2014 Rapid Bio-Assessment

In The Tualatin River Basin

Commissioned by:

Tualatin River

Watershed Council

Bio-Surveys, LLC.

Steve Trask / Jeremy Lees / Jim Holley

Funded by:

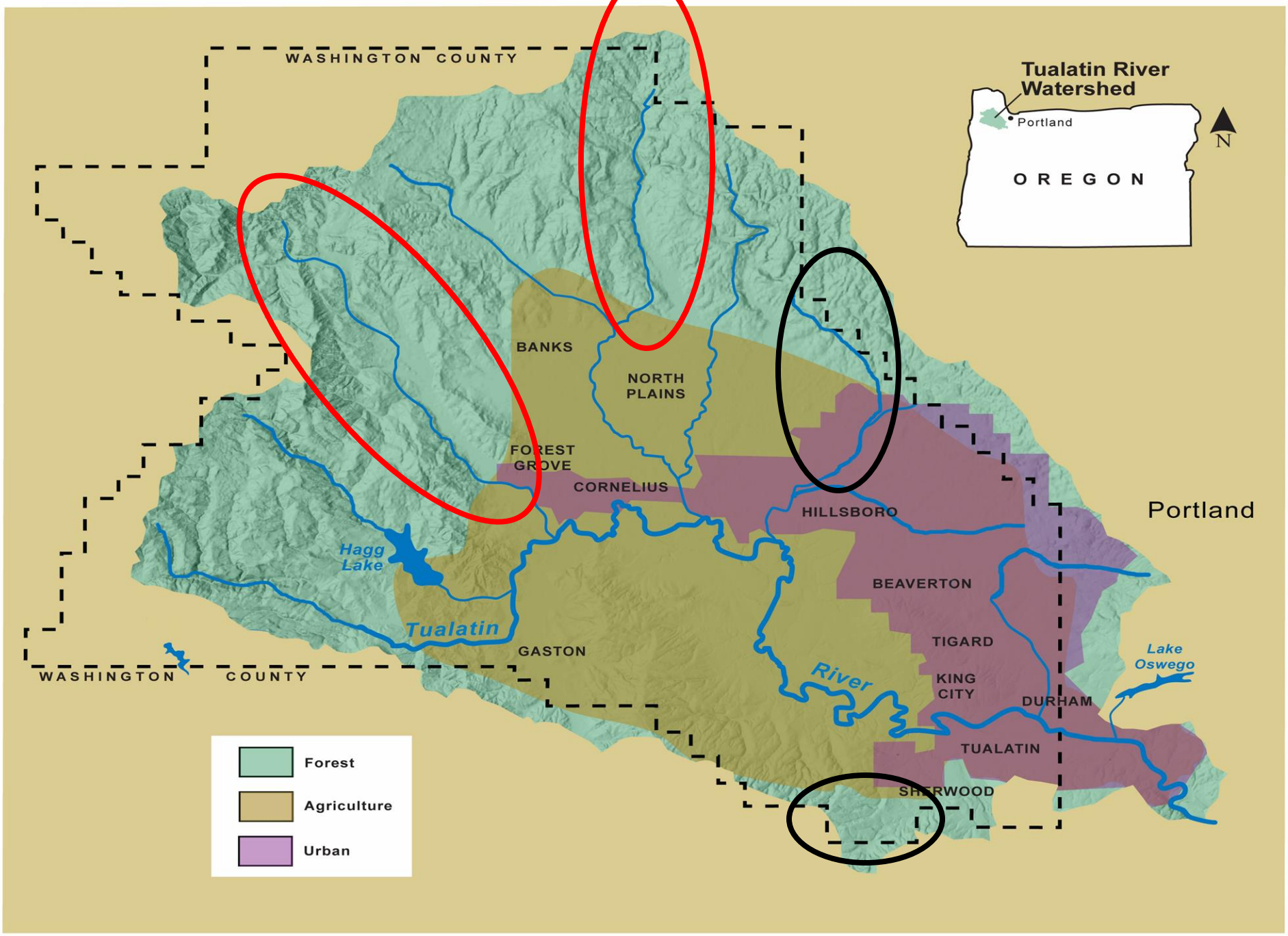
Clean Water Services

USTA
2011.06.08

Inventory Objectives

- **Determine summer distribution by species**
- **Identify summer migrations to thermal refugia**
- **Describe relative abundance of species**
- **Establish baselines for monitoring future trends**
- **Identify key anchor habitats (rearing & spawning)**

* **Provide Guidance for Restoration Planning**


WASHINGTON COUNTY
Tualatin River Watershed
Portland
OREGON
N
BANKS
NORTH PLAINS
FOREST GROVE
CORNELIUS
HILLSBORO
Portland
Hagg Lake
Tualatin
BEAVERTON
TIGARD
GASTON
River
KING CITY
DURHAM
Lake Oswego
TUALATIN
SHERWOOD
WASHINGTON COUNTY
Forest
Agriculture
Urban

Compare Relative Abundance with other Willamette Subbasins

Pudding Coho Adults ~ 182 (1% of Falls escapement 2013)

Tualatin Coho Adults ~ 1,249 (19% of Falls escapement 2012)

Yamhill Coho Adults ~ 3,089 (47% of Falls escapement 2012)

Tualatin contains flow augmentation (65 cfs through Nov 1)

Basin	Coho	Coho/mile	Sthd	Sthd/mile	Cutthroat	Cuts/mile
Pudding 92 miles	20,053	218	870	9	5,266	57
Tualatin 138 miles	90,090	653	2,747	20	12,020	87
Luckiamute 214 miles	44,028	206	975	5	11,980	56
Molalla 93 miles	18,549	199	13,031	140	4,844	52

© Lyn Topinka, 2004

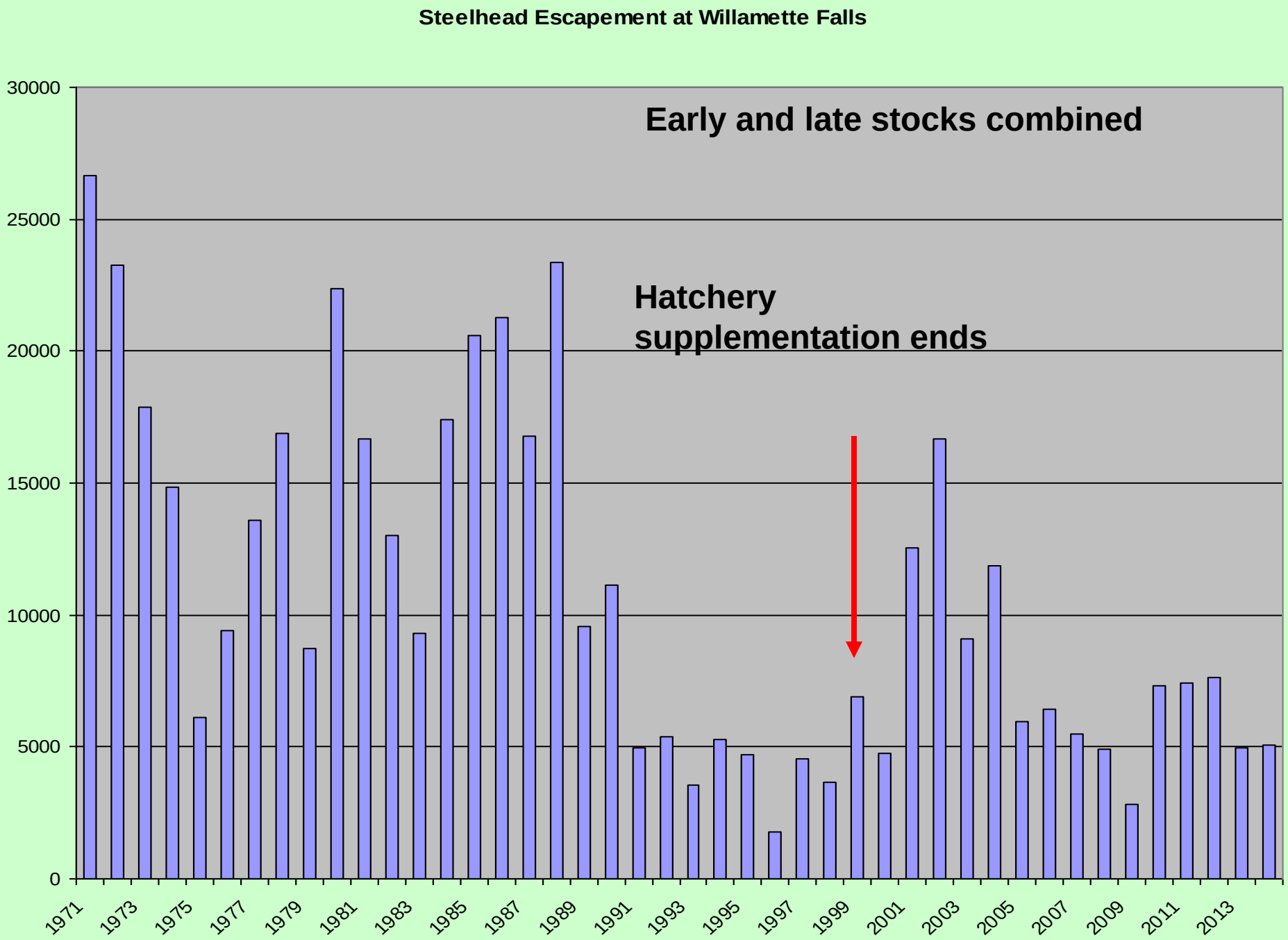

Steelhead Escapement at Willamette Falls
Early and late stocks combined
Hatchery supplementation ends
30000
25000
20000
15000
10000
5000
0
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013

Table 6. Point estimates and 95% confidence intervals of adult winter steelhead escapement to Willamette River tributaries based on return numbers and percentages of radio-tagged fish (*n* = 169) and three scenarios of ODFW count data from Willamette Falls Dam in 2012. Winter steelhead counted

Jepson, 2012

			Tag intrvl.	From 15 Feb	From 1 Nov.
			n = 3832	*n=4743*	*n = 7172*
Tributary	N	% (95% ci)	Estimate	Estimate	Estimate
None	28	16.6	635	786	1188
Clackamas	10	5.9	227	281	424
Tualatin	4	2.4	91	112	170
Molalla	23	13.6	522	645	976
Yamhill	7	4.1	159	196	297
S Santiam	29	17.1	655	811	1226
N Santiam	35	20.7	793	982	1485
Calapooia	3	1.8	68	84	127
Coast Fork	1	0.6	23	28	42
McKenzie	1	0.6	23	28	42
Fall Creek	5	3.0	113	140	212
Middle Fork	23	13.6	522	645	976

2.4% of total

(Table 5) Expanded Subbasin Estimates for 2013

Subbasin	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
EF Dairy	37,125		12,489		1,965		3,776			
Gales	26,805		18,340		650		4,055			
Inventory Total	**63,930**		**30,829**		**2,615**		**7,831**			

- 20% visual bias included for coho expansions

(Table 6) Expanded Sub-basin Estimates for 2014

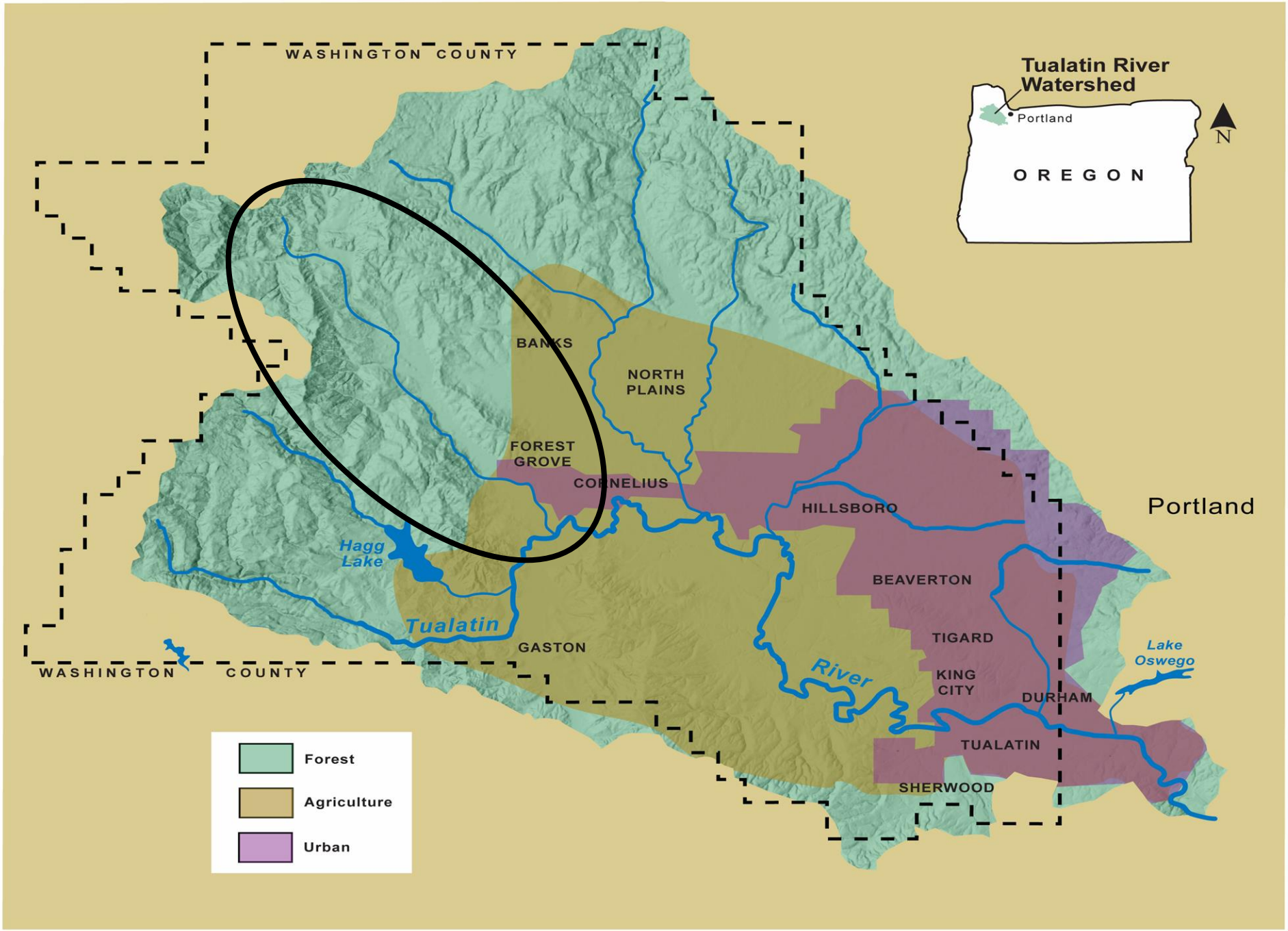
Subbasin	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
EF Dairy	28,779		5,081		2,276		3,437			
Gales	32,583		6001		441		4,110		10	
Inventory Total	**61,362**		**11,082**		**2717**		**7,547**		**10**	

- 20% visual bias included for coho expansions

(Table 7) Expanded Sub-basin Estimates for 2014

Subbasin	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Chicken	13		45				10			
McFee	2006		210				395			
Rock			20				105			
Inventory Total	**2019**		**275**				**510**			

- 20% visual bias included for coho expansions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(Table 8) Expanded Gales Cr Subbasin Estimates 2013

Stream	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Gales	2,275	8.5	8,205	44.7	430	66.1	1,585	39		
Bateman	175		250	1.4			115	2.8		
Beaver	12,700	47.4	425	2.3			360	8.9		
Clear	5,705	21.3	3,025	16.5	140	21.5	605	14.9		
Coffee			325	1.8			45	1.1		
Finger	156		45				30			
Iler	2,662	9.9	3,770	20.6	25	3.8	735	18.1		
Low Divide			110							
NF Gales	1,013	3.8	935	5.1	50	7.7	220	5.4		
Prickett			70				55	1.4		
Roderick			40				5			
SF Gales	656	2.4	1,040	5.7			210	5.2		
Trib A			25		5					
White	1,463	5.5	75				90	2.2		
Inventory total	**26,805**		**18,340**		**650**		**4,055**			

- Percent contributions are indicated for only those sub-basins that contributed greater than 1% of the total.
- 20% visual bias included for coho expansion

