



Natural Origin Broodstock Collection by Hook & Line to Meet PNI Targets for Large Production Facilities



Presented by Paul Hoffarth
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Project funded by



HSRG Hatchery Review

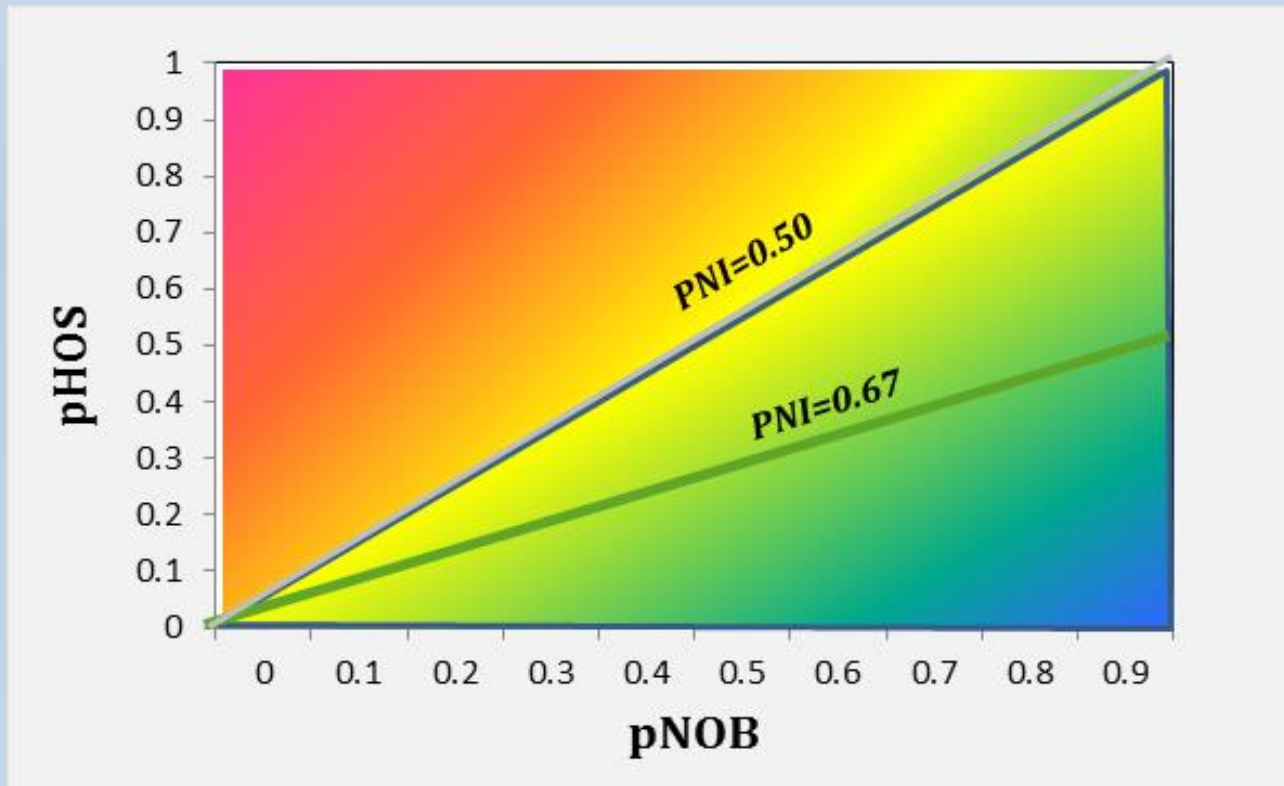
In 2005, Congress directed NOAA Fisheries to conduct a review of hatchery programs in the Columbia River Basin. The Hatchery Scientific Review Group reached several conclusions regarding areas where current hatchery and harvest practices need to be reformed.

Managers should:

- **Manage hatchery broodstocks to achieve proper genetic integration with, or segregation from, natural populations;**
- Promote local adaptation of natural and hatchery populations;
- Minimize adverse ecological interactions between hatchery- and natural-origin fish;
- Minimize effects of hatchery facilities on the ecosystem in which they operate.

