PROJECT CROOS
Collaborative Research on Oregon Ocean Salmon

GIS/GSI Prospects for Real-time Fishery Management

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See www.ProjectCROOS.com for completion report on this project

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- Industry Scientists
- Marketing
- Management
- Science

OREGON TROLL SALMON
QUALITY IS KING

Commercial Salmon Fishermen Job Opportunities

The Oregon Salmon Commission (OSC) with the Coastal Oregon Marine Experiment Station (COMES), Oregon Sea Grant, OSU Seafood Lab, and Oregon State University is working on a pilot project to collect and use genetic information to address the Klamath weak stock crisis for Oregon's ocean salmon fishery. This Collaborative Research on Oregon Ocean Salmon (CROOS) project, composed of Oregon-based fishermen and scientists, has applied to the Oregon Watershed Enhancement Board (OWEB) for funding the pilot project for this season. This funding is contingent on approval by the Legislative Emergency Board on June 23, 2006. If the funding is approved, the pilot project will take advantage of new genetic science technologies to gather more information on harvested stocks.

The project will consist of fishermen participating in sampling Chinook fin-clip tissue, scales and length (for aging), date, location, and other oceanographic data. Four vessels will use a digital technology system for datalogging individually harvested fish. The rest of the vessels will collect the data and record it using paper-based logbooks. Data from all sampled fish will be recorded and tracked
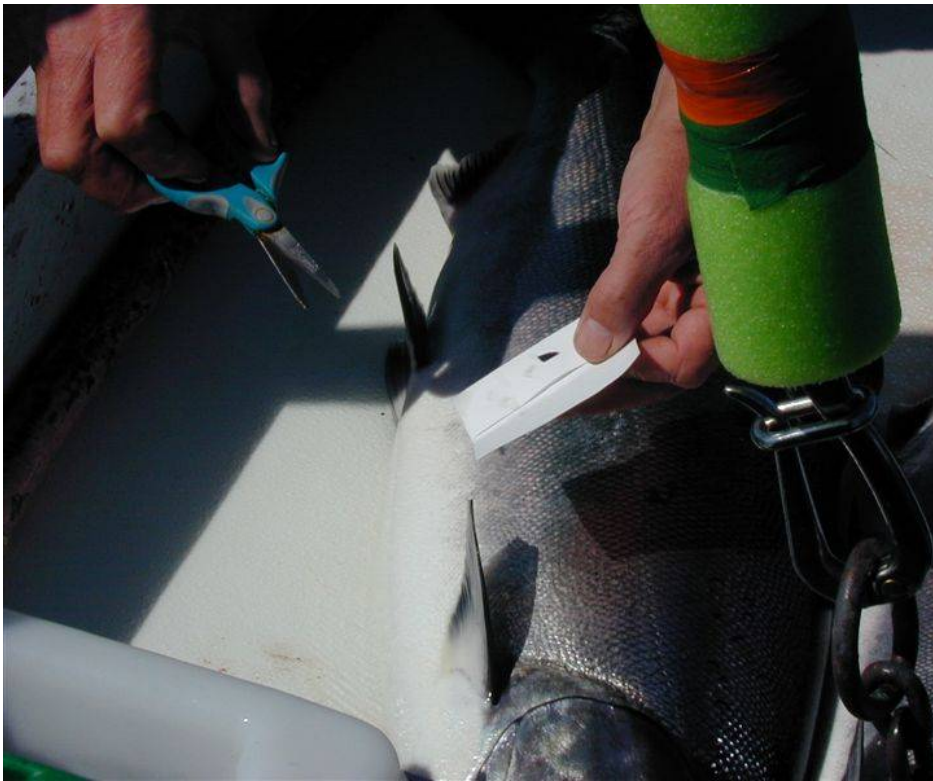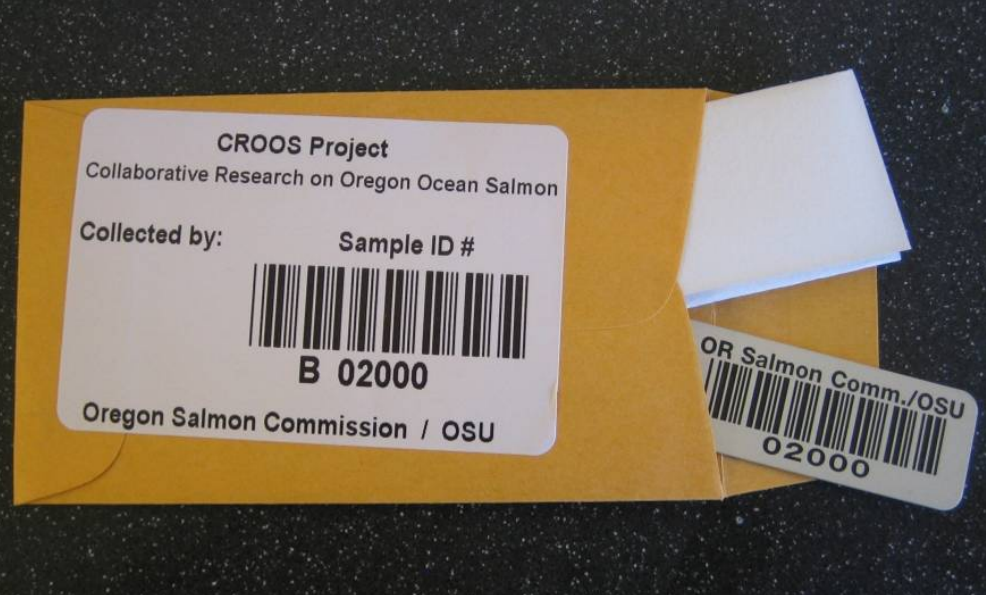
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Click For Fish Information

