used as tool for reintroduction and to manage hatchery/wild interactions. Imprinting to target waters/artificial odors may further facilitate and fine-tune management of spawning site selection.