

# *Community Salmon Investigation for Highline 2012 Findings*



**Presented by Elissa Ostergaard  
Miller and Walker Creeks Basin Steward**

March 11, 2013

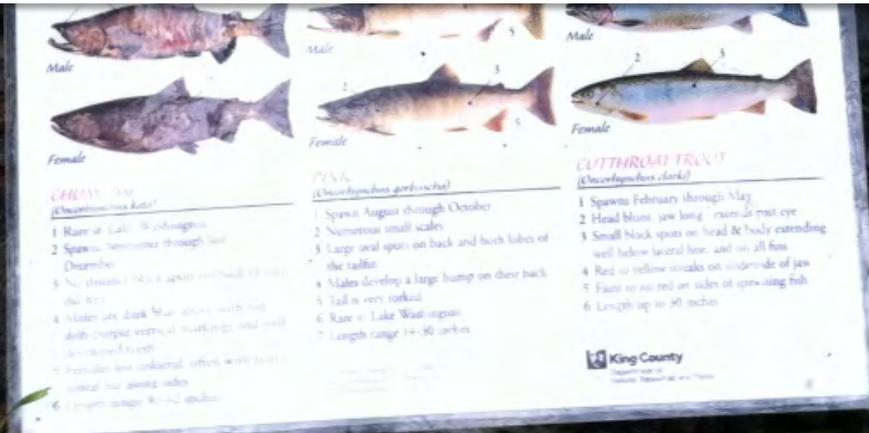
# Community Salmon Investigation for Highline 2012 Results

1. Purpose of *Community Salmon Investigation: Highline*
2. How *CSI: Highline* works
  - Stream surveys
  - Necropsies
  - Survey locations
3. Results of October – December surveys
  - Summary data
  - Analysis
  - Weather and Wildlife

## Volunteer Recognition

4. Plans for 2013
5. Factors affecting stream and salmon health
6. Your role!

# 1) Purpose of CSI



**Coho "jack"  
(immature male)**

**November 11, 2011**

**Photo courtesy of David Bobanick**



# Draft 2006 Basin Plan

## Recommendation on Monitoring

An on-going basin monitoring program should be started that will allow for trend analysis of:

- Stream flow (volume)
- Water quality
- Habitat data



**Port of Seattle water  
quality sampling station  
at Walker wetlands**

October 16, 2007

# Basin Monitoring Coordination Workshops with Dennis Clark, Fall 2008



**Monitoring Workshop #1 at  
Burien Community Center  
September 24, 2008**

**Monitoring Workshop #3  
in Burien  
December 4, 2008**





King County  
Always at your service

# Watersheds, rivers and streams

## Central Puget Sound

You're in: Central Puget Sound Watershed » Miller and Walker Creeks Stewardship Page » Monitoring Information

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- Central Puget Sound Watershed
- Vashon - Maury Island
- Miller and Walker Creeks Stewardship Page
- Stewardship Tips
- Volunteer Calendar
- Stream Blog - 2010
- Miller Creek Photo Tour
- Walker Creek Photo Tour
- Basin Plan



## Monitoring Information: How Are Miller and Walker Creeks Doing?

This page provides information on:

- [Final Monitoring Coordination Recommendations](#)
- [Background Information on Monitoring Coordination Workshops in 2008](#)
- [Current and Past Monitoring](#)

[Learn about the Community Salmon Investigation \(CSI\) of adult salmon returns in fall 2010.](#)

## Final Monitoring Coordination Recommendations

Three workshops occurred in fall 2008 where interested citizens and staff discussed coordination of monitoring of water flow, water quality, and habitat conditions on Miller and Walker Creeks. Basin Steward Dennis Clark drafted recommendations based on input from these workshops. These recommendations were posted for public review in June 2009 before being finalized. The final versions include:

- [Recommendations including Table 2 and Appendices A and B \(Adobe Acrobat\)](#)
- [Table 1: Miller and Walker Creeks Recommended Monitoring Locations for](#)

- Monitoring Information
- Salmon Monitoring Program 2010 - "CSI: Highline"
- Contacts
- Hydrologic Modeling
- Nearshore Environments
- Puget Sound Shoreline Stewardship Guidebook
- Related organizations
- News archive
- Site Map

# Activities and Purpose of *CSI: Highline*

Tasks	Why?	Use of Data
Count adult salmon	As “keystone species,” salmon are indicators of the health of fresh and marine waters and surrounding lands	Baseline data that will allow us to determine status and trends when monitored over time (>10 years)
Identify whether coho are spawning before they die	“Pre-spawn mortality” is known to occur in Miller/Walker but extent has not been quantified	Baseline data that may allow us to determine effects of pollution prevention efforts in future
Raise the profile of the streams and their resources in the Highline community	Improving the health of these streams and Puget Sound requires residents to be aware of and act to protect the shared resources of the streams	To be determined – by all of us!

# Scientific Plan for Adult Monitoring

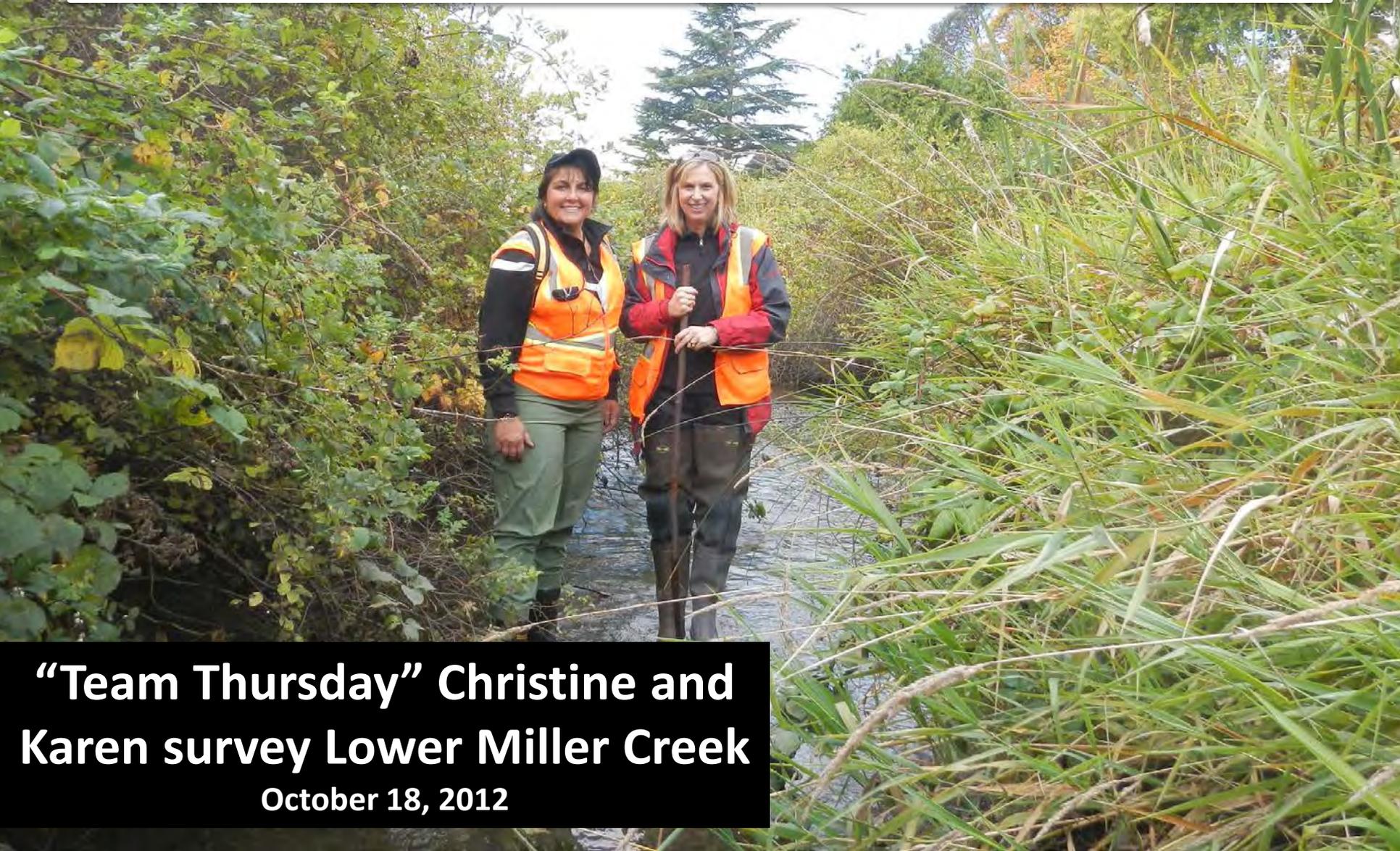
## Survey Plan for Adult Fish Counting and Coho Prespawn Mortality in Miller and Walker Creeks

### Community Salmon Investigation for Highline 2012

Version October 3, 2012

NOAA, Wild Fish Conservancy, the City of Seattle, King County and others have conducted a number of assessments concerning coho salmon in Seattle area creeks (Collier et al. 2003, Scholz et al. 2004, and McCarthy et al. 2008). Findings of these efforts indicate that while salmon were successfully returning to many urban streams, a high proportion of sexually mature female coho carcasses showed large numbers of retained eggs. Investigators documented highly erratic swimming behavior and prespawn mortality among both male and female coho. Affected fish from different urban streams displayed a common suite of symptoms, including surface swimming and gaping, fin splaying, spasming, disorientation, and loss of equilibrium. The coho usually died within a few minutes to a few hours after becoming overtly symptomatic. Visual inspections generally indicated that the affected coho spawners were in good condition, with the silver coloration typical of salmonids that have recently transitioned to freshwater from the ocean (McCarthy et al. 2008). This phenomenon has been termed coho prespawn mortality (PSM).

# 2) How CSI Works



**“Team Thursday” Christine and  
Karen survey Lower Miller Creek**

**October 18, 2012**

# CSI “Cast”

- 29 regular volunteers from Burien, Normandy Park, and Seattle (plus friends and family)
- Seven daily teams – one team for each day of the week
- Teams had 2-4 people – some surveyed weekly, some every other week
- Backups to fill in



**“Team Monday” - Joy, Roger and Michael**

# CSI Training

**Steve Damm from U.S. Fish &  
Wildlife Service teaches necropsies**

**October 7, 2010**



# CSI *Style*

**Polarized sunglasses for fish spotting**

**Back pack for supplies**

**“Team Thursday” Kay modeling survey attire on Miller Creek**  
Photo courtesy of Pam Silimperi

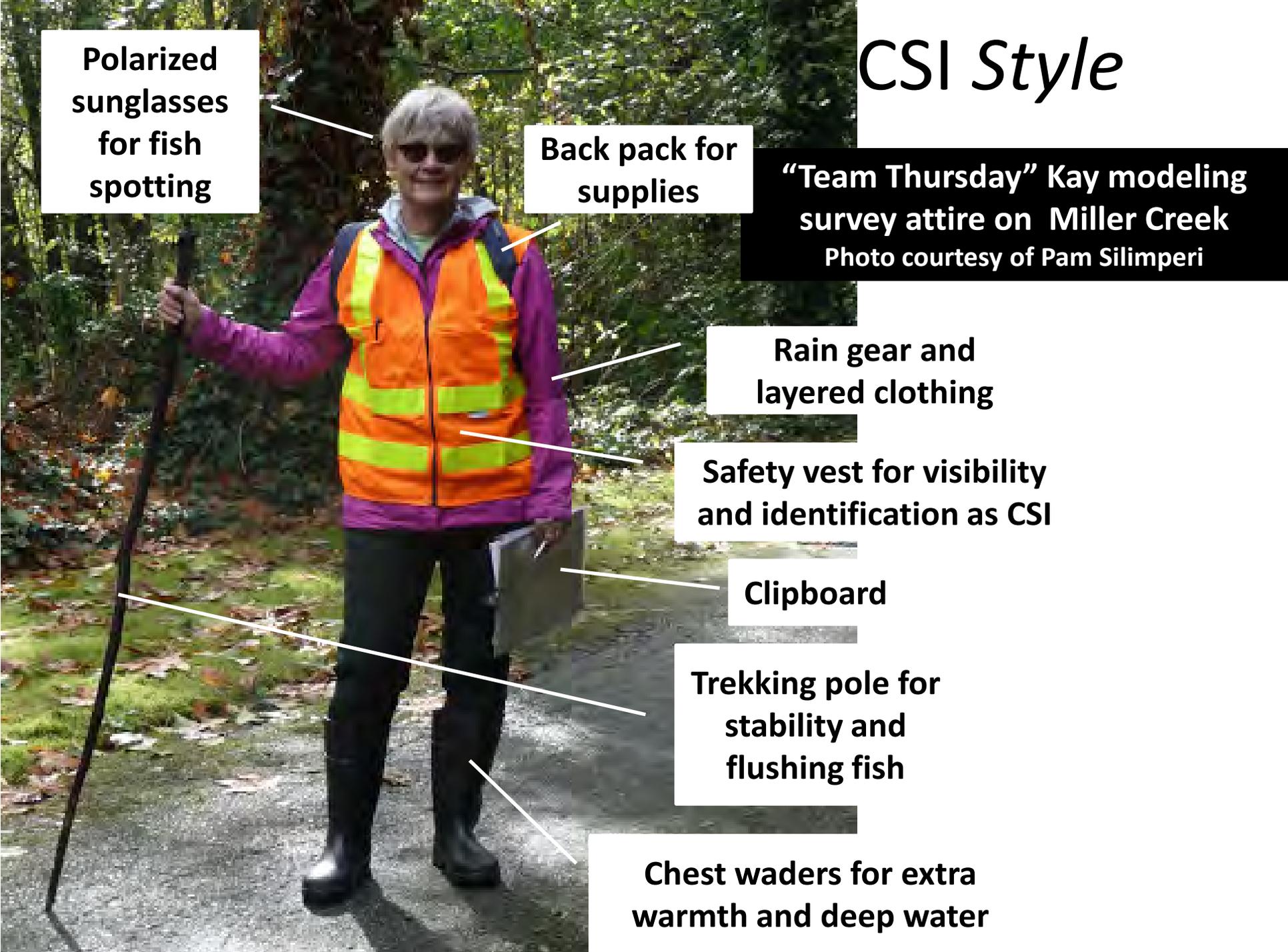
**Rain gear and layered clothing**

**Safety vest for visibility and identification as CSI**

**Clipboard**

**Trekking pole for stability and flushing fish**

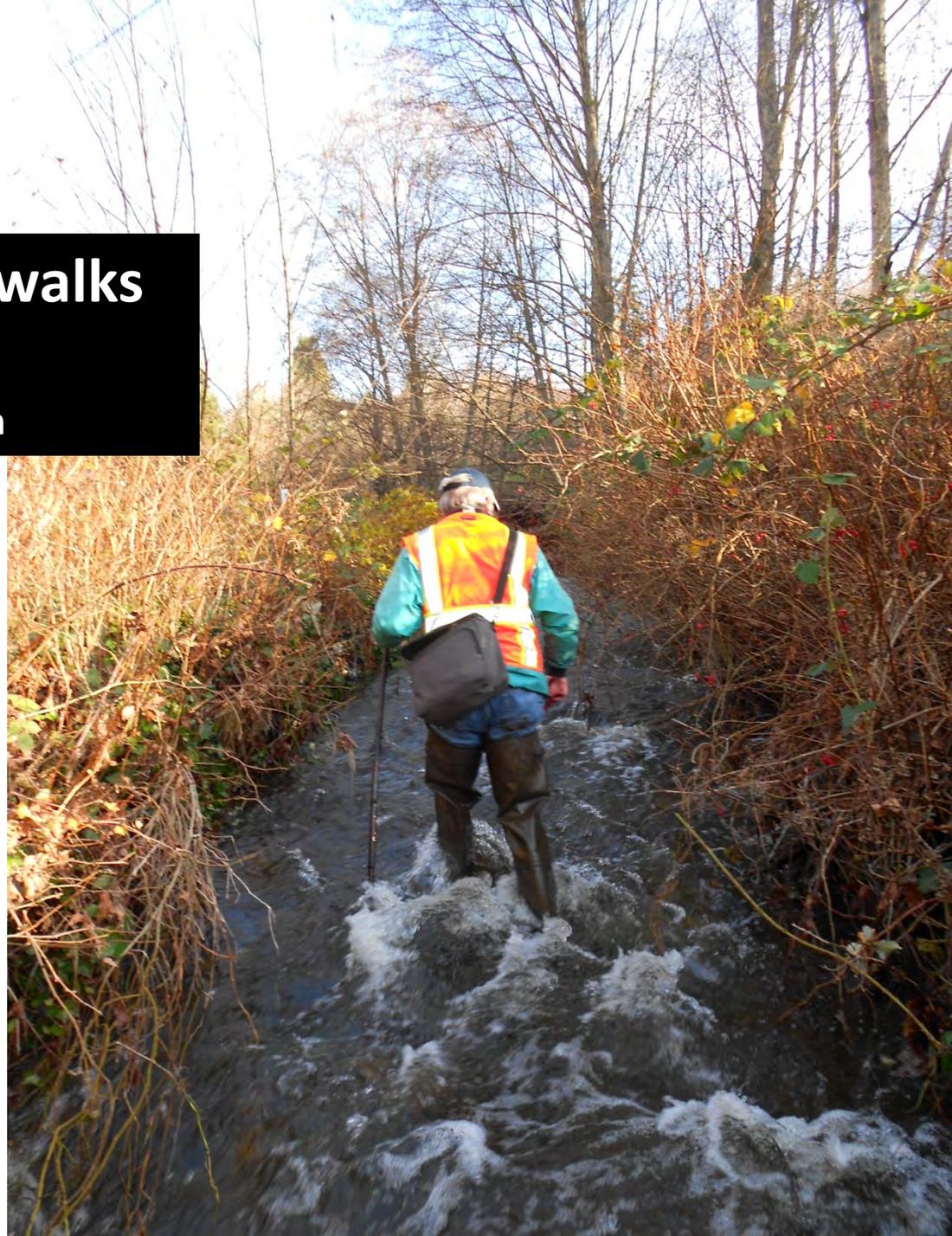
**Chest waders for extra warmth and deep water**