Please enter the barcode (or ID#) of a Salmon that you'd like to get details for and click the Search button to see the results.
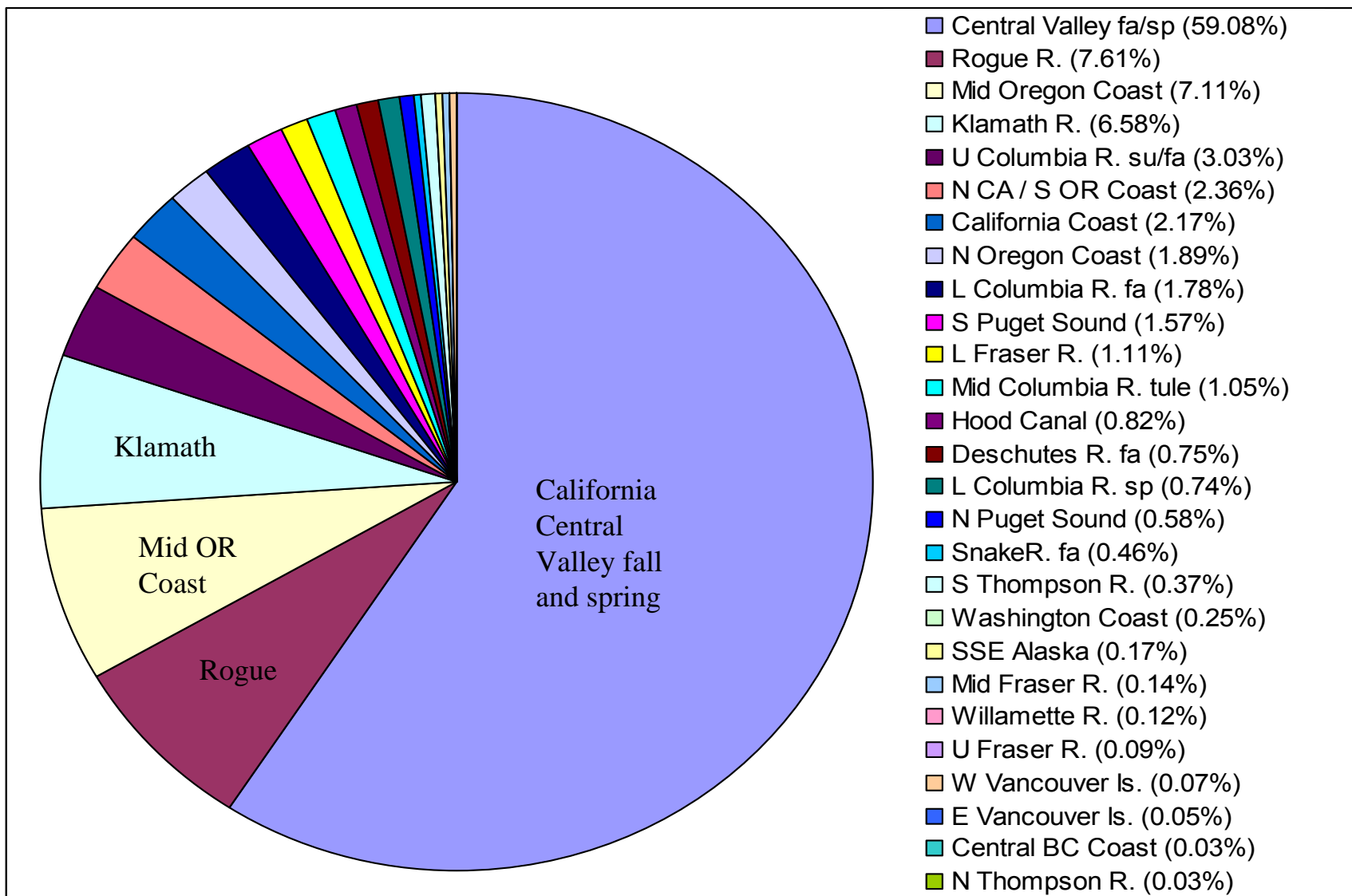
Barcode: 4024   Search   Catch Coordinates:

Barcode/ID#	4024
Fish's Reporting Region	Central_Valley_fa
Reporting Region Assignment Probability	0.99987854
River of Origin	Feather_H_fa
River of Origin Assignment Probability	0.4999
Week Caught	2006_31
Date Caught	8/2/2006 12:00:00 AM
Time Caught	9:29

