



# 2024 Spawner Survey Workshop



Photo by  
Chris Farrow  
2023

# Classroom Overview

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1. **Introductions** (everyone! Who are you and why are you here)
2. **Who is SFEG?**
3. **SFEG Spawner Survey Program**
4. **SALMON!**

## **Break (15 mins ~7pm)**

5. **Spawner Survey Data**
6. **Volunteer paperwork**
7. **Group quiz!**

# Land Acknowledgement

**We acknowledge that the lands we are on and all those lands of the Skagit and Samish Watershed are the traditional lands of the Coast Salish people. With gratitude, we honor the land itself, the water that flows through it, and the Tribes who call this land home. We are dedicated to working with the local Tribes (Swinomish, Upper Skagit, Sauk Suiattle and Samish) to develop restoration projects that respect this land, their ancestors and future generations.**

# Thank you



*Washington  
Department of*  
**FISH and  
WILDLIFE**





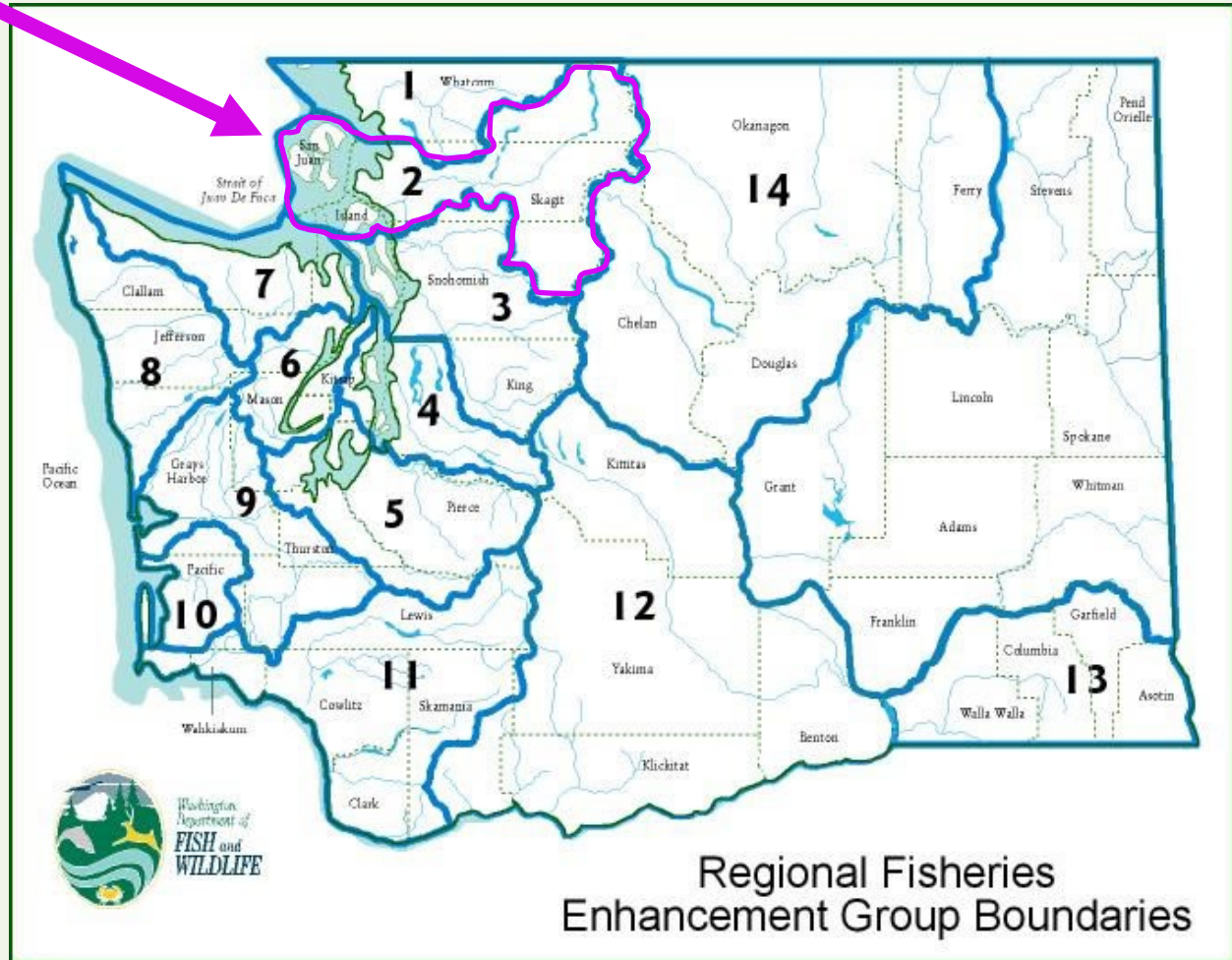
# VOLUNTEERS LIKE YOU!!!



# Who is SFEG?



## Skagit Fisheries Enhancement Group



# SFEG is a private non-profit organization



Funded by grants and donations, heavily relying on volunteers.



We are dedicated to restoring Pacific Northwest salmon populations through habitat restoration and community engagement.

# Willing landowners are *EVERYTHING*



- ❖ Fish Passage Improvement/Barrier Removal Projects
- ❖ Private Landowners allow us to park on and survey their property for salmon, plants and culverts



Before



After



# SFEG Volunteer Programs & Opportunities

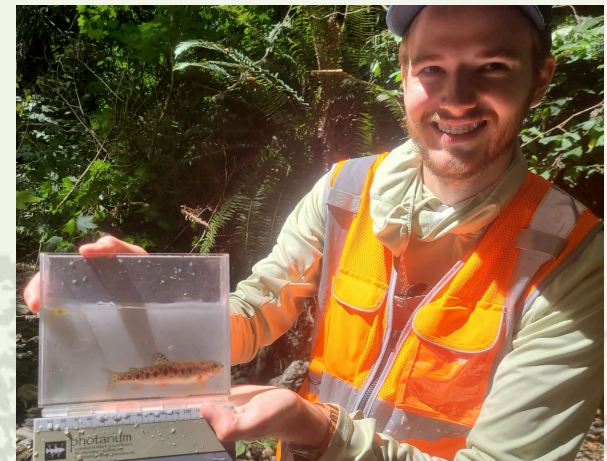


- Spawner Survey Program
- Salmon Sightings
- eDNA sampling
- Education Program
- Planting/Potting Parties
- Juvenile Fish Sampling
- Vegetation Monitoring
- Native Plant Nursery Watering

FALL  
&  
WINTER



SPRING  
&  
SUMMER



# SFEG Memberships



Your membership ensures that this **vital work for salmon continues**. Your membership gift will **plant more trees** for these critical habitat restoration projects, **work with more landowners** to identify and design new projects and **train more volunteers** to count salmon returning to these project sites.



# UPCOMING EVENTS

## *SALMON SIGHTINGS*

**October 12** at Clark Creek/Marblemount Hatchery

**November 2** at Oyster Creek/Taylor Shellfish

**November 23** at Mud Creek/Camp Lutherwood



## *PLANTING PARTIES*

**October 19** Orca Recovery Day 2024 at the Skagit River in South Mt. Vernon

**October 26** Make A Difference Day at Little Carey's Wetland

**November 9** Planting Party in West Hamilton

**November 16** Planting Party at the Skagit Land Trust's South Fork Skagit Property



# UPCOMING EVENTS



***The Wild and Scenic Film Festival***

***October 10 at 6pm***

***@ the Lincoln Theatre***

# Spawner Survey Volunteer Program



- **Est. 1998**
- **Long-term monitoring of >30 creeks in the Skagit and Samish Basins**
- **Data YOU collect is sent to WDFW for long-term use.**
  - Future return & escapement forecasts, catch limits, and indicates species presence
  - Check out WDFW's SalmonScape!
- **Informs SFEG about the success of past project sites and helps identify future projects**
- **Informs grant applications**



# Volunteer commitment



## Time commitment

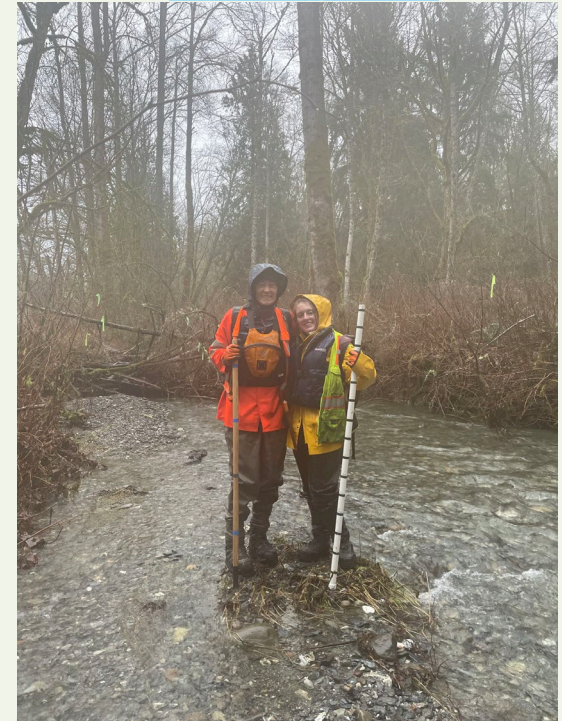
1 Day per Week

- 2-8 hours per (depending on creek and how many fish)
- October to late December (sometimes late January!)