# CSI in Action

**“Team Wednesday” Lee walks  
up Miller Creek**

Photo courtesy of Katelyn Kinn



# CSI in Action

**“Team Sunday” Bobanick  
family looking for salmon**

November 7, 2010



# CSI in Action

**Male and female coho  
on Upper Miller Creek**

**October 14, 2011**

**Photo Courtesy of Ed Nugent**



# CSI in Action

**“Team  
Wednesday” Lee  
measuring a  
salmon carcass**



# CSI in Action

**“Team Tuesday” Pam cutting  
open the carcass to look for eggs**

Photo courtesy of Pam Silimperi/Kay Larsen



# CSI in Action

**Investigating egg retention –  
this female spawned!**

Photo by L. Moyer



# CSI in Action

Each carcass was  
“marked” by cutting off  
the tail



# CSI in Action



**“Team Thursday”  
Christine – snouts  
are collected from  
hatchery coho  
carcasses to check  
for tags**

# CSI in Action



**“Team Monday” Joy,  
Roger & Michael – it  
takes teamwork**

**October 15, 2012**

# CSI in Action

**Chum building a redd**

November 7, 2010



# Property Owner Permission

## Graciously Provided by:

- Clint Adams
- Ann and Stephen Backstrom
- Linda and Thomas Beffa
- Brett Fish
- Glen and Karen Gabrielson
- William Hansen
- Chris Longridge
- Susan Klein
- Steve Dubois
- Normandy Park Community Club
- Normandy Park Swim Club
- Southwest Suburban Sewer District



# Survey Locations

- Four locations
  - Two on Miller Creek
    - Lower Miller – Longridge, The Cove, and Adams property
    - Upper Miller – Sewer District and Fish property
    - (Above 1<sup>st</sup> Ave S. not surveyed – not many fish and difficult access)
  - Two on Walker Creek
    - Upper Walker – Beffa, Backstrom, Gabrielson, Hansen properties
    - Lower Walker – The Cove, Swim Club



# Lower Miller Creek Survey Area - CSI 2010



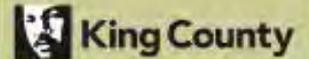
(C) 2010 King County

COMMENTS: Updated version 10/22/10.

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Date: 10/22/2010

Source: King County IMAP - Property Information (<http://www.metrokc.gov/GIS/IMAP>)



# Lower Walker Creek Survey Area - CSI 2010



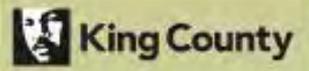
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# Upper Walker Creek Survey Area - CSI: Highline



(C) 2008 King County

COMMENTS: Updated version 9/27/2011

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# Walker Creek Stream Restoration



**Removing invasive  
weeds and planting  
native trees and  
shrubs at Walker  
Preserve**

**Monthly, fall 2012**

# Upper Miller Creek Survey Area - CSI: Highline



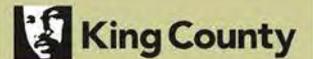
(C) 2008 King County

COMMENTS: Updated 10/1/2012

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Date: 10/1/2012

Source: King County iMAP - Property Information (<http://www.metrokc.gov/GIS/iMAP>)



# CSI in Action

2010's "Team Tuesday" Christine & Kerry  
at Sewer Plant on Upper Miller Creek

November 9, 2010



"Test plot" native plant  
revegetation area

# CSI in Action

Lee and Jim planting willows at Sewer Plant  
on Upper Miller Creek

November 22, 2011



# 3) 2012 CSI Results



**Coho carcass**  
October 23, 2012



# Coho: Life History

- October-Nov 2009 Spawned
- Early 2010 Hatched
- Early 2010 – early 2011 Rearing in stream
- Early 2011 Migration to salt water
- Early 2011 – October 2012 Rearing in Puget Sound and Pacific Ocean
- October – November 2012 Migration upstream, spawning, death
- Early 2013 New fish hatch



# Chum: Life History

- Nov. – December 2008      Spawned
- Early 2009      Hatched and migrated to salt water
- Early 2009 – Nov. 2012      Rearing in Puget Sound and Pacific Ocean
- Nov. – December 2012      Migration upstream, spawning, death
- Early 2013      Offspring hatch



# Results: Volunteer Surveys

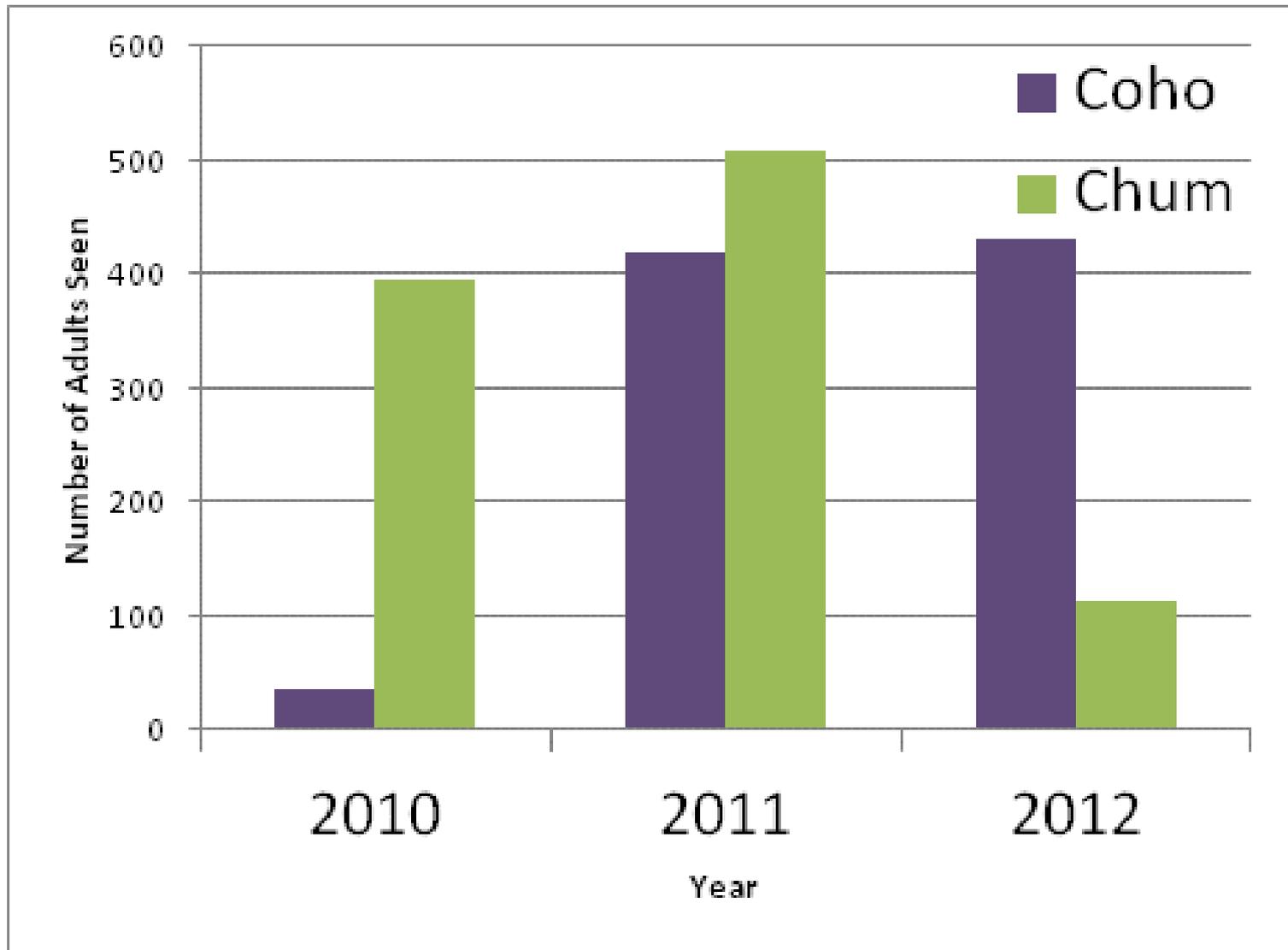
- Daily surveys from Oct. 10 to Dec. 24, 2012
- No surveys on stormy days for safety:
  - Oct. 27, 29, 31
  - Nov. 19, 20, 21, 23
  - Dec. 3, 16, 20
- Surveyed 71 days, 487 total volunteer hours

# Results: Live Fish Observations Summary

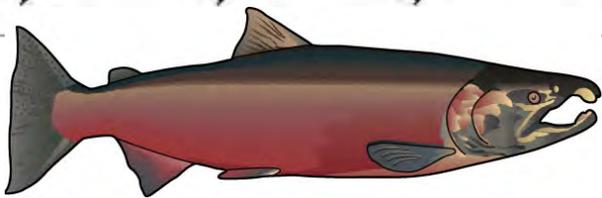
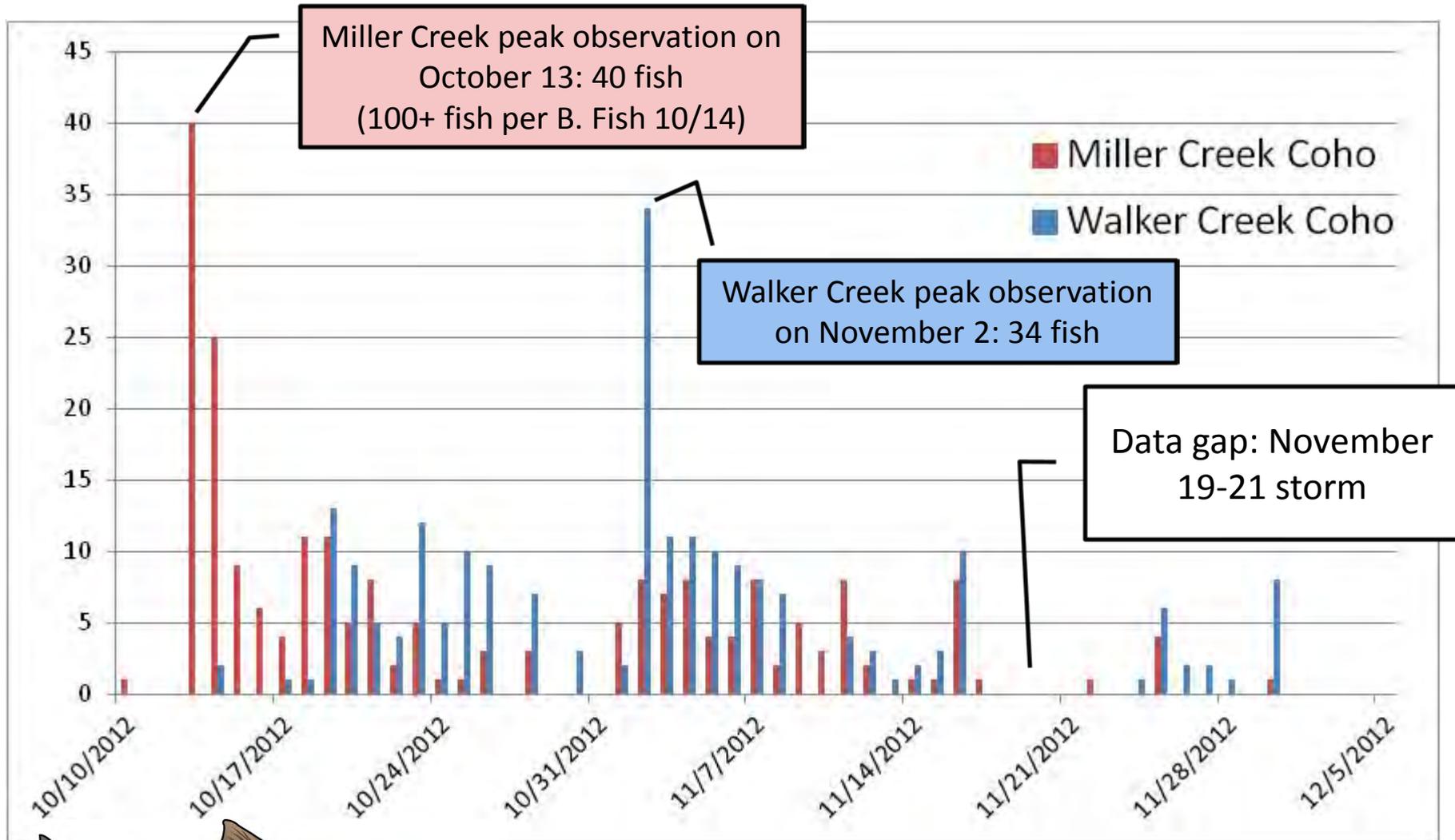
Species	Coho 	Chum 	Unidentified Adults
Miller Creek	216	56	45
Walker Creek	216	57	24
<b>Total</b>	<b>432</b>	<b>113</b>	<b>69</b>

Unidentified adults were 11.2% of total fish observed.