CROOS Project
Collaborative Research on Oregon Ocean Salmon

Collected by: Sample ID #

B 02000

Oregon Salmon Commission / OSU

OR Salmon Comm./OSU
02000

Samples received, genotyped, analyzed for stock mixture analysis, and number with individual assignment probability ≥ 90%.
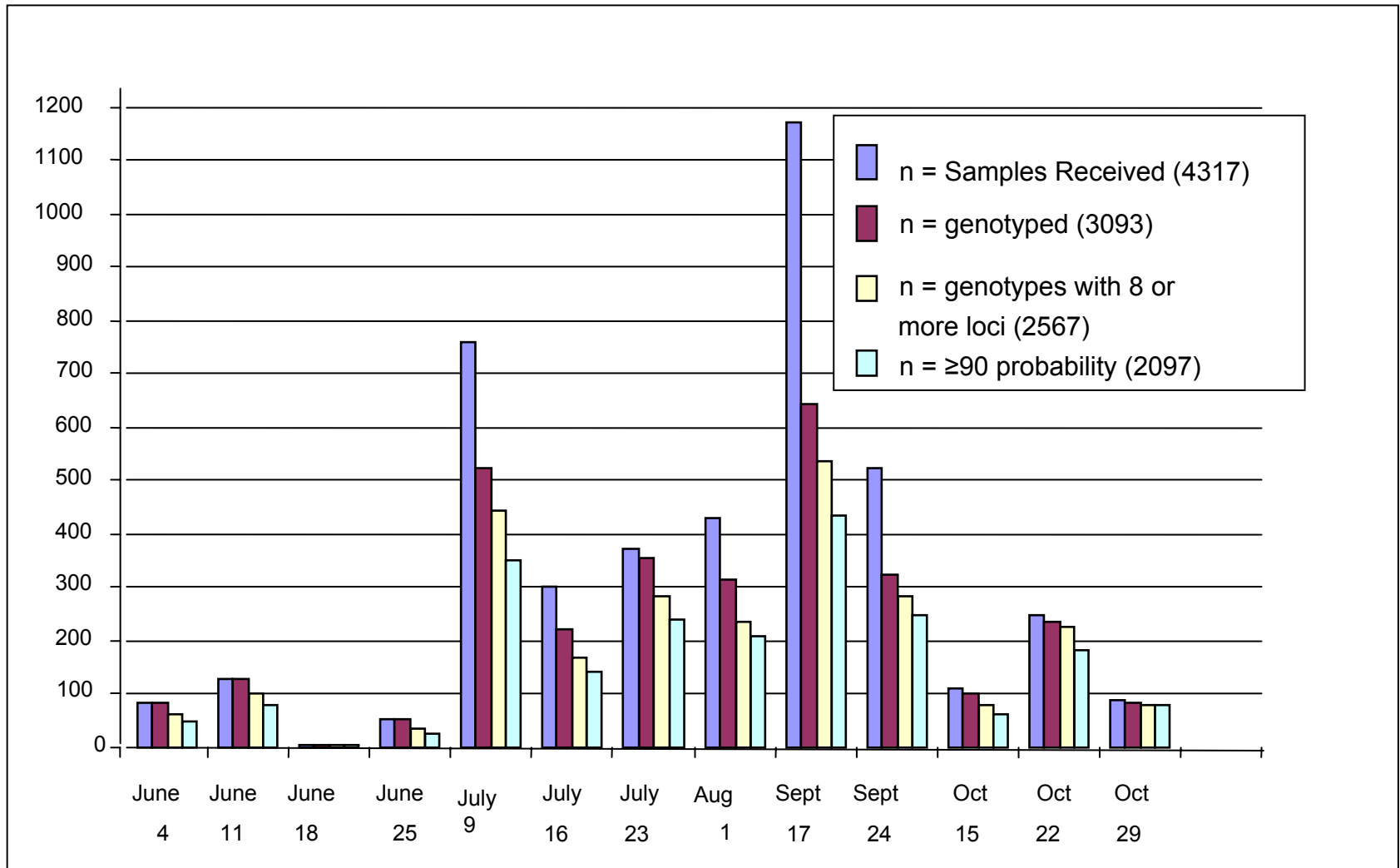
Genetic estimates of mixture proportions of Chinook harvested off the Coast of Oregon during the 2006 Project CROOS pilot study.

- ☐ Central Valley fa/sp (59.08%)
- ☐ Rogue R. (7.61%)
- ☐ Mid Oregon Coast (7.11%)
- ☐ Klamath R. (6.58%)
- ☐ U Columbia R. su/fa (3.03%)
- ☐ N CA / S OR Coast (2.36%)
- ☐ California Coast (2.17%)
- ☐ N Oregon Coast (1.89%)
- ☐ L Columbia R. fa (1.78%)
- ☐ S Puget Sound (1.57%)
- ☐ L Fraser R. (1.11%)
- ☐ Mid Columbia R. tule (1.05%)
- ☐ Hood Canal (0.82%)
- ☐ Deschutes R. fa (0.75%)
- ☐ L Columbia R. sp (0.74%)
- ☐ N Puget Sound (0.58%)
- ☐ SnakeR. fa (0.46%)
- ☐ S Thompson R. (0.37%)
- ☐ Washington Coast (0.25%)
- ☐ SSE Alaska (0.17%)
- ☐ Mid Fraser R. (0.14%)
- ☐ Willamette R. (0.12%)
- ☐ U Fraser R. (0.09%)
- ☐ W Vancouver Is. (0.07%)
- ☐ E Vancouver Is. (0.05%)
- ☐ Central BC Coast (0.03%)
- ☐ N Thompson R. (0.03%)