## Activities

- Creek buddies will be “assigned a creek” to walk weekly
  - **WE WANT: Data before, during, and after peak salmon activity**
  - Data MUST be collected every 7-10 days
  - If you can't survey, let us know ASAP and we will arrange a substitute
- Submit Datasheet to SFEG weekly
- Follow all safety guidelines and rules
- Turn in Volunteer Hours Monthly



# Background:

## Salmon in our region



**We will go over:**

- Watershed Info**
- Salmon biology & ID**
- Salmon status and trends**



# Our Watersheds



## Skagit Watershed:

- 3<sup>rd</sup> largest river on US's west coast & largest river in Puget Sound
- 1/3 of Puget Sound's freshwater
- 1/3 Puget Sound salmon return to the Skagit to spawn
- 3,100mi<sup>2</sup> & 162 miles long
- 4,500 miles of streams, rivers and sloughs connecting communities

## Samish Watershed:

- 25 miles long & 139mi<sup>2</sup>
- One of the largest Chinook hatcheries in WA





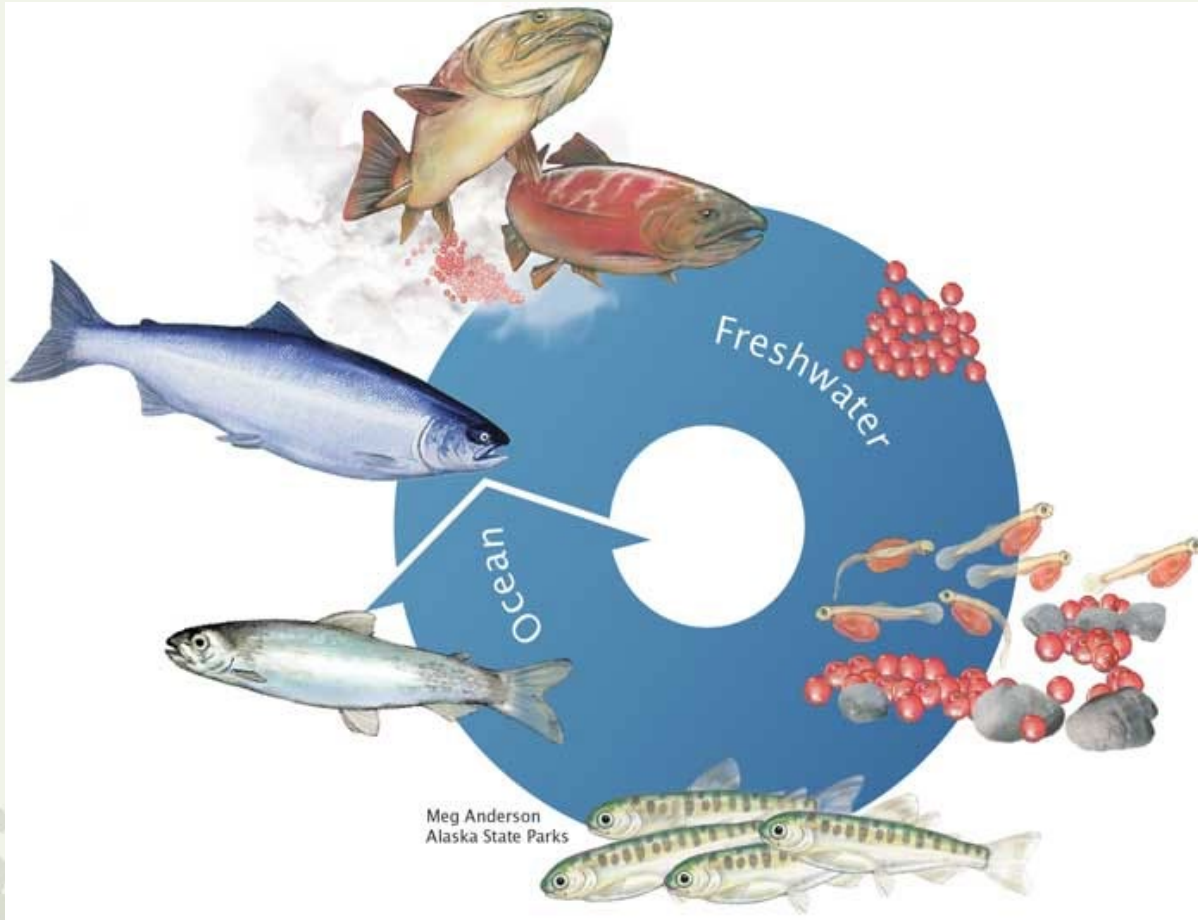
# Salmon



# Five Species of Pacific Salmon



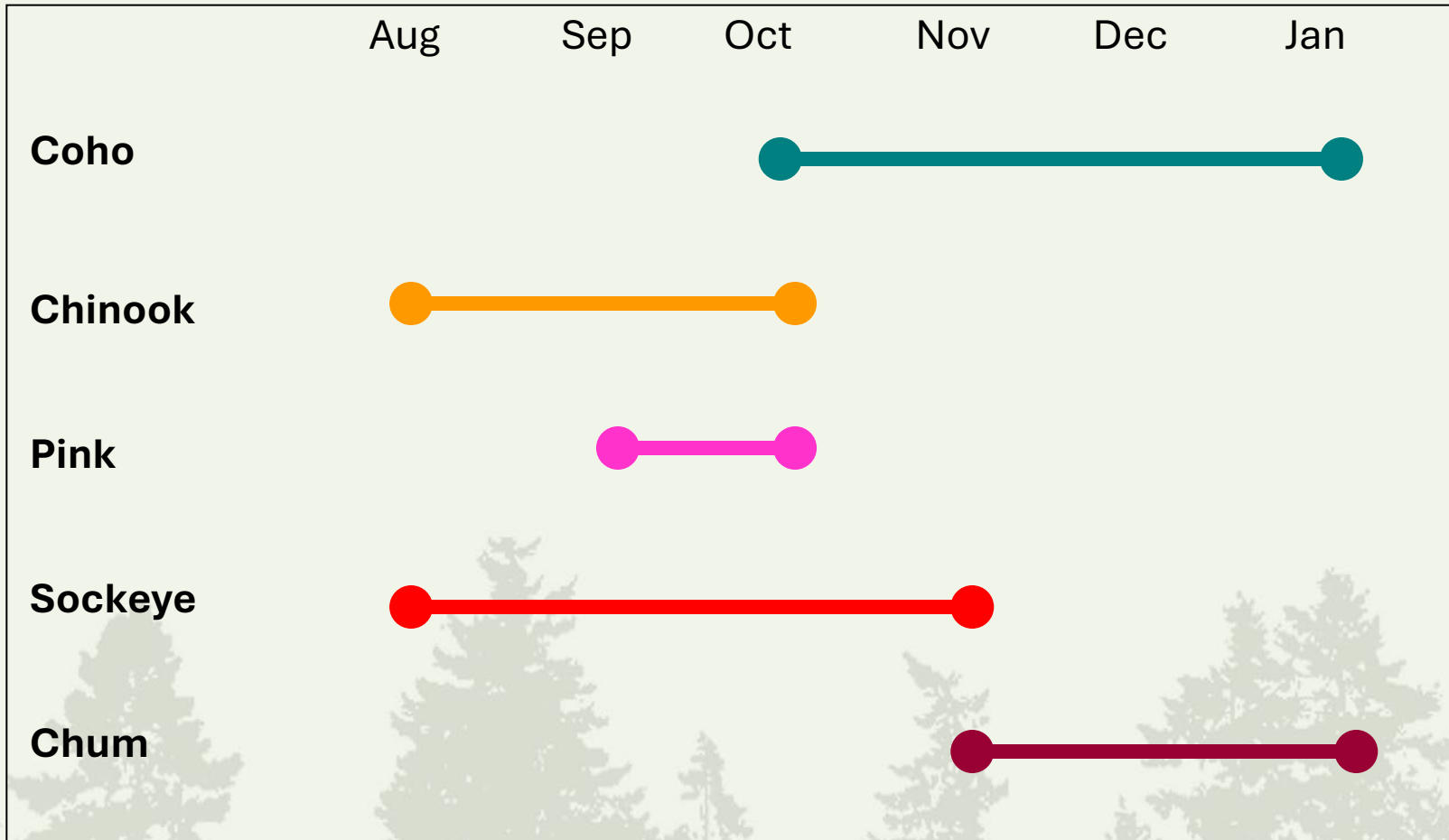
# Salmon Life Cycle



Anadromous: starts life in fresh water, matures in salt water, migrates back to fresh water to reproduce

Needs “chains” of healthy habitats linked together.

