

Population Size

Objective: Unbiased Estimates of Run Size and Spawning Abundance of Hatchery-origin and Wild-origin Pink and Chum Salmon in PWS for 2013 -- 2015

Population Size

Derivation:

A) Run Size (H) = Catch (H) + Spawning Abundance (H)

B) Run Size (W) = Catch (W) + Spawning Abundance (W)

C) Run Size (H) = Run Size \times Fraction comprised of hatchery salmon ($\equiv p$)

D) Run Size (W) = Run Size \times (1 - p)

E) Spawning Abundance (H) = Spawning Abundance \times Fraction hatchery salmon ($\equiv q$)

F) Spawning Abundance (W) = Spawning Abundance \times (1 - q)

G) Run Size \times p = Catch (H) + Spawning Abundance \times q

H) Run Size \times (1 - p) = Catch (W) + Spawning Abundance \times (1 - q)

Spawning Abundance = Function of C(H), C(W), p, and q

Population Size

Rack Returns, Cost Recovery,
and Common Property Fishery

Derivation:

A) Run Size (H) = Catch (H) + Spawning Abundance (H)

B) Run Size (W) = Catch (W) + Spawning Abundance (W)

C) Run Size (H) = Run Size (W) × Fraction of hatchery salmon ($\equiv p$)

D) Run Size (W) = Run Size (H) × (1 - p)

E) Spawning Abundance (H) = Spawning Abundance (W) × Fraction hatchery salmon ($\equiv q$)

F) Spawning Abundance (W) = Spawning Abundance (H) × (1 - q)

G) Run Size × p = Catch (H) + Spawning Abundance × q

H) Run Size × (1 - p) = Catch (W) + Spawning Abundance × (1 - q)

Spawning Abundance = Function of C(H), C(W), p, and q

Common Property
Fishery

Population Size

Derivation:

A) Run Size (H) = Catch (H) + Spawning Abundance (H)

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C) Run Size (H) = Run Size \times Fraction comprised of hatchery salmon ($\equiv p$)

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E) Spawning Abundance (H) = Spawning Abundance \times Fraction hatchery salmon ($\equiv q$)

F) Spawning Abundance (W) = Spawning Abundance \times (1 - q)

G) Run Size $\times p$ = Catch (H) + Spawning Abundance $\times q$

H) Run Size \times (1 - p) = Catch (W) + Spawning Abundance \times (1 - q)

Spawning Abundance = Function of C(H), C(W), p, and q

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A) $\text{Run Size (H)} = \text{Catch (H)} + \text{Spawning Abundance (H)}$

B) $\text{Run Size (W)} = \text{Catch (W)} + \text{Spawning Abundance (W)}$

C) $\text{Run Size (H)} = \text{Run Size} \times \text{Fraction comprised of hatchery salmon } (\equiv p)$

D) $\text{Run Size (W)} = \text{Run Size} \times (1 - p)$

E) $\text{Spawning Abundance (H)} = \text{Spawning Abundance} \times \text{Fraction hatchery salmon } (\equiv q)$

F) $\text{Spawning Abundance (W)} = \text{Spawning Abundance} \times (1 - q)$

G) $\text{Run Size} \times p = \text{Catch (H)} + \text{Spawning Abundance} \times q$

H) $\text{Run Size} \times (1 - p) = \text{Catch (W)} + \text{Spawning Abundance} \times (1 - q)$

Spawning Abundance = Function of $C(H)$, $C(W)$, p , and q

Population Size

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A) $\text{Run Size (H)} = \text{Catch (H)} + \text{Spawning Abundance (H)}$

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E) $\text{Spawning Abundance (H)} = \text{Spawning Abundance} \times \text{Fraction hatchery salmon } (\equiv q)$

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G) $\text{Run Size} \times p = \text{Catch (H)} + \text{Spawning Abundance} \times q$

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Spawning Abundance = Function of $C(H)$, $C(W)$, p , and q

Population Size

Derivation:

A) Run Size (H) = Catch (H) + Spawning Abundance (H)

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D) Run Size (W) = Run Size \times (1 - p)