Proportion Natural Influence (PNI)

$$\text{PNI} = \frac{\text{pNOB}}{\text{pNOB} + \text{pHOS}}$$



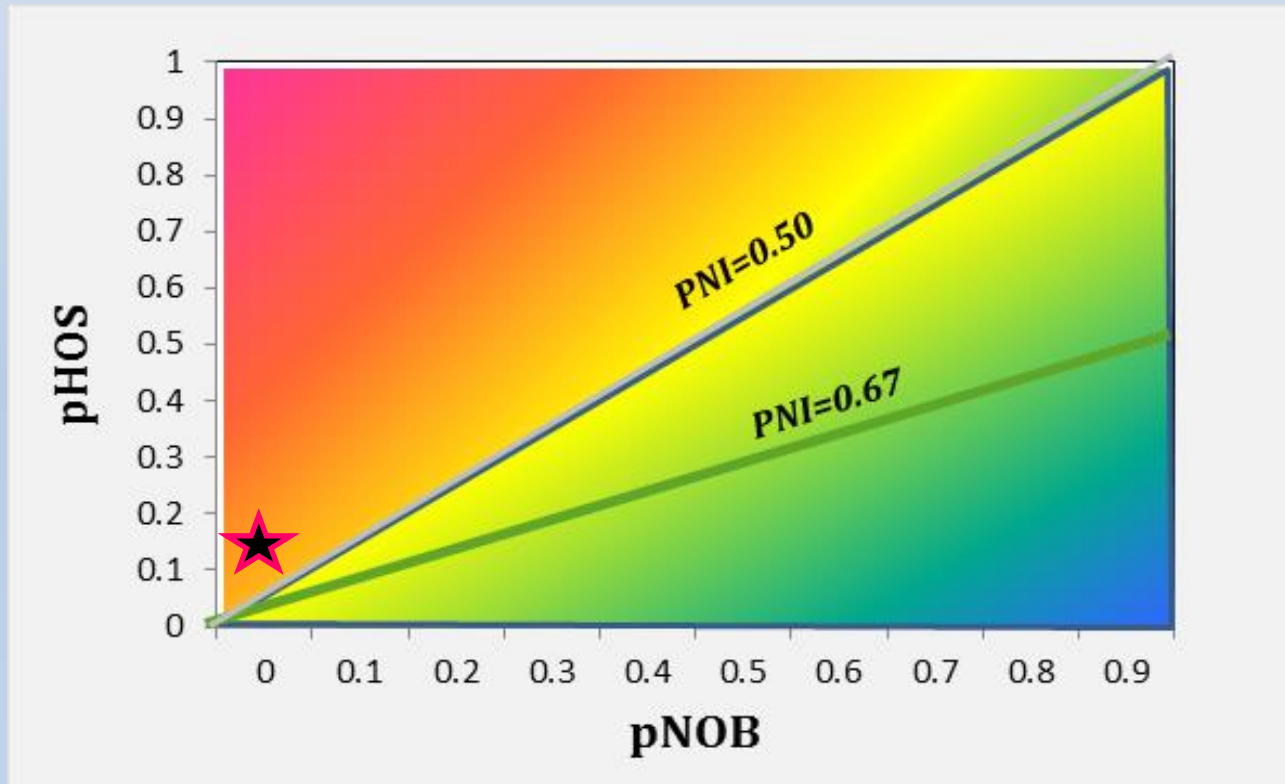
pNOB - proportion of natural origin fish in the hatchery broodstock

pHOS - proportion of the hatchery origin fish spawning in the wild

pNOB < 5% (0.05) for PRH

pHOS ~ 15% (0.15)

$$\text{PNI} = \frac{0.05}{0.05 + 0.15} = 0.25$$



PNI = where pHOS = 0.15, pNOB ≥ 0.30

$$0.30 \div (0.15 + 0.30) = 0.67$$



Facility	Priest Rapids Hatchery			Ringold Springs	Combined	PNI
Mitigation	GCPUD	USACE	Combined			
Production	5,600,000	1,700,000	7,300,000	3,500,000	10,800,000	
Egg Take	6,222,222	1,888,889	8,111,111	3,777,778	11,888,889	
Broodstock	2,333		3,042		4,458	
NO Broodstock	700		913		1,338	0.67





