Community Salmon Investigation for Highline 2013 Findings

Presented by Elissa Ostergaard
Miller/Walker Creeks Basin Steward
March 20 and April 8, 2014
1. Purpose of *Community Salmon Investigation: Highline*

2. How *CSI: Highline* works
   - Stream surveys
   - Necropsies
   - Survey locations

3. Results of October – January surveys
   - Summary data
   - Analysis
   - Weather and Wildlife

Volunteer Recognition

4. Plans for 2014

5. Factors affecting stream and salmon health

6. Your role!
Puget Sound Starts Here
1) Purpose of CSI

Coho “jack”
(immature male)
November 11, 2011
Photo courtesy of David Bobanick
Basin Boundaries for Miller and Walker Creeks
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
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
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
Activities and Purpose of CSI: Highline

- Count adult salmon – indicators of the health of the ecosystem
- Document rate of coho “pre-spawn mortality” to see how pollution prevention helps
- Raise the awareness about the streams in the community
“Team Thursday” Christine and Karen survey Lower Miller Creek
October 18, 2012
CSI “Cast”

- 27 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 filled in

“Team Monday” - Joy, Roger and Michael
CSI Training

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

October 7, 2010
CSI Style

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

- Polarized sunglasses for fish spotting
- Back pack for supplies
- 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 Tuesday”
Kristine and Rony looking for salmon along Miller Creek
Half of “Team Sunday”
Lisa and Alex brave the elements
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
• Mark and Sherri Henry
• 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 1st 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
CSI Survey Locations
Topographic Map of the Miller and Walker Creek Drainages

Upper Miller Survey Location
Lower Miller Survey Location
Upper Walker Survey Location
Lower Walker Survey Location

First Ave South

Image courtesy of GeoEngineers and Washington State Department of Transportation
Walker Creek Stream Restoration

Removing invasive weeds and planting native trees and shrubs at Walker Preserve
Monthly, fall 2012
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

“Test plot” native plant revegetation area
CSI in Action

Today - Test Plot at Sewer Plant on Upper Miller Creek
October 13, 2013
3) 2013 CSI Results

Coho carcass
October 23, 2012
Coho: Life History

• October-Nov 2010 Spawned
• Early 2011 Hatched
• Early 2011 – early 2012 Rearing in stream
• Early 2012 Migration to salt water
• Early 2012 – October 2013 Rearing in Puget Sound and Pacific Ocean
• October – December 2013 Migration upstream, spawning, death
• Early 2014 New fish hatch
Chum: Life History

- Nov.–December 2009: Spawned
- Early 2010: Hatched and migrated to salt water
- Early 2010–Nov. 2013: Rearing in Puget Sound and Pacific Ocean
- Nov.–December 2013: Migration upstream, spawning, death
- Early 2014: Offspring hatch
## Results: Live Fish Observations Summary

<table>
<thead>
<tr>
<th>Species</th>
<th>Coho</th>
<th>Chum</th>
<th>Unidentified Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller Creek</td>
<td>78</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>Walker Creek</td>
<td>41</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>119</strong></td>
<td><strong>28</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

Unidentified adults were 24% of total fish observed.
Results: 2010-2013

- **2010**: Coho (20) and Chum (300)
- **2011**: Coho (400) and Chum (500)
- **2012**: Coho (400) and Chum (100)
- **2013**: Coho (100) and Chum (20)
Results: 2010-2013

Number of Fish Seen

Coho

Chum

2010
2011
2012
2013
Results: 119 Coho Seen

Walker Creek peak observation on November 15: 14 fish

Miller Creek peak observations on 11/4 and 11/6: 10 fish
Results: 28 Chum Observations

Peak observation on November 15: 9 fish

Last fish seen: December 22
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

Coho
N = 119

Chum
N = 28
Species by Stream

**Coho**
- 18% Walker Creek
- 82% Miller Creek

**Chum**
- 21% Walker Creek
- 79% Miller Creek

N = 119

N = 28
CSI Weather – Monthly Rainfall (inches)

<table>
<thead>
<tr>
<th>Month</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Normal (30 year average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>5.24</td>
<td>3.19</td>
<td>6.59</td>
<td>1.51</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>5.05</td>
<td>5.52</td>
<td>8.42</td>
<td>3.62</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>8.69</td>
<td>2.24</td>
<td>7.57</td>
<td>1.47</td>
<td></td>
</tr>
</tbody>
</table>
Rainfall and live fish - 2013
Rainfall and live fish - 2012