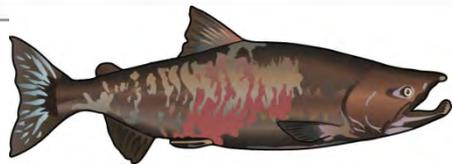
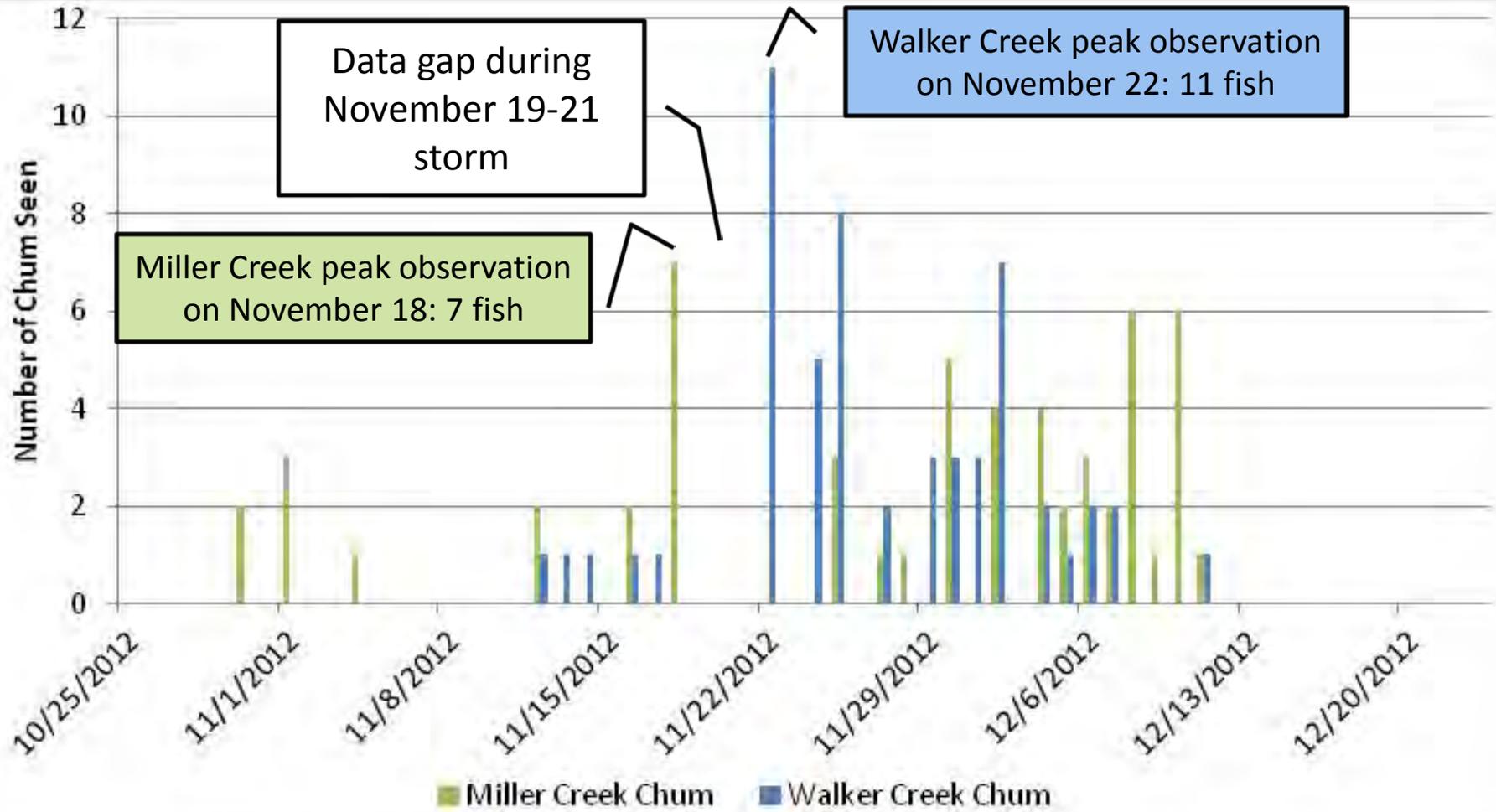
# Results: 2010, 2011 & 2012



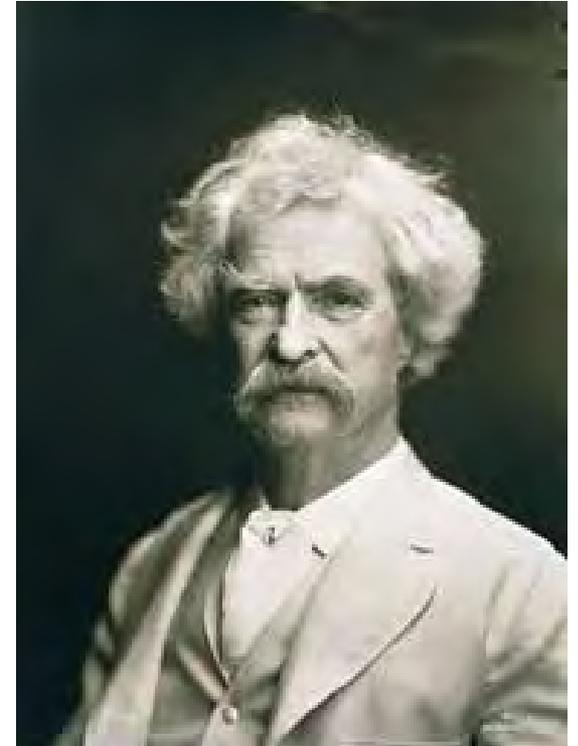
# Results: 432 Coho Seen



# Results: 113 Chum Observations

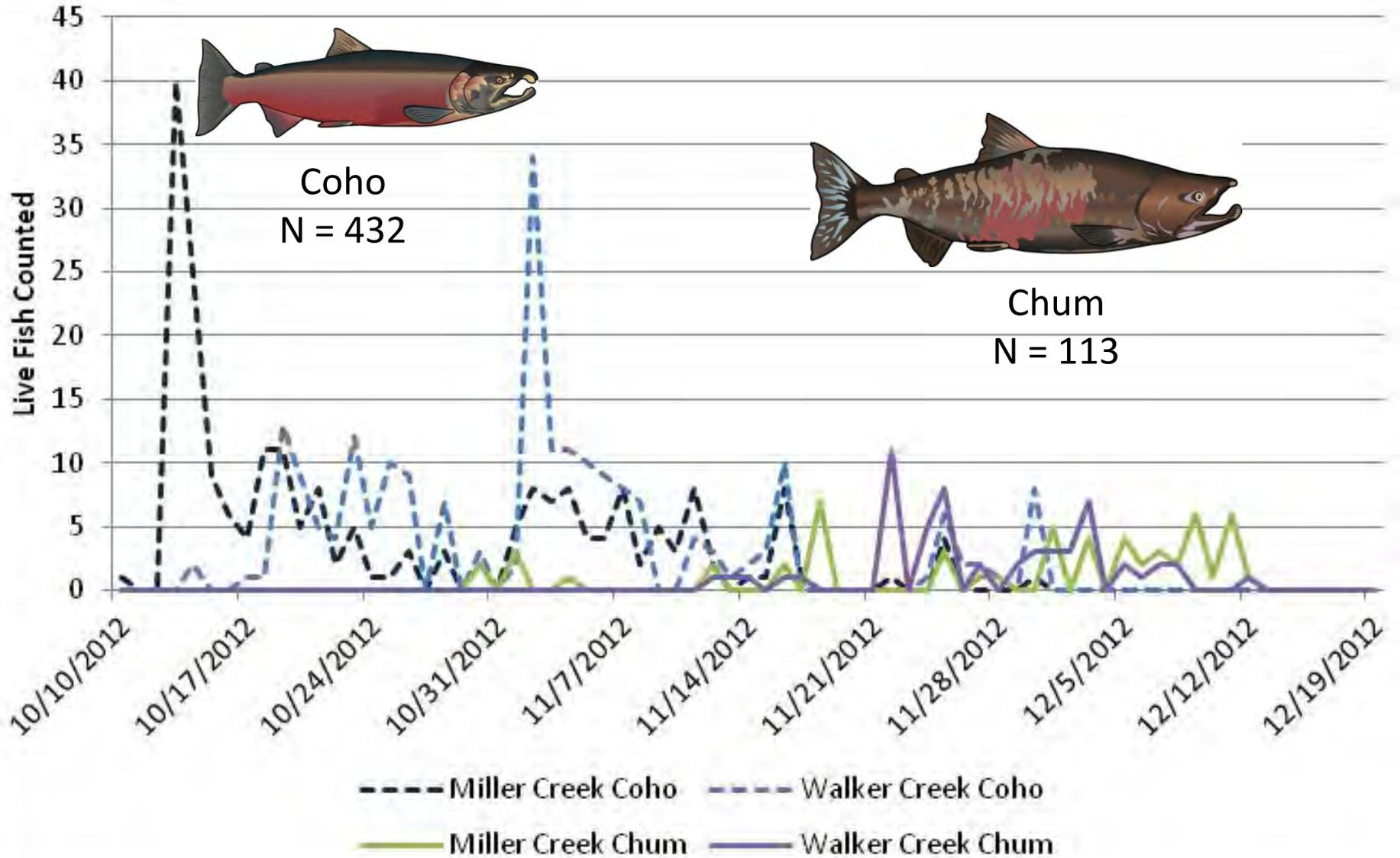


There is something  
fascinating  
about science.  
One gets such  
wholesale returns of  
conjecture out of  
such a trifling  
investment of fact.