Mixture proportions calculated with GMA, Kalinowski 2003

Time series for two weeks of data for fish harvested off the Coast of Oregon.
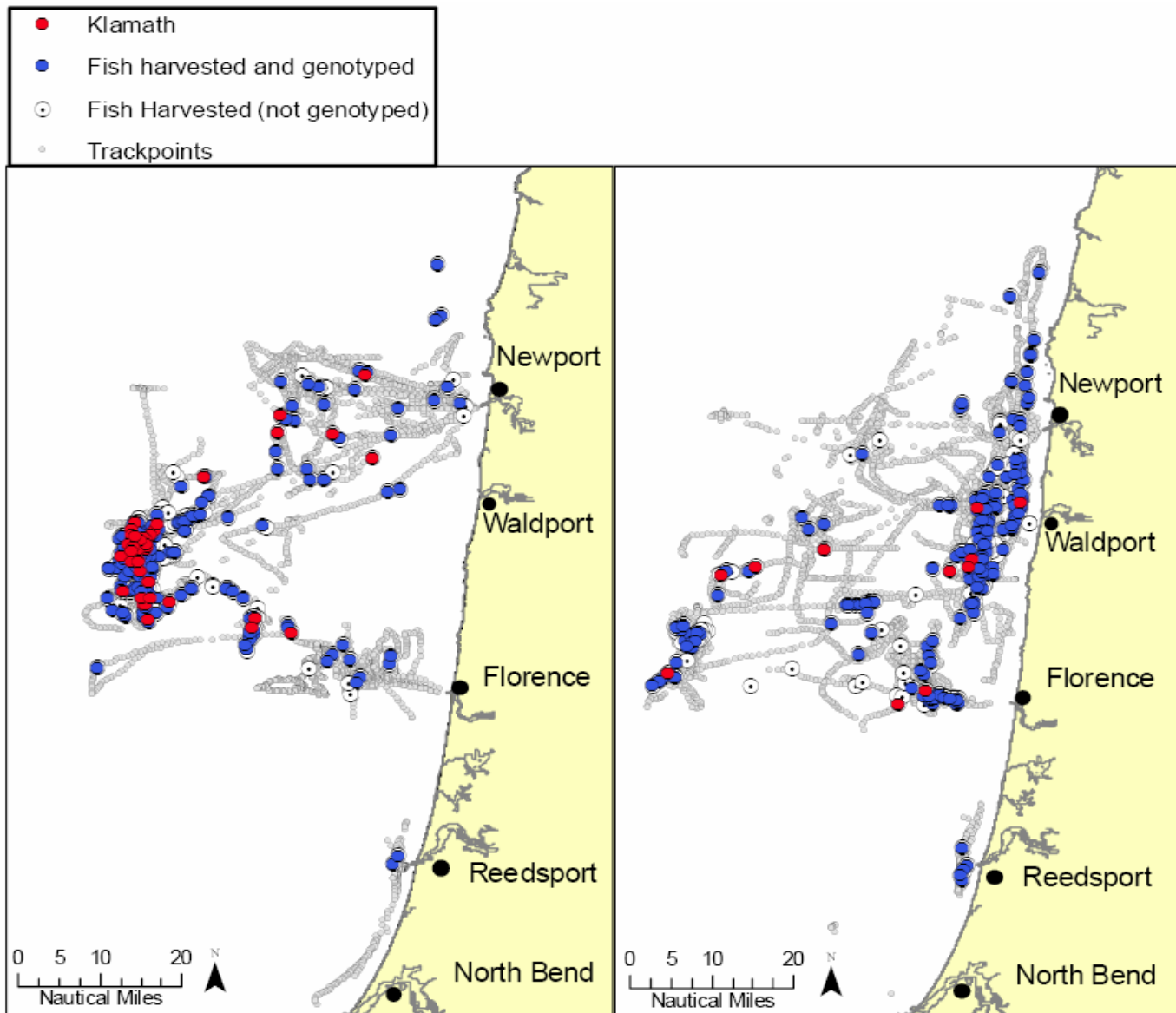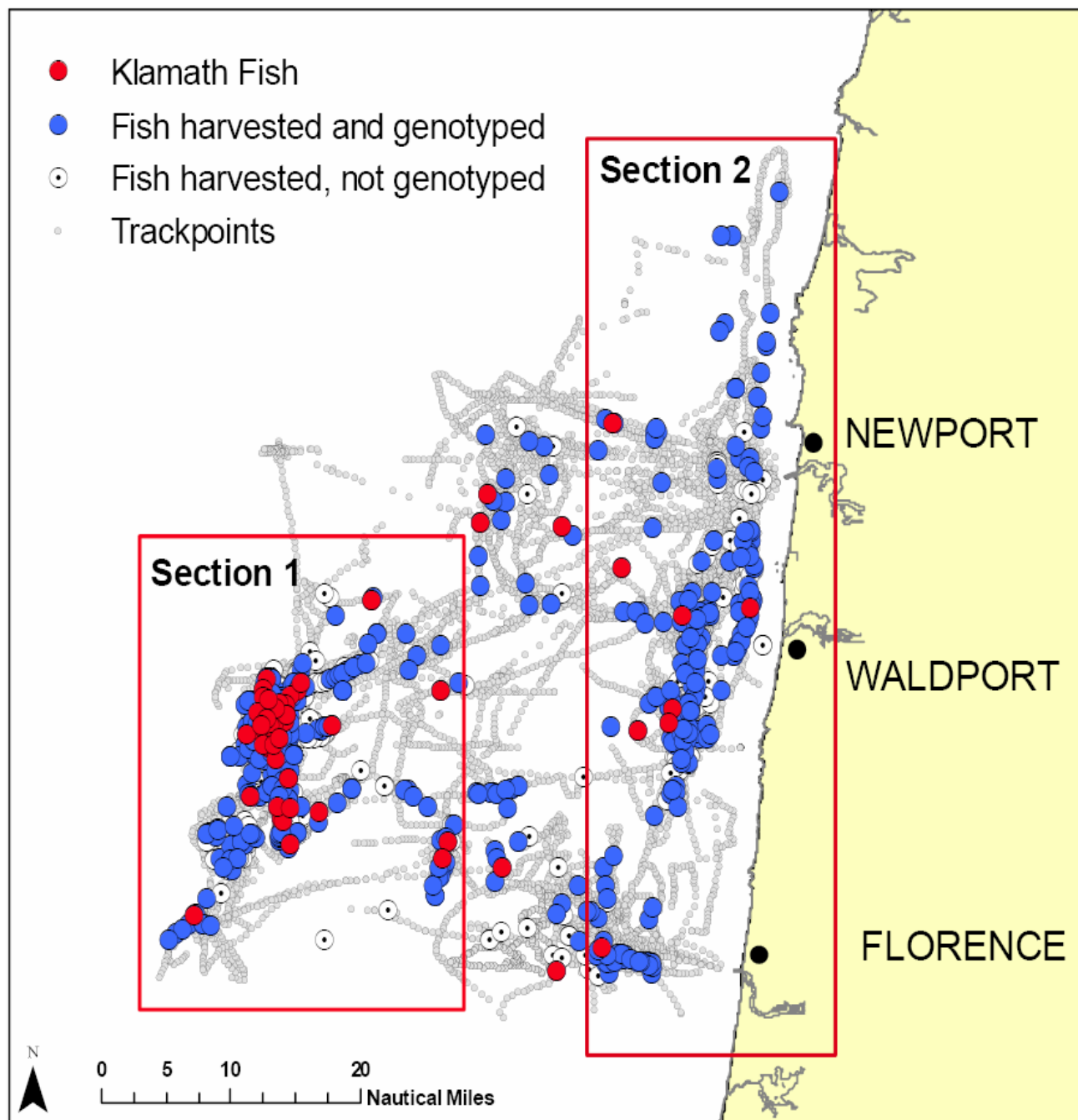
Sample # + SNOUT ID	STOCK OF ORIGIN (CWT)	REGIONAL ASSIGNMENT-GENETICS	REGIONAL PROBABILITY (Genetic)	ACCURACY OF GENETIC ASSIGNMNET
1*06J3385	MATTOLE RIVER	California_Coast	1.00	correct
2*06J3364	COLEMAN NFH	Central_Valley_fa	1.00	correct
3*06J3366	COLEMAN NFH	Central_Valley_fa	0.97	correct
4*06J3386	COLEMAN NFH	Central_Valley_fa	1.00	correct
5*06J3395	COLEMAN NFH	Central_Valley_fa	1.00	correct
6*06J3368	FEATHER RIVER	Central_Valley_fa	0.93	correct
7*06J3379	FEATHER RIVER	Central_Valley_fa	1.00	correct
8*06J3394	FEATHER RIVER	Central_Valley_fa	0.97	correct
9*06J6503	FEATHER RIVER	Central_Valley_fa	0.99	correct
10*06J3367	FEATHER RIVER	Central_Valley_fa/sp	1.00	correct