# Fall Spawning Times



**Remember this slide!! It will help you on future surveys.**

# Salmon Spawning Behaviors



- Females dig a redd (nest) → Redd ID is difficult! More on this soon...
- Males compete
- They're not really hungry
- Pacific Salmon are semelparous
  - they only reproduce (spawn) once in their life

Tracking spawning activities is key to managing salmon populations!



# Redd Digging

Q: What type of substrate do salmon dig their redds in?

A: Gravel!

\*Extra credit:

Substrate can vary from 10mm to  $\geq 60$ mm depending on the type of Pacific salmon



# How to Identify Salmon

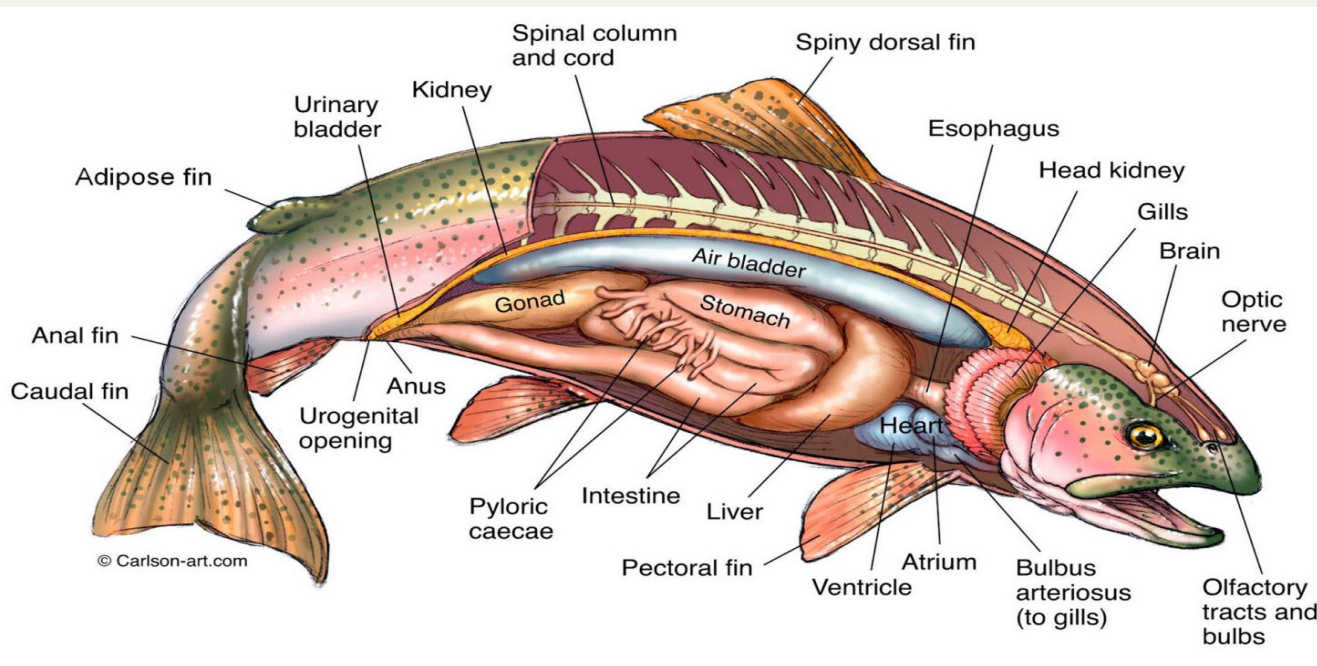


- Physical characteristics

- Size
- Shape
- Coloration (mouth and “nose”)

- Habitat use

- Creek size
- Redd formation
- \*\*Time of year



# Salmon Identification

## OCEAN PHASE



### Chinook Salmon

Large black spots on back, dorsal fin, and both the upper and lower lobes of the tail. Dark mouth with a black gum line. Average size scales. Silver pigment on the tail. Prominent teeth.



### Coho Salmon

Black spots on back with a few spots on the upper portion of the tail. White mouth with a white gum line and dark tongue. Average size scales. Silver pigment on the tail.



### Chum Salmon

No prominent spots on back or tail (small speckles may be present). White mouth with a white gum line and dark tongue. Large scales. Caudal peduncle (tail base) is slender. Silver pigment on the tail.



### Pink Salmon

Generally large black spots on back and heavy oval shaped black blotches on the upper and lower lobes of the tail. White mouth with a black gum line and tongue. Vary small scales. No silver pigment on the tail. Flexible (rubbery) lower jaw.



### Sockeye Salmon

No prominent spots on back or tail (small speckles may be present). White mouth with a white gum line and dark tongue. Average size scales. Prominent gold-colored eyes. No silver pigment on the tail. Small teeth.

## SPAWNING PHASE



### Chinook Salmon

Chinook salmon do not display the conspicuous morphological changes of pink, chum, and sockeye salmon during the spawning stage. Typically, Pacific salmon turn from the silvery bright ocean coloration to a darker bronze color as they approach spawning.



### Coho Salmon

In mature male coho salmon, the upper jaw forms an elongated hooked snout and the teeth become greatly enlarged. The male is generally brighter than that of the female and is characterized by the dorsal surface and head turning bluish-green. The sides of the males develop a broad red streak. In females, the jaws also elongate but the development is much less extreme than that of the males.



### Chum Salmon

Chum salmon display characteristic olive-green and purple (calico) vertical bars on the sides of the body as they approach the spawning phase. Both males and females develop hooked noses and large canine-like teeth.



### Pink Salmon

As male pink salmon begin to enter the spawning phase, they develop a prominent hump in front of the dorsal fin, an elongated snout, and large teeth. Body color in both males and females darkens from a bright silvery appearance to a pale slate, brownish, or greenish-gray on the back and sides and a pale whitish color below. Small, oblong irregular black spots are present on the back and sides, and on the dorsal and tail fins.



### Sockeye Salmon

Sockeye turn bright red on their body, and olive-green on the head. Males develop a prominent hump in front of the dorsal fin; the male's snout becomes elongated; and canine-like teeth grow out of the receding gums. Females undergo a distinct color change, but retain their body shape.



# Chinook Salmon - Physical ID



- Size: the biggest! 0.60m – 1.52m (2ft – 5 FEET!)
- Shape: large/thick peduncle
- Coloration is variable: olive color, maroon or almost black.
- Spots on back, dorsal fin, and both lobes of caudle fin.
- Lower gum is black.
- Environment timing → Large streams and mainstem and Fall run Aug - Oct

**MALE**



**FEMALE**





Chinook are the biggest salmonids  
you'll see in the Skagit.