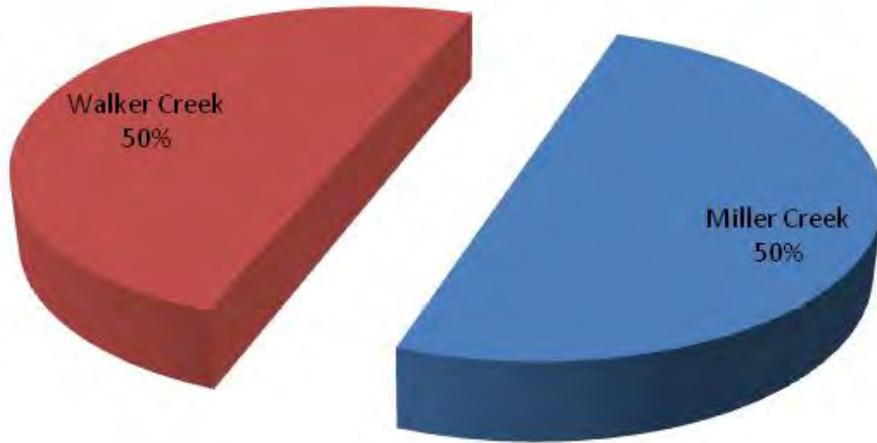
**Mark Twain**

# Species by Stream

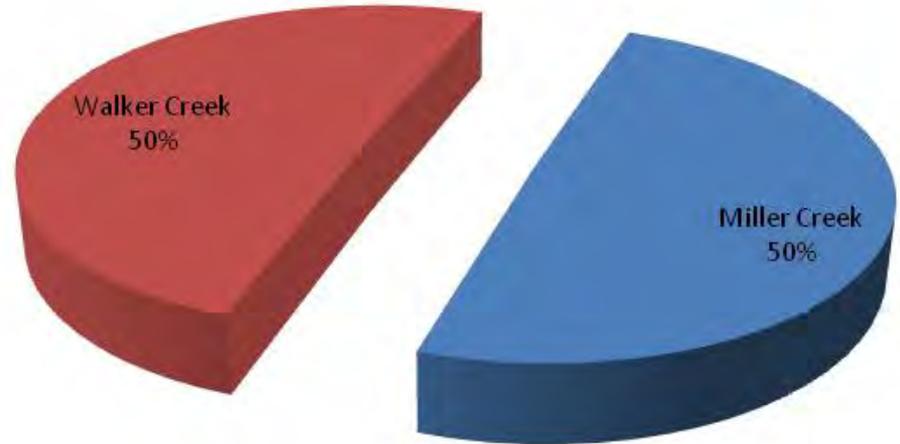


# Species by Stream

## Coho by Stream



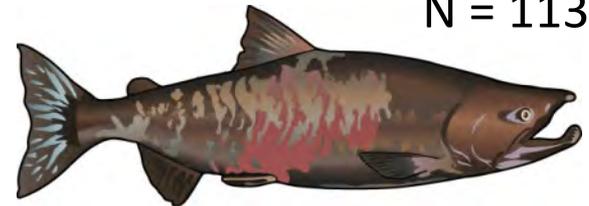
## Chum by stream



N = 432

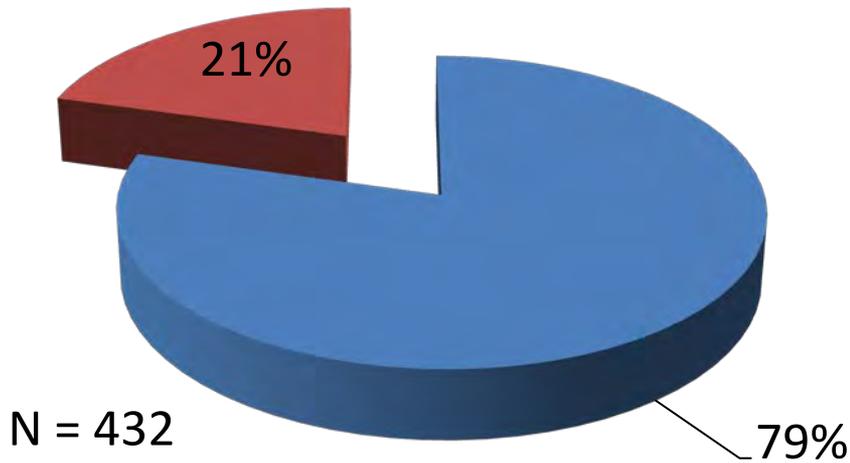


N = 113



# Use of Stream by Species

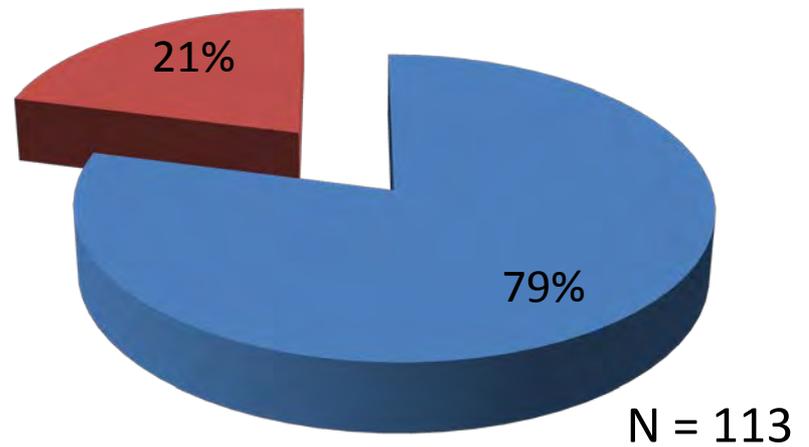
Miller Creek Salmon, 2012



■ Coho ■ Chum



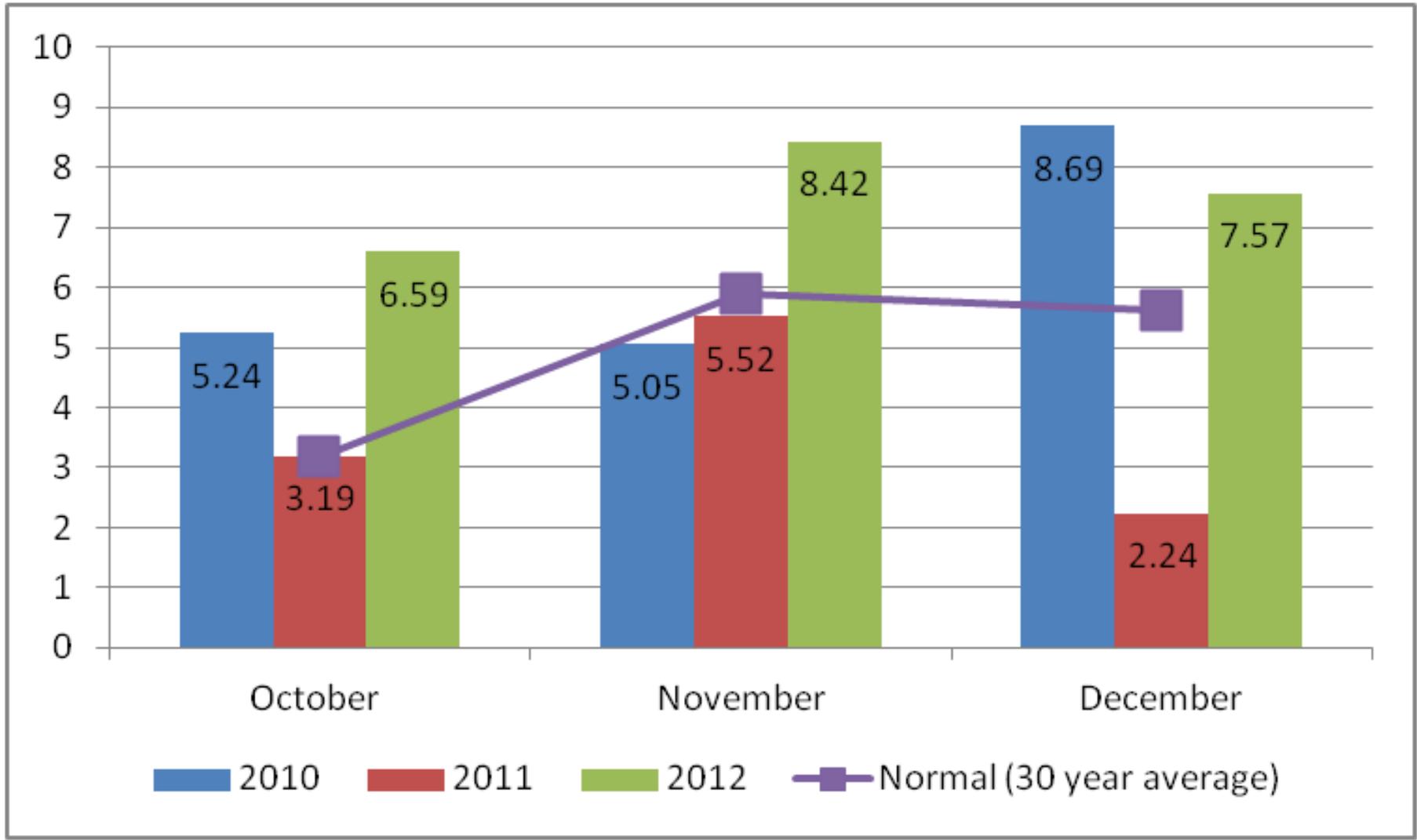
Walker Creek Salmon, 2012



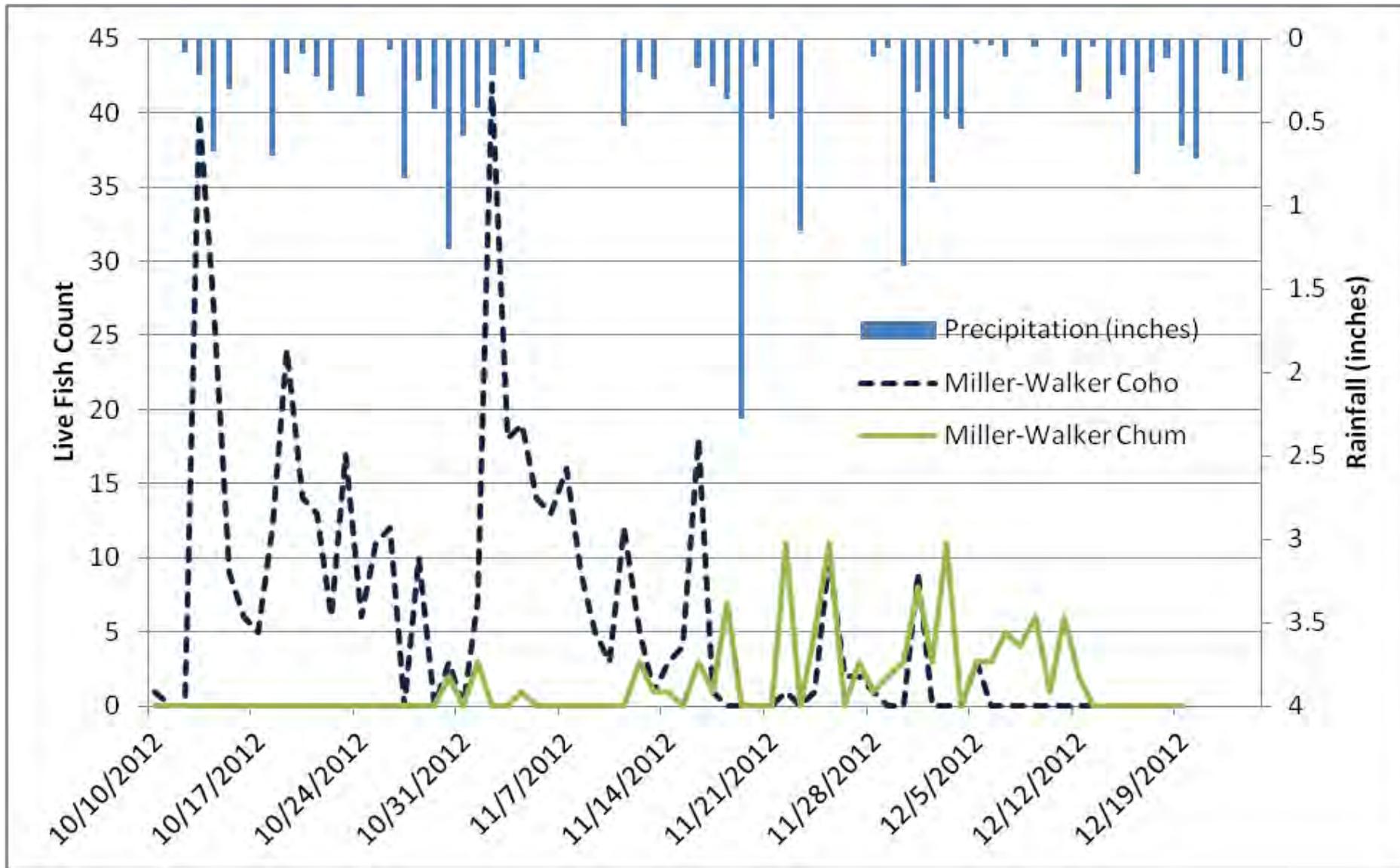
■ Coho ■ Chum



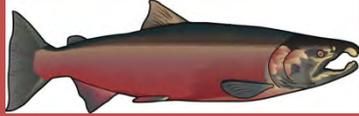
# CSI Weather – Monthly Rainfall (inches)



# Rainfall and live fish



# Estimated *Population*

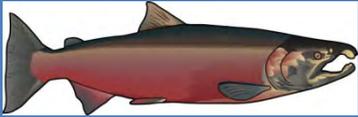
Species	Coho 	Chum 	Total
Miller Creek	196	33	229
Walker Creek	139	31	170
<b>Total</b>	<b>335</b>	<b>64</b>	<b>399</b>

## Assumptions:

- Using several peak counts over the survey period corrects for probable double-counting of fish – salmon spend several days in the stream.
- Carcass count was used for Miller Creek coho, because it was higher than the estimate using live fish, and carcasses were marked to avoid double-counting.

The estimated population is the “escapement estimate” – the actual number of fish that are likely to have spawned.

# Carcasses Summary

Species	Coho 	Chum 	Unidentified Adults
Miller Creek	196	11	7
Walker Creek	44	12	4
<b>Total</b>	<b>240</b>	<b>23</b>	<b>11</b>

# Prespawn Mortality

**Coho experiencing  
“prespawn” mortality at  
Upper Miller survey location**

**October 23, 2009**



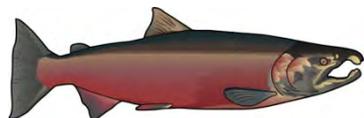
# Prespawn Mortality (PSM)



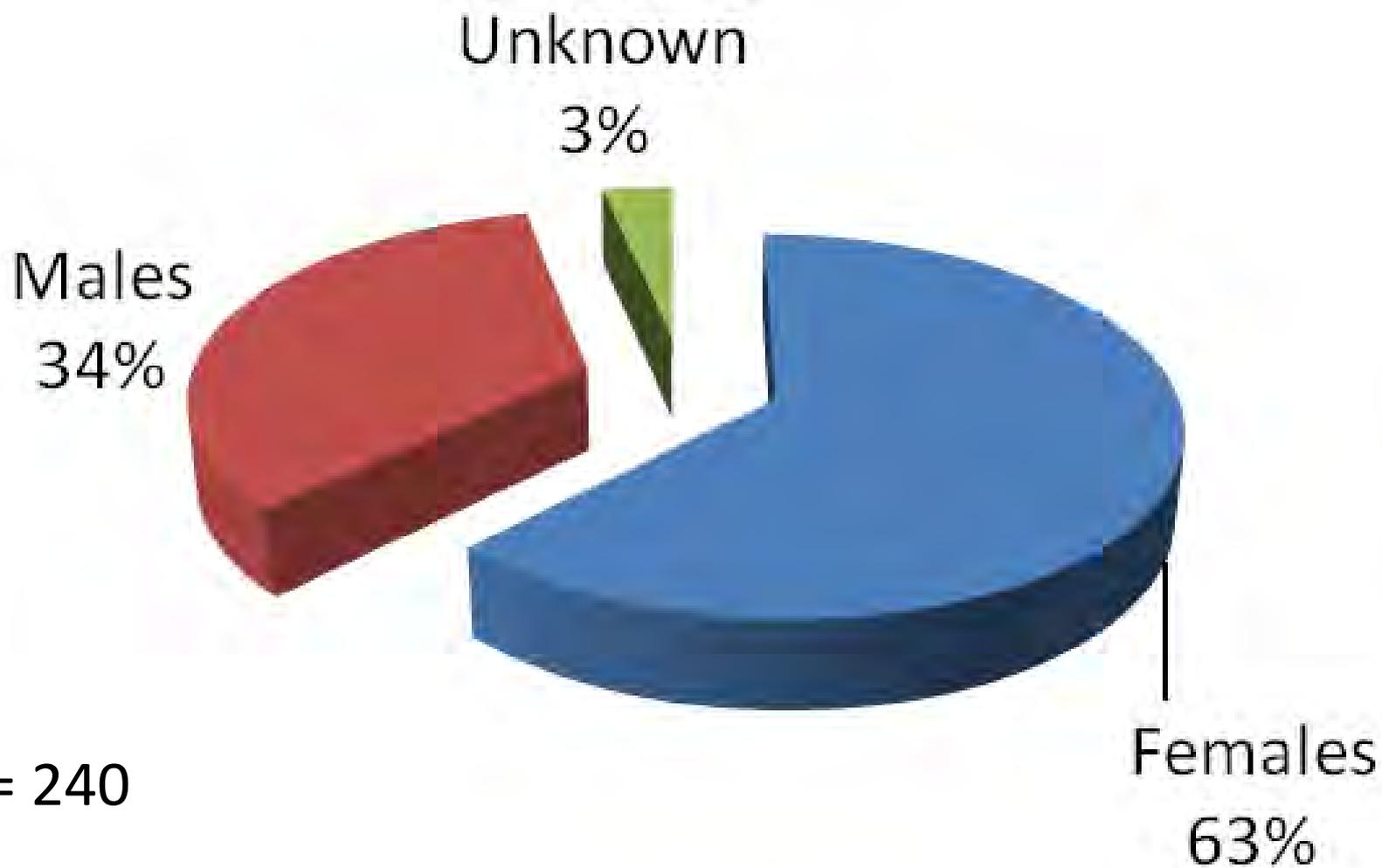
**Coho female, full of eggs**

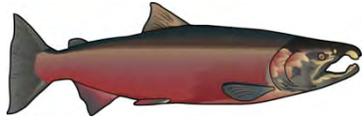
**October 25, 2012**

**Photo courtesy of Pam Silimperi**

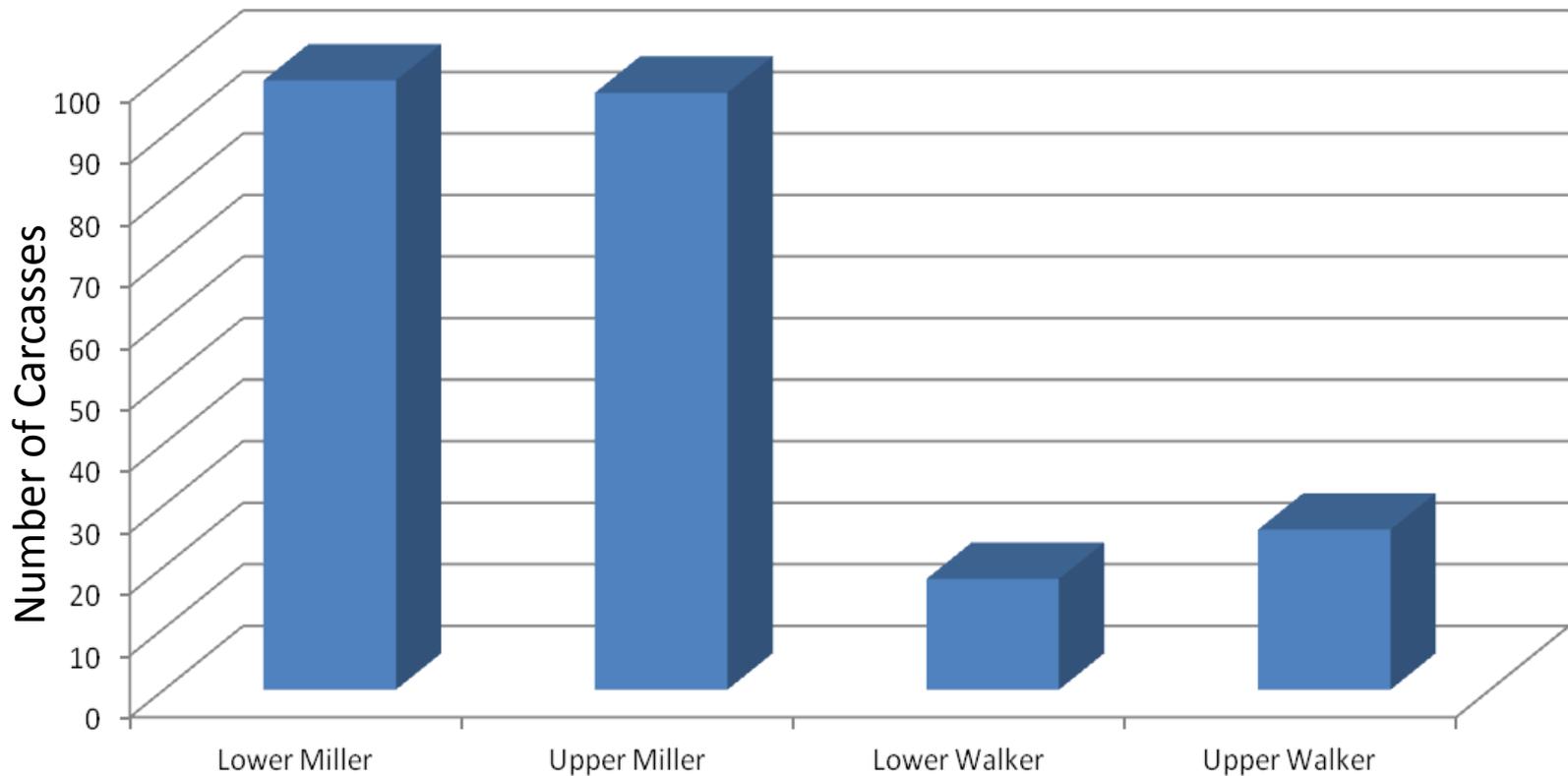


# Coho Carcasses: Sex





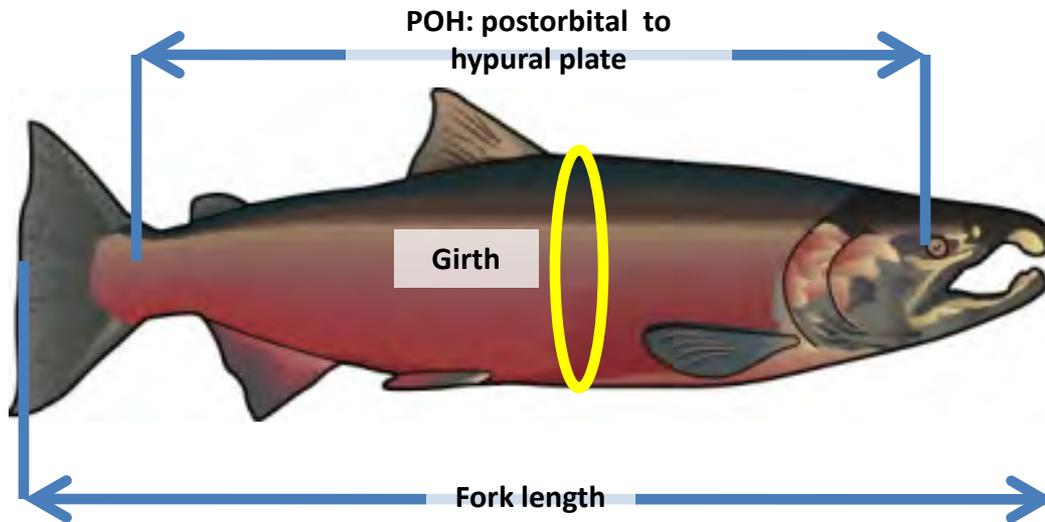
# Coho Carcasses: Location

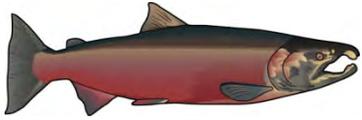


N = 240

# Coho Carcasses: Size

	Fork length (cm)	Girth (cm)	POH (cm)
Male average (n=82)	56.2	28.4	43.2
Female average (n=150)	57.6	30.2	45.1