Sample # + SNOUT ID	STOCK OF ORIGIN (CWT)	REGIONAL ASSIGNMENT-GENETICS	REGIONAL PROBABILITY (Genetic)	ACCURACY OF GENETIC ASSIGNMNET
11*06J3378	FEATHER RIVER	Central_Valley_sp	1.00	correct
12*06J3397	FEATHER RIVER	Central_Valley_sp	0.97	correct
13*06J3381	COLEMAN NFH	Central_Valley_sp/fa	1.00	correct
14*06J3399	FEATHER RIVER	Central_Valley_sp/fa	1.00	correct
15*06J6513	FEATHER RIVER	Central_Valley_sp/fa	1.00	correct
16*06J6510	COLEMAN NFH	CentralValleyfa	1.00	correct
17*06J2497	FEATHER RIVER	CentralValleyfa_sp	1.00	correct
18*06J5416	FEATHER RIVER	CentralValleyfa_sp	1.00	correct
19*06J3387	KLAMATH RIVER	Klamath_River	1.00	correct
20*06J3353	TRINITY RIVER	Klamath_River	1.00	correct

Sample # + SNOUT ID	STOCK OF ORIGIN (CWT)	REGIONAL ASSIGNMENT-GENETICS	REGIONAL PROBABILITY (Genetic)	ACCURACY OF GENETIC ASSIGNMNET
21*06J3357	TRINITY RIVER	Klamath_River	1.00	correct
22*06J3392	TRINITY RIVER	Klamath_River	0.99	correct
23*06J3396	TRINITY RIVER	Klamath_River	1.00	correct
24*06J6400	COWLITZ R 26.0002	L_Columbia_fa	0.92	correct
25*06J3358	S-HARRISON R	LFraserR.	0.99	correct
26*06J3393	ELK R (ELK R HT)	Mid_Oregon_Coast	0.99	correct
27*06J6405	ELK R (ELK R HT)	Mid_Oregon_Coast	1.00	correct
28*06J6514	SIUSLAW R	N_Oregon_Coast	0.96	correct
29*06J2804	CHETCO R	NCalifornia/SOregonCoast	0.99	correct
30*06J2816	COLE RIVERS HATCHERY	Rogue	1.00	correct
31*06J6403	COLE RIVERS HATCHERY	Rogue	0.99	correct

| Sample # + SNOUT ID	STOCK OF ORIGIN (CWT)	REGIONAL ASSIGNMENT-GENETICS	REGIONAL PROBABILITY (Genetic)	ACCURACY OF GENETIC ASSIGNMNET
32*06J6512	FEATHER RIVER	CentralValleyfa	0.64	n/a (<90%); correct
33*06J3321	GROVERS CR 15.0299	Mid_Oregon_Coast	0.66	n/a (<90%); incorrect
34*06J3359	COOS R - PUBLIC	Mid_Columbia_tule	0.62	n/a (<90%); incorrect
35*06J3363	TRINITY RIVER	Rogue	0.48	n/a (<90%); incorrect
36*06J3365	UMPQUA R (ROCK CR HT)	Mid_Oregon_Coast	0.80	n/a (<90%); correct
37*06J3382	COLE RIVERS HATCHERY	Rogue	0.63	n/a (<90%); correct
38*06J2495	KALAMA R 27.0002	MidOregonCoast	0.42	n/a (<90%); incorrect
39*06J6402	ELK R (ELK R HT)	NCalifornia/SOregonCoast	0.81	n/a (<90%); incorrect

Beyond GSI – why are fish where they're encountered?

- Fleet management
- Data logger development
- Website
- Oceanography
- Otolith micro-chemistry
- Gut contents analysis
- Scale analysis
- Management