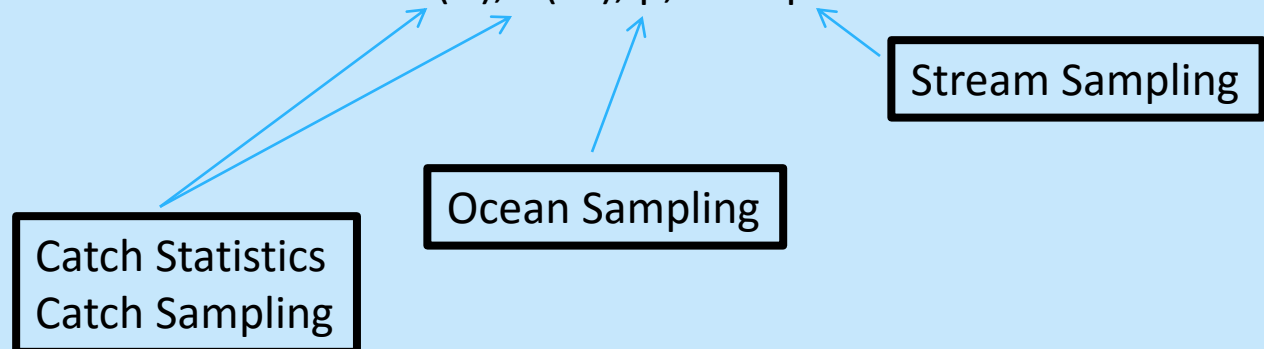
E) Spawning Abundance (H) = Spawning Abundance \times Fraction hatchery salmon ($\equiv q$)

F) Spawning Abundance (W) = Spawning Abundance \times (1 - q)

G) Run Size \times p = Catch (H) + Spawning Abundance \times q

H) Run Size \times (1 - p) = Catch (W) + Spawning Abundance \times (1 - q)

Spawning Abundance = Function of C(H), C(W), p, and q



Preliminary Run Size Estimates – PWS Pink Salmon 2015

Key Inputs for 2015

	p	q	C_w	C_H
Estimate →	0.549	0.09557634	25,558,145	64,542,809
Variance →	0.0040000	0.00117818	940000000	940000000

Thousands of Pink Salmon

Year	Wild spawners	Hatchery spawners	Total spawners	Wild run	Hatchery run	Total run
2013	15,698	701	16,399	33,096	69,888	102,985
2014	5,130	741	5,872	6,960	42,757	49,718
2015	30,074	3,178	33,252	55,632	67,720	123,353