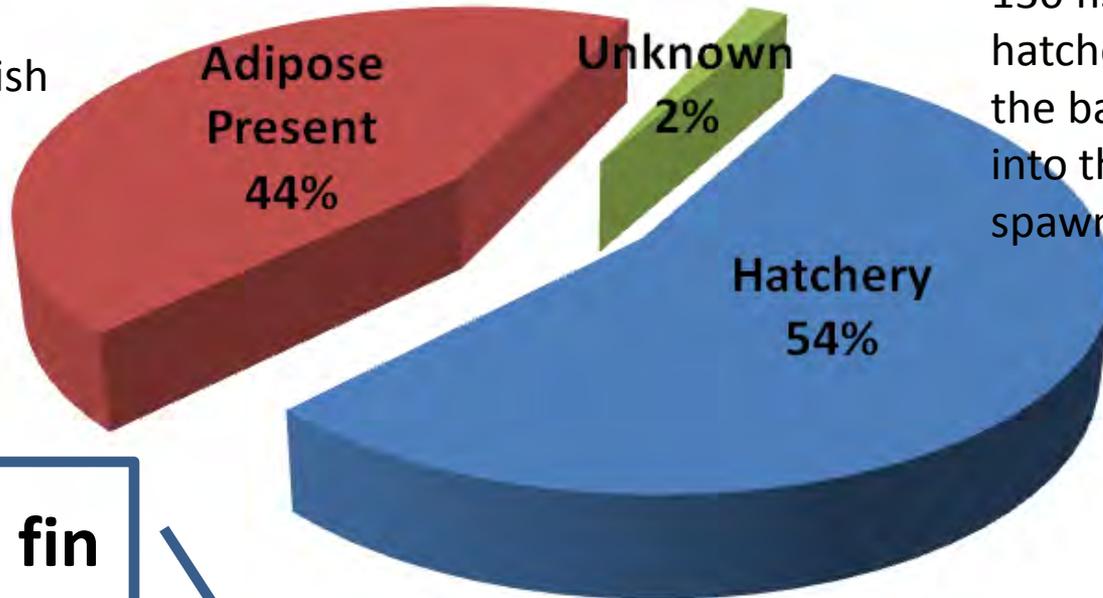




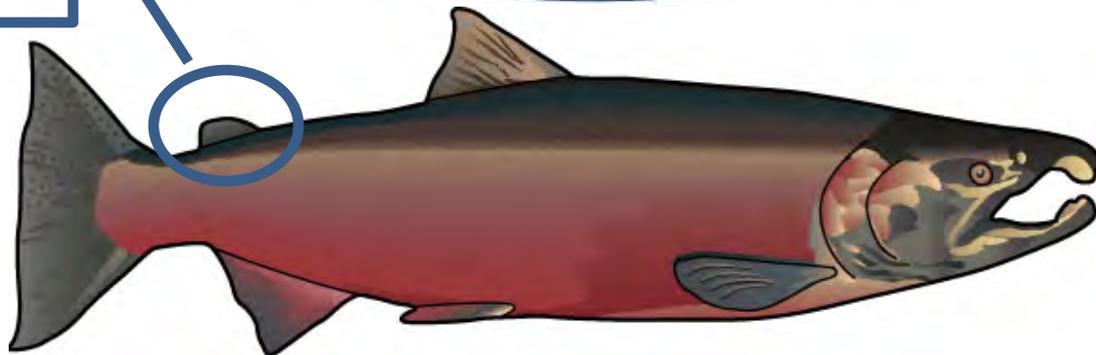
# Coho: Hatchery Origin

106 fish were “wild-origin” or TU outplanted fish

130 fish originated from hatcheries outside of the basin and “strayed” into the streams to spawn



**Adipose fin**



N = 240

# Collecting Coho Heads for Coded Wire Tags

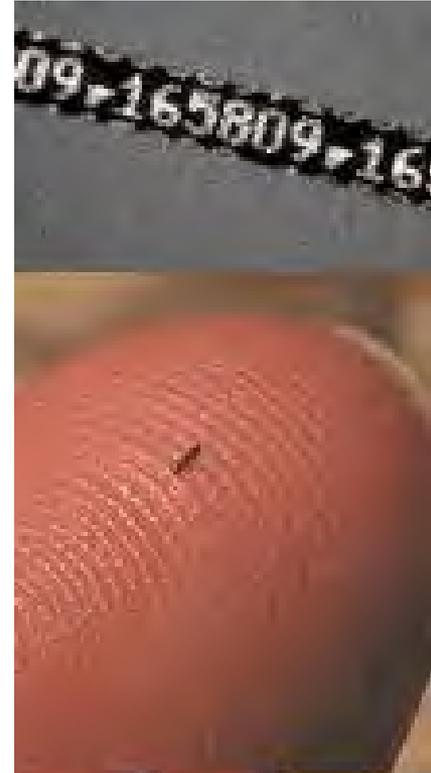
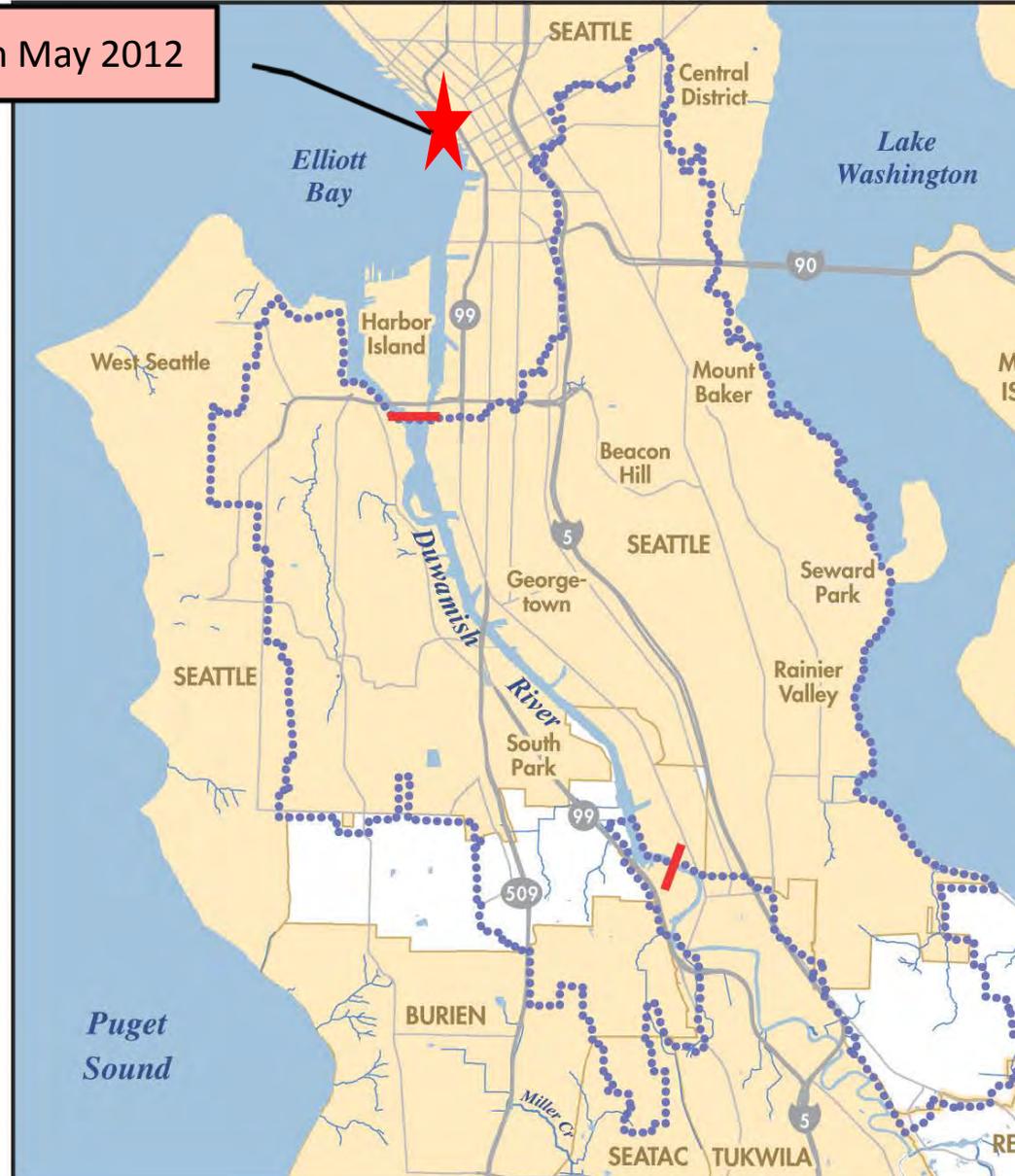


Image from Alaska Department of Fish and Game

# Six Coho with Coded Wire Tags found

Coho released here in May 2012

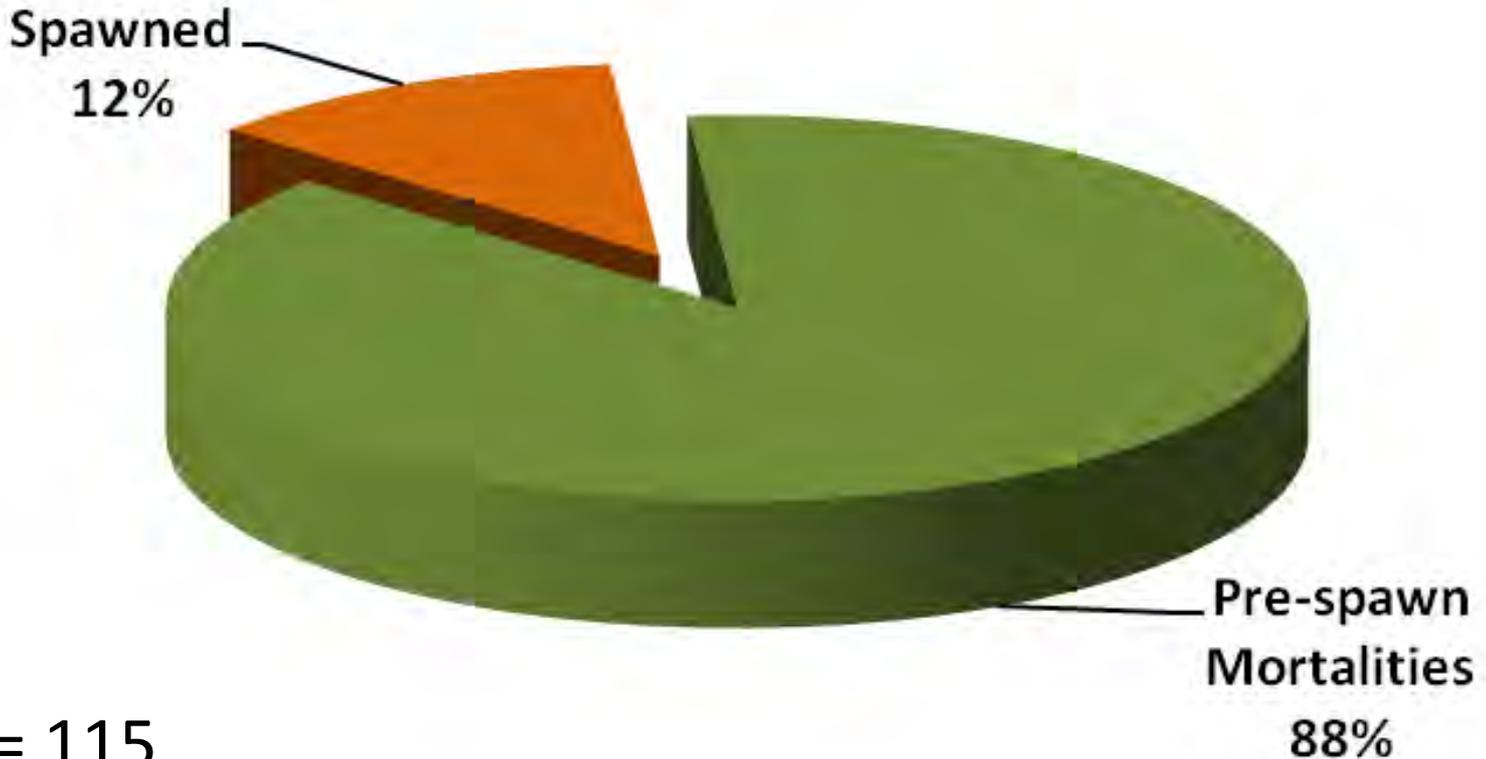
- Coho from Elliot Bay – Muckleshoot Indian Tribes Net Pen
- From Keta Creek Hatchery (Green River) in 2009
- Fed for several years in pen
- Released in 2012 into Puget Sound
- 5 females, of these, 4 were PSM, 1 was predated