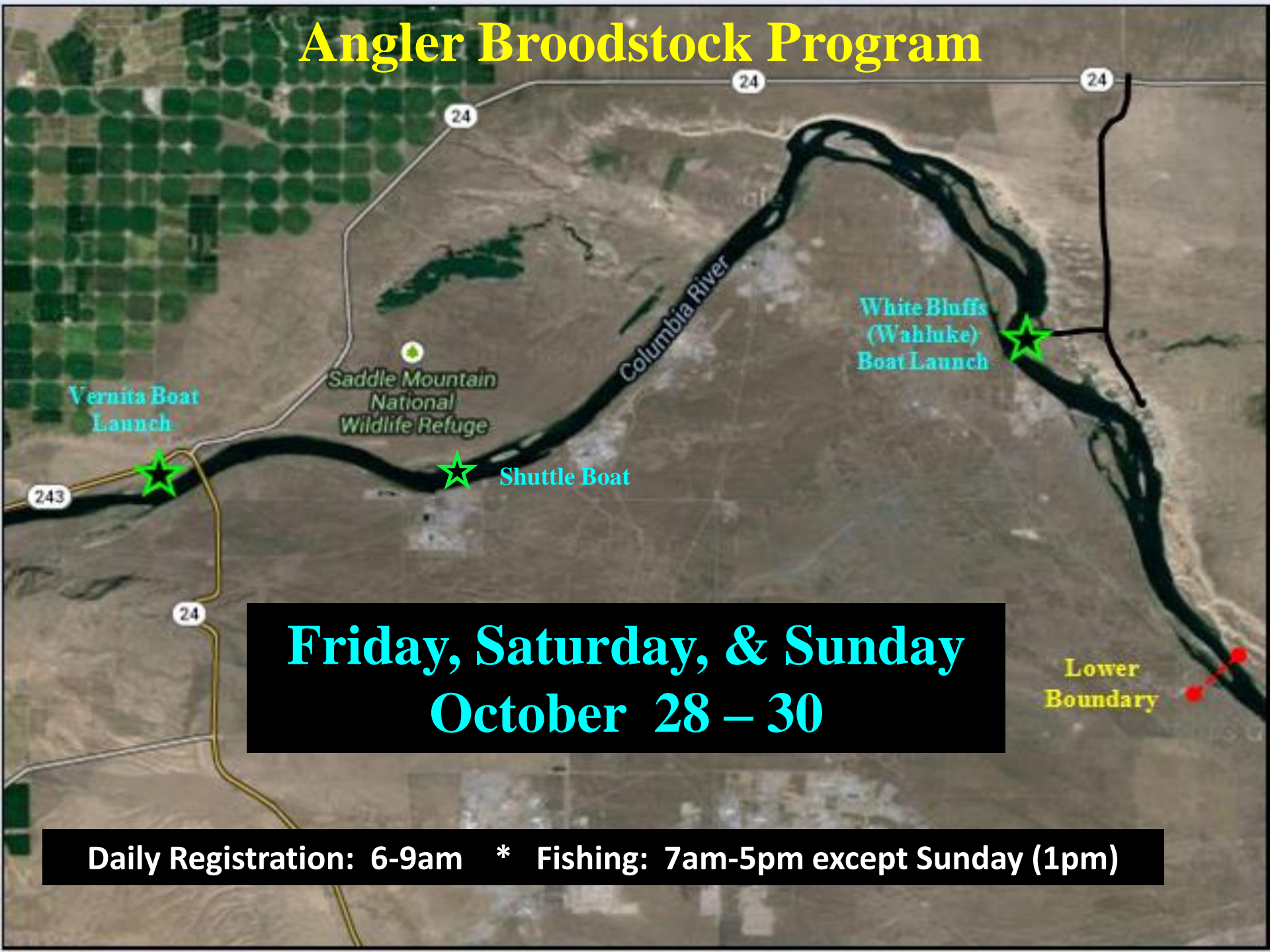
Hanford Reach Angler Broodstock Collection Project

“King of the Reach”

This project was started in 2012 as a three-year pilot project to determine if natural origin broodstock could be effectively collected by anglers. The six primary objectives of the project are:

1. Determine if hook and line could be used to collect adult fall Chinook salmon without incurring significant mortality from capture to transport (hooking mortality).
2. Determine if adult fall Chinook could be captured by hook & line, held for several hours at the collection sites, and transported to the holding facilities at Priest Rapids Hatchery without significant mortality (transport mortality).
3. Determine if the Angler Broodstock fish would survive until spawned at the hatchery (delayed holding mortality).
4. Determine if fall Chinook collected by hook & line in the Hanford Reach in late October were primarily natural origin fall Chinook.
5. Collect sufficient numbers to increase pNOB for egg takes for Priest Rapids Hatchery.
6. Obtain sufficient angler participation to meet natural origin broodstock collection needs

Angler Broodstock Program



**Friday, Saturday, & Sunday
October 28 – 30**

Daily Registration: 6-9am * Fishing: 7am-5pm except Sunday (1pm)



Coordinated by:



King of the Reach Capture Fishing Derby



















Hanford Reach Angler Broodstock Program (2012-2016)

Year	Boats per Day	Anglers per Day	Angler Hours	Collection		
				Male	Female	Total
2012	10	27	598	43	26	69
2013	22	56	1,059	298	104	402
2014	15	38	1,178	174	131	305
2015	22	55	1,342	205	310	515
2016	28	82	2,021	133	176	309
Average	22	58	1,400	203	180	383

Hanford Reach Angler Broodstock Program (2012-2016)