Preliminary Run Size Estimates – PWS Chum Salmon 2015

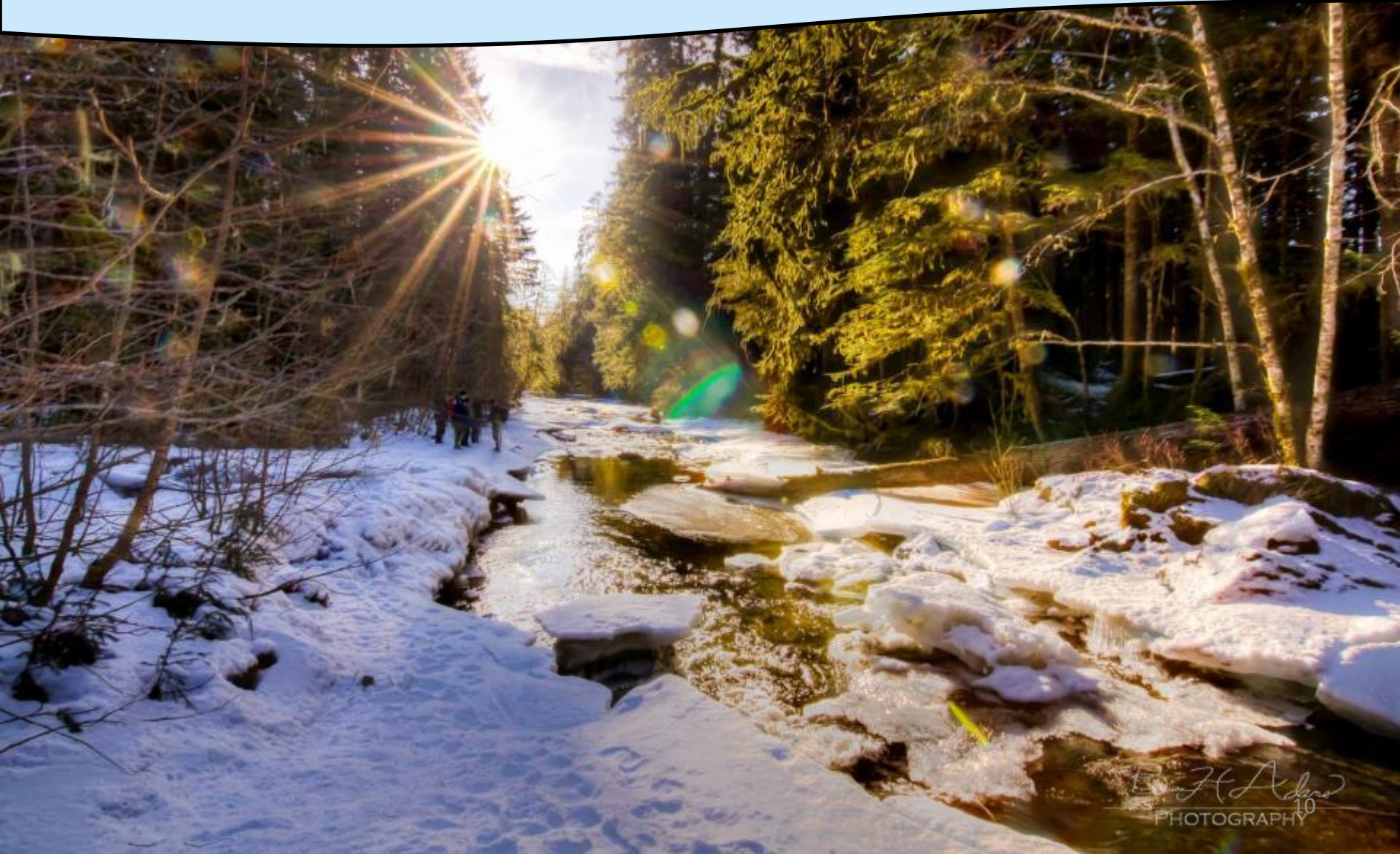
Key Inputs for 2015

	p	q	C_w	C_H
Estimate →	0.688	0.0308956	221,512	2,455,950
Variance →	0.0150000	0.00063121	940000000	940000000

Thousands of Chum Salmon

Year	Wild spawners	Hatchery spawners	Total spawners	Wild run	Hatchery run	Total run
2013	894	50	944	1,141	3,007	4,148
2014	925	49	975	1,175	1,228	2,404
2015	905	28	934	1,126	2,484	3,611

Alevin Sampling - 2015



Redd Sampling Technique



T.Kline/PWSSC Alevin sampling



T.Kline/PWSSC Alevin sampling



Stockdale Creek Positive Pink Alevin Samples by Section

2014

Section #	# of sample attempts	positive samples	% positive samples
1	98	11	11.2%
2	200	141	70.5%
3	142	67	47.2%
4	80	31	38.8%