(Table 9) Expanded Gales Cr Subbasin Estimates 2014

Stream	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Gales	4,319	13.3	3,000	50	270	61.2	1,005	24.5	5	50
Side Channels	1,141	3.5	1		1		10			
Bateman	38		65	1.1	20	4.5	30			
Beaver	10,343	31.7	100	1.7			620	15.1		
Clear	7,628	23.4	710	11.8	135	30.6	665	16.2		
Coffee			195	3.2			60	1.5		
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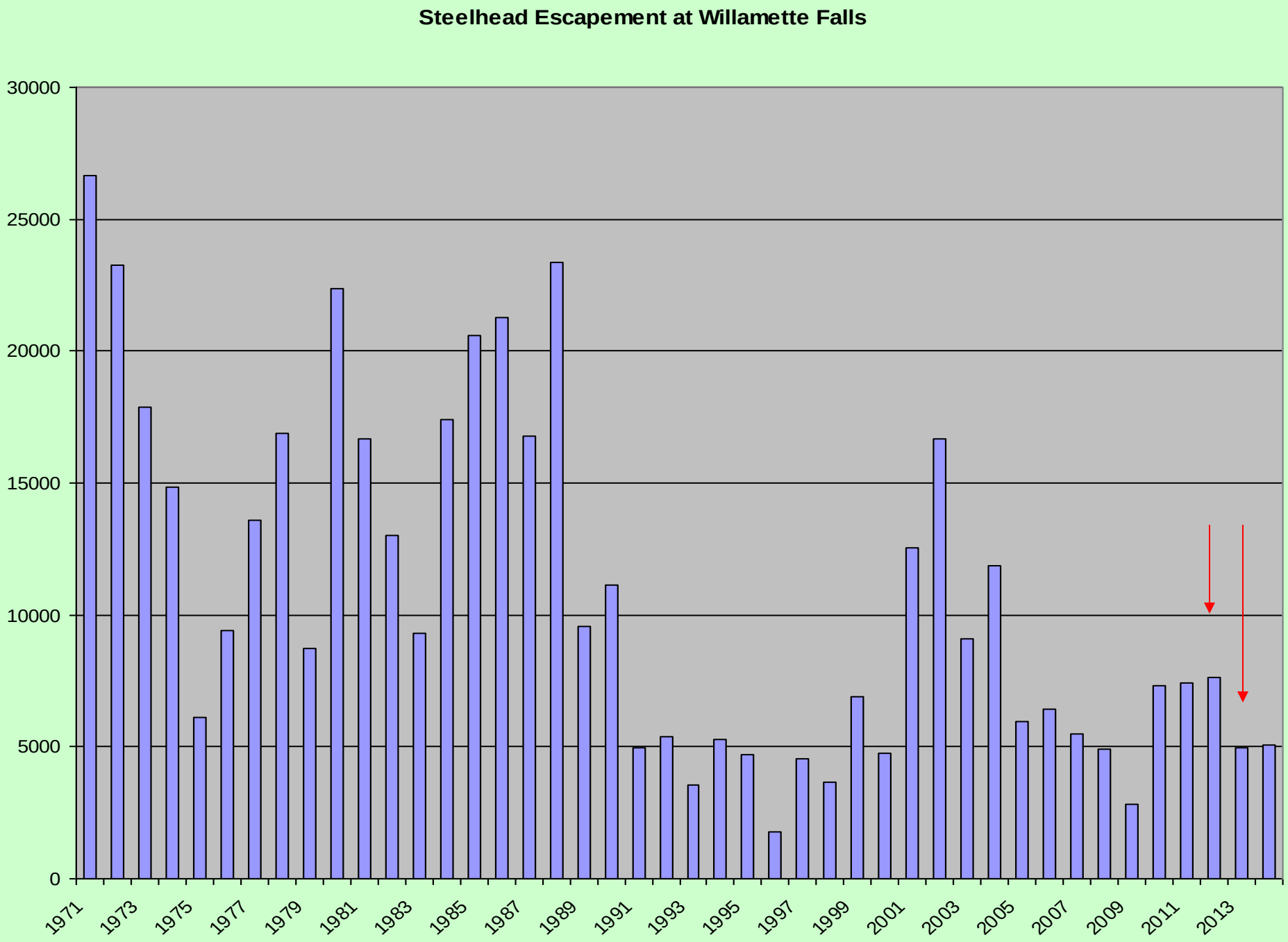
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25000
20000
15000
10000
5000
0
1971
1973
1975
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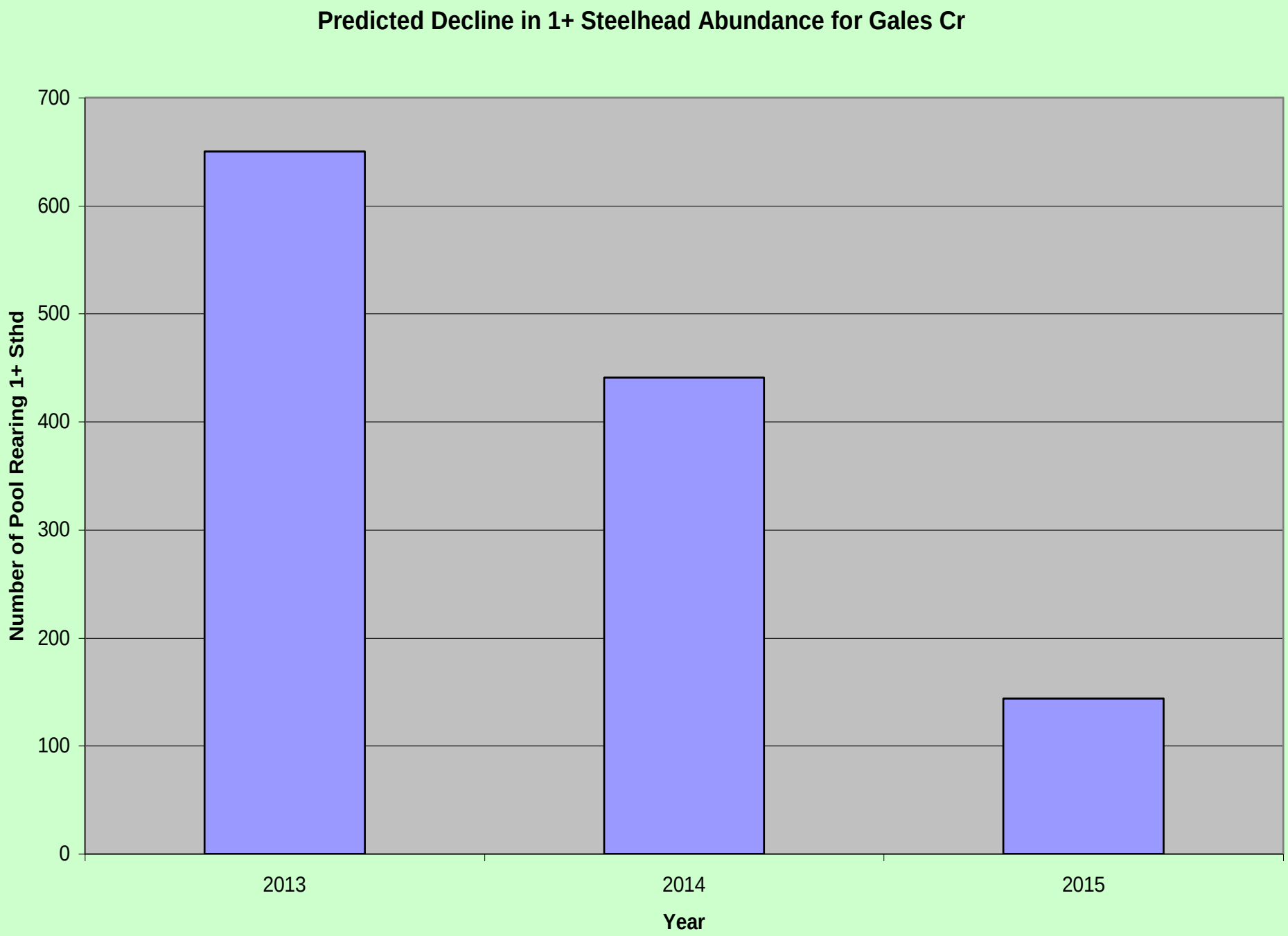
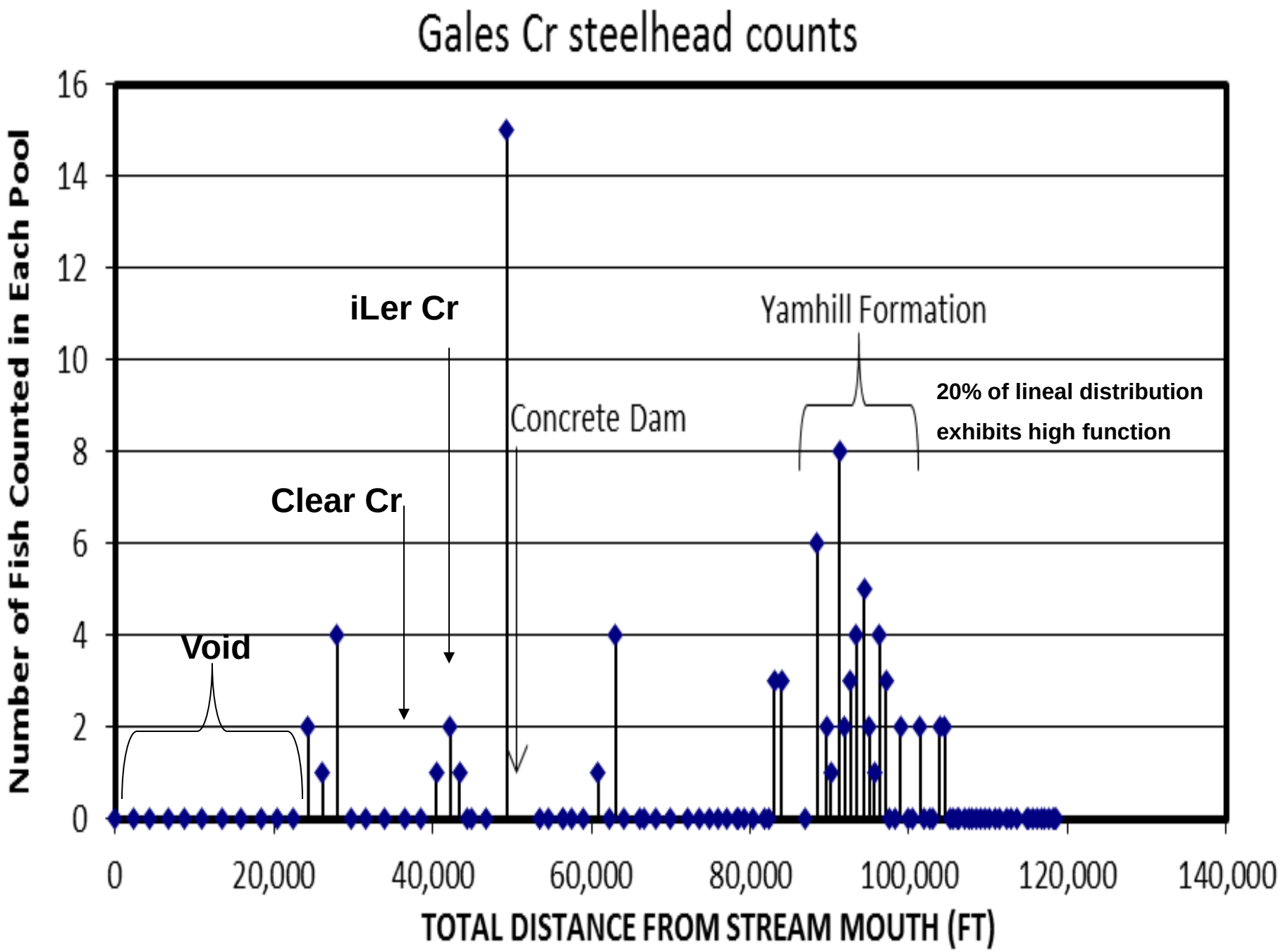
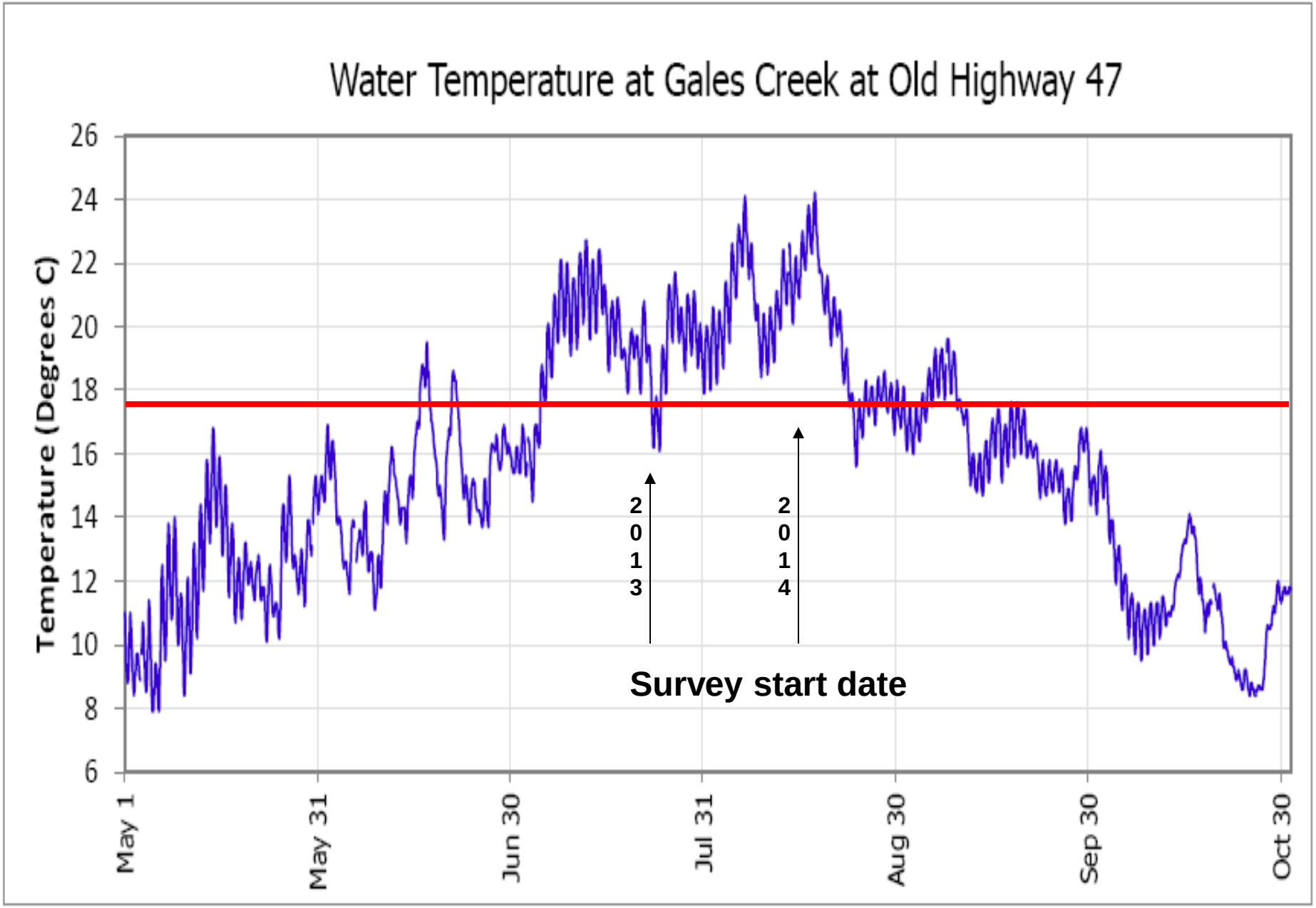
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013

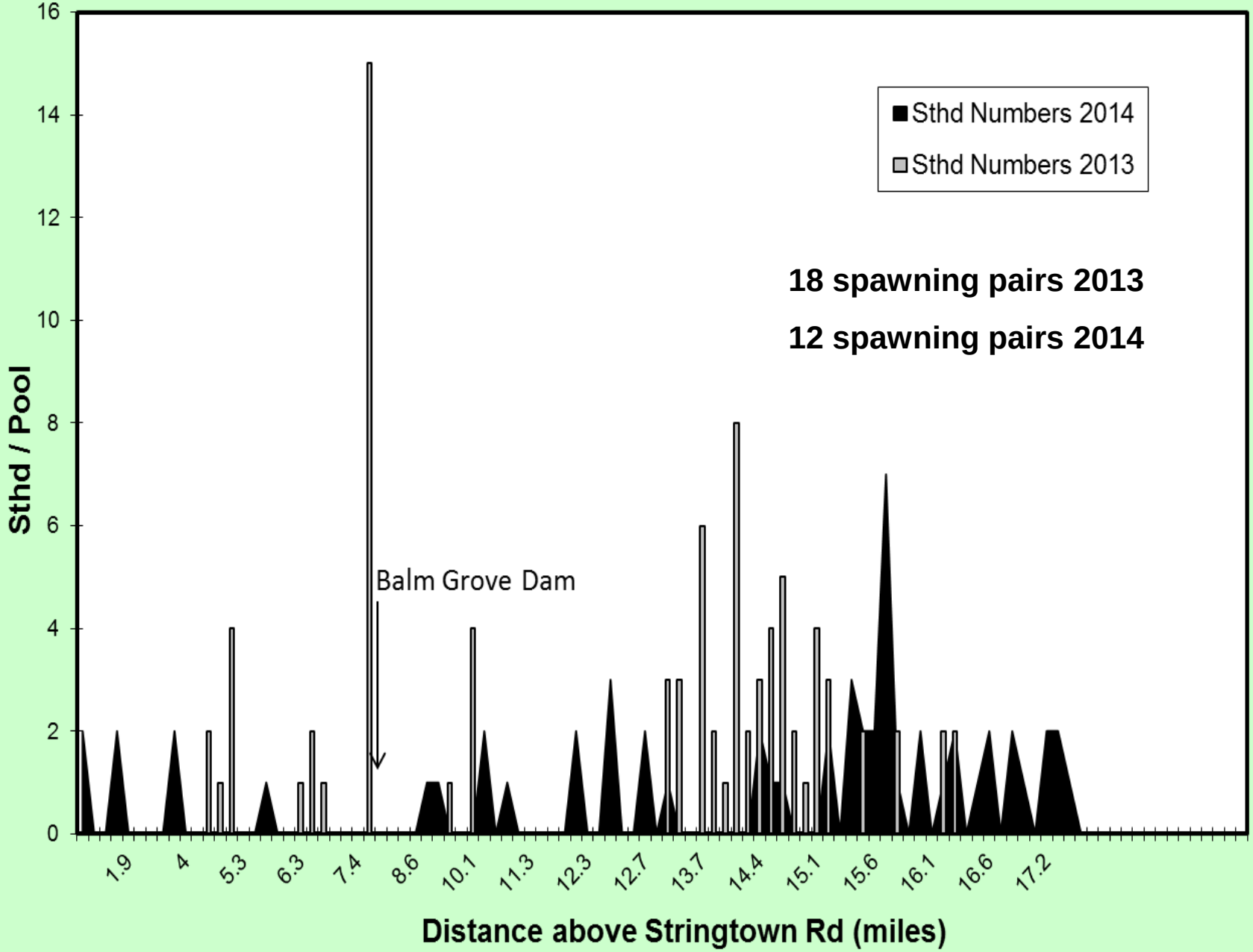

Predicted Decline in 1+ Steelhead Abundance for Gales Cr
Number of Pool Rearing 1+ Sthd
700
600
500
400
300
200
100
0
2013
2014
2015
Year


Gales Cr steelhead counts
Number of Fish Counted in Each Pool
16
14
12
10
8
6
4
2
0
iLer Cr
Yamhill Formation
20% of lineal distribution
exhibits high function
Concrete Dam
Clear Cr
Void
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
TOTAL DISTANCE FROM STREAM MOUTH (FT)

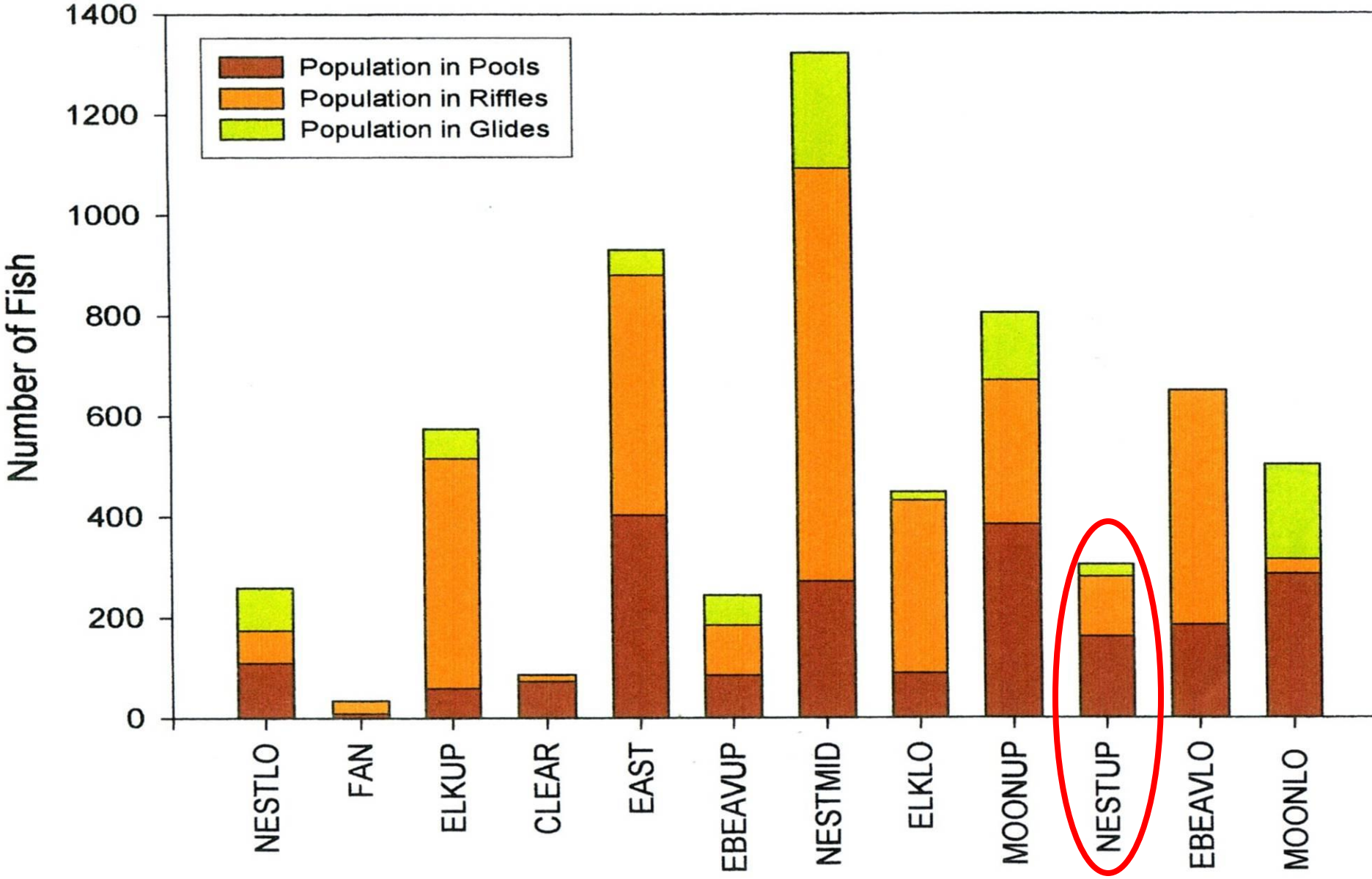


4.6 miles below start of inventory at Stringtown Rd

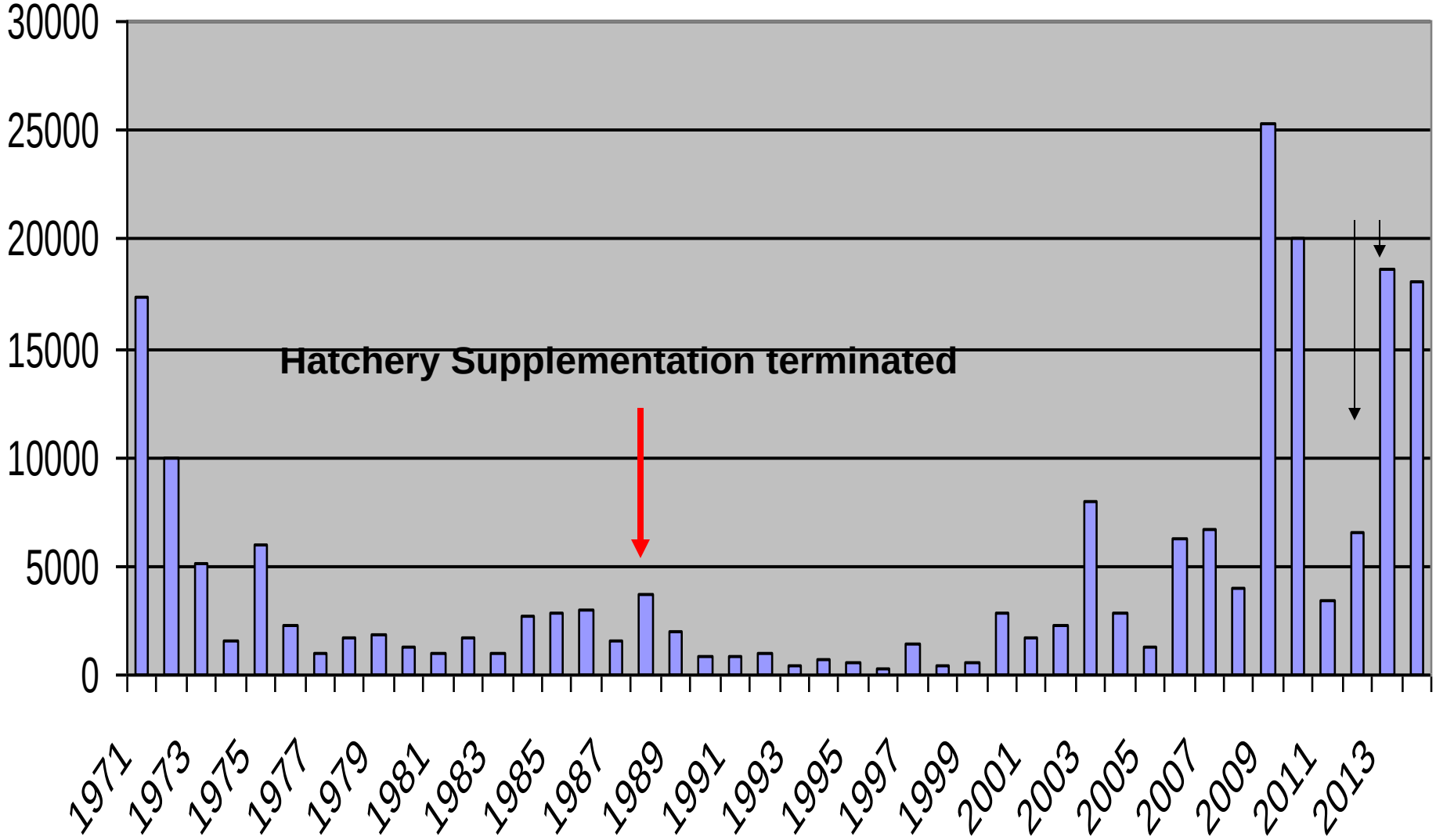
Gales Cr Steelhead Numbers



Nestucca 1+ Steelhead (summer 1988)