The chart shows the daily rainfall (in inches) and the counts of live fish (including Miller-Walker Coho and Miller-Walker Chum) from October 10 to December 19, 2012. The rainfall data is represented by the solid blue line, while the live fish counts for Miller-Walker Coho are shown by the dashed black line and for Miller-Walker Chum by the green line.
## Estimated Population

<table>
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<tr>
<th>Species</th>
<th>Coho</th>
<th>Chum</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller Creek</td>
<td>78</td>
<td>17</td>
<td>95</td>
</tr>
<tr>
<td>Walker Creek</td>
<td>41</td>
<td>11</td>
<td>52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>119</strong></td>
<td><strong>28</strong></td>
<td><strong>147</strong></td>
</tr>
</tbody>
</table>

**Assumptions:**
- Using several peak counts over the survey period corrects for probable double-counting of fish – salmon spend several days in the stream.
- The estimated population is the “escapement estimate” – the actual number of fish that are likely to have spawned.
## Estimated Population

<table>
<thead>
<tr>
<th>Species</th>
<th>Coho</th>
<th>Chum</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller Creek</td>
<td>56**</td>
<td>33*</td>
<td>89</td>
</tr>
<tr>
<td>Walker Creek</td>
<td>16*</td>
<td>12*</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>45</strong></td>
<td><strong>117</strong></td>
</tr>
</tbody>
</table>

**Assumptions:**
* Using several peak counts over the survey period corrects for probable double-counting of fish – salmon spend several days in the stream.
** The number of coho carcasses was greater than the population estimate using peak counts on Miller Creek, so we will use number of carcasses for Miller Creek coho – carcasses were marked to prevent counting more than once.

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Coho</th>
<th>Chum</th>
<th>Unidentified Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller Creek</td>
<td>56</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Walker Creek</td>
<td>8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>64</strong></td>
<td><strong>26</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>
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

- Females: 41%
- Males: 28%
- Unknown: 31%

N = 64
Coho Carcasses: Location

N = 64
# Coho Carcasses: Size

<table>
<thead>
<tr>
<th></th>
<th>Fork length (cm)</th>
<th>POH (cm)</th>
<th>Girth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male average</td>
<td>49.6</td>
<td>38.6</td>
<td>23.9</td>
</tr>
<tr>
<td>(n=18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female average</td>
<td>58.3</td>
<td>46.2</td>
<td>27.6</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**POH:** postorbital to hypural plate

**Fork length**

**Girth**
Coho: Hatchery Origin

- **Unmarked**: 25%
  - 16 fish were either “wild-origin” or TU outplanted fish
- **Hatchery**: 53%
  - 34 fish originated from hatcheries outside of the basin and “strayed” into the streams to spawn
- **Unknown**: 22%
  - 14 fish were too far gone to tell

N = 64
Collecting Coho Heads for Coded Wire Tags
Coho with Coded Wire Tags: 3

- Coho from Elliot Bay – Muckleshoot Indian Tribes Net Pen
- From Keta Creek Hatchery (Green River) in 2010
- Released in 2012 into Puget Sound
- 3 females: 2 spawned, 1 PSM
- Miller Creek
Coho: Success in Spawning

Miller and Walker Creeks – 10/22 females = 45% Pre-spawn Mortality

N = 22
Coho: Success in Spawning

Miller Creek
50% PSM
20 females
- 50% Spawned
- 50% Pre-spawn mortalities

Walker Creek
0% PSM
2 females
- 100% Spawned
- 0% Pre-spawn mortalities
Coho: Success in Spawning and Origin

**Pre-spawn Mortalities**
- Unmarked: 20%
- Hatchery Origin: 80%

**Spawned Fish**
- Unmarked: 25%
- Hatchery Origin: 75%

N = 10
N = 12
Chum Carcasses: Location

N = 26
Chum Carcasses: Sex

- Females: 33%
- Males: 34%
- Unknown: 33%

N = 27
# Chum Carcasses: Size

<table>
<thead>
<tr>
<th></th>
<th>Fork length (cm)</th>
<th>POH (cm)</th>
<th>Girth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male average</strong> (^{(n=9)})</td>
<td>70.6</td>
<td>53.6</td>
<td>35.4</td>
</tr>
<tr>
<td><strong>Female average</strong> (^{(n=9)})</td>
<td>62.6</td>
<td>48.7</td>
<td>28.3</td>
</tr>
</tbody>
</table>