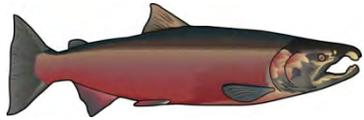


# Coho: Success in Spawning

Miller and Walker Creeks – 101/115 females =  
**88% Pre-spawn Mortality**

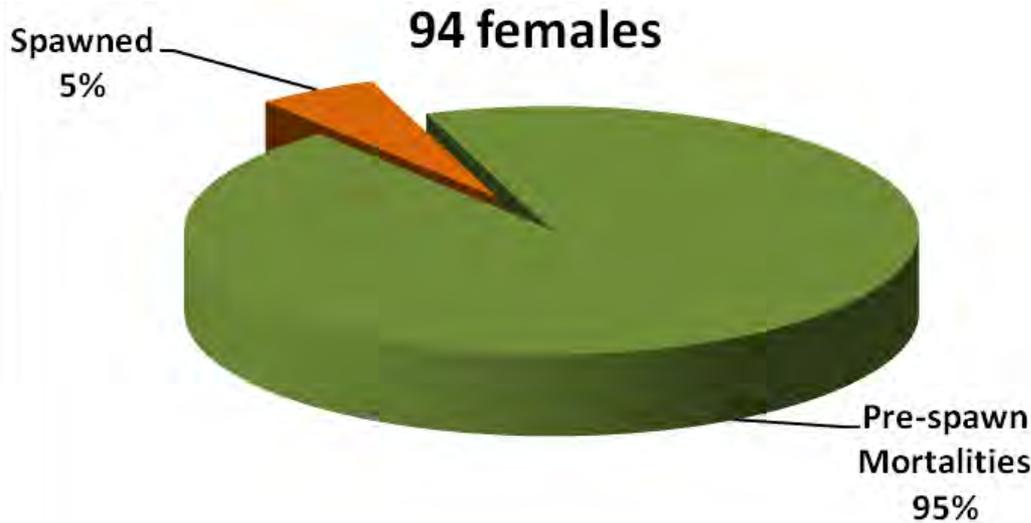


N = 115

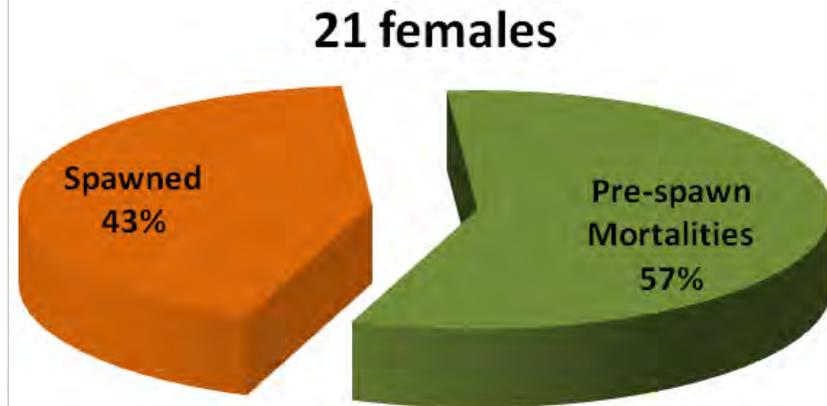


# Coho: Success in Spawning

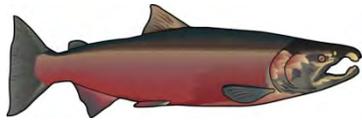
## Miller Creek 95% PSM



## Walker Creek 57% PSM

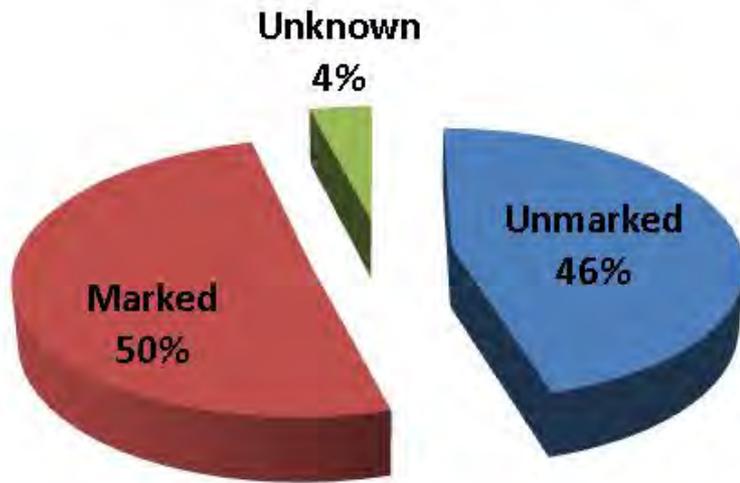


N = 115



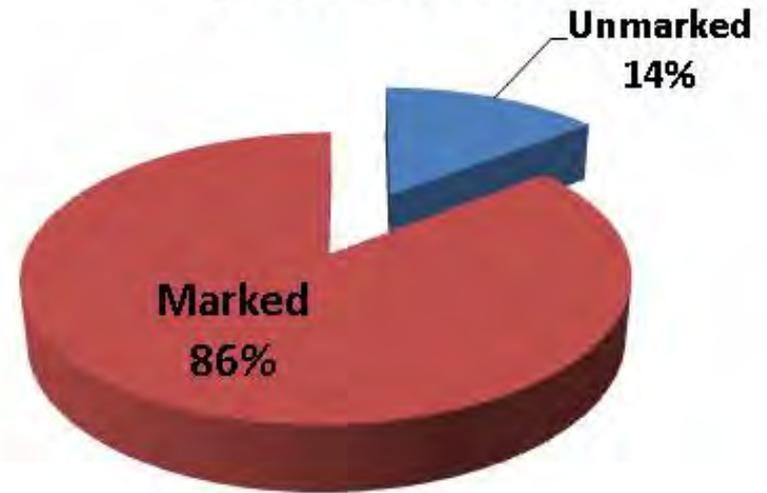
# Coho: Success in Spawning and Origin

**Pre-Spawn Mortality Fish**  
Marked = from Hatchery



N = 101

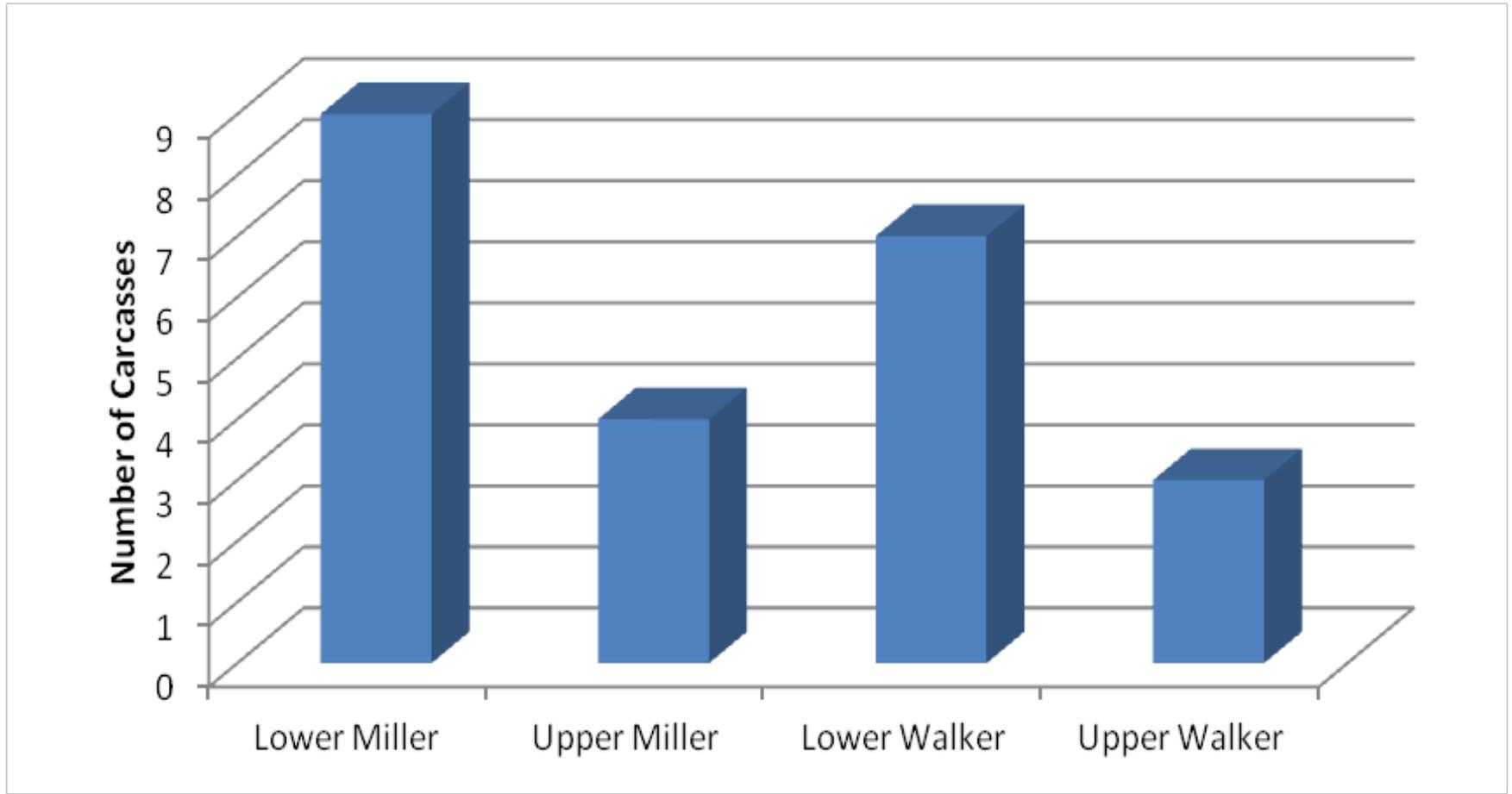
**Spawned Fish**



N = 14



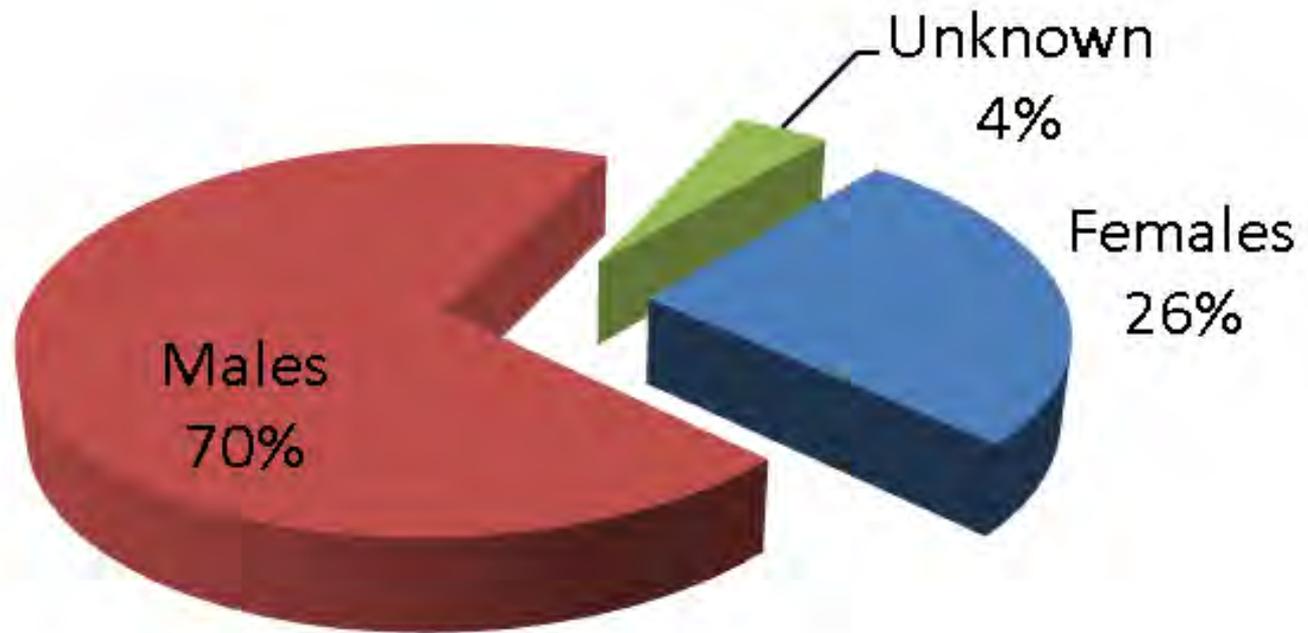
# Chum Carcasses: Location



N = 23



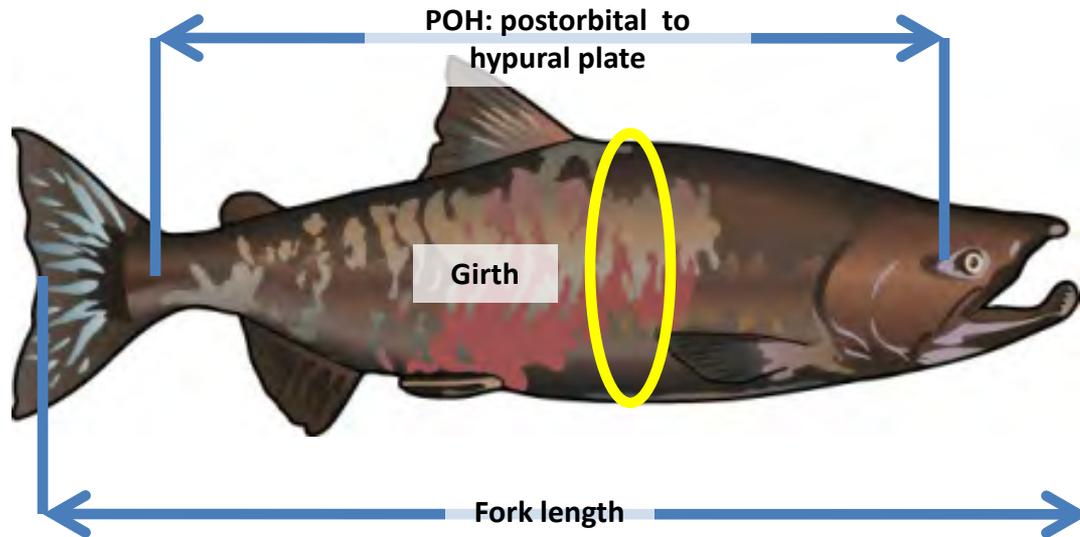
# Chum Carcasses: Sex



N = 23

# Chum Carcasses: Size

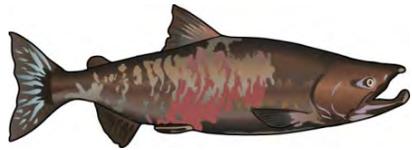
	Fork length (cm)	Girth (cm)	POH (cm)
Male average	62.2 (N = 14)	31 (N = 11)	46.8 (N = 12)
Female average	58.2 (N = 4)	26.9 (N = 5)	48.9 (N = 5)