Coho Escapement at Willamette Falls



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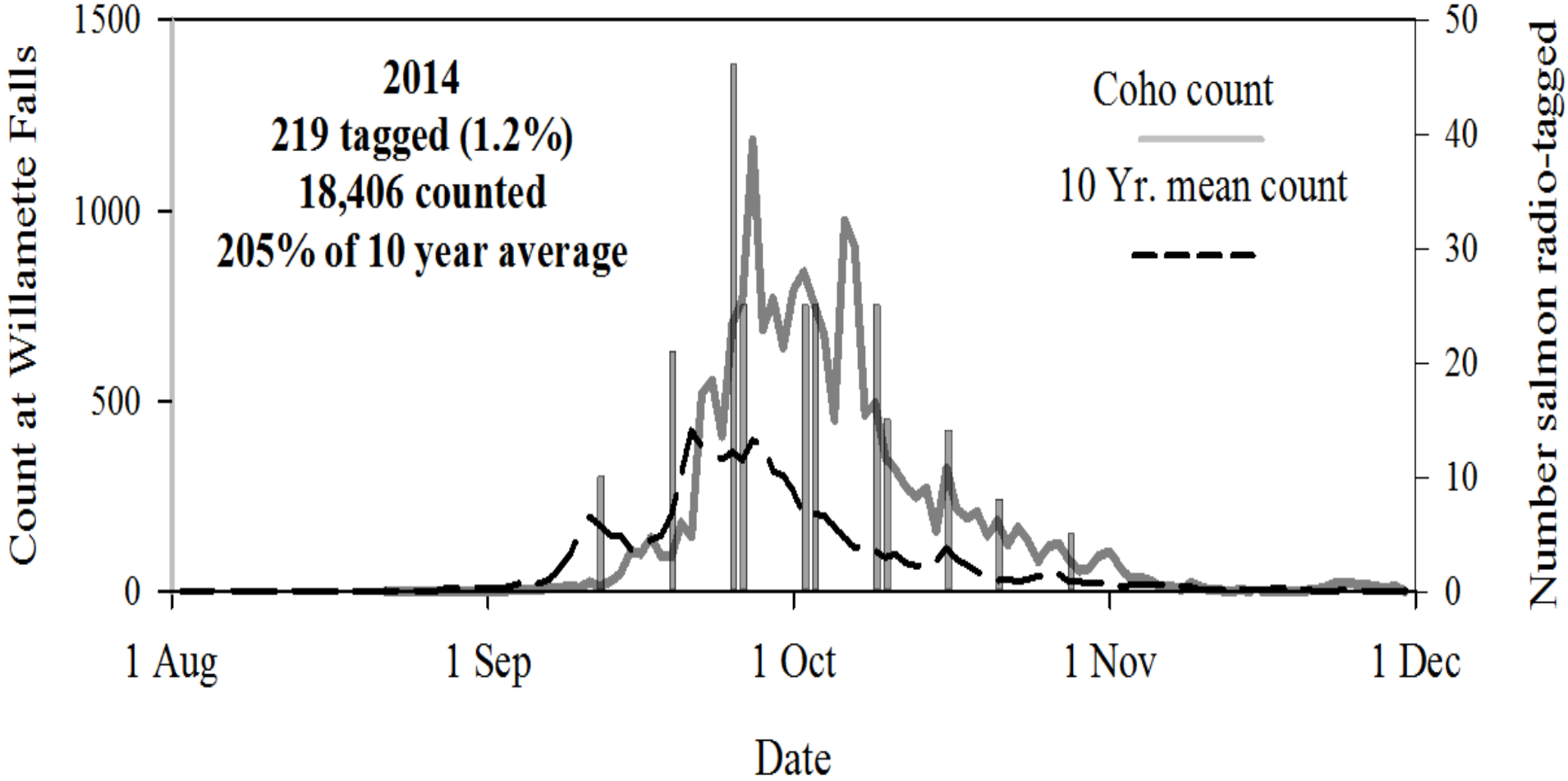
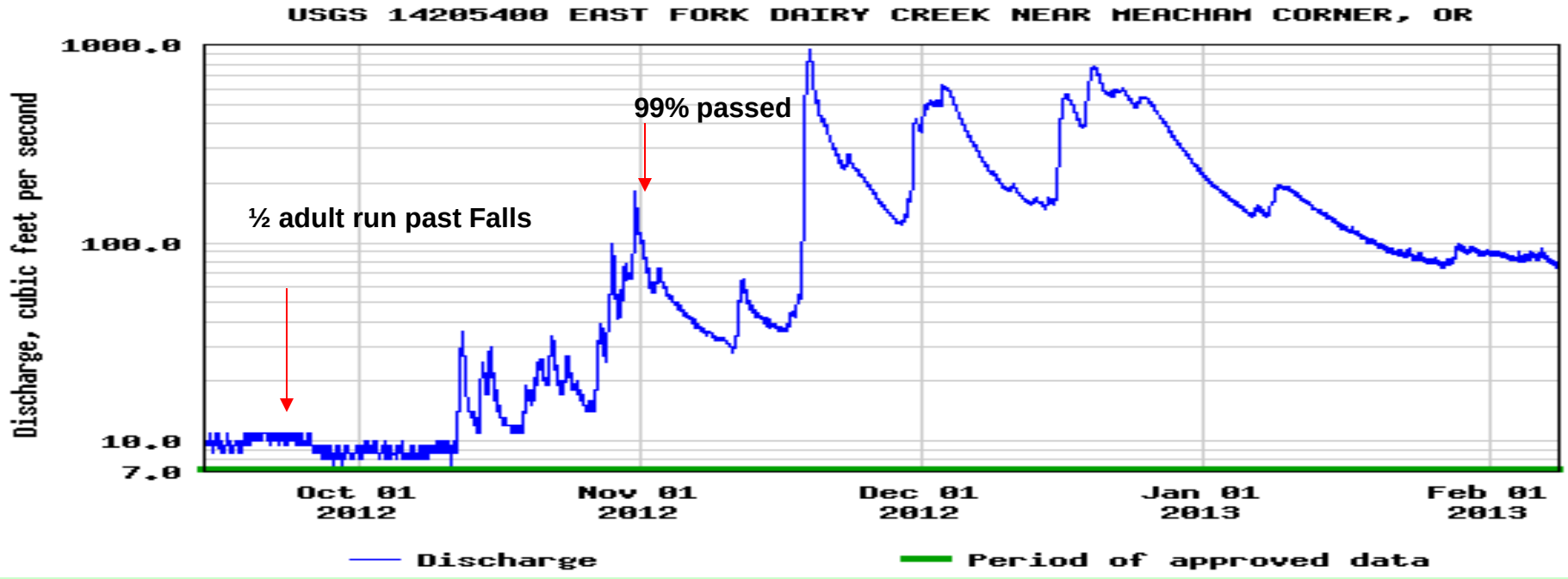
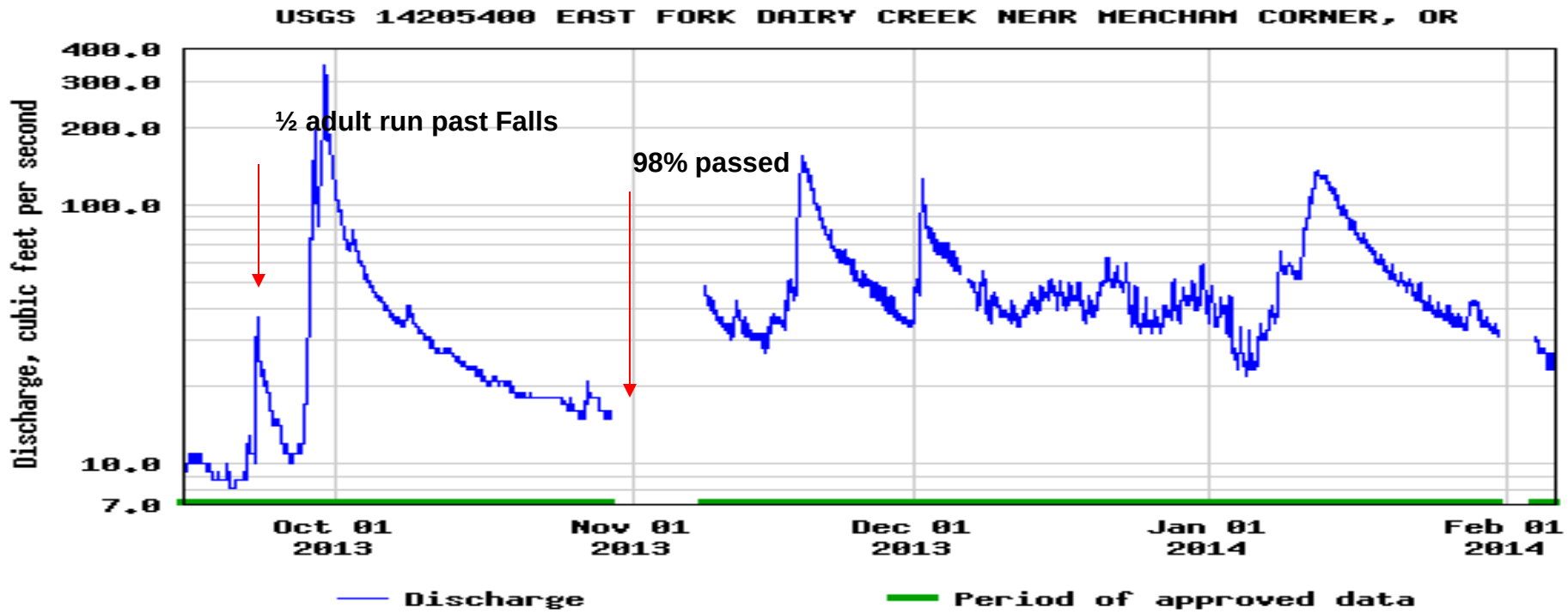
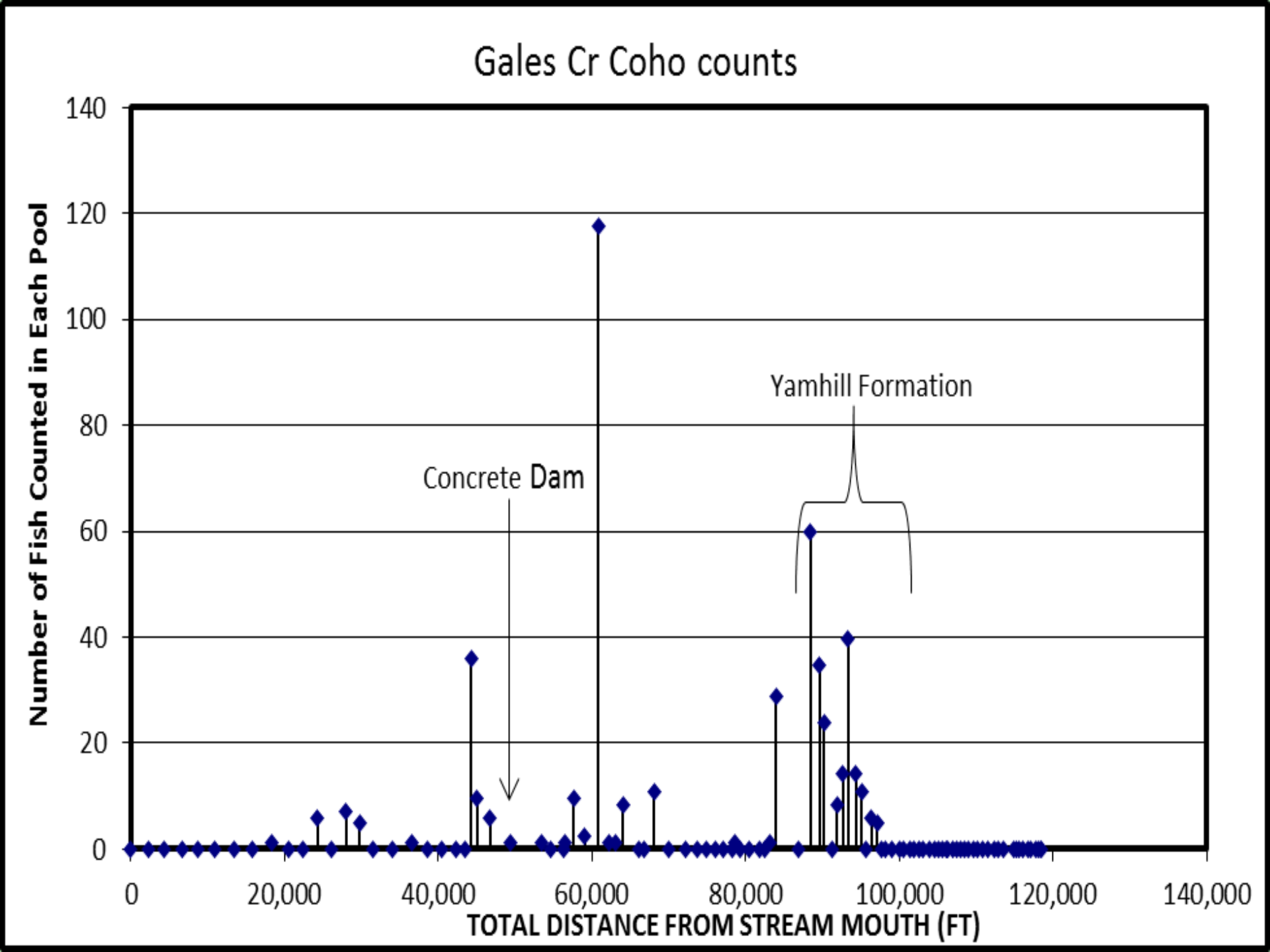
Coho Salmon Tags and Counts - 2014




USGS 14205400 EAST FORK DAIRY CREEK NEAR MEACHAM CORNER, OR
Discharge, cubic feet per second
1000.0
100.0
10.0
7.0
99% passed
½ adult run past Falls
Oct 01 2012
Nov 01 2012
Dec 01 2012
Jan 01 2013
Feb 01 2013
Discharge
Period of approved data


USGS 14205400 EAST FORK DAIRY CREEK NEAR MEACHAM CORNER, OR
Discharge, cubic feet per second
400.0
300.0
200.0
100.0
10.0
7.0
½ adult run past Falls
98% passed
Oct 01 2013
Nov 01 2013
Dec 01 2013
Jan 01 2014
Feb 01 2014
Discharge
Period of approved data


Gales Cr Coho counts
Number of Fish Counted in Each Pool
140
120
100
80
60
40
20
0
Yamhill Formation
Concrete Dam
0
20,000
40,000
60,000
80,000
100,000
120,000
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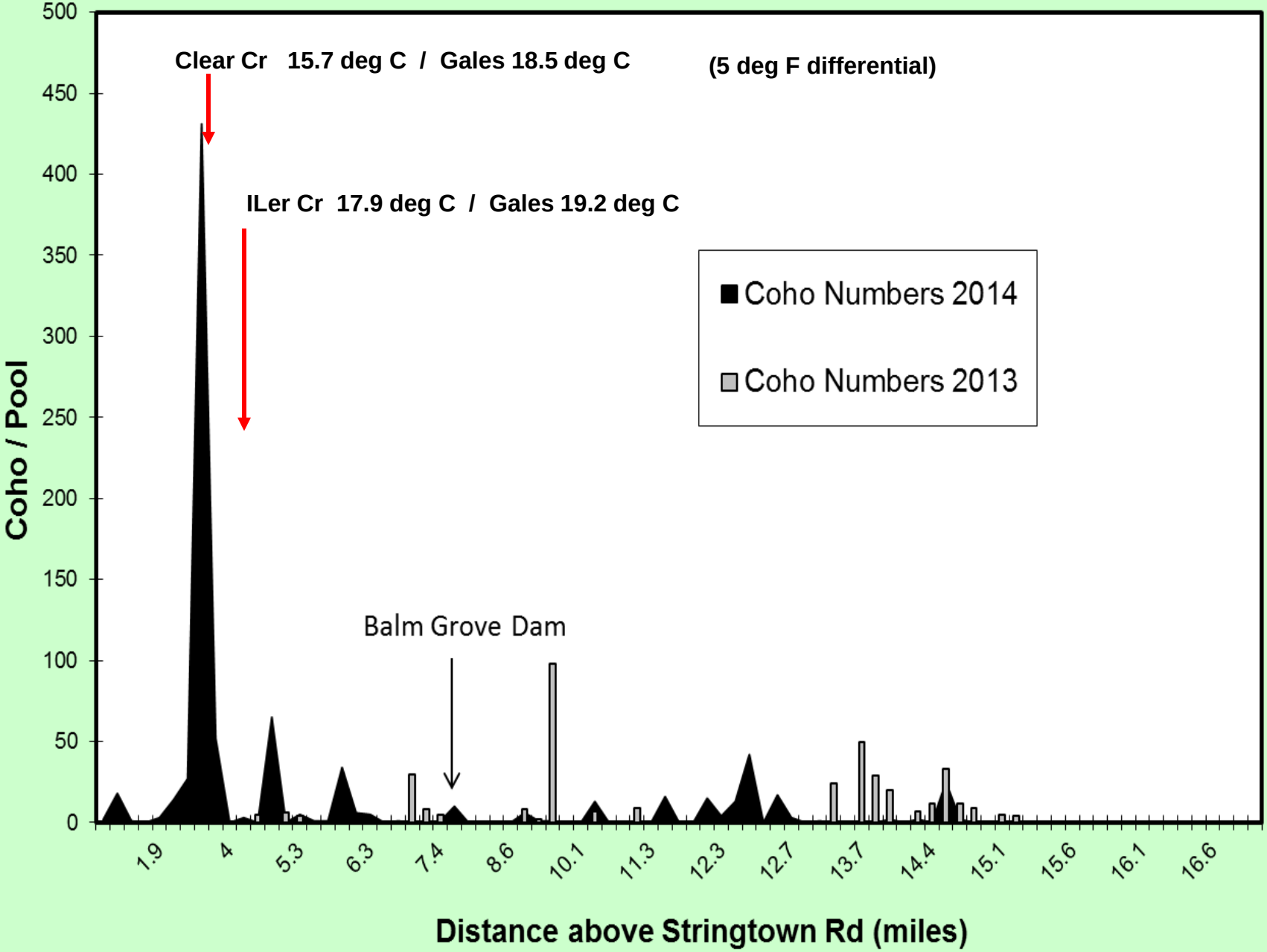
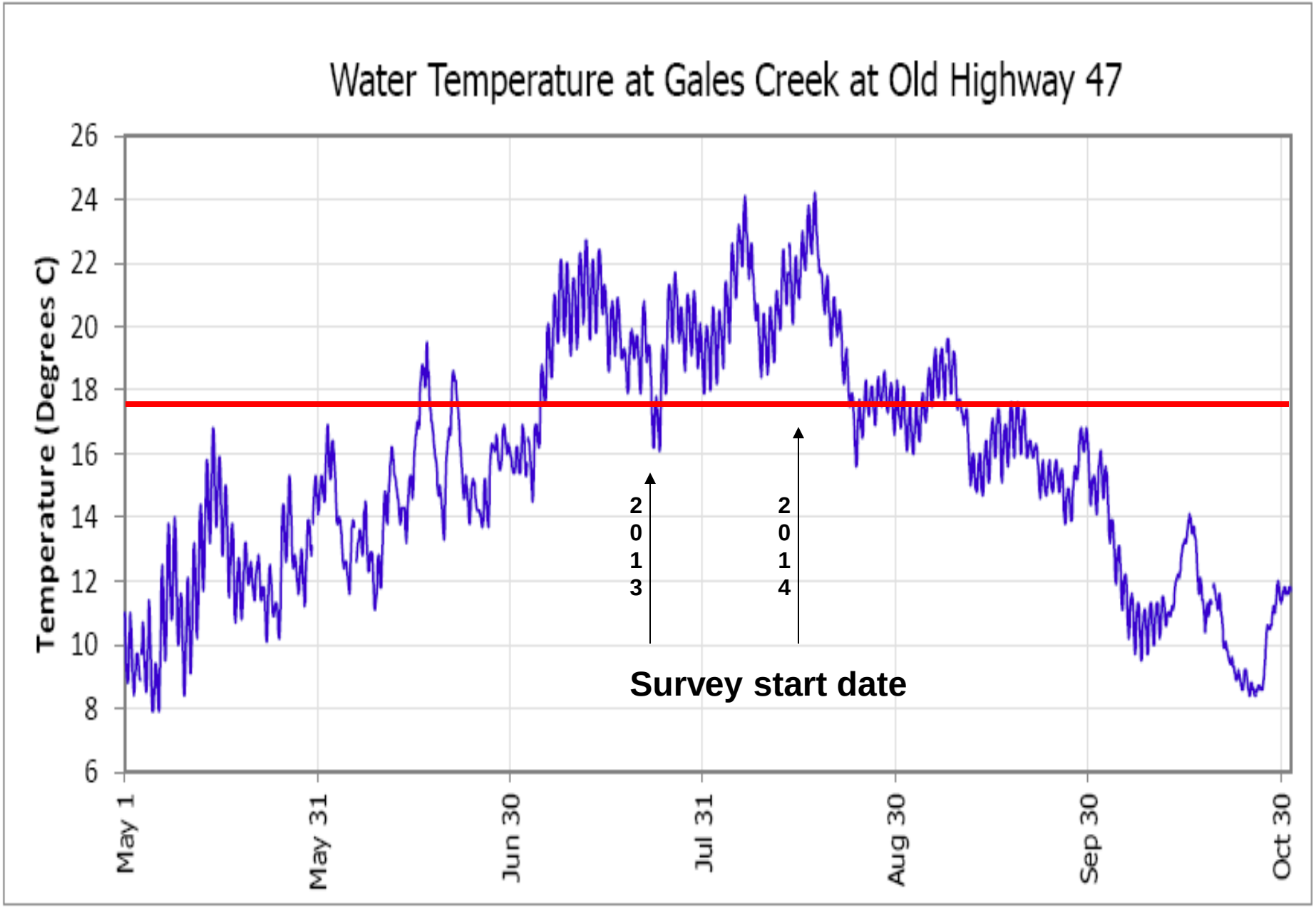
TOTAL DISTANCE FROM STREAM MOUTH (FT)