# Chinook Salmon - Physical ID

Chinook

VS

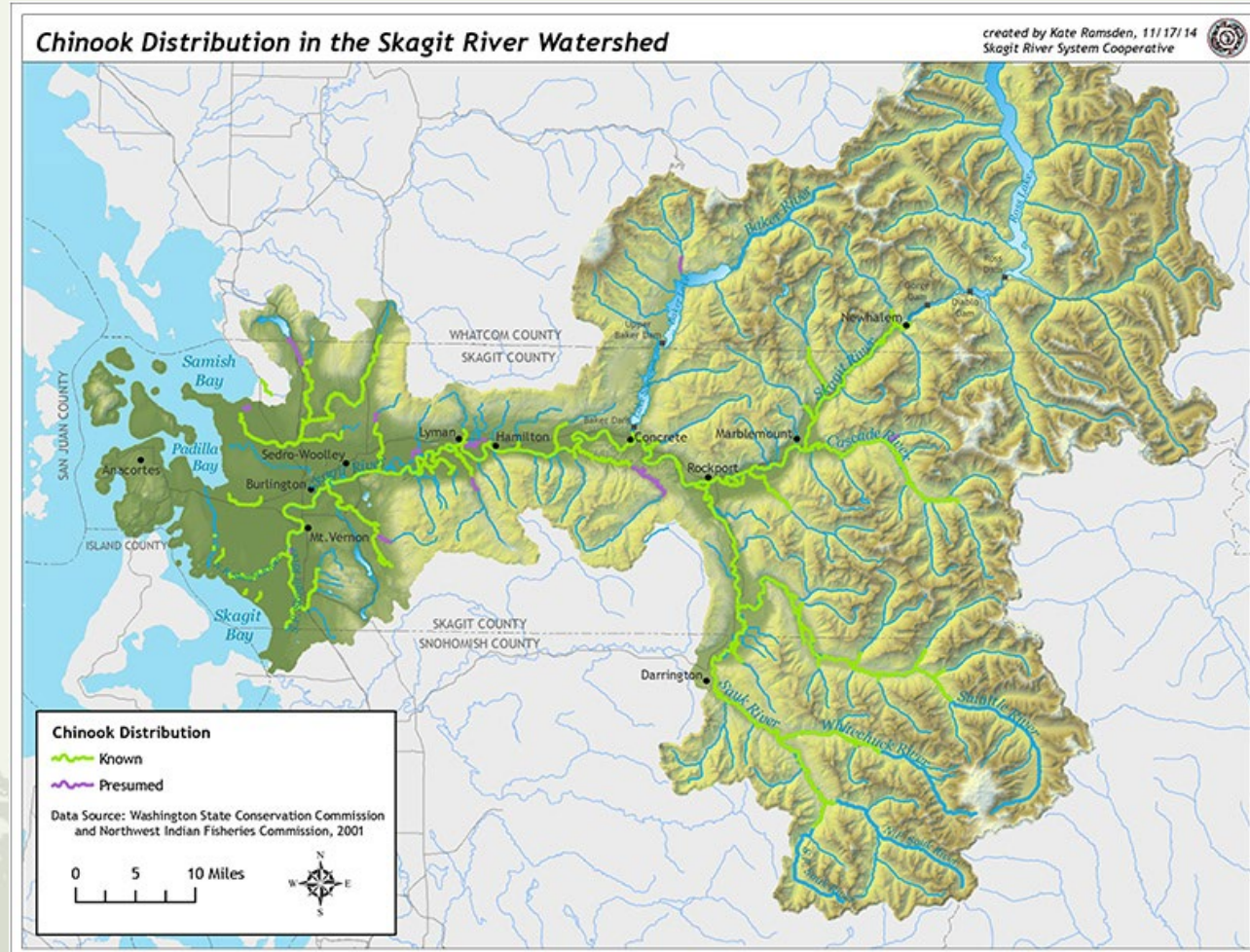
Coho



# Chinook Salmon: Habitat



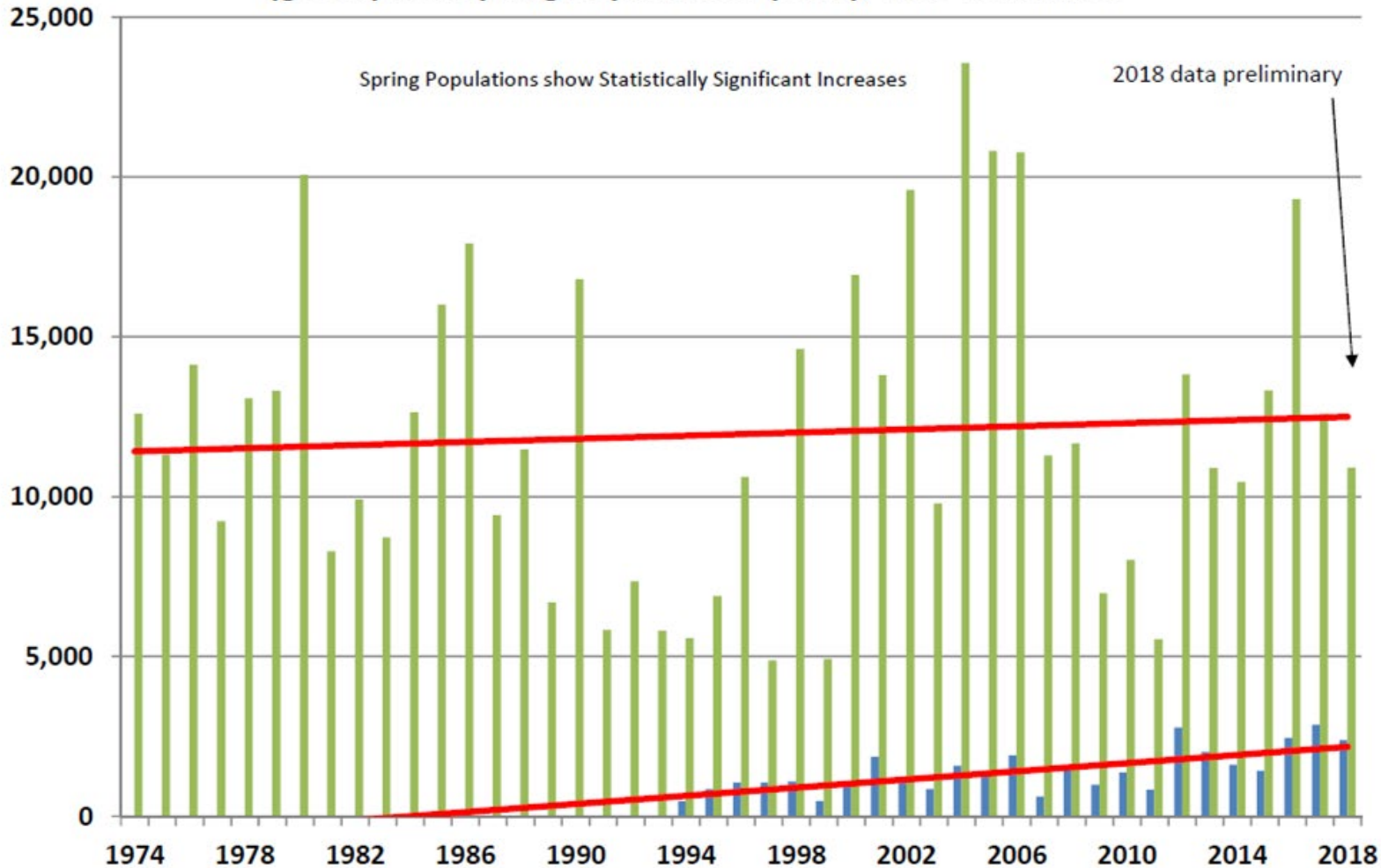
- Creek size: Large
  - Big fish needs big water
  - Avoid breaching the surface
- Redd formation: Large
  - Largest salmon = Largest redd
- Timing: August-October



# Skagit Chinook populations



Skagit River Chinook Salmon Escapement - Summer/Fall Populations (green) and Spring Populations (blue), with Trendlines



# Chinook Salmon



- Puget Sound Chinook listed as “threatened” under ESA in 1999
- Skagit River produces 60% of the wild Chinook in the Puget Sound
- Chinook need estuary habitat for rearing
- Restoration is working!!