Year	Collection	On-Site Mortality		48 Hour Mortality		Ponding Mortality			Hatchery Broodstock
	#	#	%	#	%	#	%		%
2012	69	1	1.4%	0	0.0%	1	1.4%		33.1%
2013	402	5	1.2%	9	2.2%	95	23.6%		31.6%
2014	305	3	1.0%	6	2.0%	62	20.3%		16.9%
2015	515	5	1.0%	16	3.1%	153	29.7%		15.4%
2016	309	4	1.3%	2	0.6%	48	15.5%		9.1%
Avg	383	18	1.1%	33	2.0%	359	22.3%		18.3%

Origin of the Catch

Project conducted in late October

Majority of the hatchery origin chinook have returned to hatchery

Fish are beginning to spawn, reduced holding time at hatchery

Fishery is closed, increases angler participation

	Collection			Natural Origin	
	Male	Female	Total	%	#
2013	298	104	402	81%	325
2014	174	131	305	92%	280
2015	205	310	515	97%	497
				90%	

Hanford Reach Fall Chinook PNI

Facility	Priest Rapids Hatchery			Ringold Springs	Combined	PNI
Mitigation	GCPUD	USACE	Combined			
Production	5,600,000	1,700,000	7,300,000	3,500,000	10,800,000	
Egg Take	6,222,222	1,888,889	8,111,111	3,777,778	11,888,889	
Broodstock	2,333		3,042		4,458	
NO Broodstock	700		913		1,338	0.67

Year	Collection	Natural Origin Broodstock	Priest Rapids Hatchery				Combined	PNI
			GCPUD	USACE	Combined			
2013	402	201	29%		22%		15%	0.32
2014	305	178	25%		20%		13%	0.37
2015	515	290	41%		32%		22%	0.46
2016	309							
	383	223	33%		25%		17%	0.38

H x W Egg Takes

Priest Rapids Hatchery			Ringold Springs	Combined
GCPUD	USACE	Combined		
5,600,000	1,700,000	7,300,000	3,500,000	10,800,000
6,222,222	1,888,889	8,111,111	3,777,778	11,888,889

	Collection			Males	
	Male	Female	Total	1x2	1x4
2013	298	104	402	2,800,000	5,184,000
2014	174	131	305	1,916,000	3,308,000
2015	205	310	515	2,880,000	4,520,000
2016	133	176	309	1,768,000	2,832,000
	203	180	383	2,341,000	3,961,000

	Priest Rapids Hatchery			Ringold Springs	Combined
	GCPUD	USACE	Combined		
2013	83%		64%		44%
2014	53%		41%		28%
2015	73%		56%		38%
2016	46%		35%		24%
	64%		49%		33%

HxW Egg Takes from Hanford Reach Angler Broodstock Collection

					Priest Rapids Hatchery			Ringold Springs	Combined	
					GCPUD	USACE	Combined			
Collection					Egg Take	5,600,000	1,700,000	7,300,000	3,500,000	10,800,000
	Male	Female	Total	(1x4)	6,222,222	1,888,889	8,111,111	3,777,778	11,888,889	
2013	298	104	402	5,184,000	83%		64%		44%	
2014	174	131	305	3,308,000	53%		41%		28%	
2015	205	310	515	4,520,000	73%		56%		38%	
2016	133	176	309	2,832,000	46%		35%		24%	
	203	180	383	3,961,000	64%		49%		33%	
Actual										
2013	184	65	249	1,658,400	27%		20%		14%	
2014	128	66	194	1,584,000	25%		20%		13%	
2015	147	154	301	2,380,000	38%		29%		20%	
2016*	99	150	249	1,788,000	29%		22%		15%	
	140	109	248	1,852,600	30%		23%		16%	

The six primary objectives of the project are:

1. Determine if hook and line could be used to collect adult fall Chinook salmon without incurring significant mortality from capture to transport (hooking mortality). **1.1%**
2. Determine if adult fall Chinook could be captured by hook & line, held for several hours at the collection sites, and transported to the holding facilities at Priest Rapids Hatchery without significant mortality (transport mortality). **2.0%**
3. Determine if the Angler Broodstock fish would survive until spawned at the hatchery (delayed holding mortality). **22.3%**
Hatchery 18.3%
4. Determine if fall Chinook collected by hook & line in the Hanford Reach in late October were primarily natural origin fall Chinook. **90.0%**
5. Collect sufficient numbers to increase pNOB for egg takes for Priest Rapids Hatchery.

1/3 of the NO Broodstock * 33% of HxW eggs for GCPUD Production * ~15% for Hanford Reach

6. Obtain sufficient angler participation to meet natural origin broodstock collection needs

22 boats/day (58 anglers/day) * 300-500 fish collection annually

Any Questions?