Gales Cr Coho Numbers





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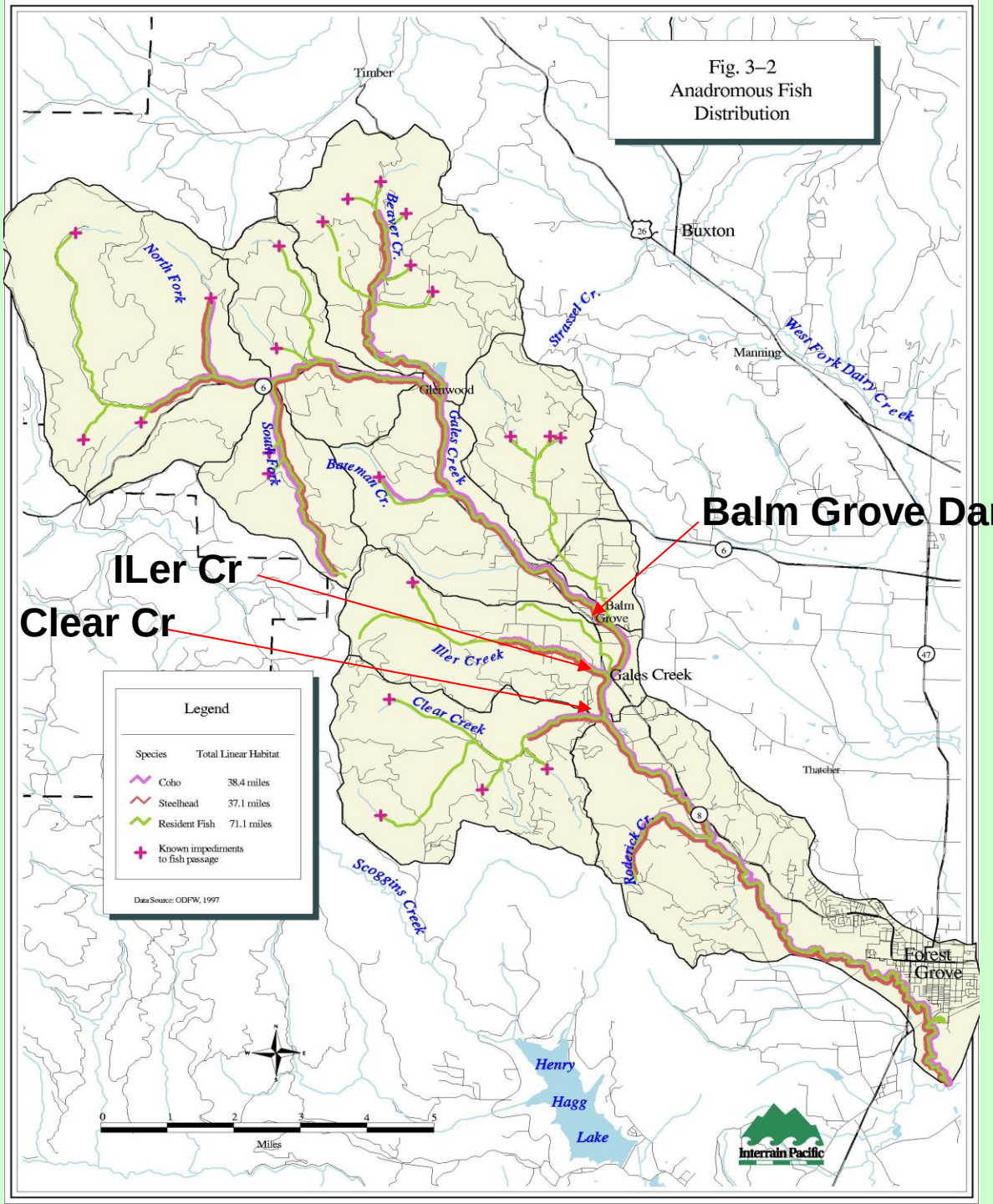
Fig. 3–2
Anadromous Fish
Distribution
Timber
Buxton
Manning
Glenwood
Balm Grove
Gales Creek
Thatcher
Forest Grove
North Fork
South Fork
Beaver Cr.
Strassel Cr.
West Fork Dairy Creek
Gales Creek
Bateman Cr.
Ller Creek
Clear Creek
Roderick Cr.
Scoggins Creek
Henry Hagg Lake
Balm Grove Dam
ILer Cr
Clear Cr
Legend
Species
Total Linear Habitat
Coho 38.4 miles
Steelhead 37.1 miles
Resident Fish 71.1 miles
Known impediments to fish passage
Data Source: ODFW, 1997
0 1 2 3 4 5
Miles
Interrain Pacific

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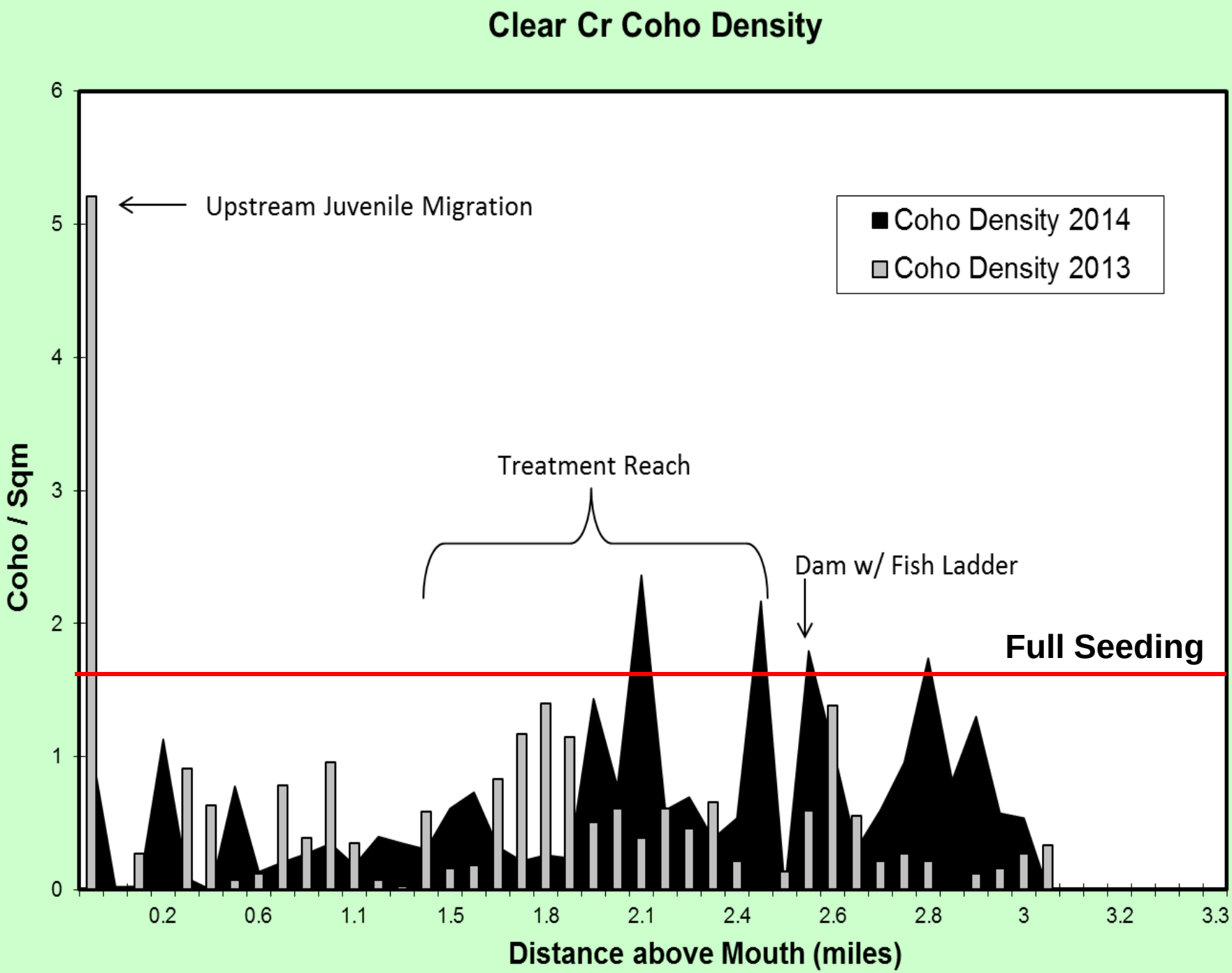
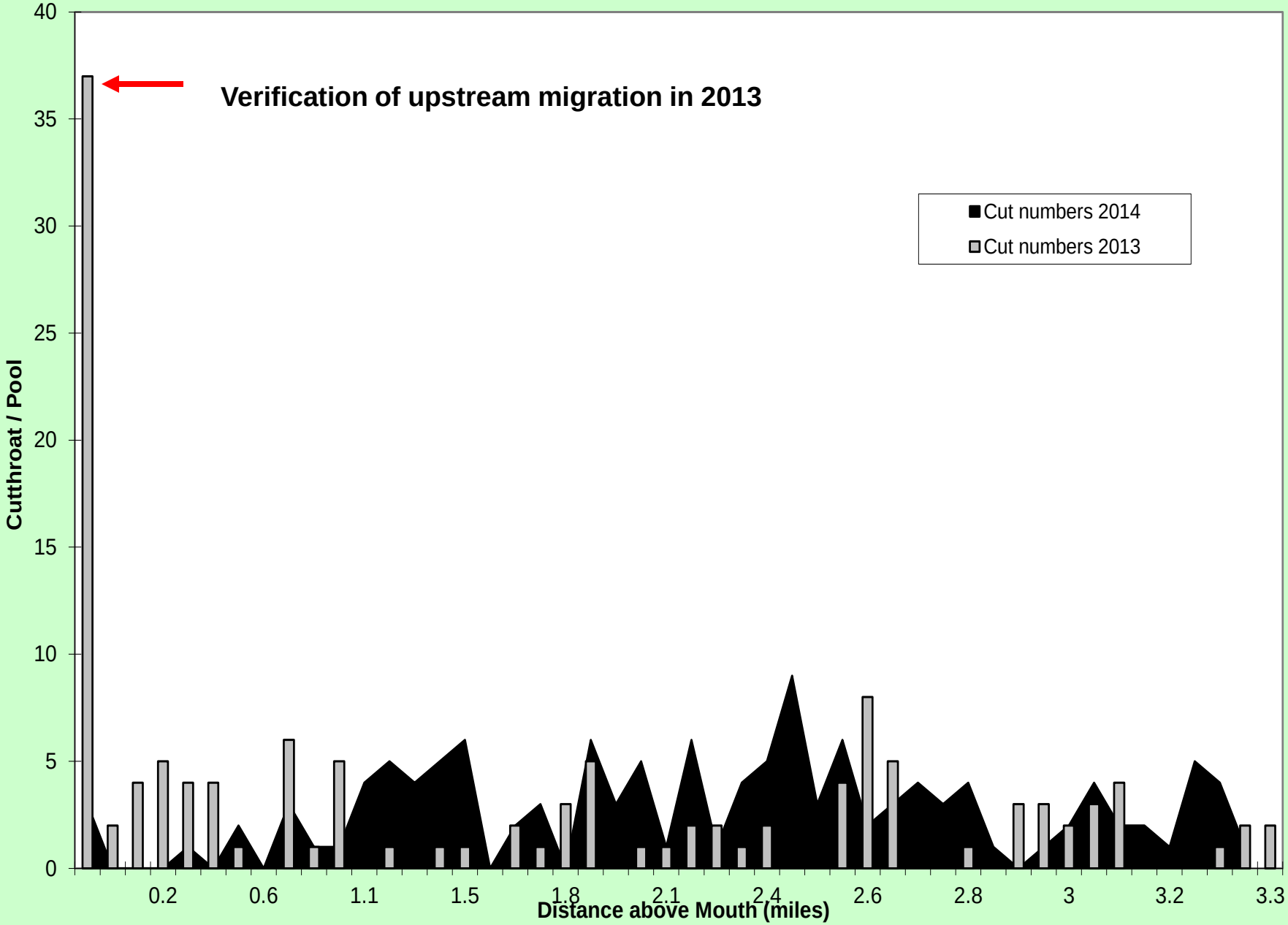
34% increase


Clear Cr Coho Density
Upstream Juvenile Migration
Coho Density 2014
Coho Density 2013
Treatment Reach
Dam w/ Fish Ladder
Full Seeding
Coho / Sqm
0
1
2
3
4
5
6
0.2
0.6
1.1
1.5
1.8
2.1
2.4
2.6
2.8
3
3.2
3.3
Distance above Mouth (miles)

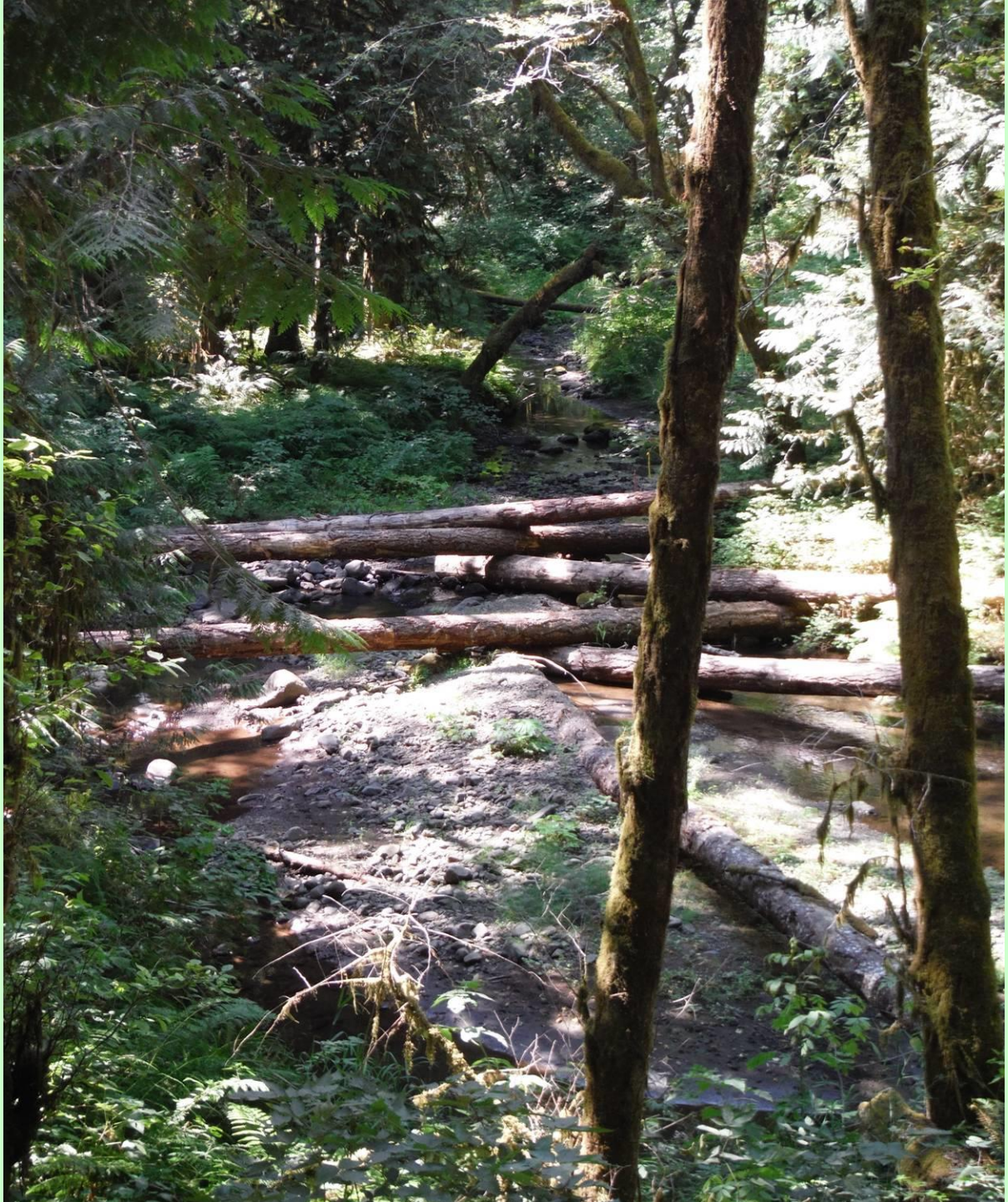
Clear Cr Cutthroat Numbers

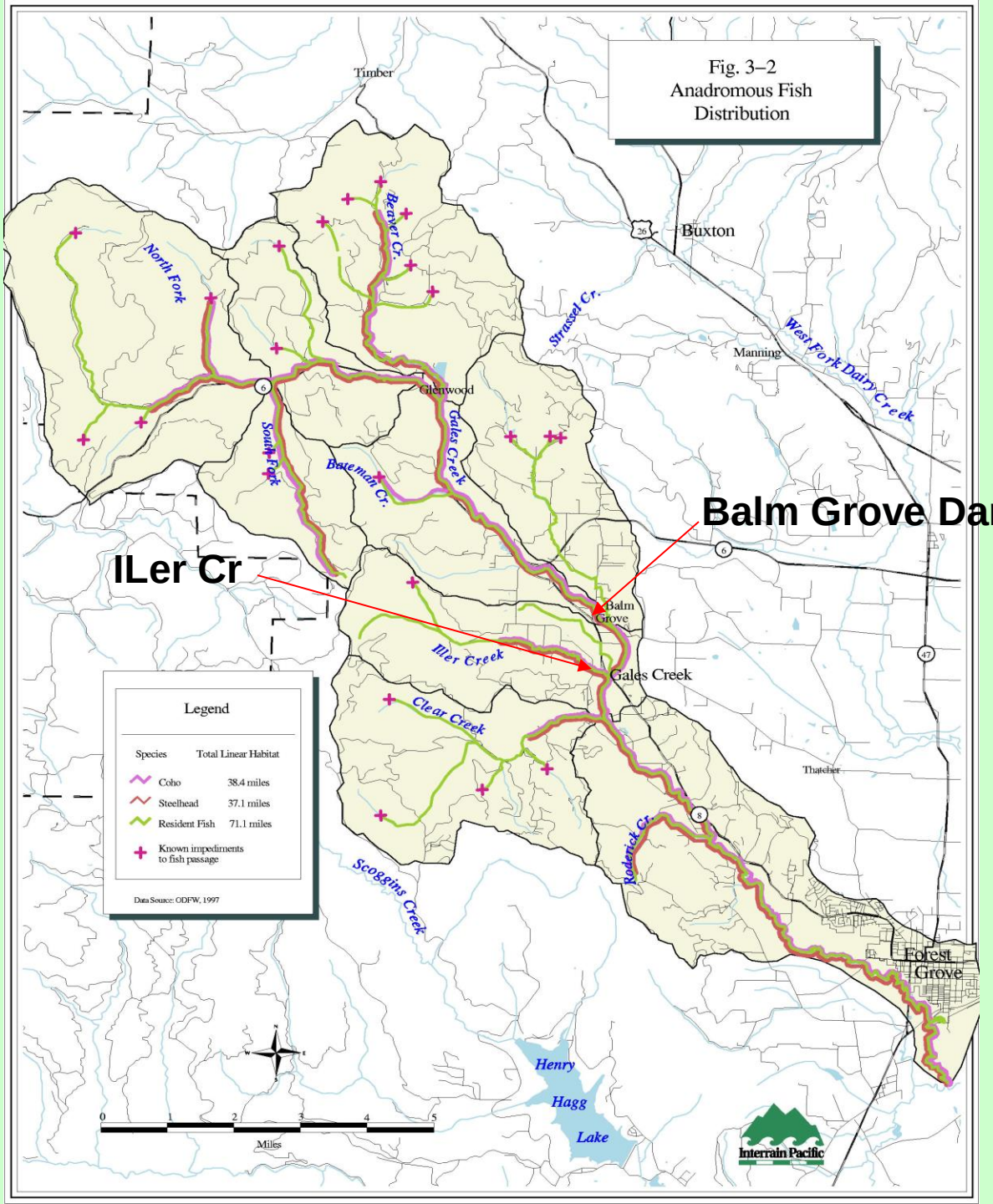


(Table 10) Expanded Clear Cr Comparison for Treatment Reach

	Years	coho	0+	steelhead	cutthroat
Pre	2012	631	410	0	195
Post	2013	2,669	1,000	30	130
Post	2014	3,044	225	60	300

- 20% visual bias included for coho expansion

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Manning
Glenwood
Balm Grove
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Thatcher
Forest Grove
North Fork
South Fork
Beaver Cr.
Strassel Cr.
West Fork Dairy Creek
Gales Creek
Bateman Cr.
Ller Creek
Clear Creek
Scoggins Creek
Roderick Cr.
Henry Hagg Lake
Balm Grove Dam
ILer Cr
Legend
Species
Total Linear Habitat
Coho 38.4 miles
Steelhead 37.1 miles
Resident Fish 71.1 miles
Known impediments to fish passage
Data Source: ODFW, 1997
0 1 2 3 4 5
Miles
Interrain Pacific