# Coho Salmon



- Also known as “silvers”
- Found in smaller streams
- Spends a year in freshwater before migrating to estuary
- Spends 3-4 years in ocean
- They are scrappy! (and able to navigate steeper gradients)

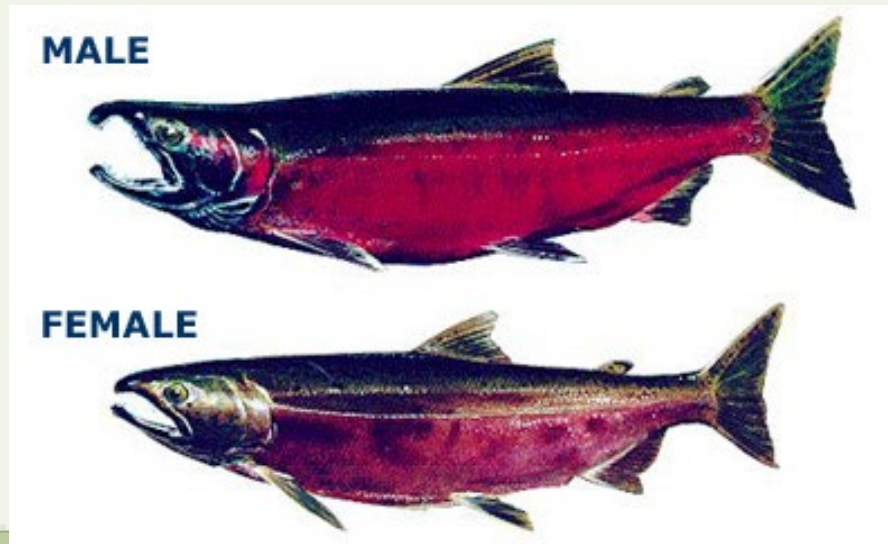


Photo J. Newley

# Coho Salmon - Physical ID



- Size: midsized salmon 0.4m – 0.97m (1.3ft – 3.25ft)
- Shape: males can have an especially hooked kype (but don't rely on this alone!)
- Habitat and timing: Oct - Jan
- Coloration:
  - deep red stomach/sides extending over operculum towards eye
  - Bright white “headlight”
  - Spots on back or UPPER lobe of tail may be present
  - Gums are white where they touch the teeth.

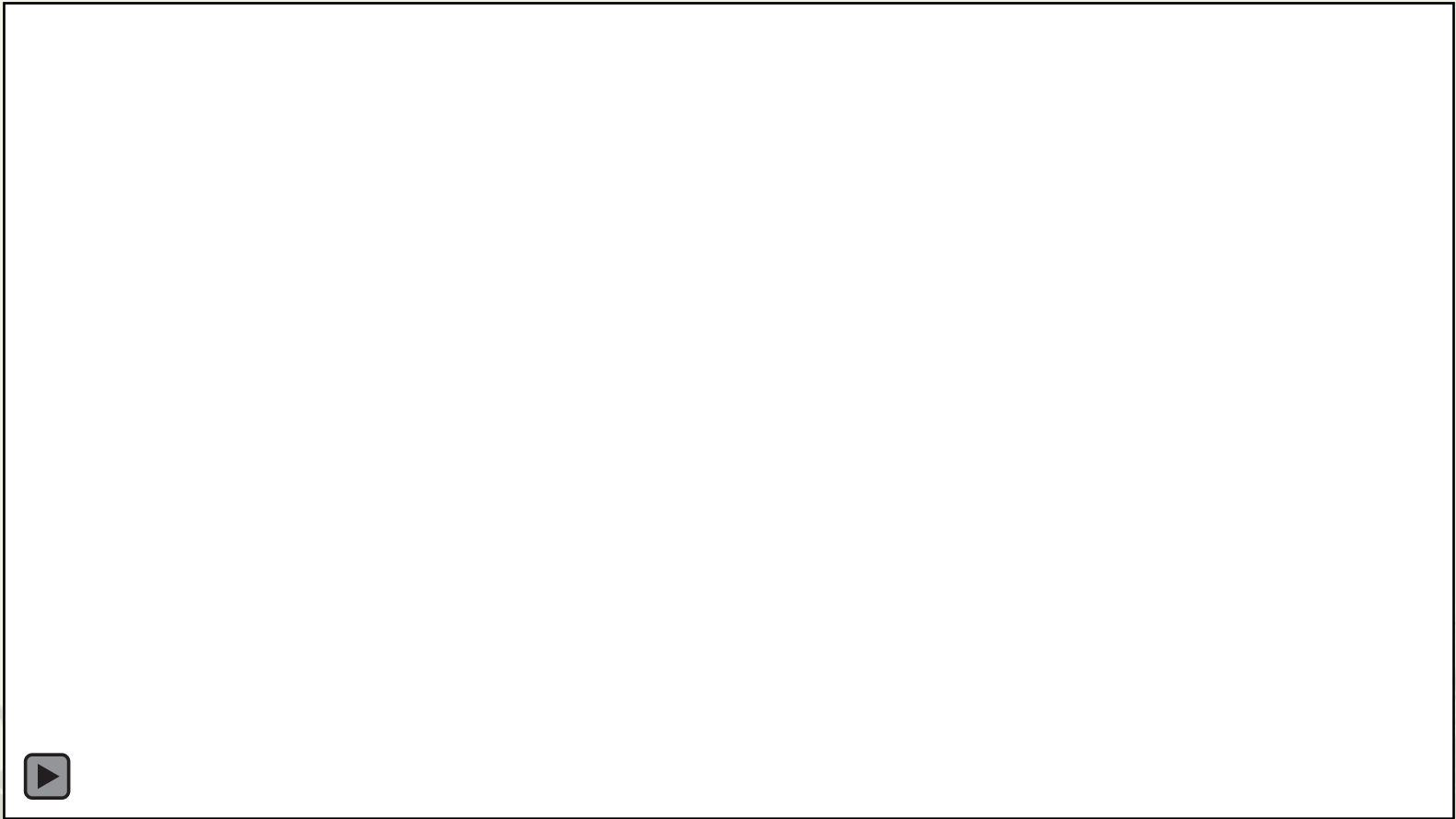




# Coho Salmon: Habitat



- Medium to small streams & throughout the watershed
- They're great jumpers!



# Chinook Salmon: Physical ID



Chinook

VS

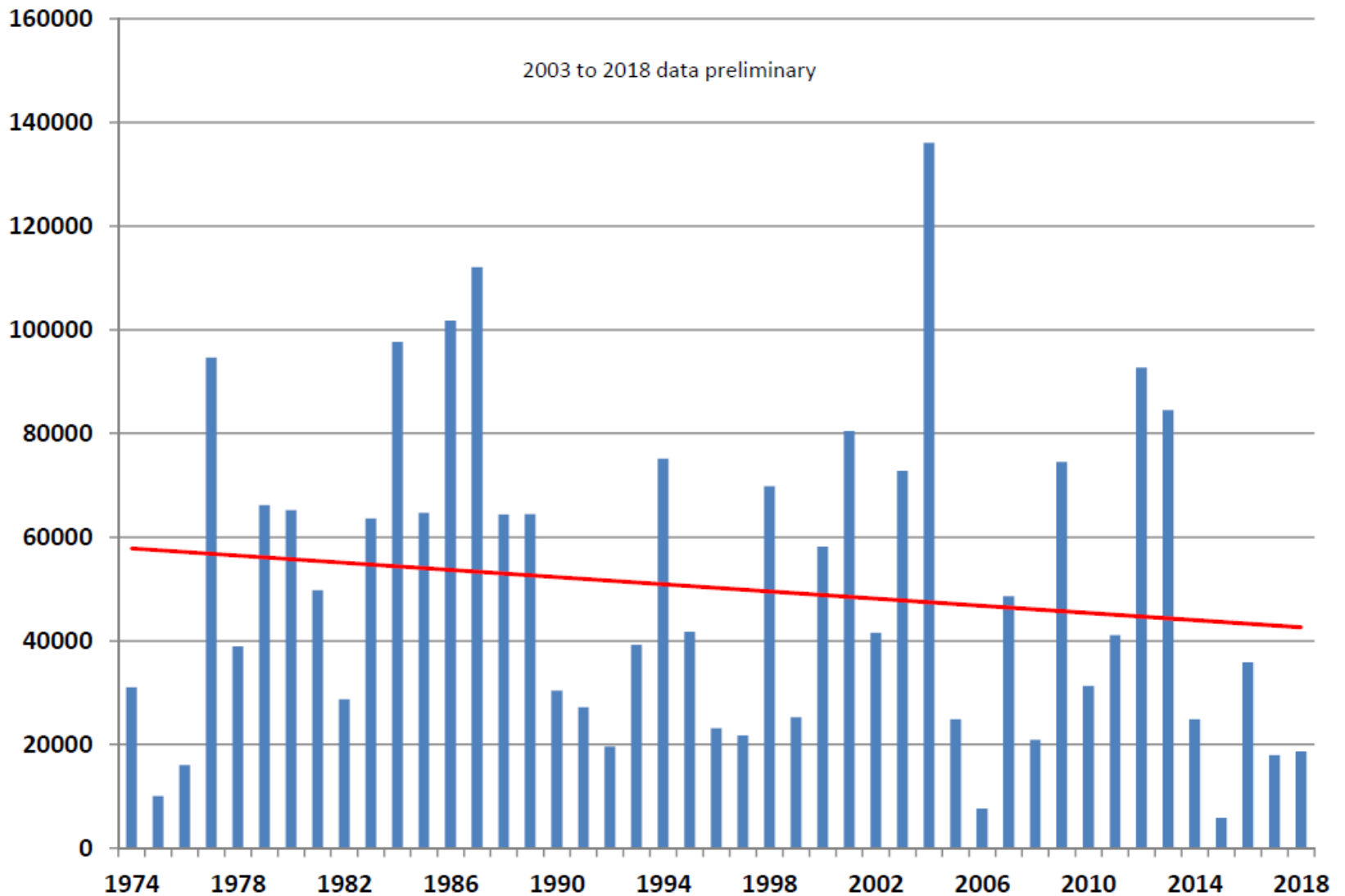
Coho



Can you point out some characteristics that help you ID these as coho ?