POH: postorbital to hypural plate

![Diagram of Chum Salmon](image)
Chum: Hatchery Origin Unknown

Adipose fin
Chum: Success in Spawning

Miller and Walker Creeks – 2 of 5 females = 40% Pre-spawn Mortality

N = 5
Coho: Spawning Success in 2012:
Miller/Walker and Nearby

Miller Creek - 95% PSM
- Spawners: 94 females
- Pre-spayn Mortalities: 5%

Walker Creek – 57% PSM
- Spawners: 21 females
- Pre-spayn Mortalities: 43%

Longfellow Creek – 86% PSM
- Spawners: 86 females
- Pre-spayn Mortalities: 14%

Des Moines – 100% PSM
- Spawners: 34 females
- Pre-spayn Mortalities: 0%
Evidence of Predators

Predated coho carcass and raccoon tracks
October 16, 2012
CSI Weather

- Average survey time = 2 hours, 38 minutes
- Weather conditions (84 survey days):
Wildlife

- Great blue heron
- Raccoon
- Coyote
- Bald eagle
- Red tailed hawks
- Green-backed heron

Coyote near Miller Creek
December 23, 2012
Photo by Robin Hoefer
Great blue heron

Beaver pond at The Cove

December 2, 2011
River otter
Remarkable Iron Bacteria on Miller Creek at the Cove October 23, 2013 Photo by Kristine Feldman
Beautiful Ice

Photo by Joy Neubauer
Shared Funding for Stewardship

King County basin stewardship is jointly funded by five governments:

- Burien
- City of Normandy Park, Washington
- City of SeaTac, Est. 1990
- King County
- Port of Seattle
Thank You Volunteers!

“Team Saturday”
Jim, Matt and Tom walk Miller Creek on a training survey
October 13, 2012
4) Plans for 2014 CSI

Ethan documents a carcass
December 5, 2010
Photo courtesy of David Bobanick
Plans for 2014 CSI Survey Season

• Continue the excellent work of the last 4 years by surveying again at four locations in Normandy Park
• Monitor through end of chum spawning season
• Maintain volunteer pool at between 25 & 32 persons
• Training (mark your calendars): October 2, 2014
St. Francis Elementary students mark storm drains by Lake Burien
October 5, 2010
Photo courtesy of Michael Stein-Ross
Coho salmon fry in Miller Creek in Normandy Park
June 30, 2008
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
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

Graph showing the concentration of Sodium, Magnesium, Calcium, and Chloride over time on October 15, 2012.
Expanded Ambaum stormwater detention pond in Burien
December 3, 2007

With funding support from:

Port of Seattle
Washington State Department of Transportation
Stewards of the Cove at work since 2003
Cove volunteers installing log in Miller Creek
August 9, 2008

Photo courtesy of Al Miller
Homeowner Stewardship

Before
November 16, 2007

After
January 11, 2008

Photo on right courtesy of Kevin Alexander
Miller Creek S. 144th Way Restoration
“Before” restoration at S. 144th Way on Miller Creek in Burien
October 11, 2007
Invasive Himalayan blackberry; no small native trees

“Before” restoration at S. 144th Way on Miller Creek in Burien
October 11, 2007
Community tree-planting
October 27, 2007
“After” restoration at S. 144th 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 (former) 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

This stream is in your care.
Clean up runoff:
Fix oil leaks in your car
• Check for leaks
• Contain leaks until you can get the car fixed

www.fixcarleaks.org
Clean up runoff:

• 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)
Clean up runoff: pick up after your pet

Rocksie
Things You Can Do

Clean up runoff: 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

• Support and contribute to Miller-Walker Stormwater Retrofit Planning
• Watch for upcoming open houses this spring and summer
• Attend to learn more and provide input on best locations and designs
Puget Sound Starts Here
Volunteer to mark storm drains

Lindsay/Andolina family marked storm drains in their Burien neighborhood
August 25, 2010
Things You Can Do

Before

Save your trees – remove the ivy

After

Trees ARE the view
Great Things You Can Do

- Leave down logs in the stream
- Leave down logs and branches for wildlife

Not so great

- Leave down logs and branches for wildlife
Things You Can Do: Volunteer

Upcoming volunteer events:
Ivy removal at Walker Preserve on March 22 and April 19, 2014

Photo taken February 18, 2012
Things *You* Can Do: Volunteer

Volunteer for the Community Salmon Investigation for 2014!

“Team Wednesday”
Margy taking statistics
October 23, 2012
Photo courtesy of Margy Wallace
1. Purpose of *CSI: Highline*
2. How *CSI: Highline* works
3. Results of October 2013 – January 2014 surveys
4. Thanked volunteers and property owners
4. Plans for *CSI: Highline* 2014
5. Factors affecting stream and salmon health
6. Your role!
The End

Photo courtesy of Barb and Darrell Williams