(Table 8) Expanded Gales Cr Subbasin Estimates 2013

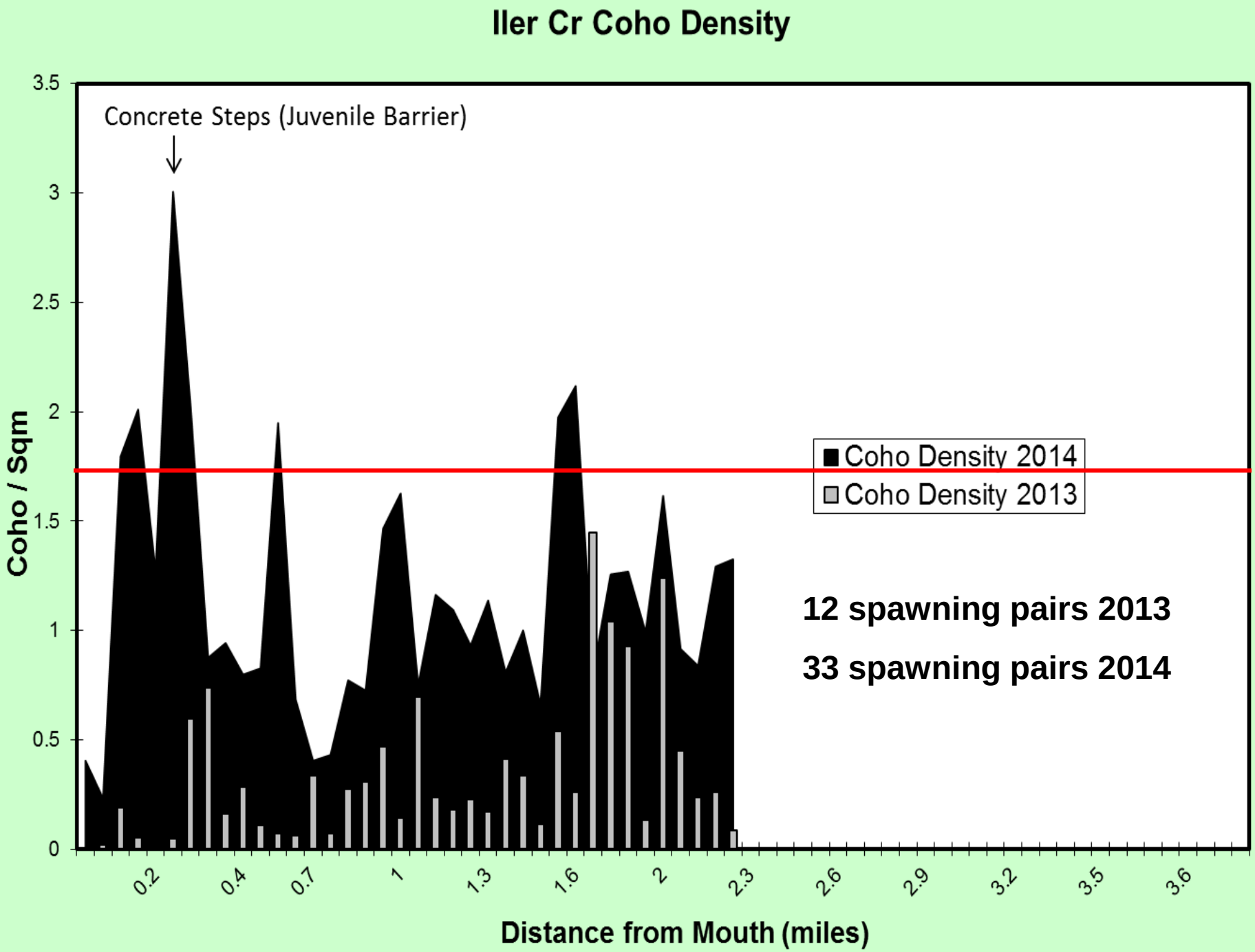
Stream	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Gales	2,275	8.5	8,205	44.7	430	66.1	1,585	39		
Bateman	175		250	1.4			115	2.8		
Beaver	12,700	47.4	425	2.3			360	8.9		
Clear	5,705	21.3	3,025	16.5	140	21.5	605	14.9		
Coffee			325	1.8			45	1.1		
Finger	156		45				30			
Iler	2,662	9.9	3,770	20.6	25	3.8	735	18.1		
Low Divide			110							
NF Gales	1,013	3.8	935	5.1	50	7.7	220	5.4		
Prickett			70				55	1.4		
Roderick			40				5			
SF Gales	656	2.4	1,040	5.7			210	5.2		
Trib A			25		5					
White	1,463	5.5	75				90	2.2		
Inventory total	**26,805**		**18,340**		**650**		**4,055**			

- Percent contributions are indicated for only those sub-basins that contributed greater than 1% of the total.
- 20% visual bias included for coho expansion

(Table 9) Expanded Gales Cr Subbasin Estimates 2014

Stream	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Gales	4,319	13.3	3,000	50	270	61.2	1,005	24.5	5	50
Side Channels	1,141	3.5	1		1		10			
Bateman	38		65	1.1	20	4.5	30			
Beaver	10,343	31.7	100	1.7			620	15.1		
Clear	7,628	23.4	710	11.8	135	30.6	665	16.2		
Coffee			195	3.2			60	1.5		
Finger			30				30			
Iler	7,188	22.1	675	11.2	5	1.1	885	21.5	5	50
Low Divide			40				15			
NF Gales	138		510	8.5			295	7.2		
Prickett	31		20				15			
SF Gales	438	1.3	630	10.5	10	2.3	325	7.9		
White	1,319	4	25				155	3.8		
Inventory total	**32,583**		**6001**		**441**		**4,110**		**10**	

170% increase


Iler Cr Coho Density
Concrete Steps (Juvenile Barrier)
Coho Density 2014
Coho Density 2013
12 spawning pairs 2013
33 spawning pairs 2014
Coho / Sqm
Distance from Mouth (miles)
3.5
3
2.5
2
1.5
1
0.5
0
0.2
0.4
0.7
1
1.3
1.6
2
2.3
2.6
2.9
3.2
3.5
3.6

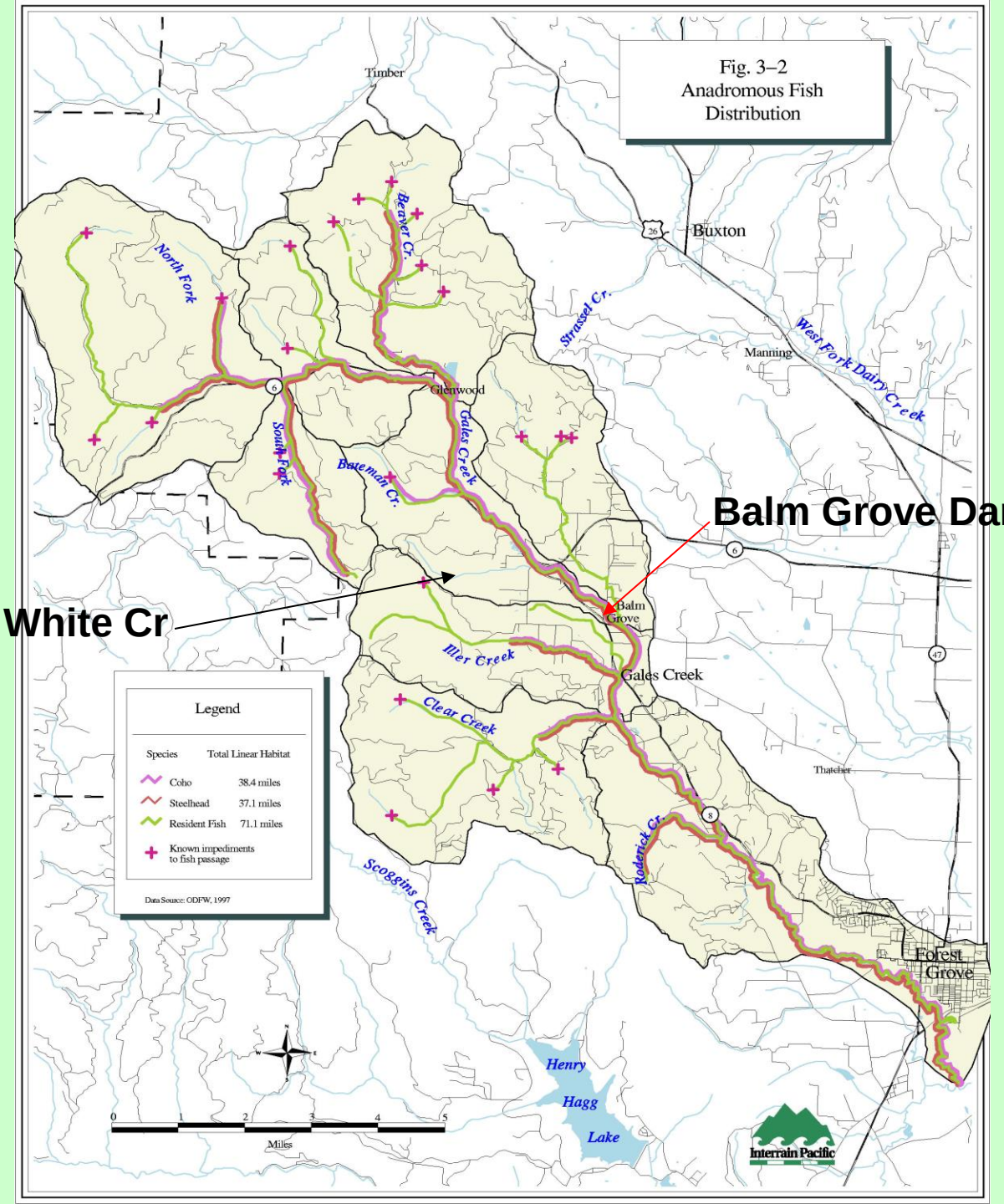
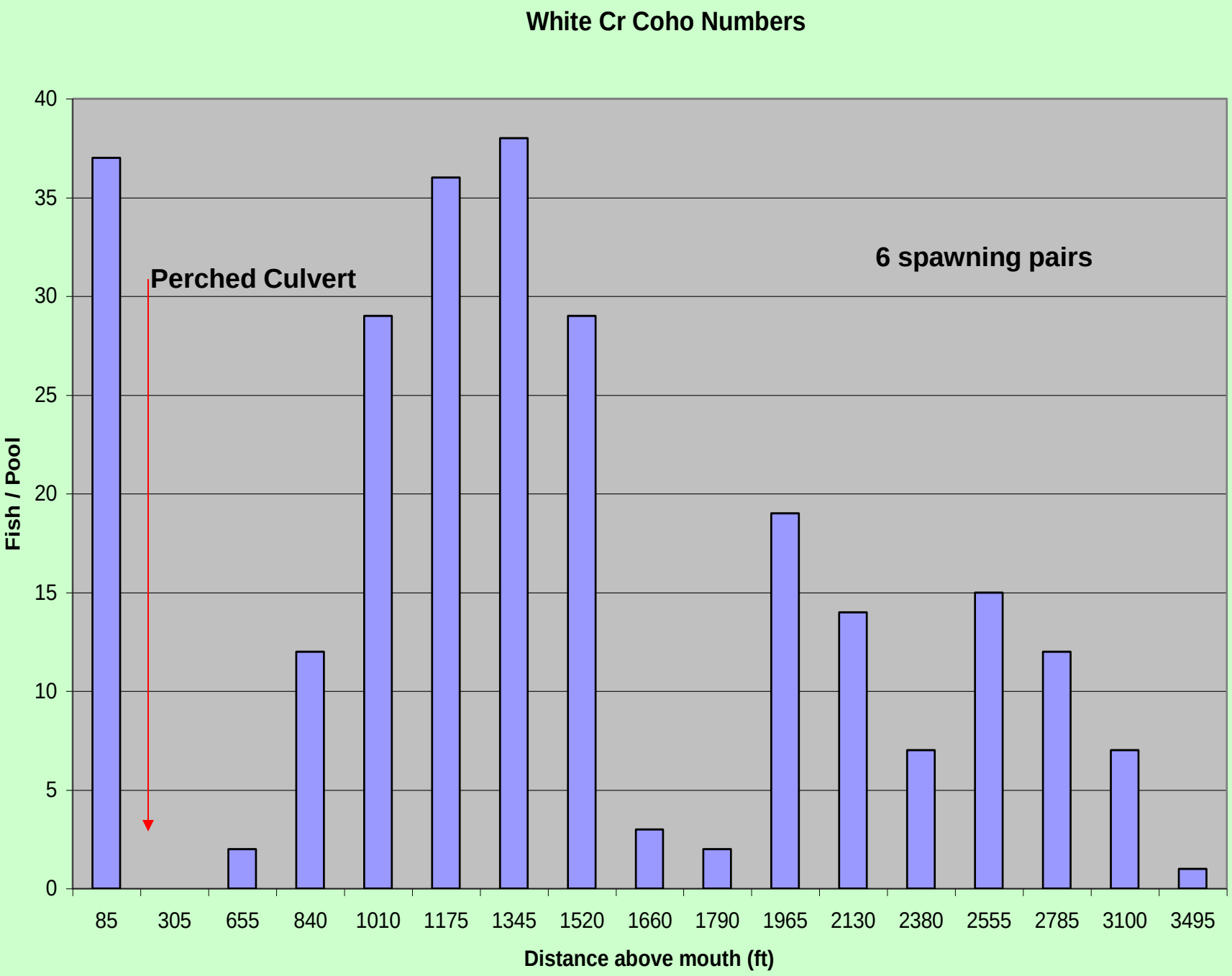


Fig. 3–2
Anadromous Fish
Distribution
Timber
Buxton
Manning
Glenwood
Balm Grove
Gales Creek
Thatcher
Forest Grove
North Fork
South Fork
Beaver Cr.
Gales Creek
Bateman Cr.
Strassel Cr.
West Fork Dairy Creek
Miller Creek
Clear Creek
Scoggins Creek
Roderick Cr.
Henry Hagg Lake
Balm Grove Dam
White Cr
Legend
Species
Total Linear Habitat
Coho 38.4 miles
Steelhead 37.1 miles
Resident Fish 71.1 miles
Known impediments to fish passage
Data Source: ODFW, 1997
0 1 2 3 4 5
Miles
Interrain Pacific


White Cr Coho Numbers
Perched Culvert
6 spawning pairs
Fish / Pool
0
5
10
15
20
25
30
35
40
85
305
655
840
1010
1175
1345
1520
1660
1790
1965
2130
2380
2555
2785
3100
3495
Distance above mouth (ft)

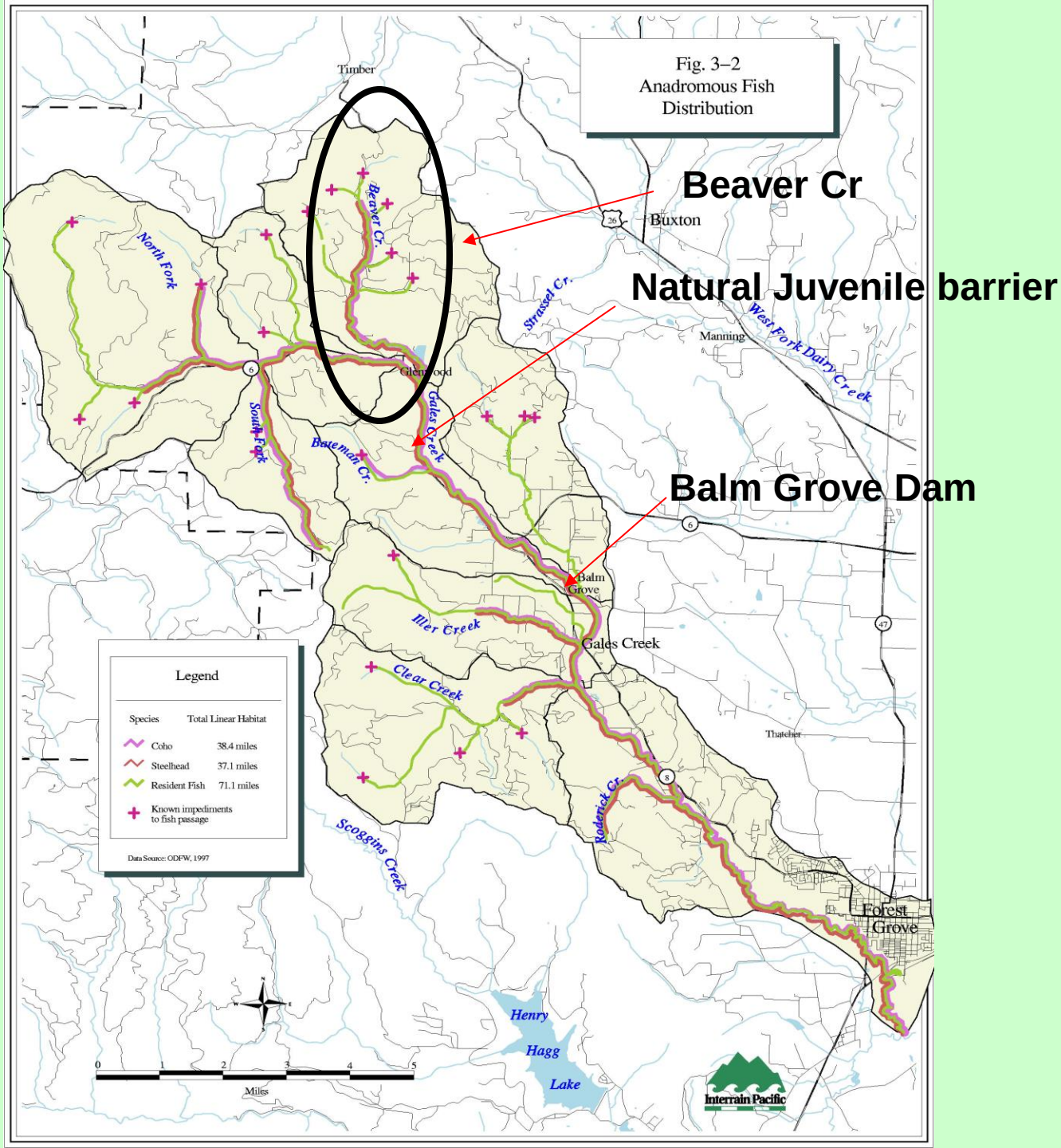
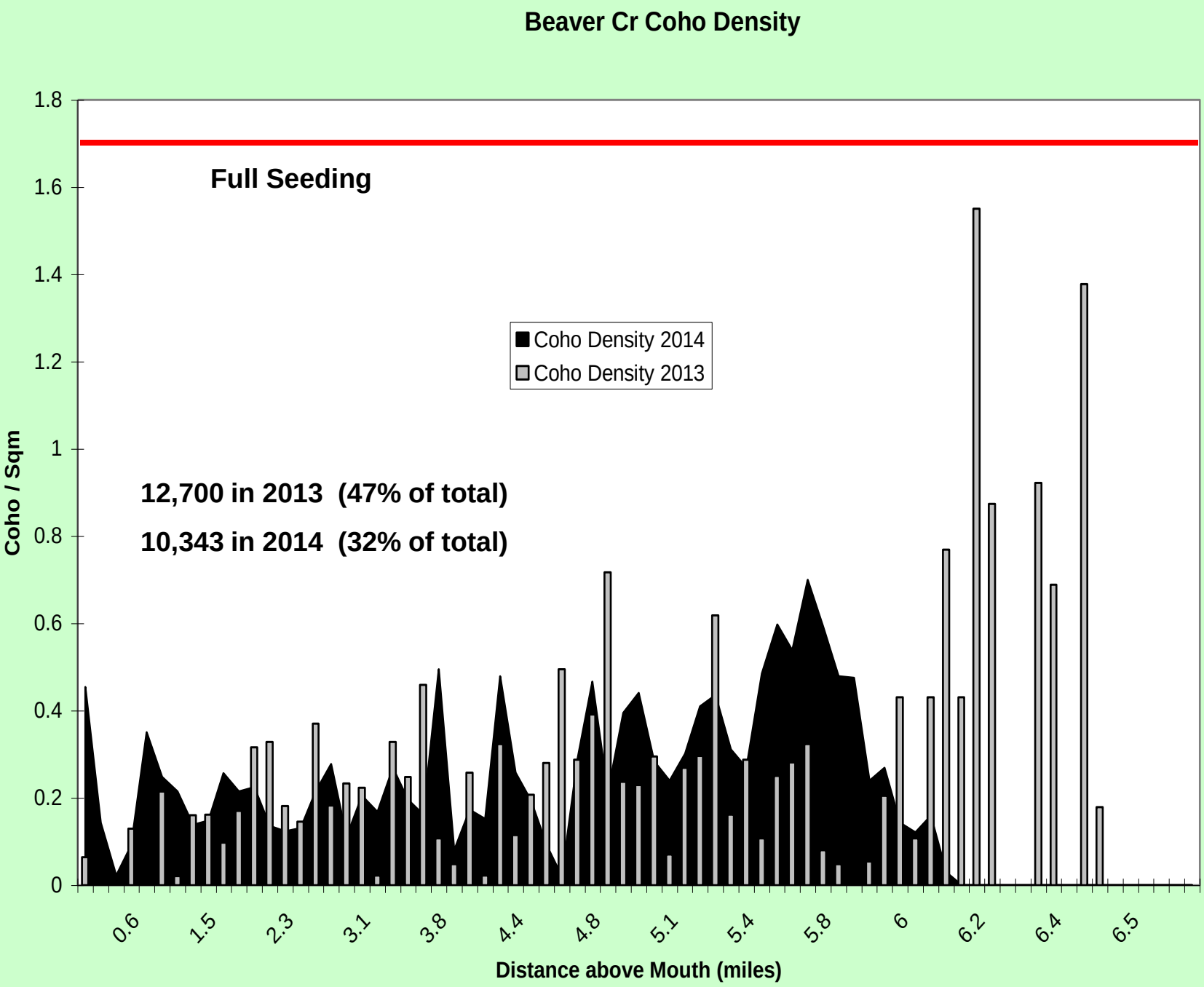
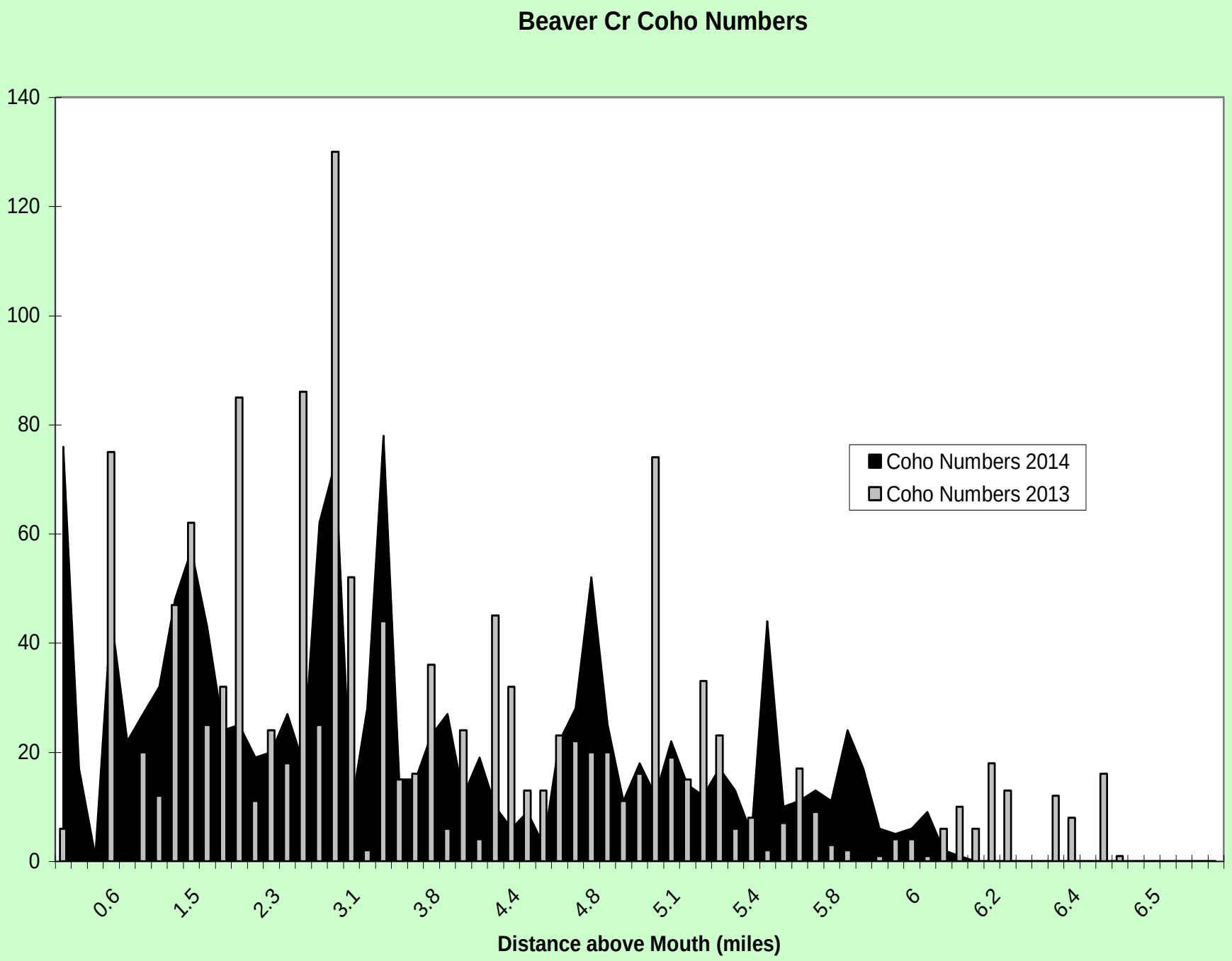
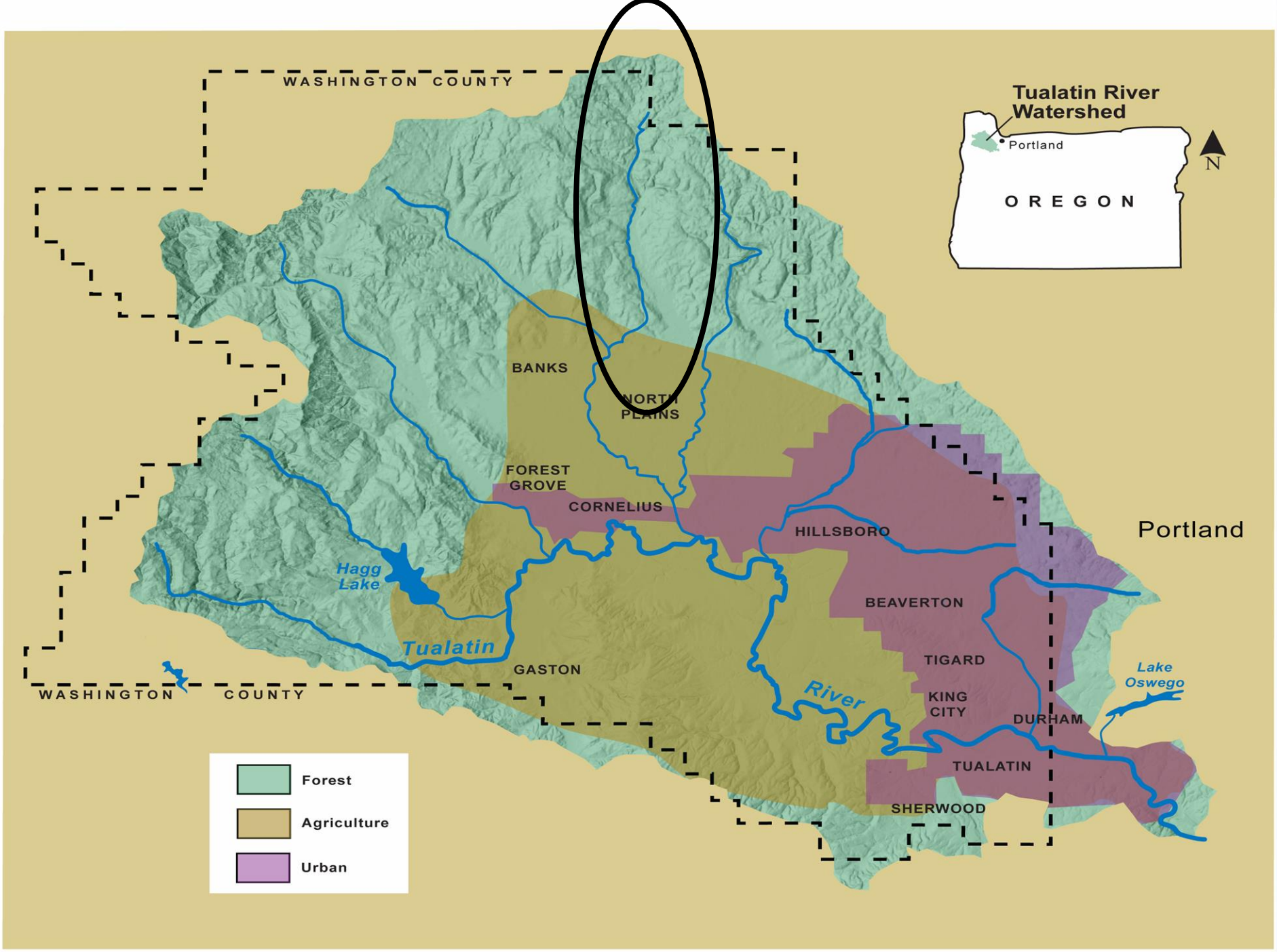