Fleet Management

Oceanography

Temperature

Salinity

Density

Chlorophyl

CDOM

Dissolved Oxygen
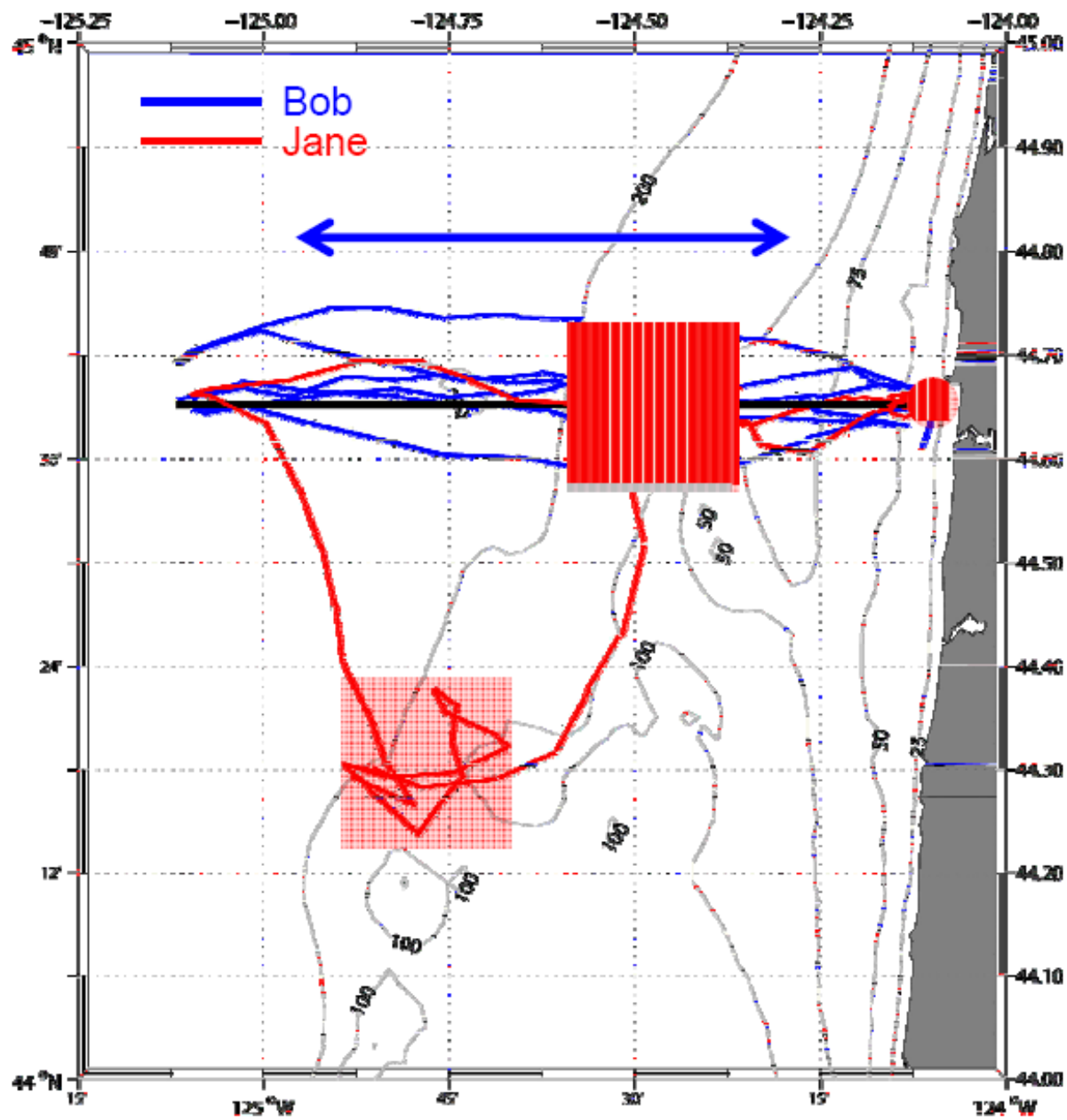
05/08/16
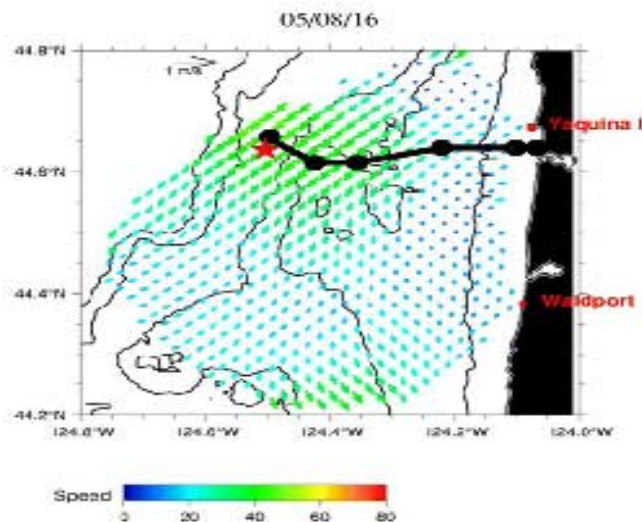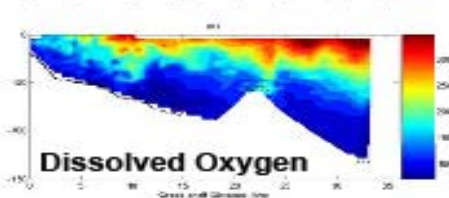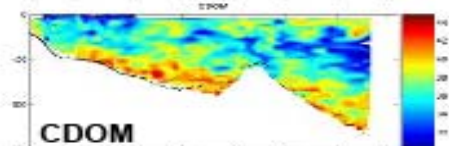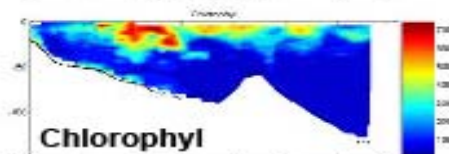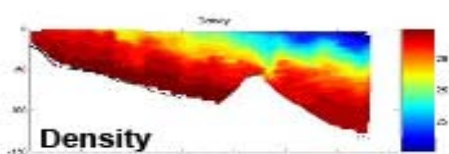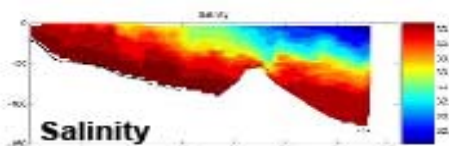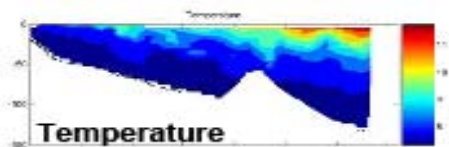
OSU Glider Lab