## Skagit River Coho Salmon Escapement, with Trendline



# Chum Salmon



- Also known as “dog” or “keta” salmon
- Spends 3-5 years in the ocean
- Migrates to estuary quickly for rearing
- Reliant on ground water fed side channels for spawning
- Population numbers are of concern to co-managers

# Chum Salmon - Physical ID



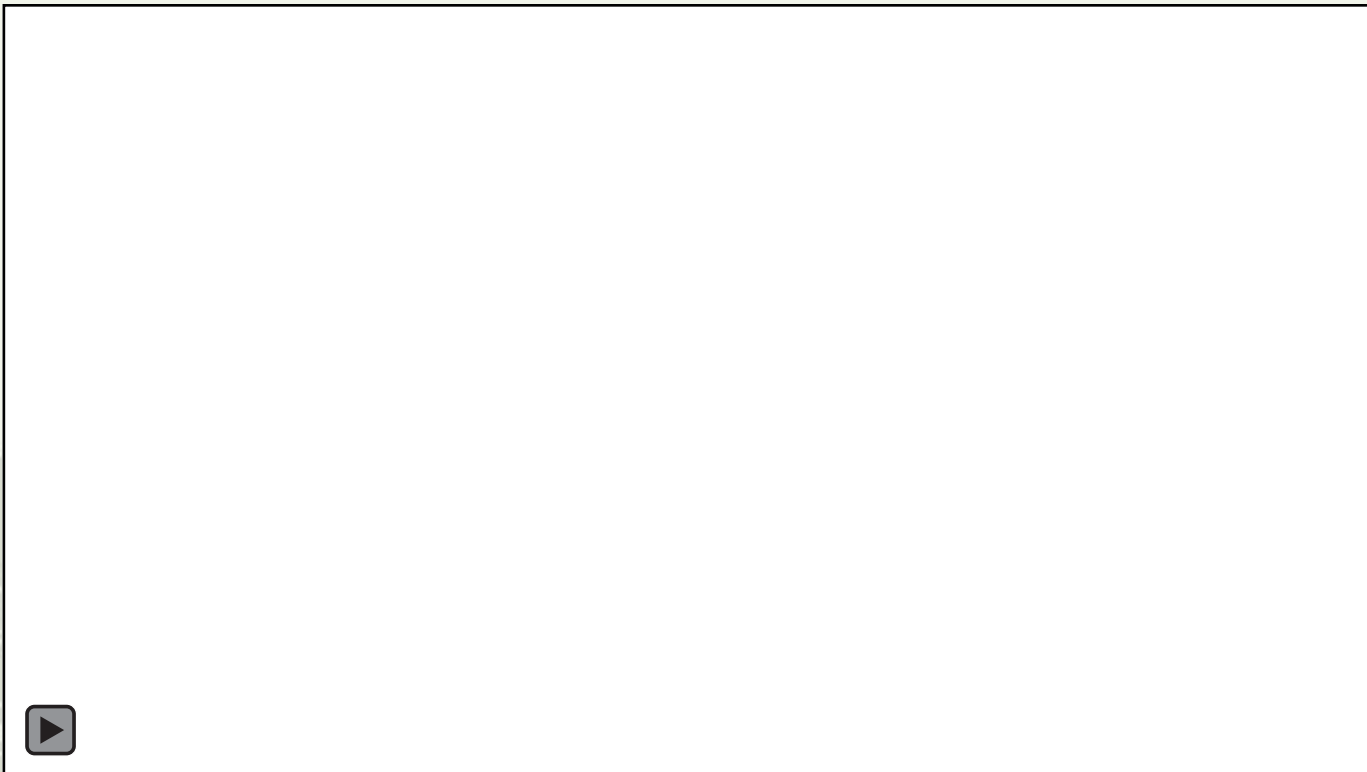
- Size: 0.88m – 1.14m (2.9ft – 3.75ft)
- Shape: “football” shaped with small caudal peduncle
- Coloration:
  - spawners have vertical calico bands on sides (wine stains)
  - Males may have large teeth and kype
  - Anal and pelvic tails often have white tips



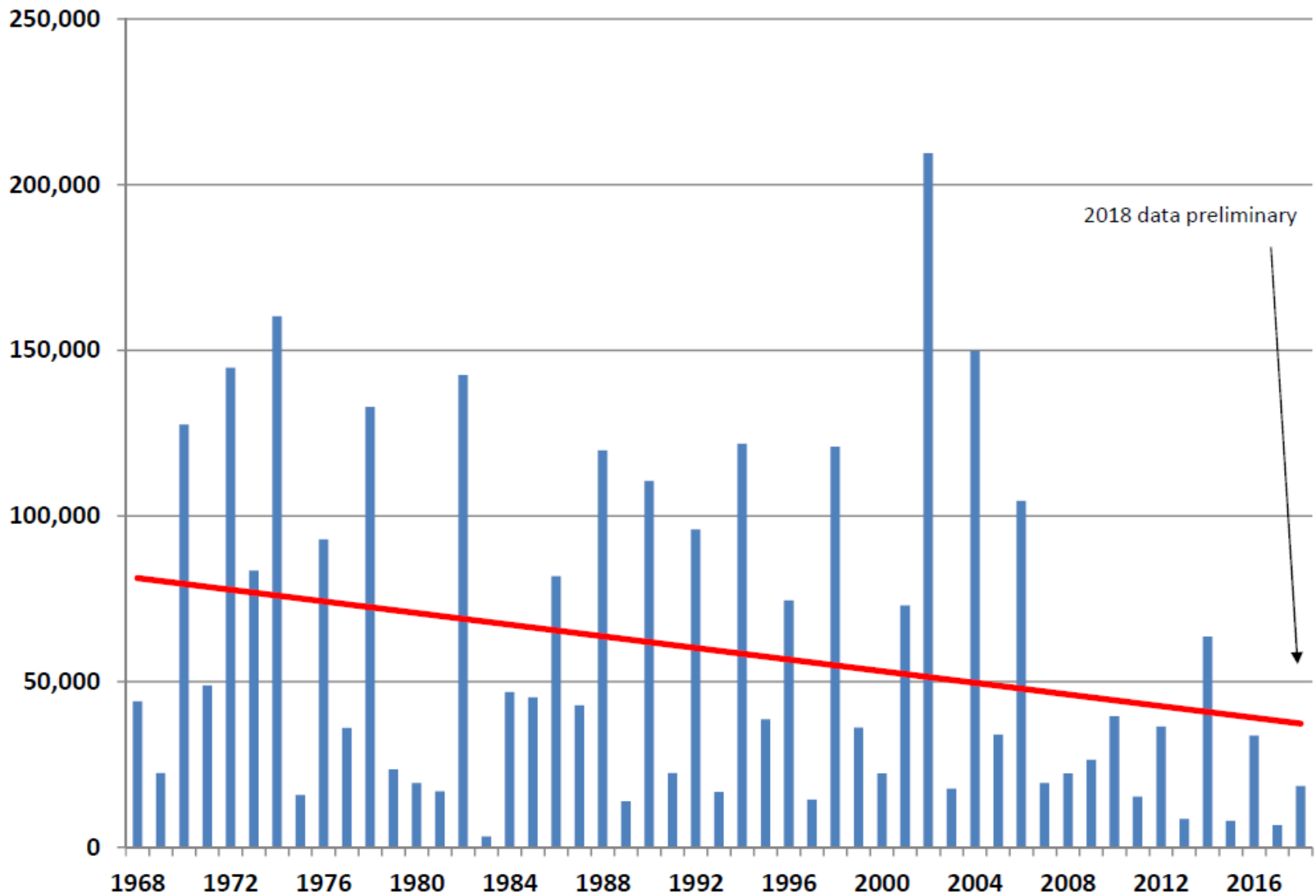
# Chum Salmon - Habitat



- Creeks:
  - small streams
  - especially in intertidal zones or in lower portion of river
  - They're terrible at climbing and don't jump like coho
- Run Timing: November to January