Fig. 3–2
Anadromous Fish
Distribution
Beaver Cr
Natural Juvenile barrier
Balm Grove Dam
Timber
Buxton
Manning
Glenwood
Gales Creek
Balm Grove
Thatcher
Forest Grove
North Fork
South Fork
Beaver Cr.
Bateman Cr.
Gales Creek
Strassel Cr.
West Fork Dairy Creek
Iller Creek
Clear Creek
Scoggins Creek
Roderick Cr.
Henry
Hagg
Lake
Legend
Species
Total Linear Habitat
Coho 38.4 miles
Steelhead 37.1 miles
Resident Fish 71.1 miles
Known impediments to fish passage
Data Source: ODFW, 1997
0 1 2 3 4 5
Miles
Interrain Pacific


Beaver Cr Coho Density
Full Seeding
Coho Density 2014
Coho Density 2013
12,700 in 2013 (47% of total)
10,343 in 2014 (32% of total)
Coho / Sqm
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.6
1.5
2.3
3.1
3.8
4.4
4.8
5.1
5.4
5.8
6
6.2
6.4
6.5
Distance above Mouth (miles)


Beaver Cr Coho Numbers
140
120
100
80
60
40
20
0
Coho Numbers 2014
Coho Numbers 2013
0.6
1.5
2.3
3.1
3.8
4.4
4.8
5.1
5.4
5.8
6
6.2
6.4
6.5
Distance above Mouth (miles)


WASHINGTON COUNTY
Tualatin River Watershed
Portland
OREGON
N
BANKS
NORTH PLAINS
FOREST GROVE
CORNELIUS
HILLSBORO
Portland
Hagg Lake
BEAVERTON
Tualatin
TIGARD
GASTON
Lake Oswego
River
KING CITY
DURHAM
WASHINGTON COUNTY
TUALATIN
SHERWOOD
Forest
Agriculture
Urban

(Table 11) 2013 Expanded EF Dairy Sub-basin Estimates

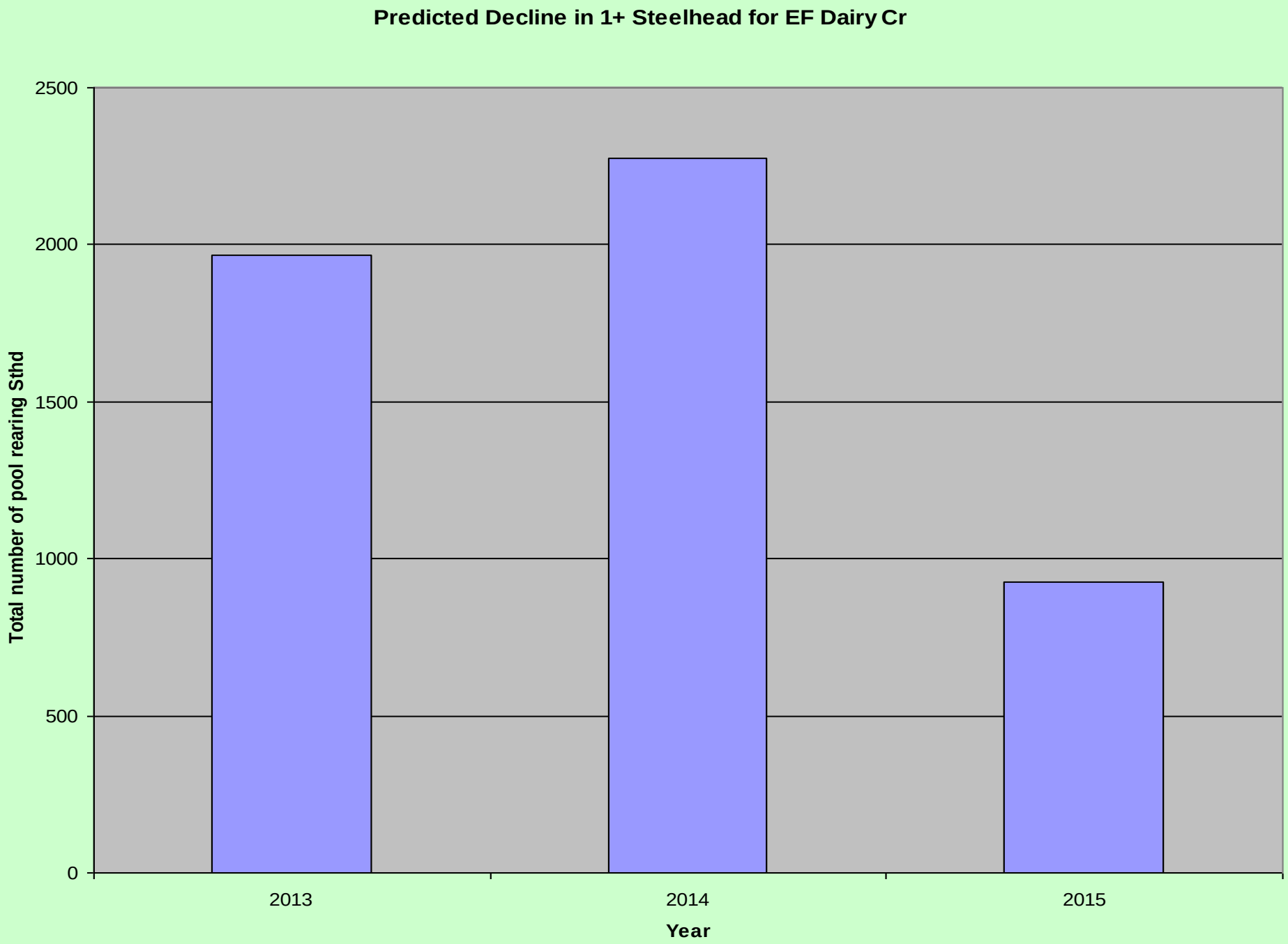
Stream	Coho	%	0+	%	Sthd	%	Cut	%
EF Dairy	35,175	94.8	8,180	65.5	1,950	99.2	2635	69.8
Side Channel A	234		9					
Side Channel B	284		25				6	
Side Channel C	75		5					
Big Canyon	163		65				30	
Campbell	388	1	1,280	10.2			280	7.4
Denny	419	1.1	1,205	9.6	5		285	7.5
Murtaugh	150		125	1	10		180	4.8
Panther			130	1			20	
Plentywater	7		135	1.1			40	1.1
Rock	219		1,095	8.8			265	7
Roundy	6.25		195	1.6			35	
Trib A	6.25		40					
Inventory Total	**37,124**		**12,489**		**1,965**		**3,776**	

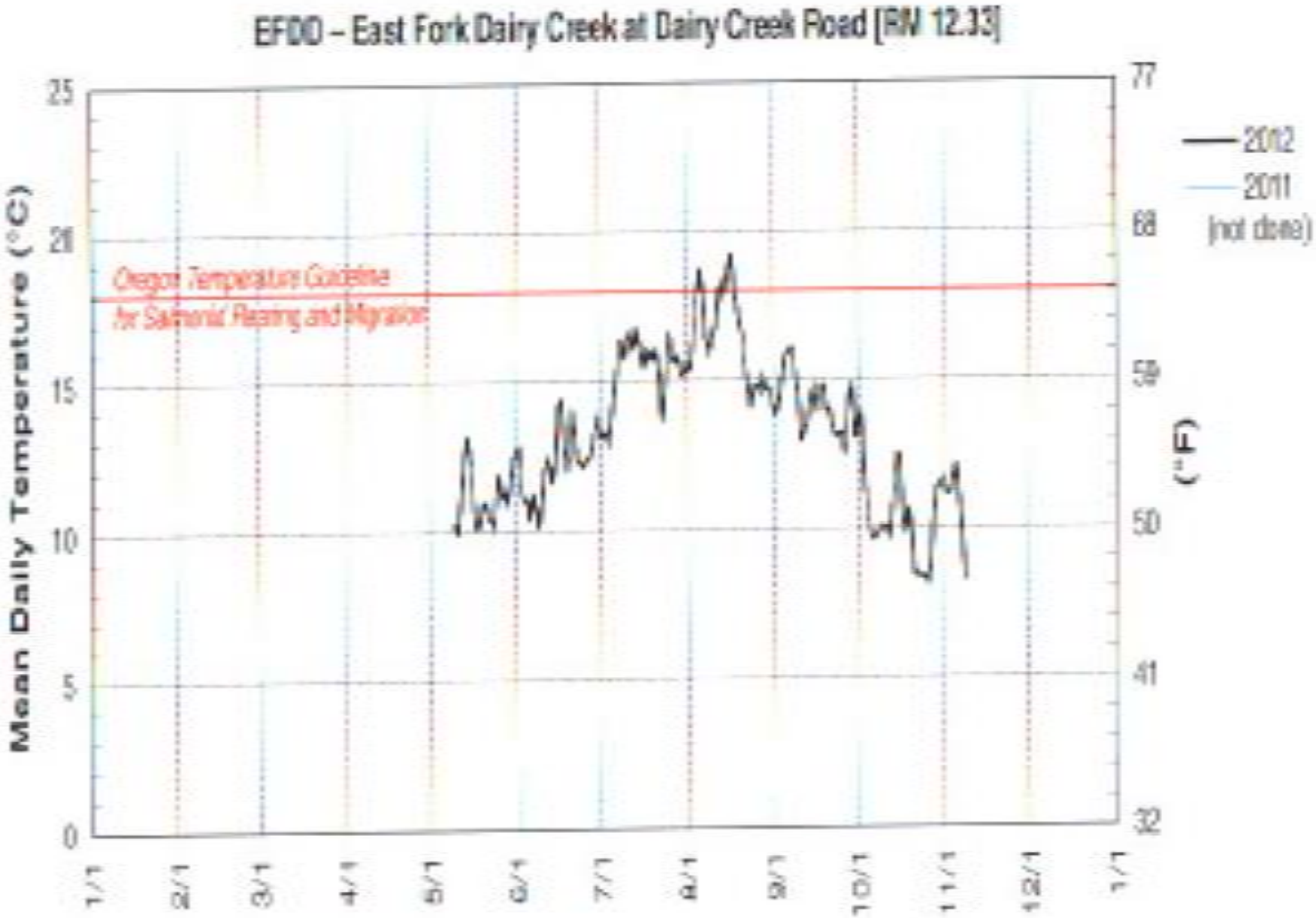
- Percent contributions are indicated for only those streams that contributed greater than 1% of the total.
- 20% visual bias included for coho expansion

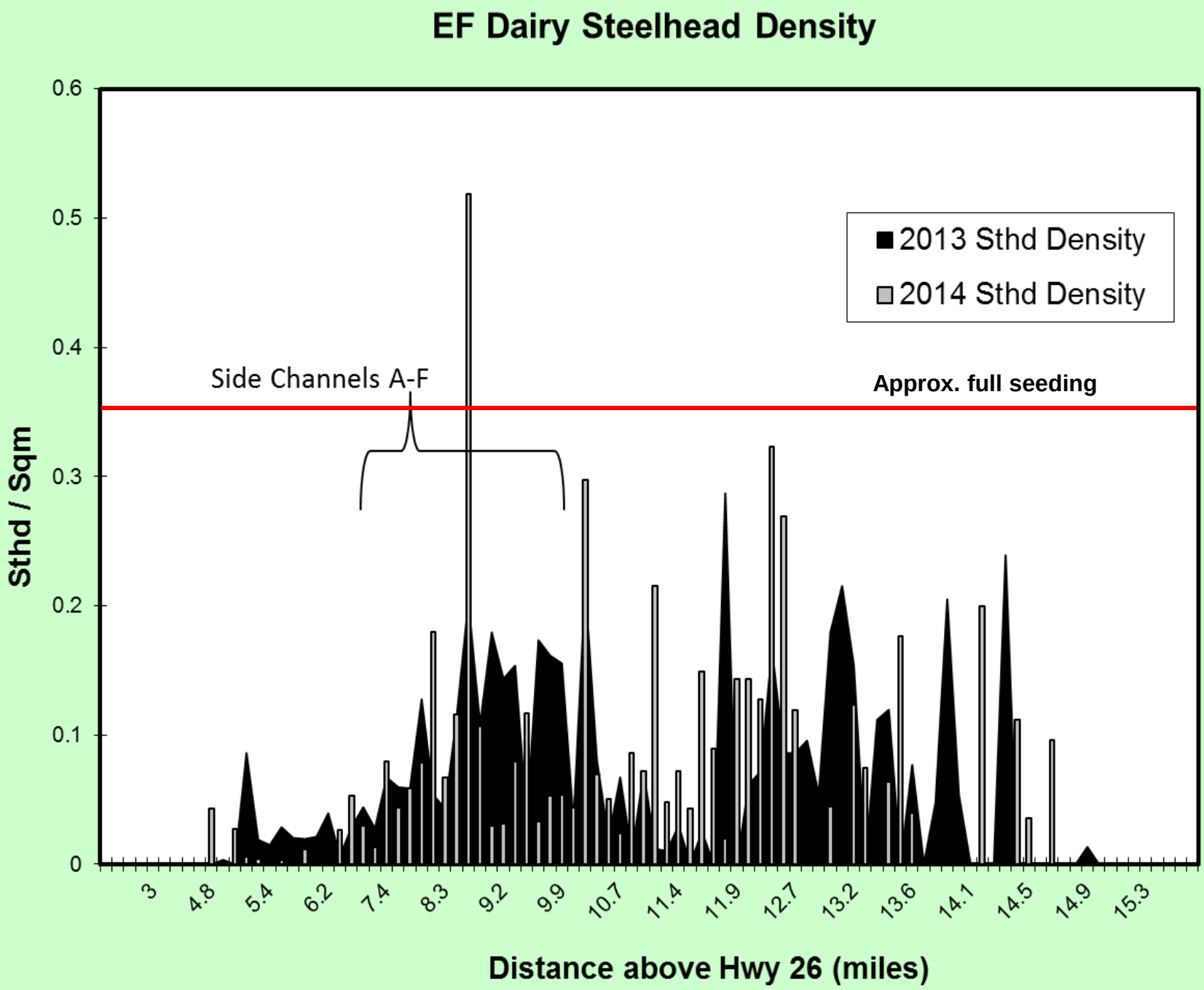
(Table 12) 2014 Expanded EF Dairy Sub-basin Estimates