# Chum: Hatchery Origin Unknown



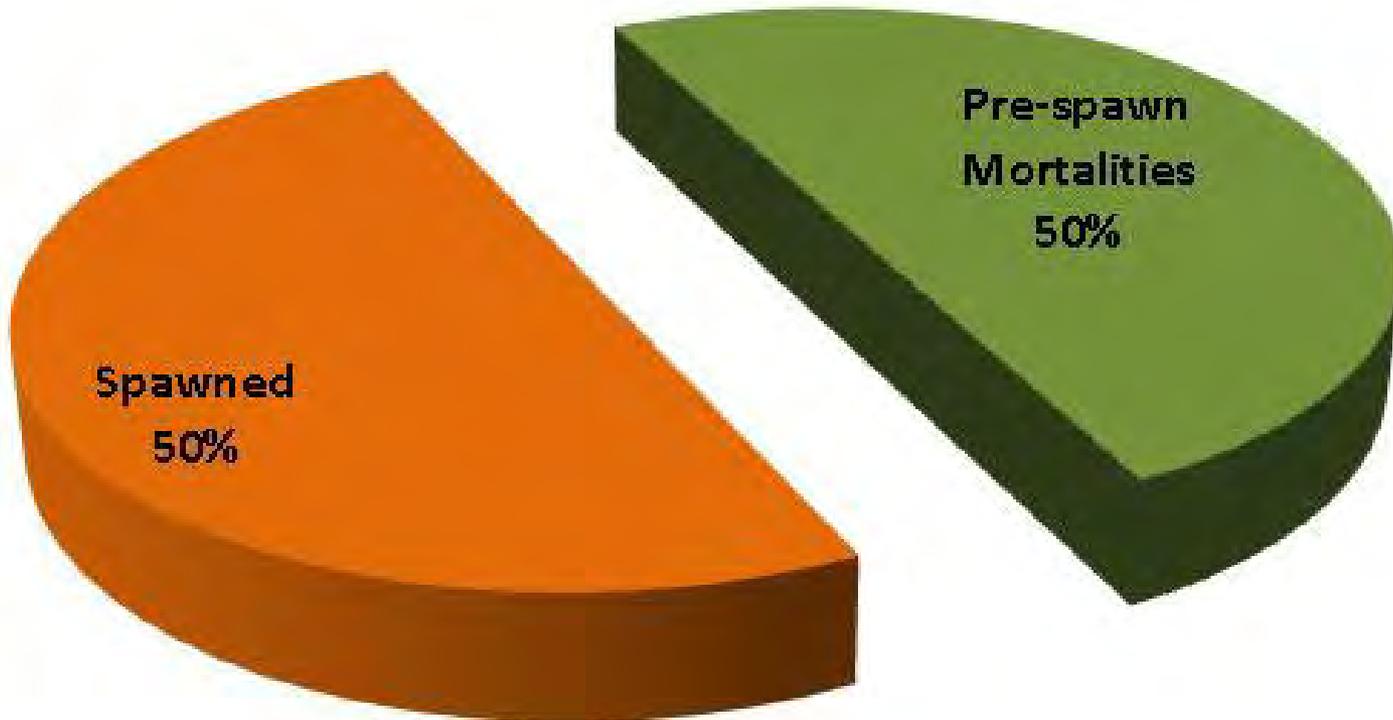
**Adipose fin**



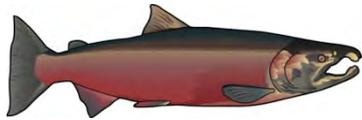
# Chum: Success in Spawning

Miller and Walker Creeks – 1 of 2 females =

**50% Pre-spawn Mortality**

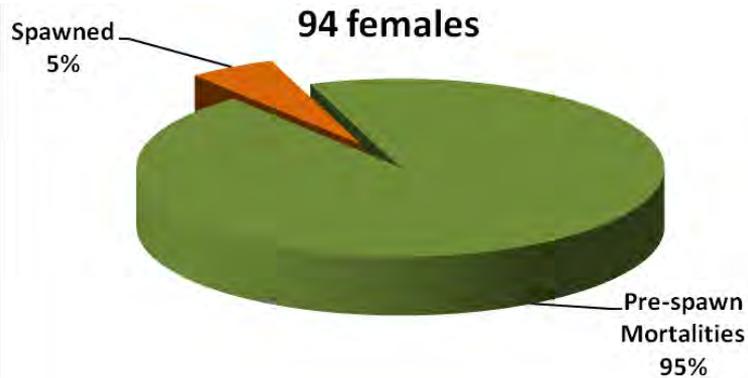


N = 6

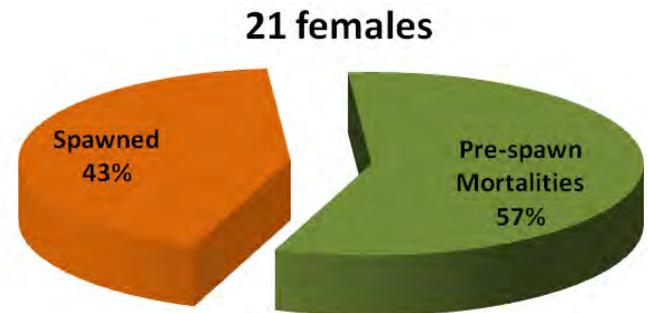


# Coho: Spawning Success in Nearby Creeks - 2012

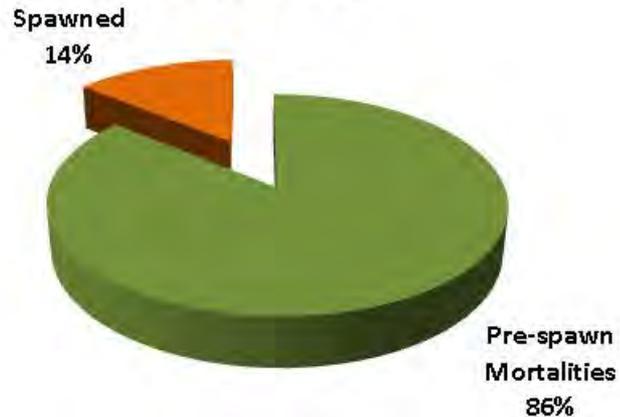
## Miller Creek- 95% PSM



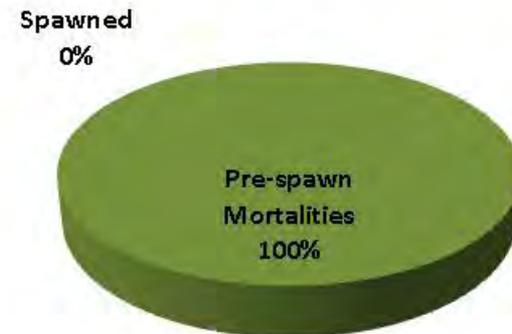
## Walker Creek – 57% PSM



## Longfellow Creek – 86% PSM



## Des Moines – 100% PSM

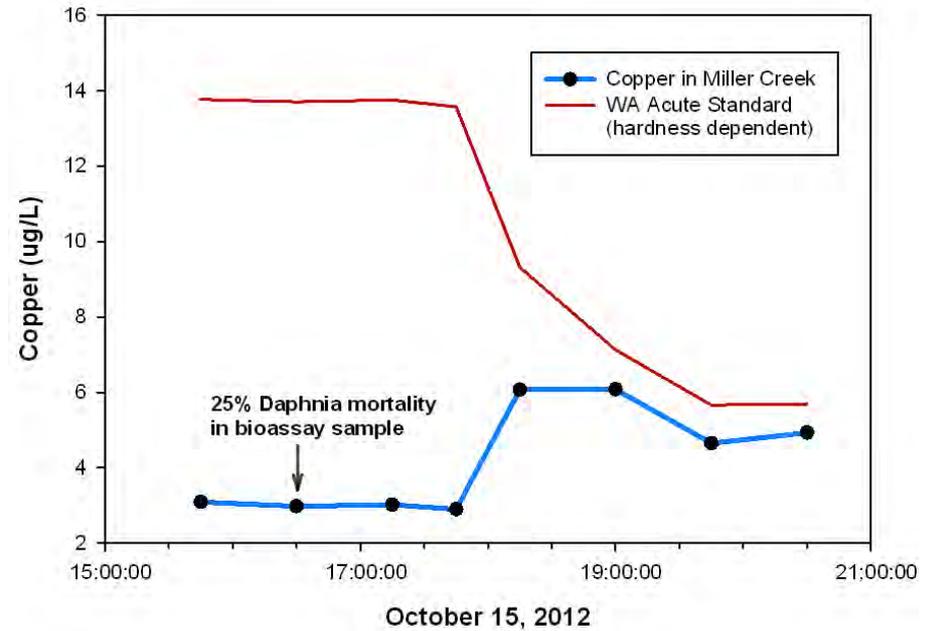
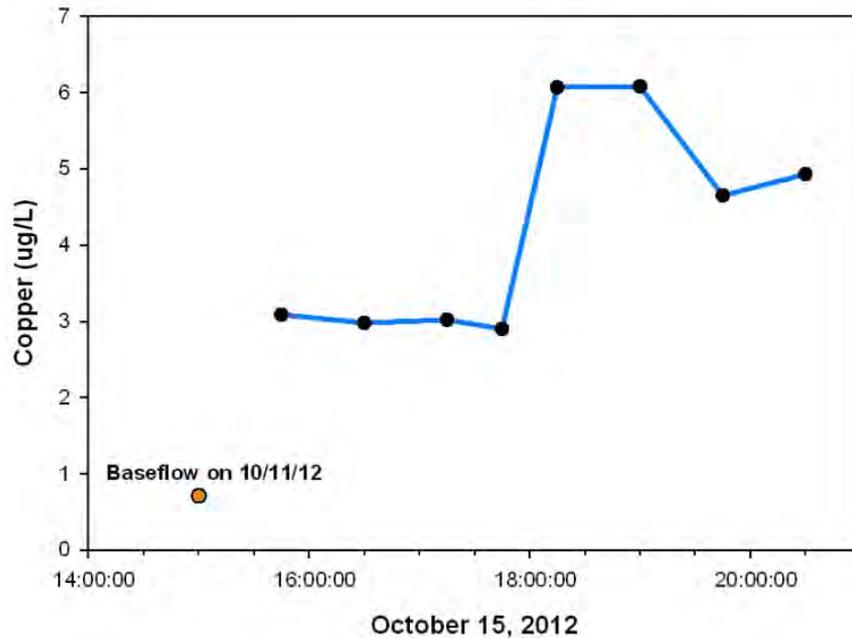


# Testing highway runoff on adult coho

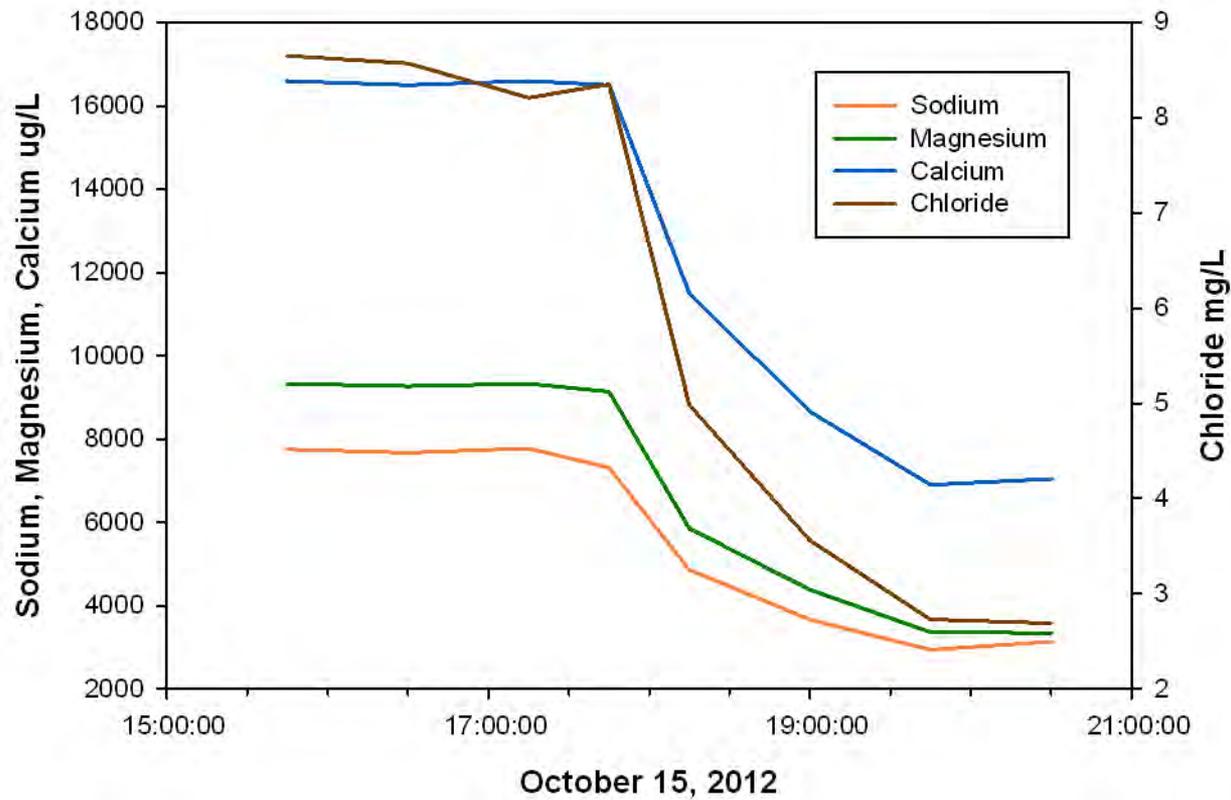


Photo courtesy of Tiffany Royal, Northwest Indian Fisheries Commission

# Water Quality in Miller Creek – Copper



# Water Quality in Miller Creek - Minerals



# Evidence of Predators

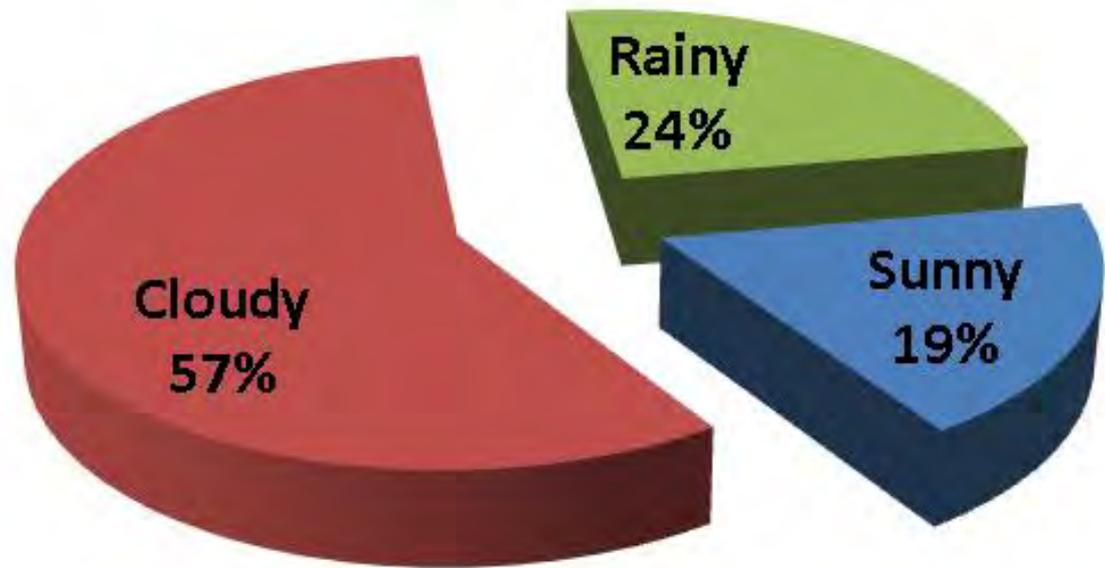


**Predated coho carcass and  
raccoon tracks**

**October 16, 2012**

# CSI Weather

- Average survey time = 3 hours, 1 minute
- Weather conditions (71 survey days):



# Wildlife

- Great blue heron
- Raccoon
- Coyote
- Bald eagle
- Red tailed hawks
- Pileated woodpeckers
- River otter



**Coyote near Miller Creek**

**December 23, 2012**

**Photo by Robin Hoefer**

# Great blue heron

Beaver pond at The Cove

December 2, 2011



# River otter

**Miller Creek at B.  
Fish property  
November 7, 2010**



# The Unexpected and Strange



**Male &  
female coho  
and cutthroat  
juvenile on  
Miller Creek  
October 15, 2012**

# The Unexpected and Strange



**Foam on Miller  
Creek**

**October 15, 2012**

**Photo by Christine Terry**

# The Unexpected and Strange



**Christmas Chum**

December 13, 2012

Photo by Christine Terry

# Shared Funding for Stewardship

King County basin stewardship is jointly funded by five governments:



**King County**



# Thank You Volunteers!

**“Team Saturday”  
Jim, Matt and Tom walk  
Miller Creek on a training  
survey  
October 13, 2012**



# 4) Plans for 2013 CSI

**Ethan prepares  
flagging for a carcass**

December 5, 2010

Photo courtesy of  
David Bobanick



# Plans for 2013 CSI Survey Season

- Continue the excellent work of 2010, 2011 and 2012 by surveying again at four locations in Normandy Park
- Monitor through end of chum spawning season
- Maintain volunteer pool at between 25 & 32 persons

# 5) Factors Driving Stream and Salmon Health

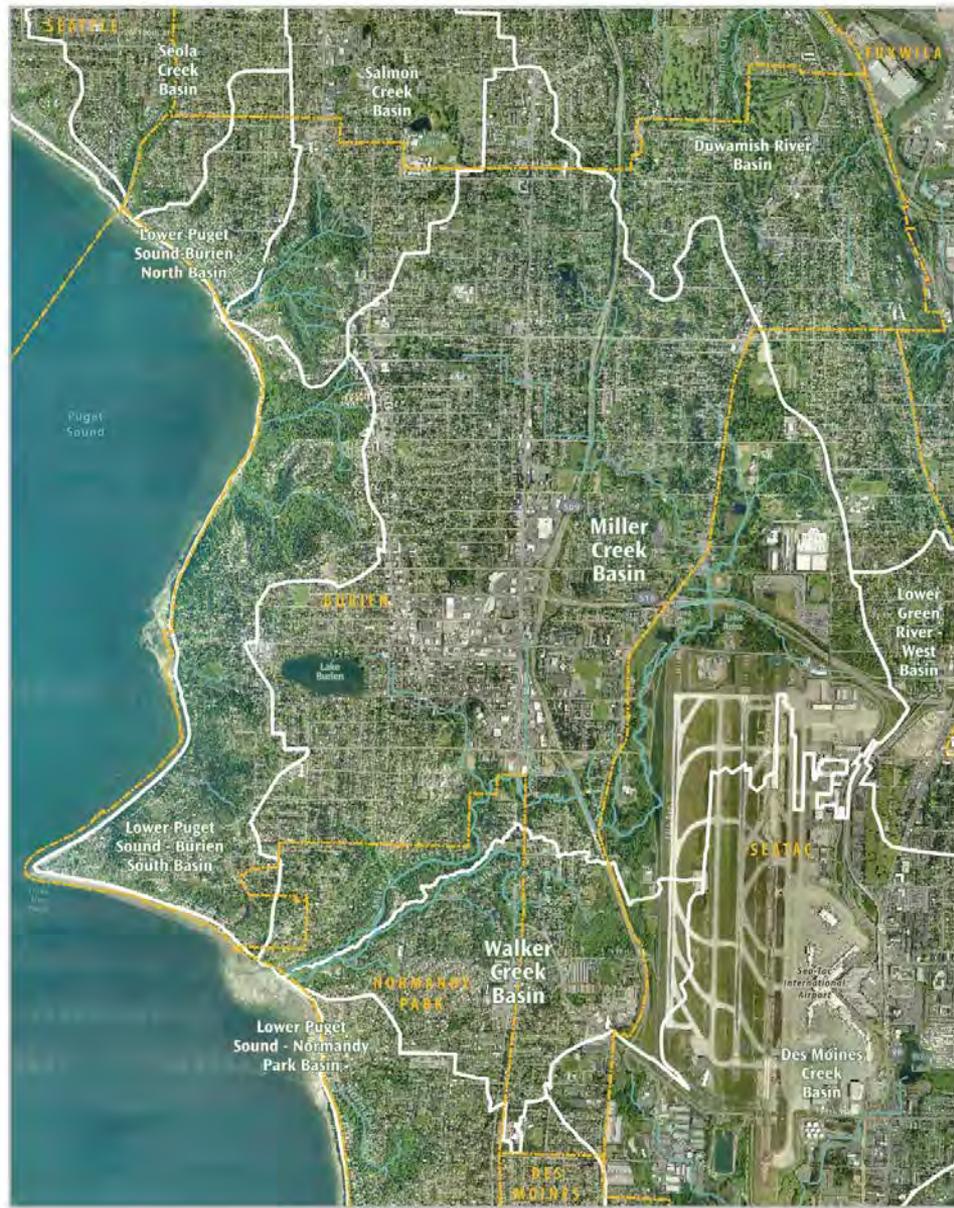


**St. Francis  
Elementary students  
mark storm drains by**

**Lake Burien**

October 5, 2010

Photo courtesy of  
Michael Stein-Ross



## Miller and Walker Creeks

### Basin Boundary Update 2010

-  Basin Boundary
-  Incorporated Area Boundary

Map Document:  
 [D:\ep7\projects\081813\10000\081813\graphics.mxd]