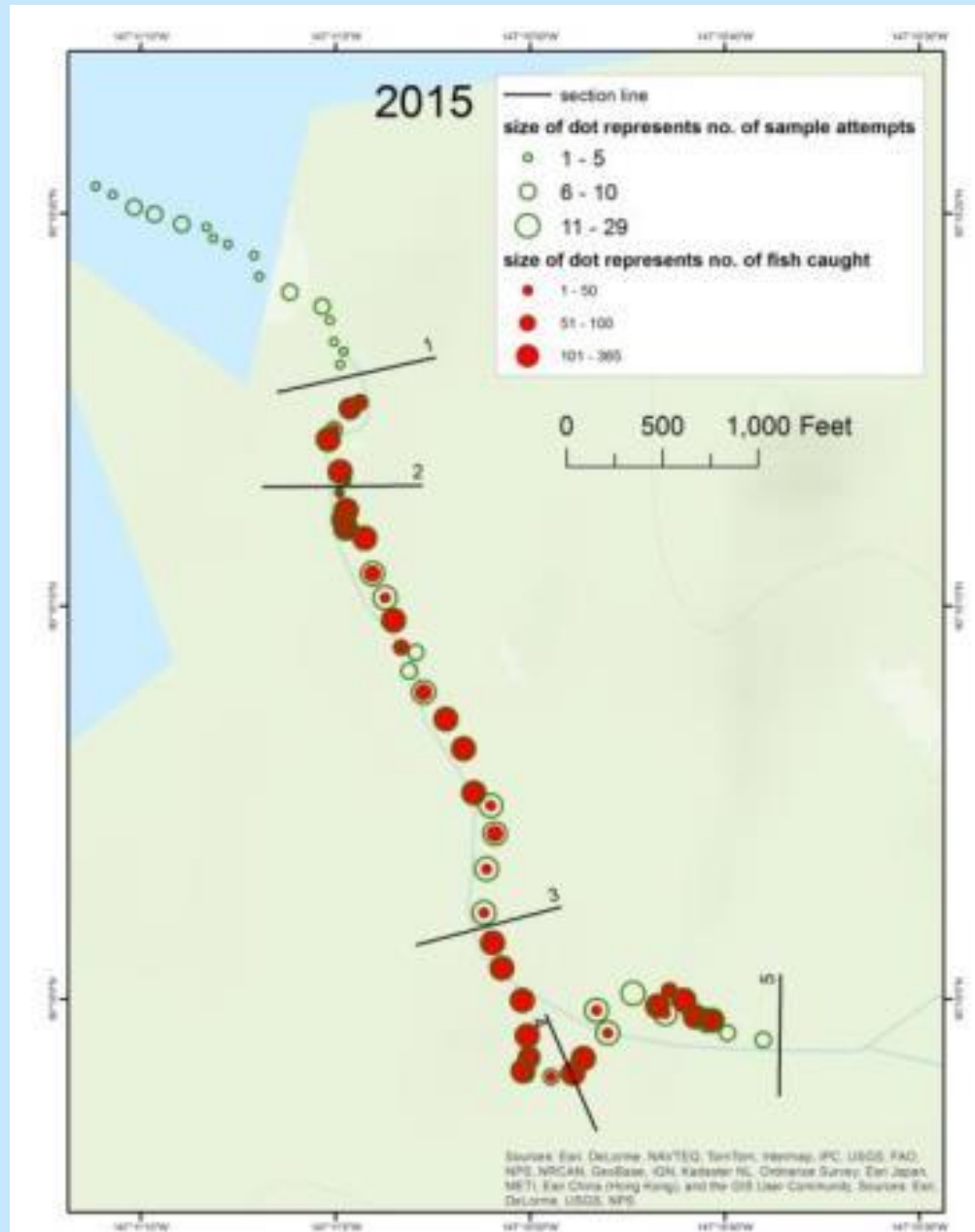
Legend

- Section 1 - Lower intertidal
- Section 2 - High tide
- Section 3 - Under ice
- Section 4 - Upper reach
- Ice extent



Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors

Stockdale Creek - 2015



2015 Stockdale Cr Pink Alevin

Section #	# of sample attempts	Avg pump time	positive samples	% positive samples	# Pink caught	# Pink collected	# Chum caught
1	73	47.9	0	0.0%	0	0	0
2	47	58	22	46.8%	388	228	0
3	265	57.5	111	41.9%	2425	1281	0
4	130	51.3	47	37.7%	893	657	0
5	205	49.7	70	34.1%	1332	853	0
Total	720	52.88	250	34.71%	5038	3019	0