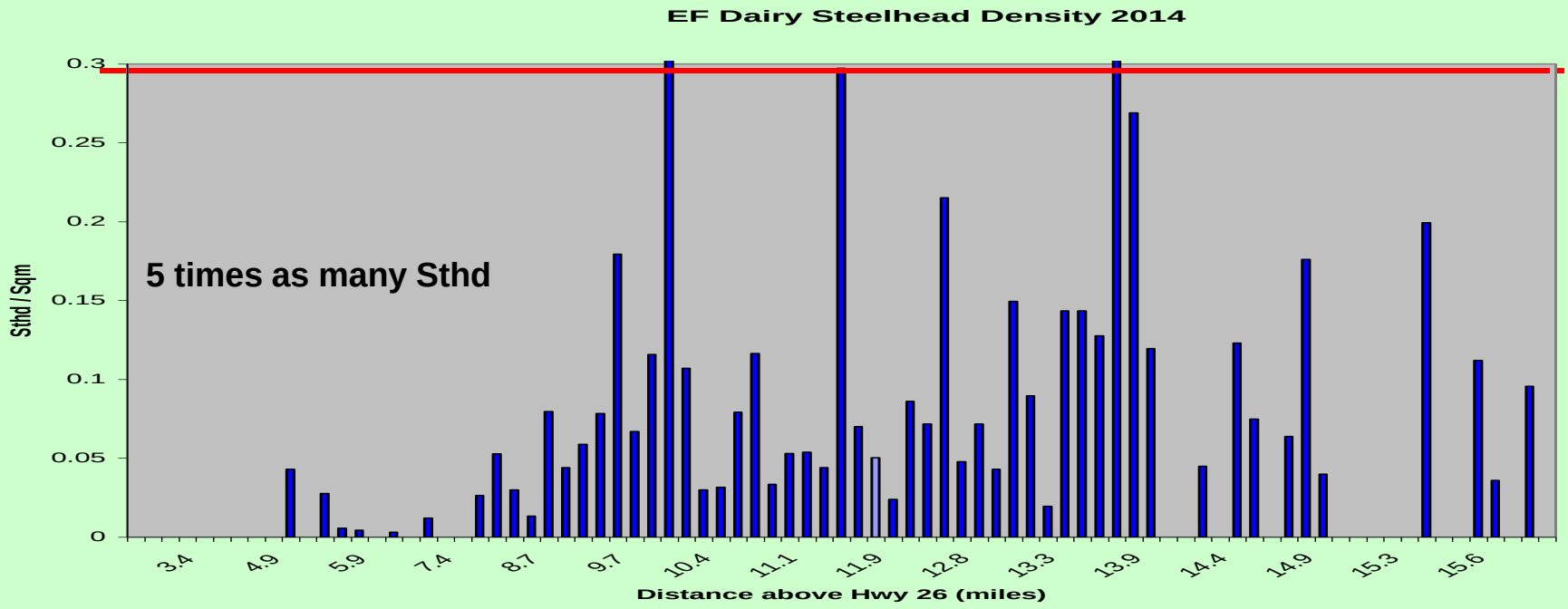
Stream	Coho	%	0+	%	Sthd	%	Cut	%
EF Dairy	26,188	91	3,595	70.8	2,265	99.5	2,680	78
Side Channel A	602	2.1	3					
Side Channel B	180		22		10		34	1
Side Channel C	123		4				10	
Side Channel D	240		4				27	
Side Channel E	218							
Side Channel F	220		3		1		6	
Campbell			415	8.2			225	6.5
Denny	813	2.8	340	6.7			200	5.8
Murtaugh	88		55	1.1			30	
Panther			65	1.3			60	1.7
Plentywater	88		70	1.4			35	
Rock	19		440	8.7			120	3.5
Roundy			65	1.3			10	
Inventory Total	**28,778**		**5,081**		**2,276**		**3,437**	

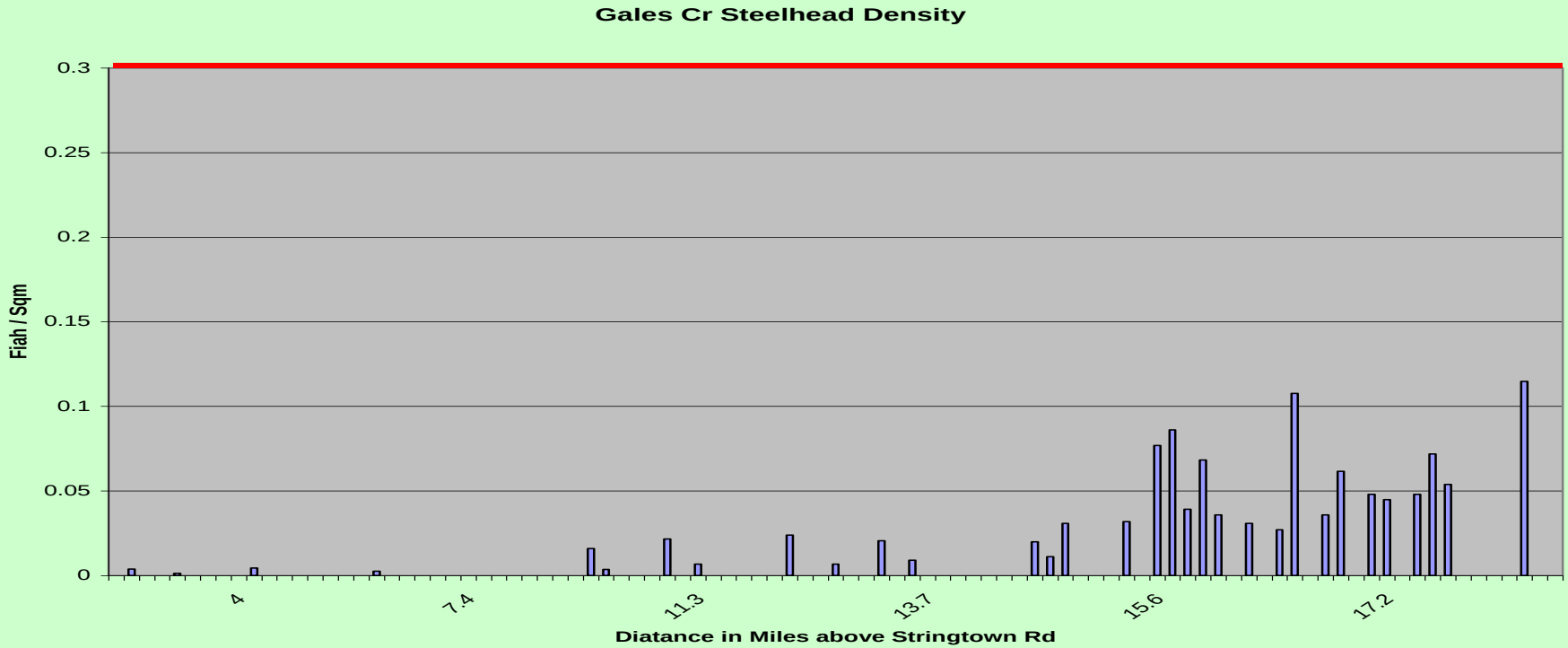
- Percent contributions are indicated for only those streams that contributed greater than 1% of the total.


Predicted Decline in 1+ Steelhead for EF Dairy Cr
Total number of pool rearing Sthd
2500
2000
1500
1000
500
0
2013
2014
2015
Year

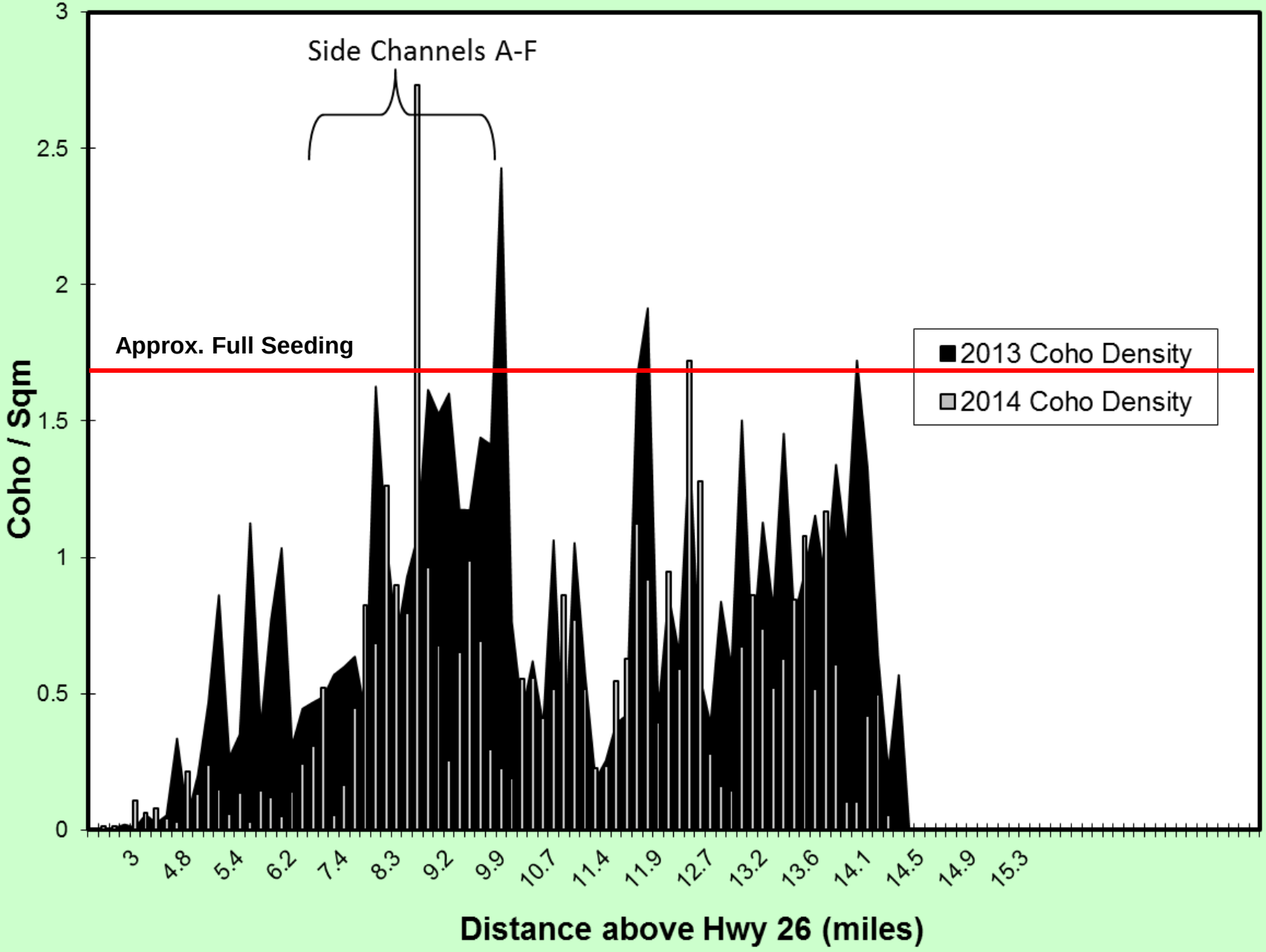

EFDD – East Fork Dairy Creek at Dairy Creek Road [RM 12.33]
Mean Daily Temperature (°C)
(°F)
Oregon Temperature Guideline
for Salmonid Rearing and Migration
2012
2011
(not done)
25
20
15
10
5
0
77
68
59
50
41
32
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
1/1

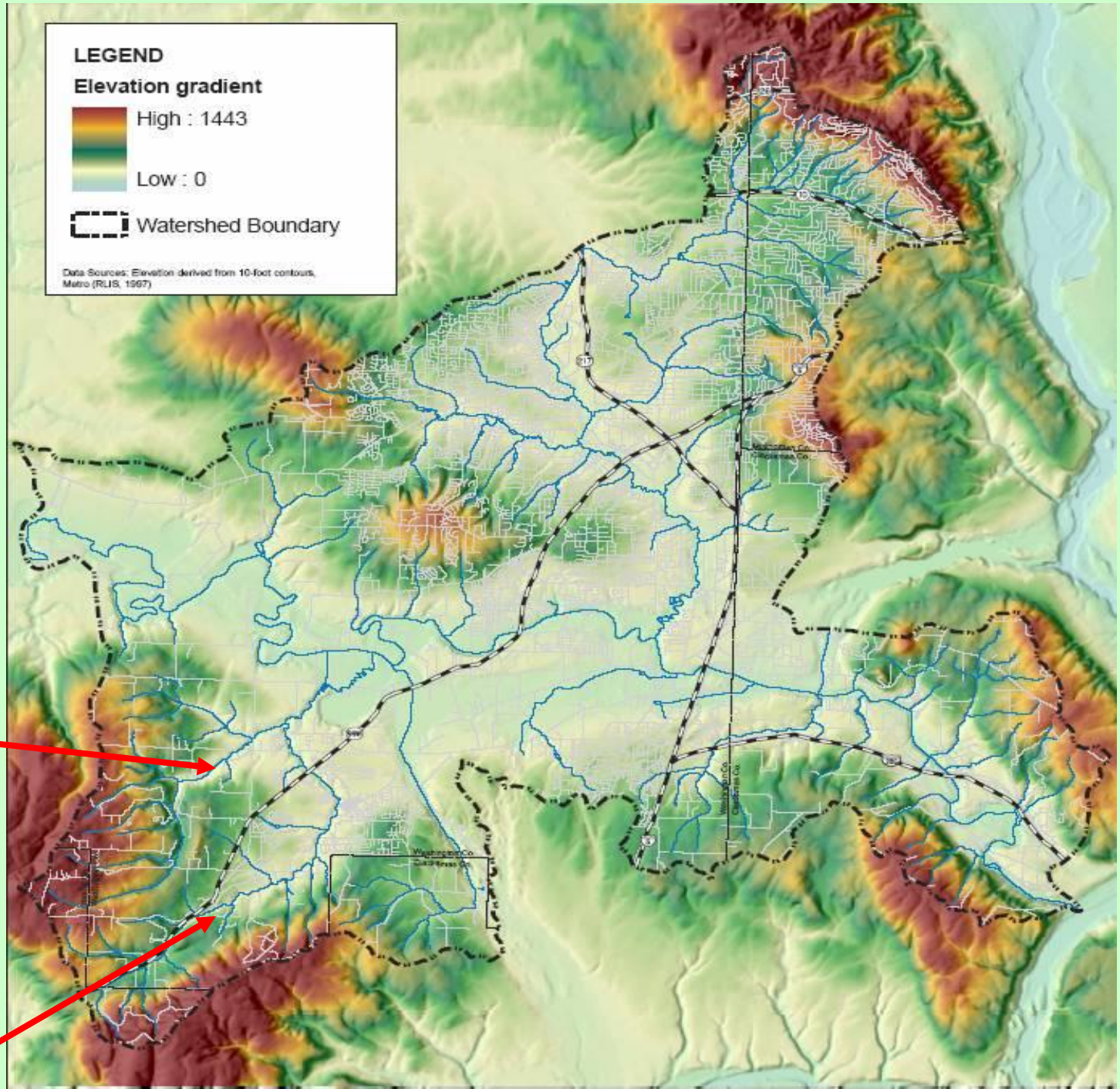

EF Dairy Steelhead Density
0.6
0.5
0.4
0.3
0.2
0.1
0
Sthd / Sqm
2013 Sthd Density
2014 Sthd Density
Side Channels A-F
Approx. full seeding
3
4.8
5.4
6.2
7.4
8.3
9.2
9.9
10.7
11.4
11.9
12.7
13.2
13.6
14.1
14.5
14.9
15.3
Distance above Hwy 26 (miles)


EF Dairy Steelhead Density 2014
5 times as many Sthd
Sthd / Sqm
0.3
0.25
0.2
0.15
0.1
0.05
0
3.4
4.9
5.9
7.4
8.7
9.7
10.4
11.1
11.9
12.8
13.3
13.9
14.4
14.9
15.3
15.6
Distance above Hwy 26 (miles)


Gales Cr Steelhead Density
Fiah / Sqm
0.3
0.25
0.2
0.15
0.1
0.05
0
4
7.4
11.3
13.7
15.6
17.2
Diatance in Miles above Stringtown Rd

EF Dairy Coho Density



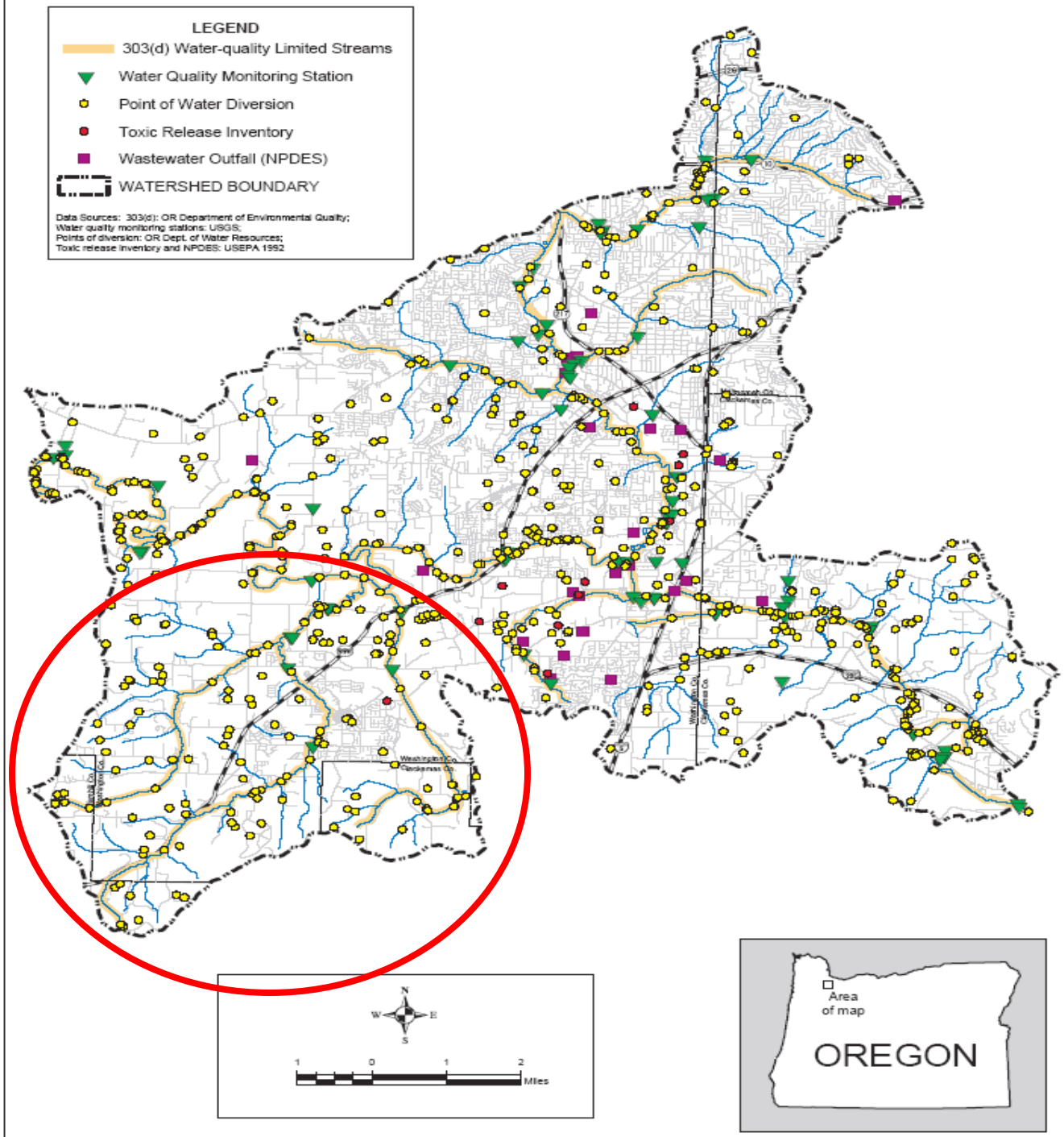


Chicken

Cedar

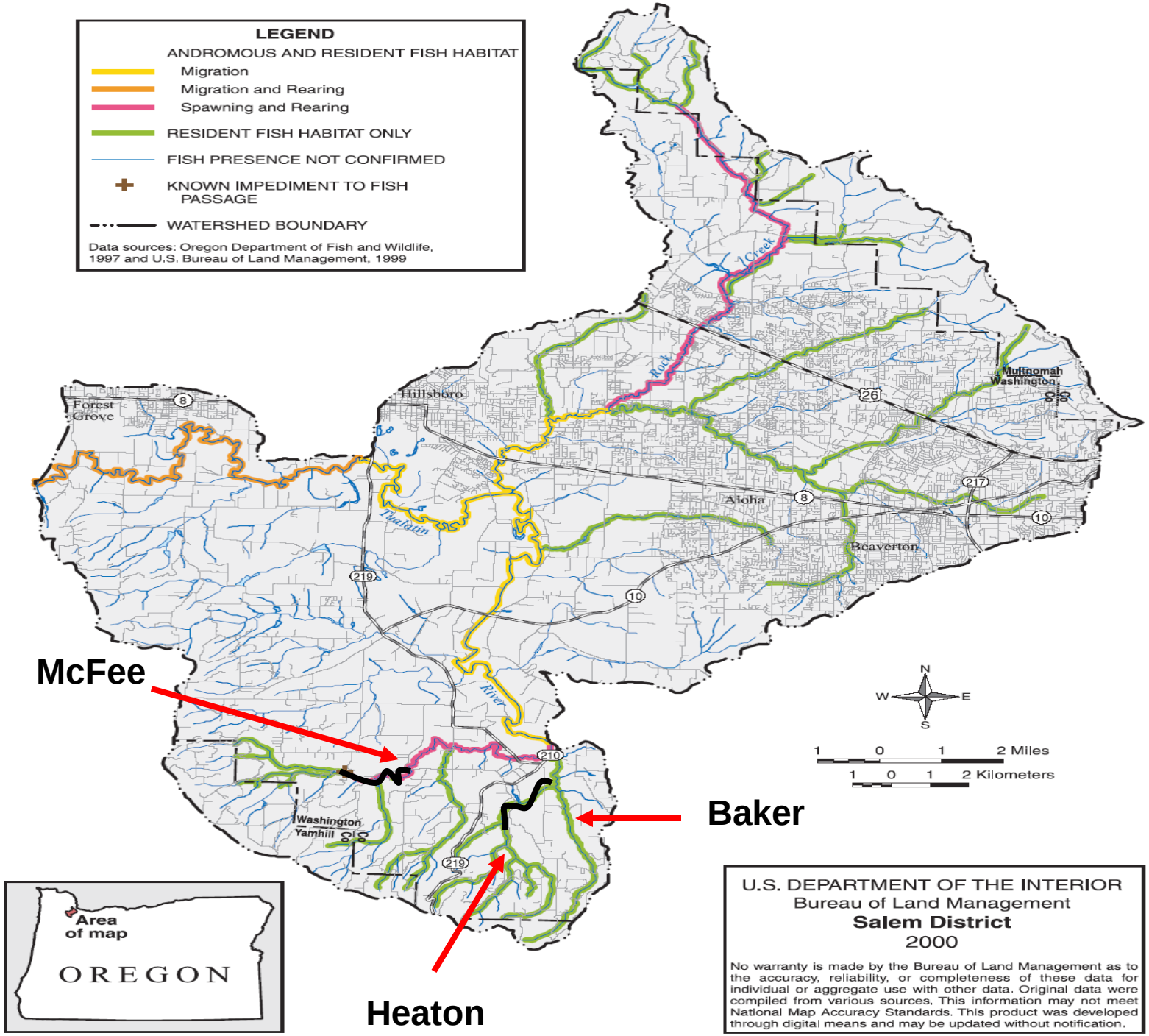
(Table 13) 2014 Expanded Chicken and McFee Subbasin Estimates