2 Slocum electric, 200 m gliders
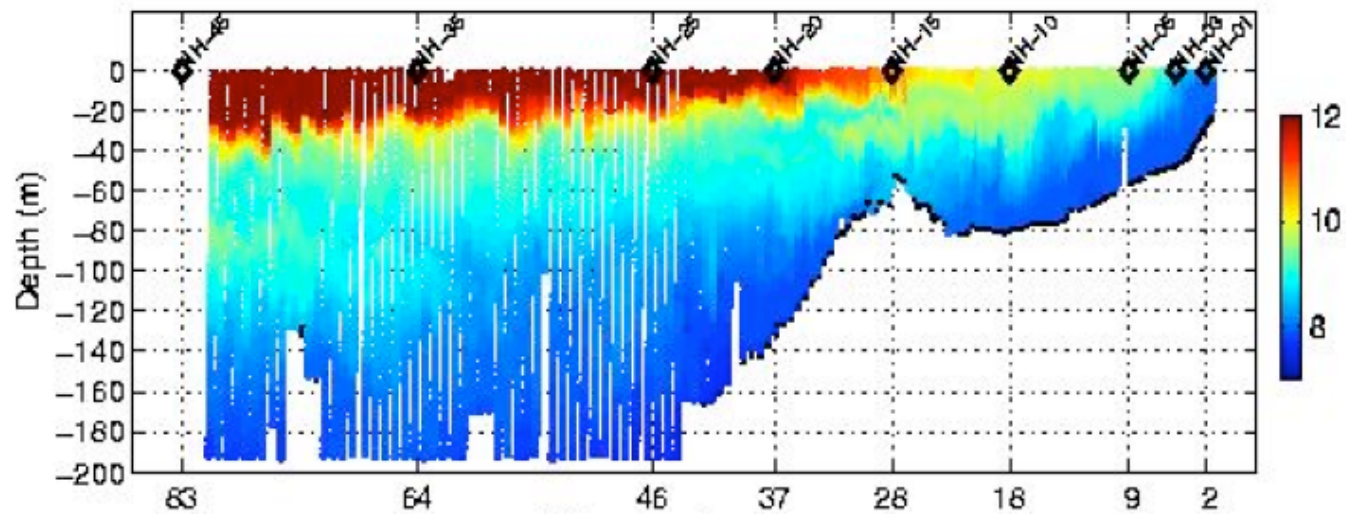
New 1000 m glider (spring 2007)

Endurance Lines off Newport and south of Heceta Bank

- starting spring 2006
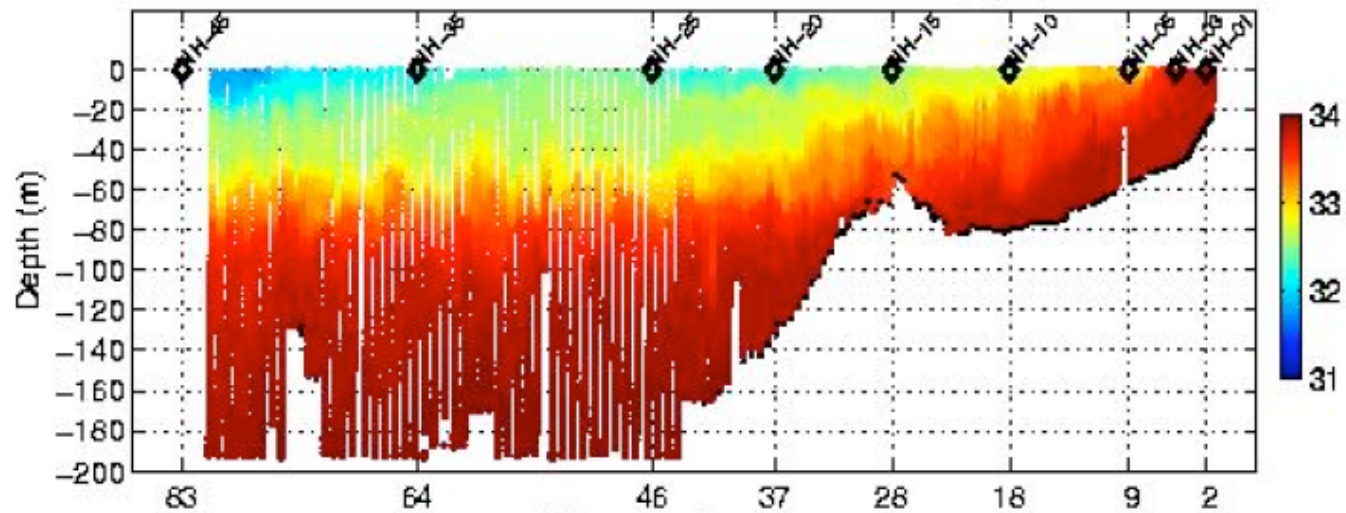- 100 km offshore
- 7-10 day repeat cycle

Glider Transect Line:09/14/06–09/17/06:Temperature (°C)

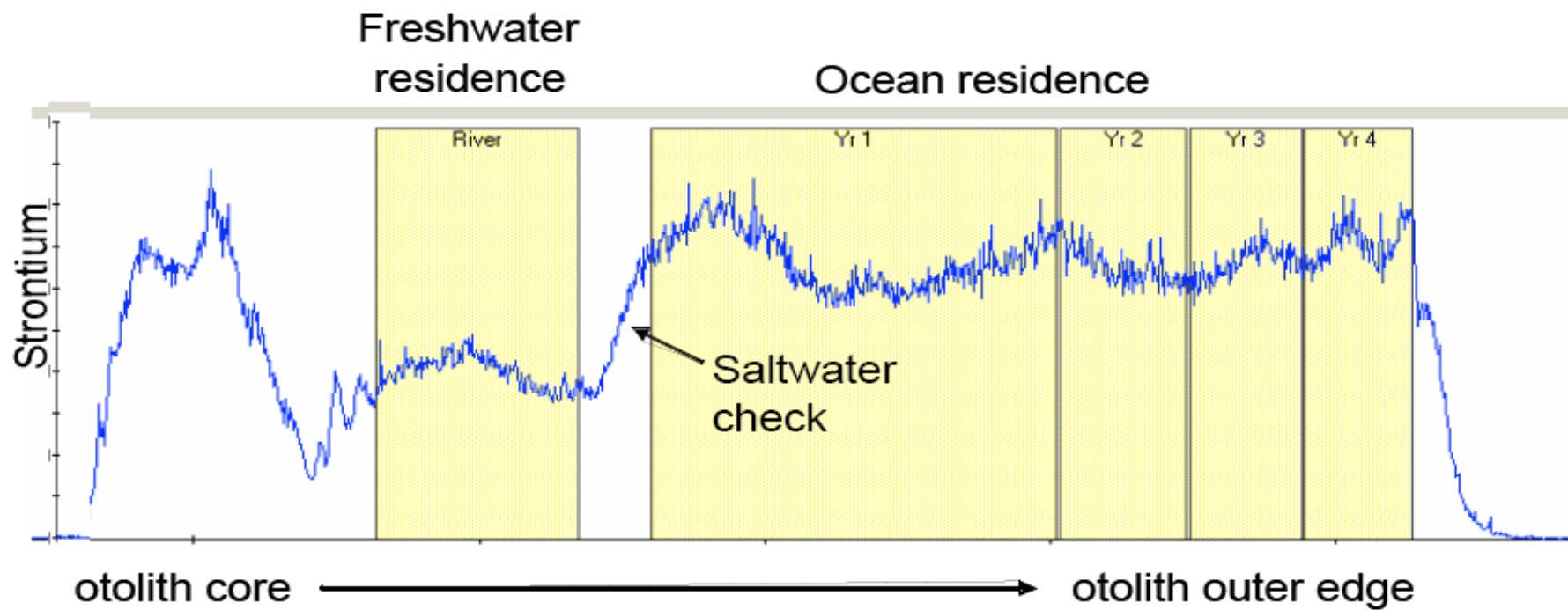Glider Transect Line:09/14/06–09/17/06:Salinity (psu)