# Skagit River Chum Salmon Escapement, with Trendline





# Pink Salmon



- Also called “humpy” salmon
- Smallest of salmon with 2-year life cycle
- Return to Skagit in odd years
- Quickly migrates to estuary for rearing



# Pink Salmon - Physical ID



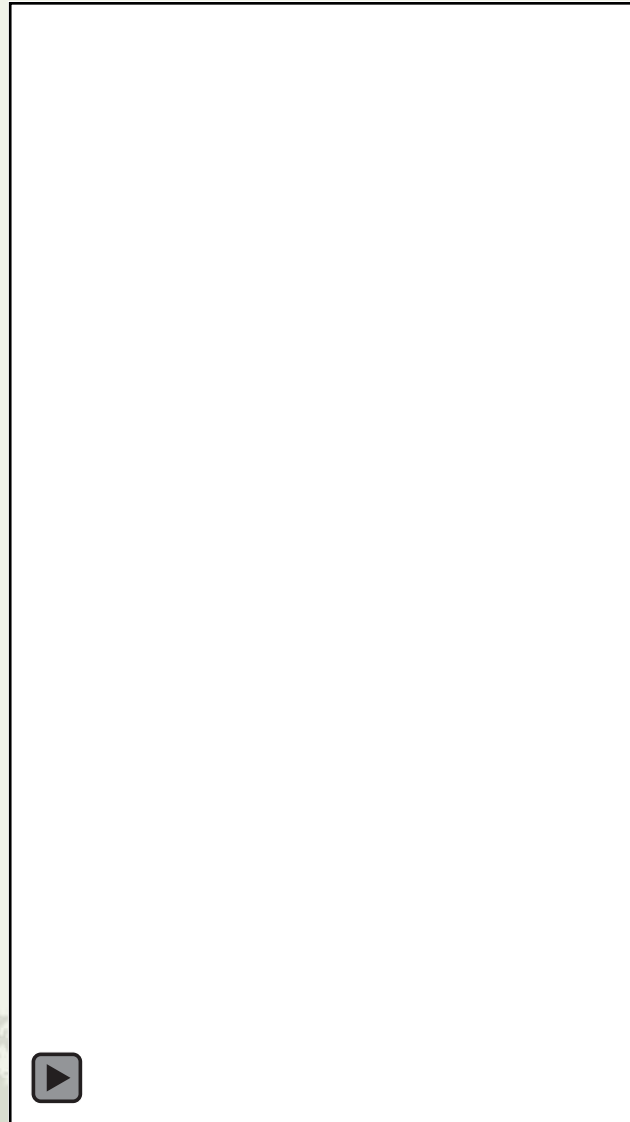
- Size: 0.50m – 0.64m
- Shape: Males often have very large humps
- Coloration:
  - Often dull grey backs and white bellies
  - Large oval spots on upper and lower lobes



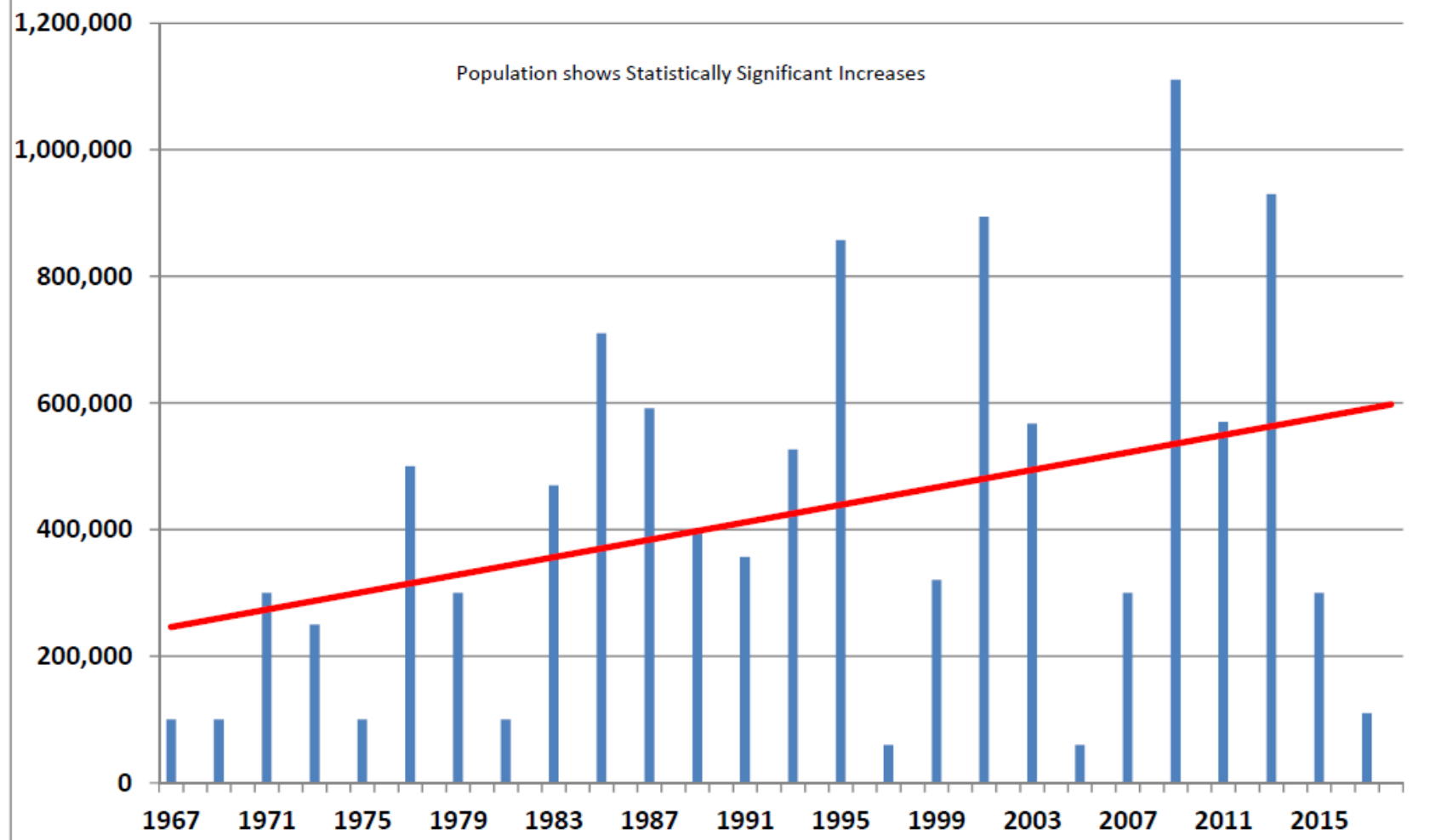
# Pink Salmon – Habitat



- They return in large numbers in comparison to other species.
- They spawn in mainstem and smaller creeks
- They're also not very good climbers, so find them in less steep creeks.