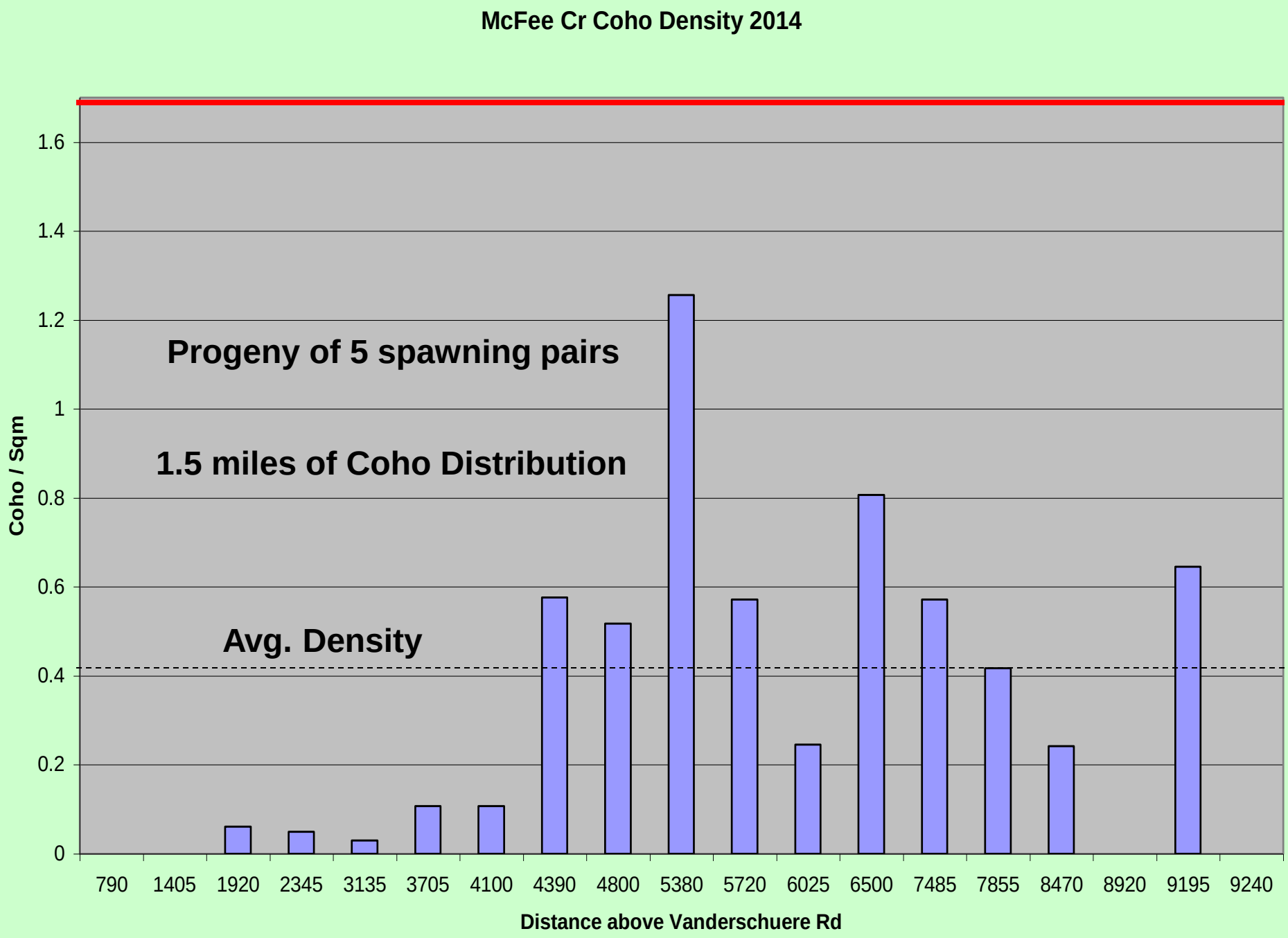
Stream	Coho	%	0+	%	Cut	%
Chicken	**13**		25	9.8		
Cedar			20	7.8	10	2.5
West Fork Chicken						
McFee	**1181**	**58.5**	10	3.9	**150**	**37**
Gulf Canyon			25	9.8	**25**	**6.2**
Trib A			**55**	**21.6**	15	3.7
Heaton	**819**	**40.6**	**60**	**23.5**	**180**	**44.4**
Baker						
Fir Clearing			5	2		
Trib A	6		**55**	**21.6**	25	6.2
Inventory total	**2019**		**255**		**405**	


LEGEND
303(d) Water-quality Limited Streams
Water Quality Monitoring Station
Point of Water Diversion
Toxic Release Inventory
Wastewater Outfall (NPDES)
WATERSHED BOUNDARY
Data Sources: 303(d): OR Department of Environmental Quality;
Water quality monitoring stations: USGS;
Points of diversion: OR Dept. of Water Resources;
Toxic release inventory and NPDES: USEPA 1992
N
W
E
S
1
0
1
2
Miles
Area
of map
OREGON

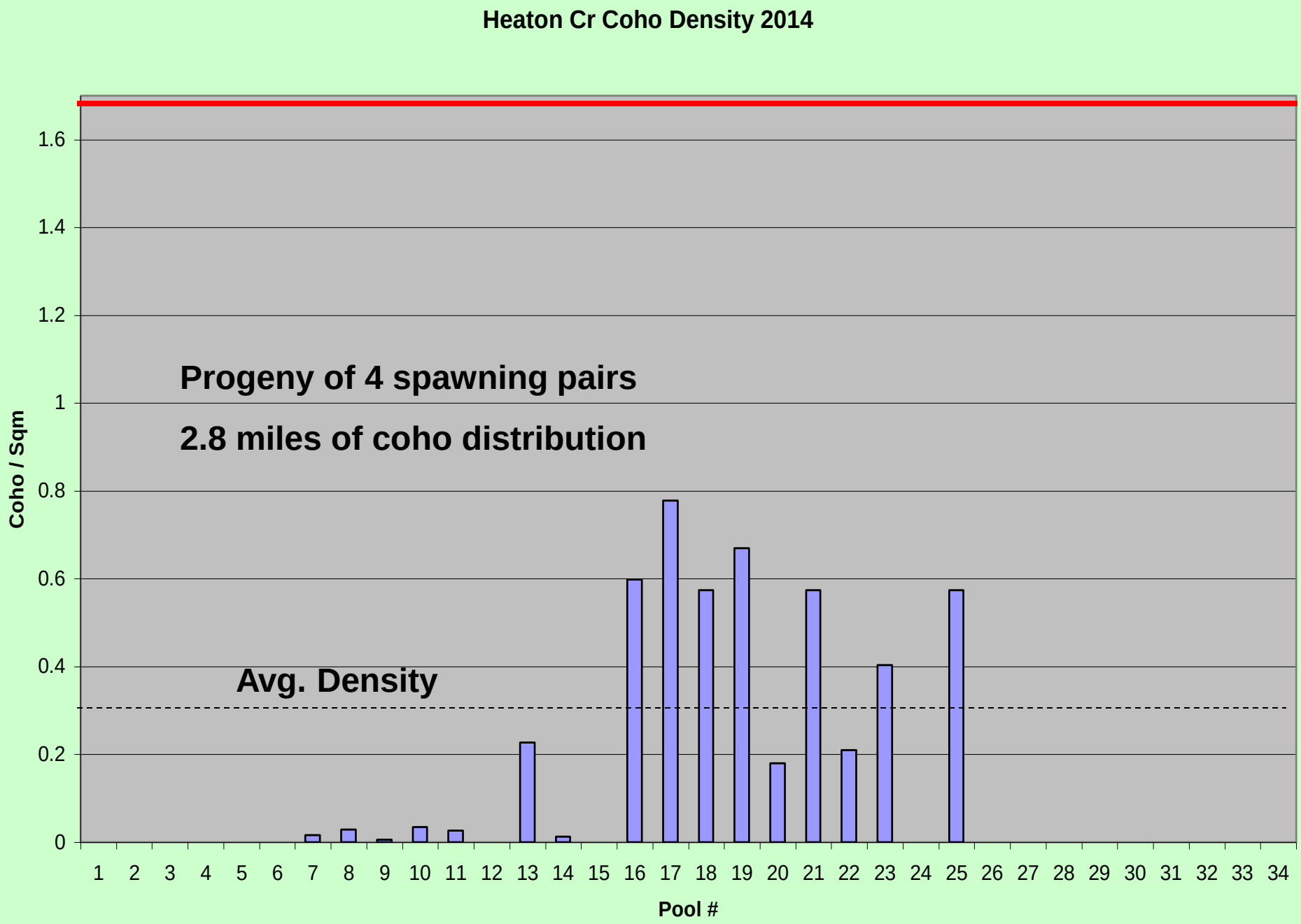
(Table 13) 2014 Expanded Chicken and McFee Subbasin Estimates

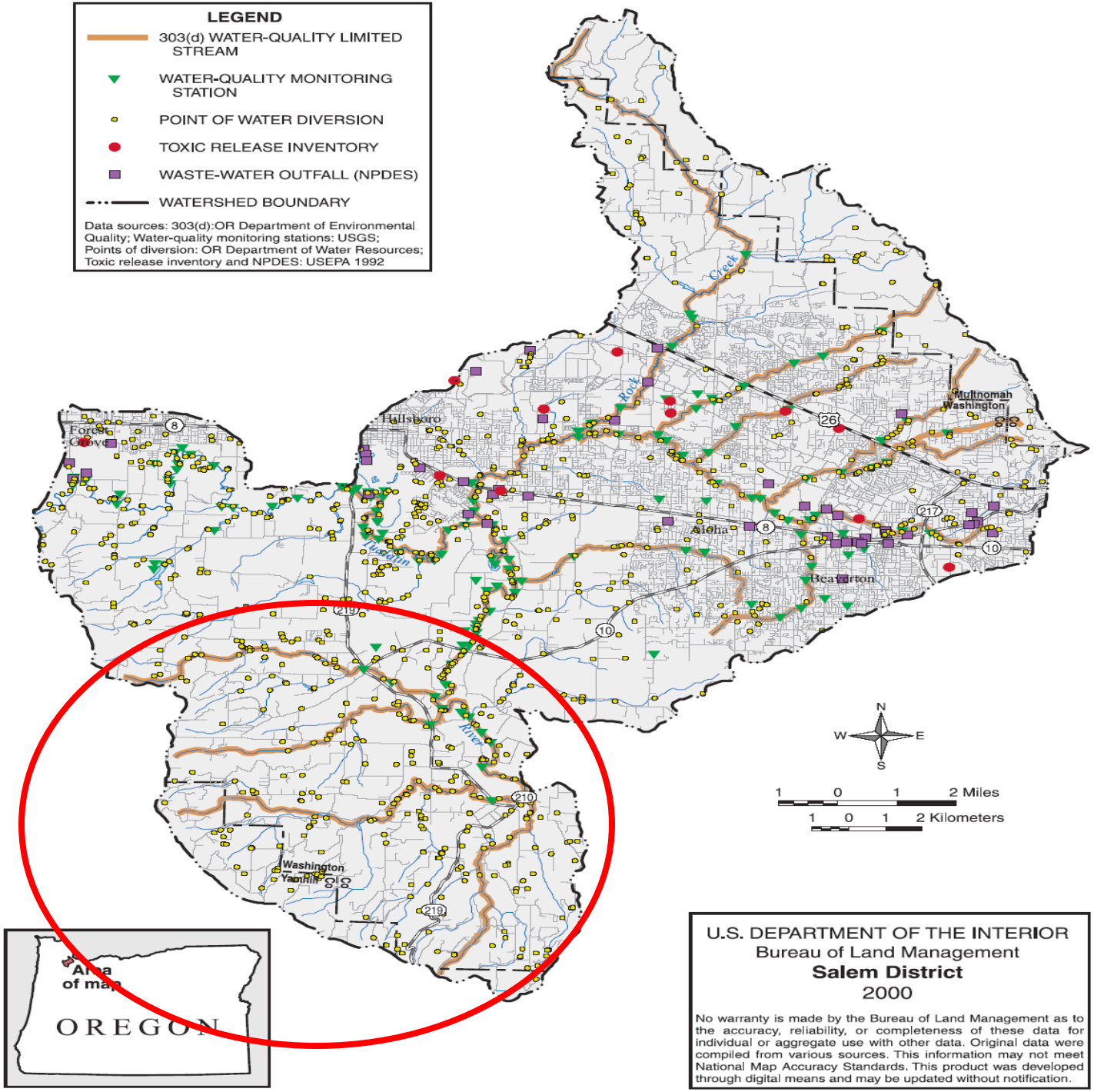
Stream	Coho	%	0+	%	Cut	%
Chicken	**13**		25	9.8		
Cedar			20	7.8	10	2.5
West Fork Chicken						
McFee	**1181**	**58.5**	10	3.9	**150**	**37**
Gulf Canyon			25	9.8	**25**	**6.2**
Trib A			**55**	**21.6**	15	3.7
Heaton	**819**	**40.6**	**60**	**23.5**	**180**	**44.4**
Baker						
Fir Clearing			5	2		
Trib A	6		**55**	**21.6**	25	6.2
Inventory total	**2019**		**255**		**405**	


LEGEND
ANDROMOUS AND RESIDENT FISH HABITAT
Migration
Migration and Rearing
Spawning and Rearing
RESIDENT FISH HABITAT ONLY
FISH PRESENCE NOT CONFIRMED
KNOWN IMPEDIMENT TO FISH PASSAGE
WATERSHED BOUNDARY
Data sources: Oregon Department of Fish and Wildlife, 1997 and U.S. Bureau of Land Management, 1999
Forest Grove
Hillsboro
Aloha
Beaverton
Multnomah
Washington
Washington
Yamhill
Rock Creek
Tualatin River
McFee
Baker
Heaton
N
W
E
S
1 0 1 2 Miles
1 0 1 2 Kilometers
Area of map
OREGON
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Salem District
2000
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.


McFee Cr Coho Density 2014
Progeny of 5 spawning pairs
1.5 miles of Coho Distribution
Avg. Density
Coho / Sqm
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
790
1405
1920
2345
3135
3705
4100
4390
4800
5380
5720
6025
6500
7485
7855
8470
8920
9195
9240
Distance above Vanderschuere Rd

Lower 4.5 miles of McFee


Heaton Cr Coho Density 2014
Progeny of 4 spawning pairs
2.8 miles of coho distribution
Avg. Density
Coho / Sqm
Pool #
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Salem District
2000

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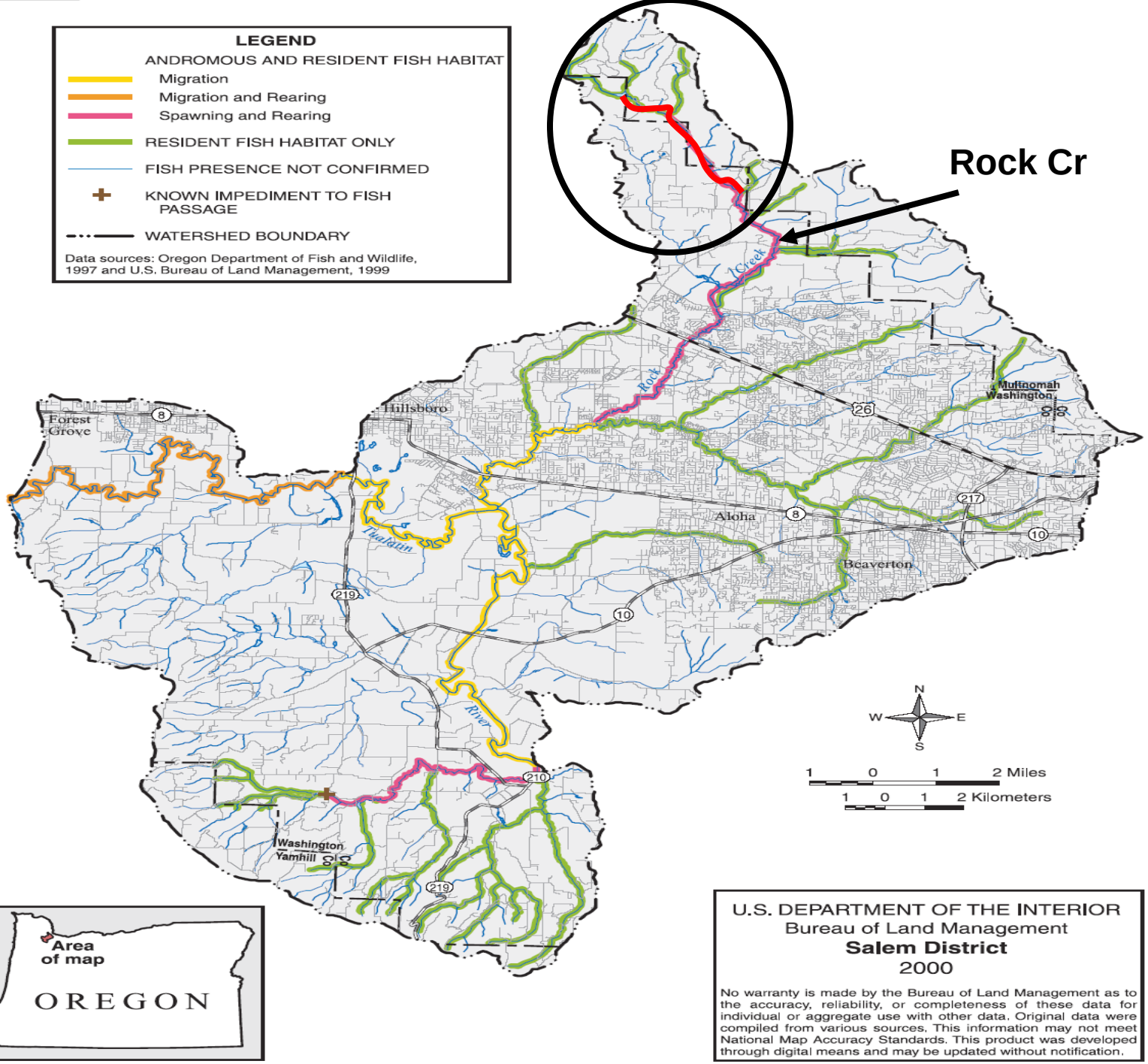
LEGEND
ANDROMOUS AND RESIDENT FISH HABITAT
Migration
Migration and Rearing
Spawning and Rearing
RESIDENT FISH HABITAT ONLY
FISH PRESENCE NOT CONFIRMED
KNOWN IMPEDIMENT TO FISH PASSAGE
WATERSHED BOUNDARY
Data sources: Oregon Department of Fish and Wildlife, 1997 and U.S. Bureau of Land Management, 1999
Rock Cr
Rock Creek
Forest Grove
Hillsboro
Aloha
Beaverton
Multnomah
Washington
Washington
Yamhill
Tualatin
River
N
W
E
S
1 0 1 2 Miles
1 0 1 2 Kilometers
Area of map
OREGON
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Salem District
2000
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

(Table 7) Expanded Sub-basin Estimates for 2014

Subbasin	Coho	%	0+	%	Sthd	%	Cut	%	Chin	%
Chicken	13		45				10			
McFee	2006		210				395			
Rock			20				105			
Inventory Total	**2019**		**275**				**510**			

- 20% visual bias included for coho expansions

3.3 miles of stream was inventoried

DEQ 303 d listed for lead, arsenic

and elevated temperature to RM 18.2

So much history

Urban development

Lowland agriculture

Livestock grazing

Upland industrial forestry (FP Act 1971)

Road construction

Water withdrawal

Splash damming and log drives

Agency directed stream clearing

Surface mining (gravel)

Dam construction

Restoration Targets

- Pick your battles

  *Access (**Balm Grove dam, ILer Cr Steps, Culverts on White and Beaver**)

  *Provide critical thermal refugia

  (**Side channel / floodplain enhancement Clear Cr, EF Dairy Cr**)

  (Riparian Planting for maximum impact White Cr, McFee Cr)

- Avoid Opportunistic Restoration

  * Develop a prioritized restoration plan

  * Stick to the Plan

- Focus on conserving remnant function first

  *Protect / Enhance existing cold water sources