2014 Fish Creek

— section line

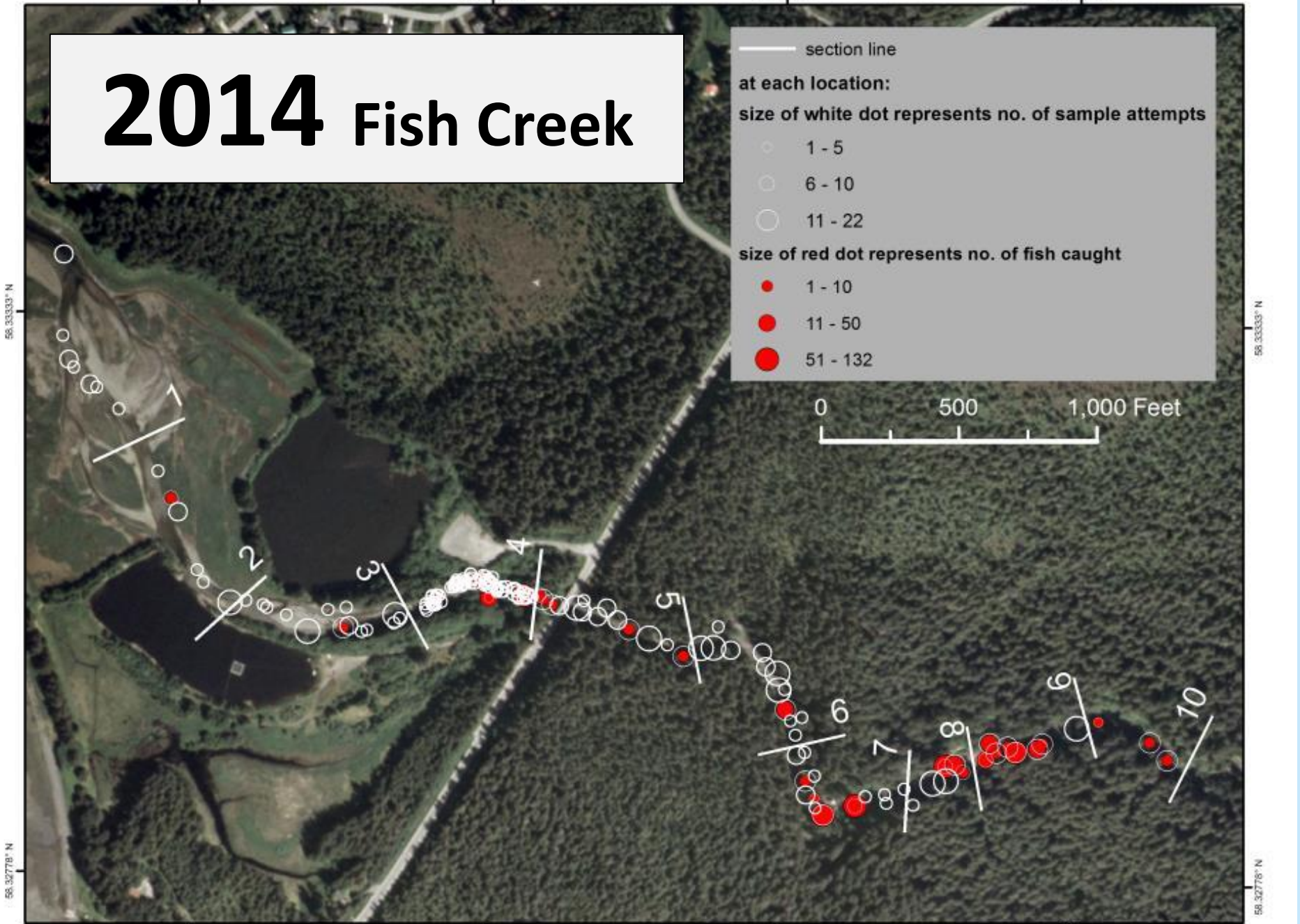
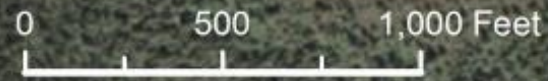
at each location:

size of white dot represents no. of sample attempts

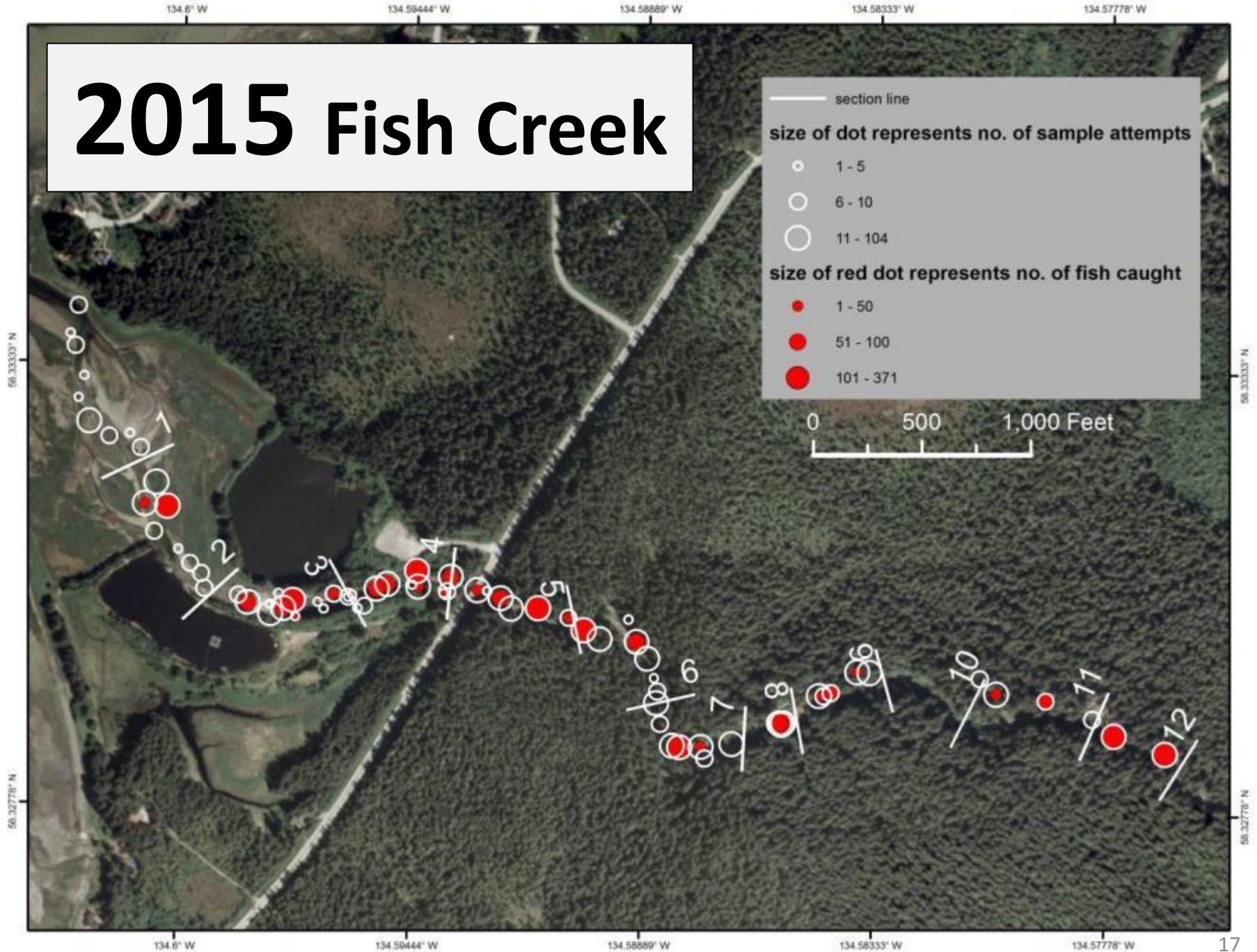
- 1 - 5
- 6 - 10
- 11 - 22

size of red dot represents no. of fish caught

- 1 - 10
- 11 - 50
- 51 - 132



2015 Fish Creek



2015 Fish Cr Chum Alevin

975 sample attempts (digs)

160 positive samples

Section #	# of sample attempts	Avg pump time	positive samples	% positive samples	# chum caught	# chum collected	#pink caught
1	35	32.7	0	0.0%	0	0	0
2	92	39.8	2	5.0%	122	37	318
3	105	54.4	16	29.4%	296	182	15
4	85	65.5	20	30.5%	559	331	170
5	95	69.8	17	24.4%	304	201	0
6	123	60.2	30	49.8%	481	379	26
7	93	60.1	15	25.0%	224	144	0
8	88	61.3	25	40.8%	511	223	5
9	109	52.3	11	21.0%	236	136	0
10	7	47.6	0	0.0%	0	0	0
11	29	45.1	2	4.4%	53	27	1
12	114	55.2	22	39.9%	457	325	56
Total	975	53.7	160	16.4%	3243	1985	591

Fish and Stockdale Creeks 2015

- Sampled February 24 –28 & March 11-16
 - Sampled longer stretch of stream
 - Good spatial coverage
- Alevins prevalent throughout
 - Exceptions:
 - Tide flat
 - Large substrate



Plans for 2016 Field Sampling

- PWS Streams
 - Fitness study – same streams -- visit daily with 2-3 people during peak
- SEAK streams
 - Fitness study – no sampling in 2017
- Carryover from 2015 = ~ \$225,000
- Costs 2016
 - Six streams, same effort, w charters \$600 K
 - Five streams, same effort, w charters \$550 K
 - Five streams, smaller crews, w charters \$525 K
 - Five streams, smaller crews, w camps \$495 K