**King County**  
 Department of Natural Resources and Parks  
 Water and Land Resource Division

# Factors Driving Stream and Salmon Health in Highline

- Hard surfaces: roads, parking lots, roofs, cleared/compacted earth
- Fewer trees
- Pollution on land: pesticides, fertilizer, oil, metals (e.g., brake pad residue), car wash soap, pet waste, silt
- Fish passage barriers: culverts

# Ways Streams Are Affected

- Hydrology – stream flow
  - Faster, higher flowing water more often
  - Less and warmer water in summer
- Water quality
  - Warmer, low dissolved oxygen, altered pH, more turbid
  - More pollution - bacteria, metals, pesticides, oil, salt, etc.
- Physical habitat conditions
  - Substrate: hardened, more silt/sand, less gravel
  - Salmon nests in gravel are smothered
  - Streamside vegetation: native, invasive, absent
  - Reaches inaccessible to resident and anadromous fish

**Coho salmon fry in Miller  
Creek in Normandy Park**

June 30, 2008





# Expanded Ambaum stormwater detention pond in Burien

December 3, 2007



With funding  
support from:



Washington State  
Department of Transportation



# Restoration of Walker Creek at Walker Preserve

August 24, 2009



With funding  
support from:

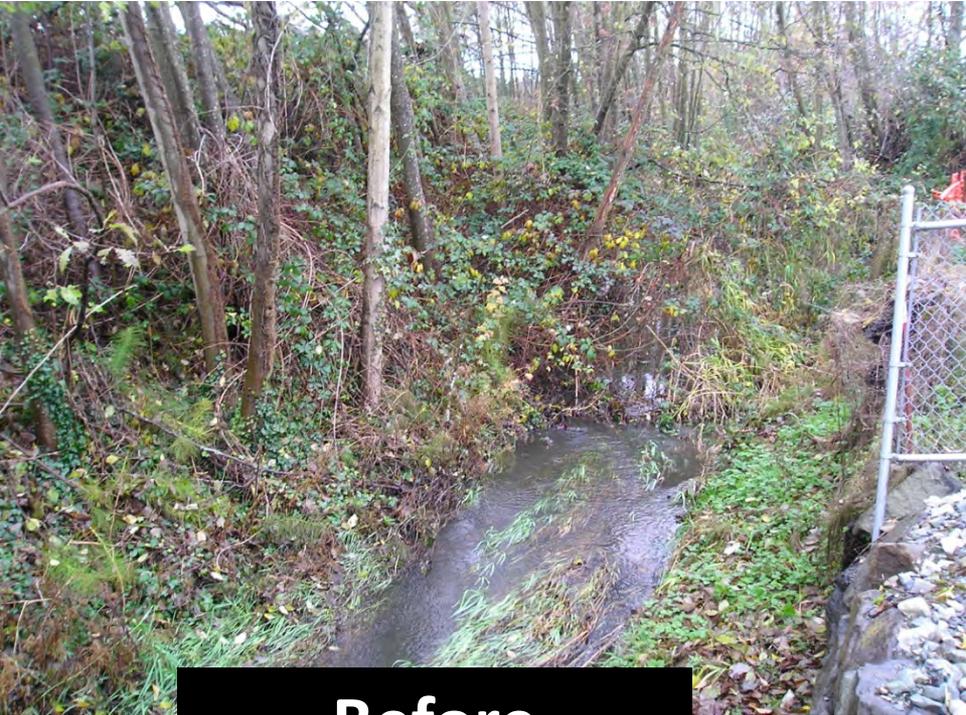


# Stewards of the Cove at work since 2003



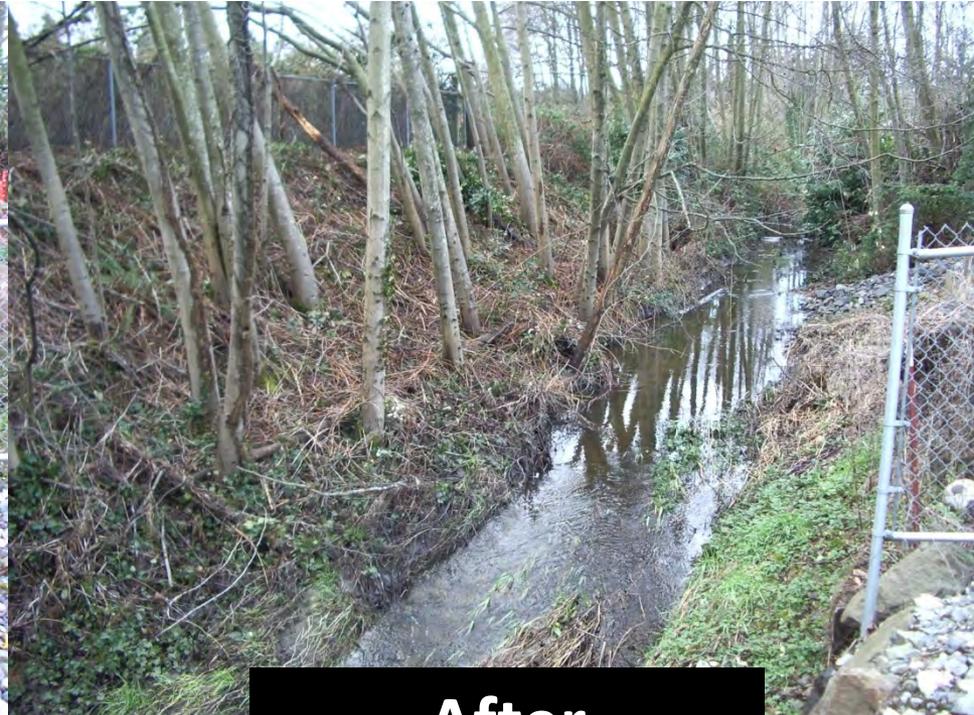
**Normandy Park  
Community Club**

# Homeowner Stewardship



**Before**

**November 16, 2007**

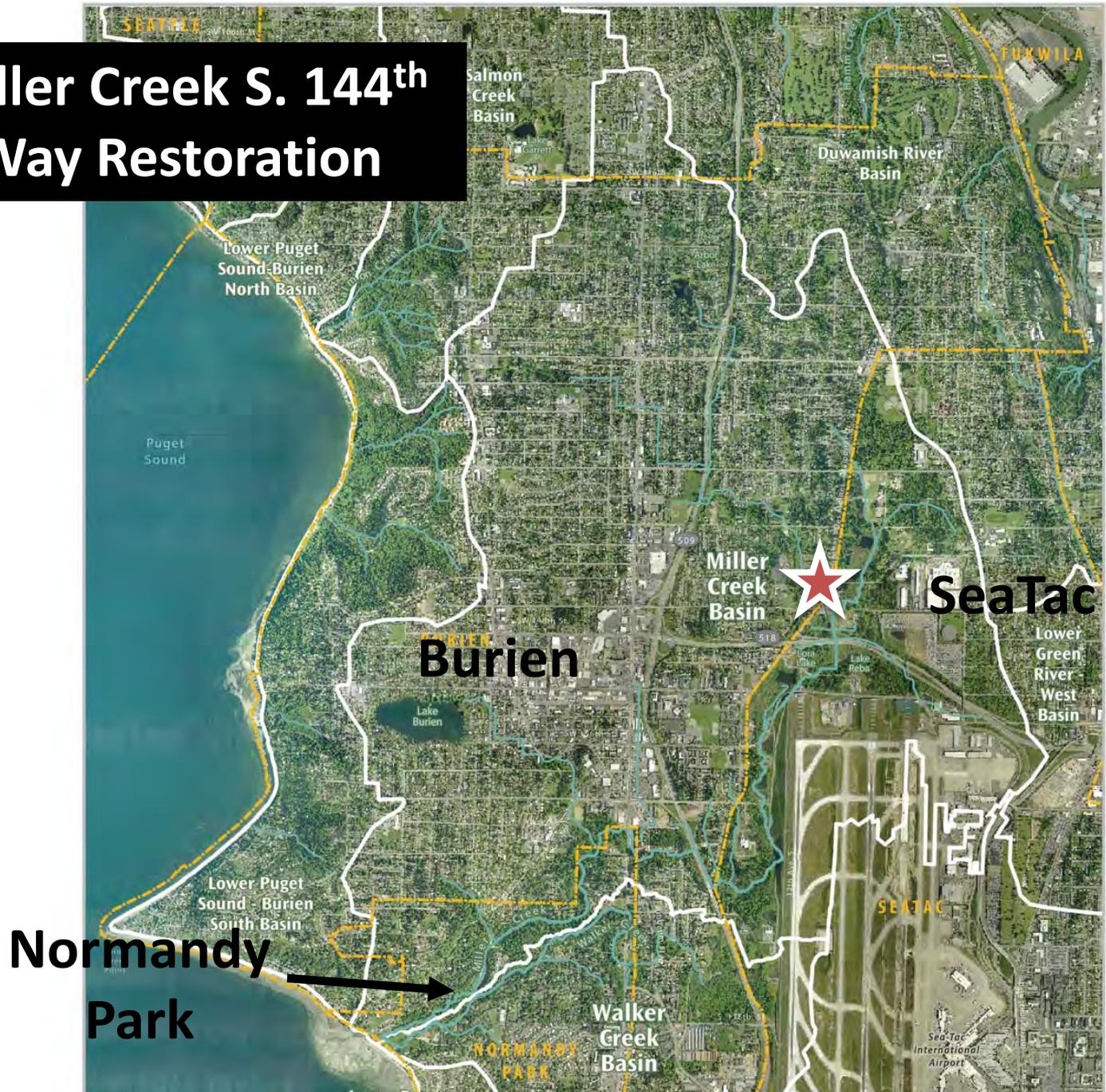


**After**

**January 11, 2008**

Photo on right courtesy of Kevin Alexander

# Miller Creek S. 144<sup>th</sup> Way Restoration



**“Before” restoration at S. 144<sup>th</sup>  
Way on Miller Creek in Burien**

**October 11, 2007**



**“Before” restoration at S. 144<sup>th</sup>  
Way on Miller Creek in Burien**

**October 11, 2007**



**Invasive Himalayan blackberry;  
no small native trees**

# Community tree-planting

October 27, 2007

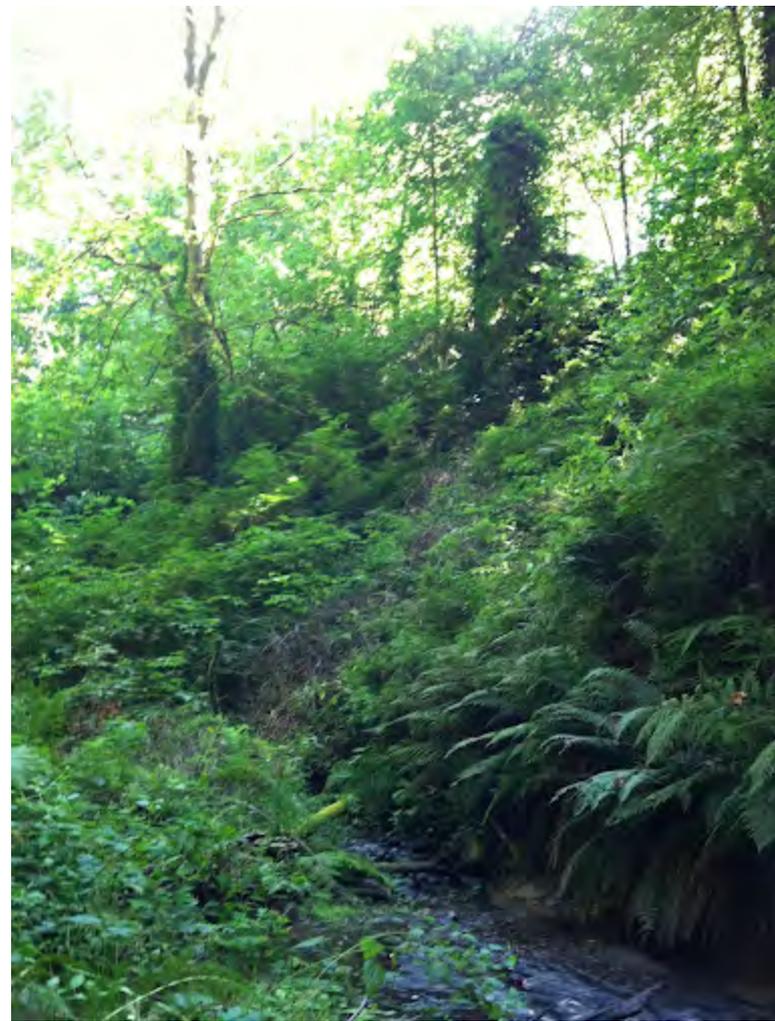




**“After” restoration at S. 144<sup>th</sup> Way  
on Miller Creek in Burien**

**October 26, 2007**

**Himalayan blackberry removed;  
over 150 native trees planted**



**Ivy in trees along Walker Creek in  
Normandy Park**

**August 25, 2011**

**Normandy Park Mayor  
Clarke Brant removes ivy  
along Walker Creek in  
Normandy Park  
March 22, 2008**



# Knotweed control on Walker Creek in Burien

October 16, 2007

Control by



**King County**

Funded by

Port   
of Seattle



# 6) Your Role





# Things *You* Can Do

Fix oil leaks in your car

- Check for leaks
- Contain leaks until you can get the car fixed
- Keeps oil out of our creeks



## Things You Can Do

Your car:

- Wash your car at a carwash (avoids wasting up to 80 gallons!) or on the lawn rather than in the street (keeps soap and oil out of the storm sewer and out of the creek)



# Things You Can Do

Clean up after your pet



# Things You Can Do

Build a rain garden:



**Rain garden at  
Burien Town Square**

**January 25, 2011**

Photo courtesy of Ken Srilofung, City of Burien



# Things *You* Can Do

Volunteer to mark storm drains



**Lindsay/Andolina family  
marked storm drains in  
their Burien neighborhood**

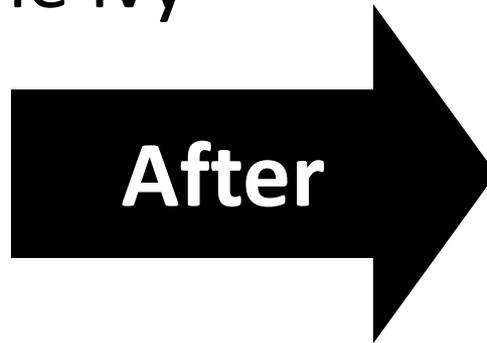
**August 25, 2010**



# Things *You* Can Do



Save your trees –  
remove the ivy

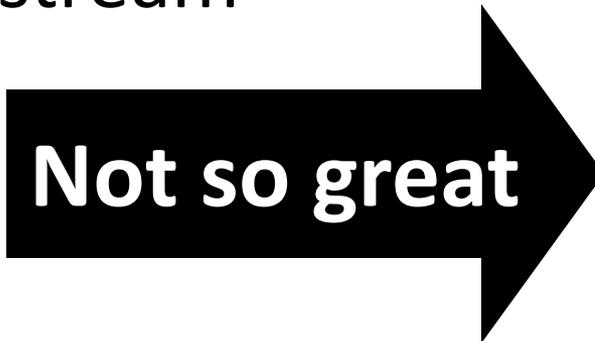




# Things *You* Can Do



Leave down logs  
in the stream



# Things *You* Can Do: Volunteer

**Upcoming volunteer event:  
Ivy removal at Walker  
Preserve on March 16, 2013**

Photo taken February 18, 2012



# Things *You* Can Do: Volunteer

Volunteer for the  
Community  
Salmon  
Investigation  
for 2013!



**“Team Wednesday”**  
**Margy taking statistics**  
October 23, 2012  
Photo courtesy of Margy Wallace

# Community Salmon Investigation for Highline 2012 Presentation

1. Purpose of *CSI: Highline*
2. How *CSI: Highline* works
3. Results of October – December 2012 surveys
4. Thanked volunteers and property owners
4. Plans for *CSI: Highline* 2013
5. Factors affecting stream and salmon health
6. Your role!



**The End**

Photo courtesy of Barb and Darrell Williams