Otolith micro-chemistry

- Do different stocks reside in waters of similar chemistry (within stock)?

- Determine the temperature history of individual Chinook ($^{18}O/^{16}O$)

- Distinguish fall vs spring Chinook ($^{87}Sr/^{86}Sr$)

- Determine size at ocean entry

Salt Water Check

1st Ocean Year

2nd Ocean Year

Laser path

3rd Ocean Year

Freshwater residence

Ocean residence

River

Yr 1

Yr 2

Yr 3

Yr 4

Strontium

Saltwater check

otolith core ⟶ otolith outer edge

Scale analysis

Month	Percentage of sample					Number of scales aged
	Age 2	Age 3	Age 4	Age 5	Age 6	
June	0.0	30.5	59.4	9.9	0.0	131
July	0.0	36.0	59.7	3.7	0.6	705
August	0.0	43.8	51.7	4.0	0.5	201
September	0.2	77.8	18.4	3.2	0.5	657
October	0.0	77.9	18.0	3.5	0.6	316

Data logger development

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Siletz River
Elk Creek
Alsea River
Siuslaw River

100
70
100
80
80
40
40
30
80
50
60
60
50
50
40
30
60
20
70
60
30
60
50
40
60
90
50
30
20

12 Miles
0   30 Kilometers

Map created by Project CROOS, Copyright(C) 2006

Legend

+ K28

CatchWeek28

region

× #N/A

■ California_Coast

■ Central_Valley_fa

■ Central_Valley_fa/sp

■ Central_Valley_sp

■ Central_Valley_sp/fa

● Deschutes_River_fa

● E_Vancouver_Is

● Klamath_River

★ L_Columbia_fa

★ L_Columbia_sp

● L_Fraser

● L_Thompson

★ Mid_Columbia_tule

● Mid_Fraser

● Mid_Oregon_Coast

● N_California_S_Oregon_Coast

▲ N_Puget_Sound

● Rogue

◊ SSE_Alaska

▲ S_Puget_Sound

★ Snake_R_fa

★ U_Columbia_R_su-fa

● U_Fraser_R

Rec	barcode	source	yearweek	date_	time_	y	x	depth	fork	mark	stomach	plate	cell	platecell	river	riverprob	river1	
1	713	e	2006_28	Sun, 9 Jul 2006 00:00:00	Sat, 30 Dec 1899 13:14:00	44.66633333	-124.4216667	53	37	no mark	0	6	a2	pl_6_1H	California_Coast	0.99544516	California_Coast	
				Sun, 9	Sat, 30													

Query

Fishermen
Croos Website
- Same info as public
- Summary of individual tag info
Declaration of Area
- Must declare area for each week
- Catch limited to that area's limit
- Cannot move to lower limit area
- Report to NMFS 24/7
    telereporting site
- Declare area of catch on ticket

Management
Fishery Manager
- Access to CROOS website to
track stocks of concern
- Access to telecheck site to
project harvests
- Management changes made for
following week based on last
week's results and projections
(1 week lag time)

Website
- Results updated weekly
- All fishermen information
available to management
- Public sector site list general
results
    • General area of capture
    • Boat & fisherman for
individual tag
    • Date of landing/capture
    • River of origin

NMFS Telecheck –
Declaration for Area
- 24/7 automated telephone
with 2-3 incoming lines
    • Vessel name, date
    • Area to be fished
    • Skipper
    • Document of boat number
    • Anticipated port of landing
- Information collated into
spreadsheet and made available
to managers and/or
enforcement via website.

Public
CROOS Website
- Know the river of origin of a
tagged fish
- Date of landing/capture
- General area of capture
    • Management area
- Boat and fisherman
    • Link to photo/history
    • Link to individual website

Enforcement
Enforcement Tools
- Telecheck declaration
- Fish tickets
- Fly-overs
- VMS when available
- Dockside verification
- Track logs from handheld GPS

Management

- We have demonstrated that we can map the stock, space and time of Chinook harvest with high precision approaching a two day turn around

- Now we need to verify if there is a predictable pattern to this distribution – substantially more sampling over three – 5 years : CA, OR & WA

- If this is the case we will next need to work out how best use this to manage harvest adaptively towards stocks of harvest intent and away from threatened stocks

Plans for 2007

4 block sampled at 200 fish per week:

>87% of observing a 1% stock

>99.8% of observing a 3% stock

800 fish sampled per month:

>98.2% of observing a 0.5% stock

Also sample:

>bubble fisheries

>whiting fishery

In-shore/off-shore test

August test: real-time, marketing & managment