# Skagit River Pink Salmon Trap Counts, with Trendline



# Sockeye Salmon



- Also known as “red” salmon
- Depends on lakes
- Live about 3 years in Ocean
- Baker River is only native run in Puget Sound



# Sockeye Salmon Physical ID



- Size: 0.45m – 0.76m (1.5ft – 2.5ft)
- Shape: males often with a pronounced hunched back and hooked kype
- Coloration:
  - Vivid red with greenish heads (can be bright green or olive)
  - NO spots on back or tail



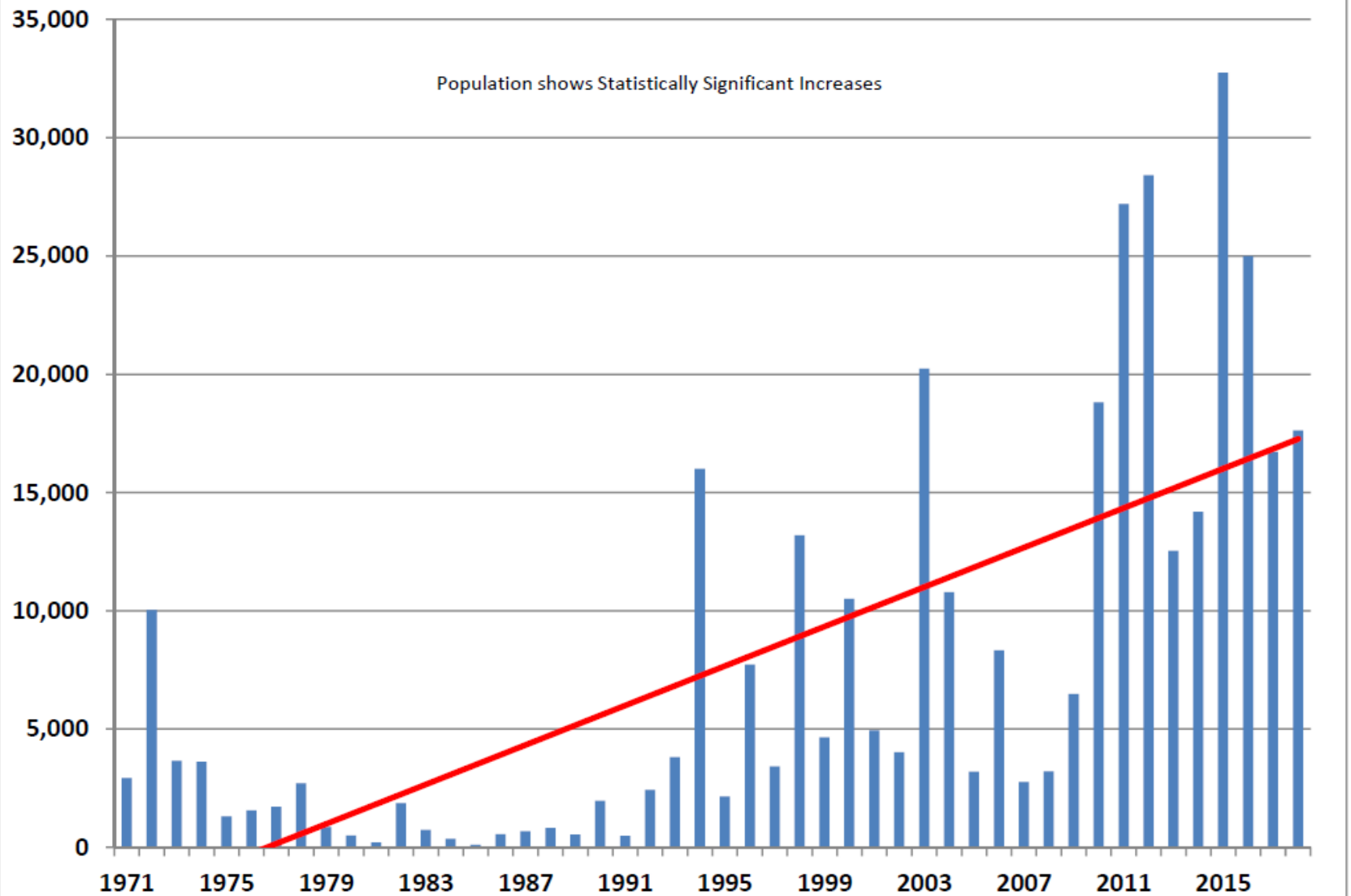
# Sockeye Salmon - Habitat



- Timing: Aug – Nov
- Spawn in lakes tributaries, lake shores or in outflow streams
- Landlocked populations = Kokanee
- **Kokanee Timing: Oct – Dec**
- Mud and Finnegan Creeks



## Baker River Sockeye Salmon Trap Counts, with Trendline





# Kokanee!

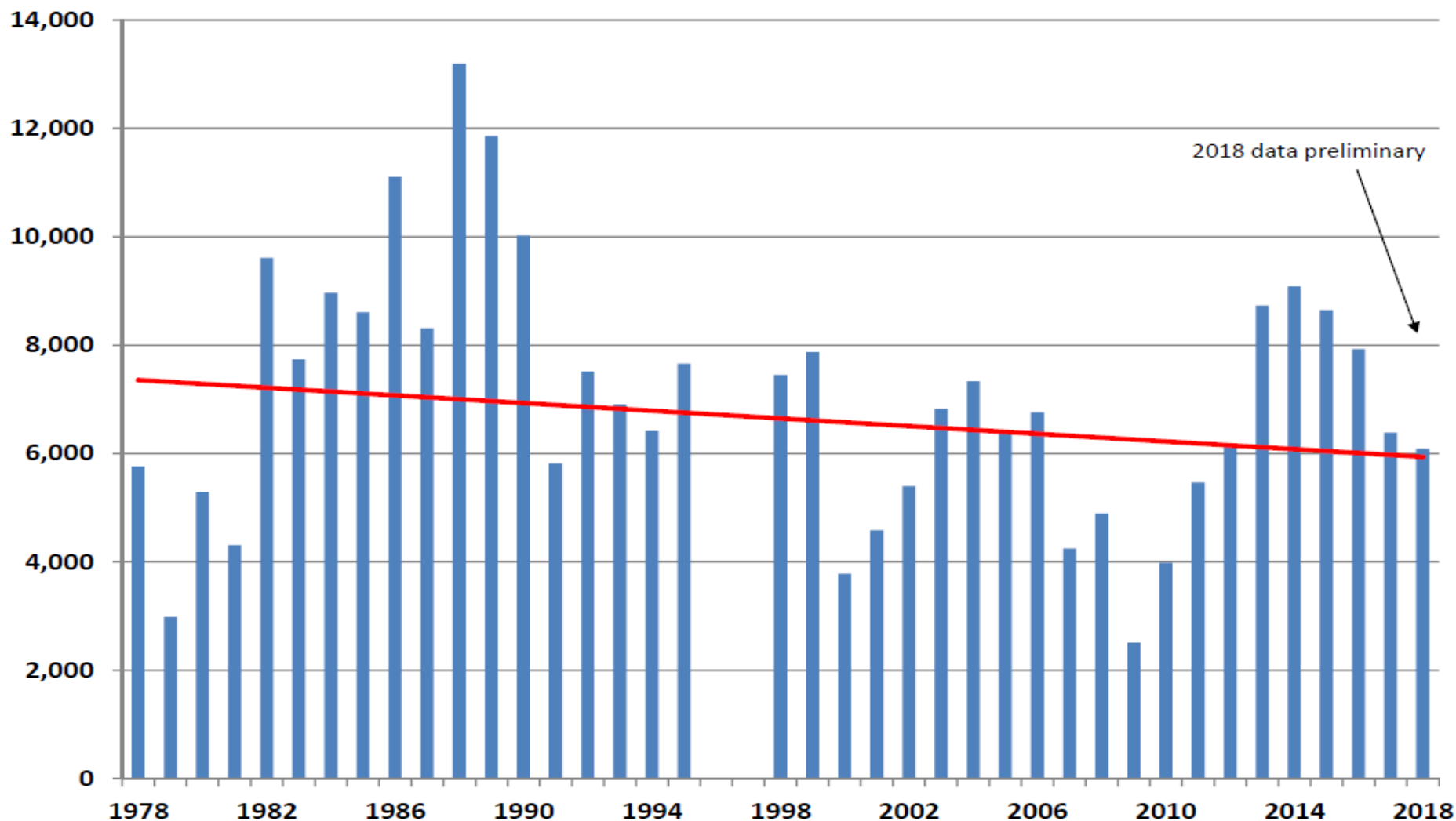


The little guys...

- Fork length: 0.20m – 0.3m
- Their redds are very small too!
- Run time: Nov – Dec
- Often waiting for the creeks to get rain!



## Skagit Winter Run Steelhead Escapement, with Trendline





# Trout



# Steelhead/Rainbow Trout



- **Steelhead have two runs, a summer run and a winter run**
- **This species is identified as a Species of Greatest Conservation Need (SGCN) under the State Wildlife Action Plan (SWAP)**
- **ESA listed: Threatened**
- **They are ubiquitous and can be found pretty much everywhere they can get to**
- **Can spawn multiple times – winter and spring runs**



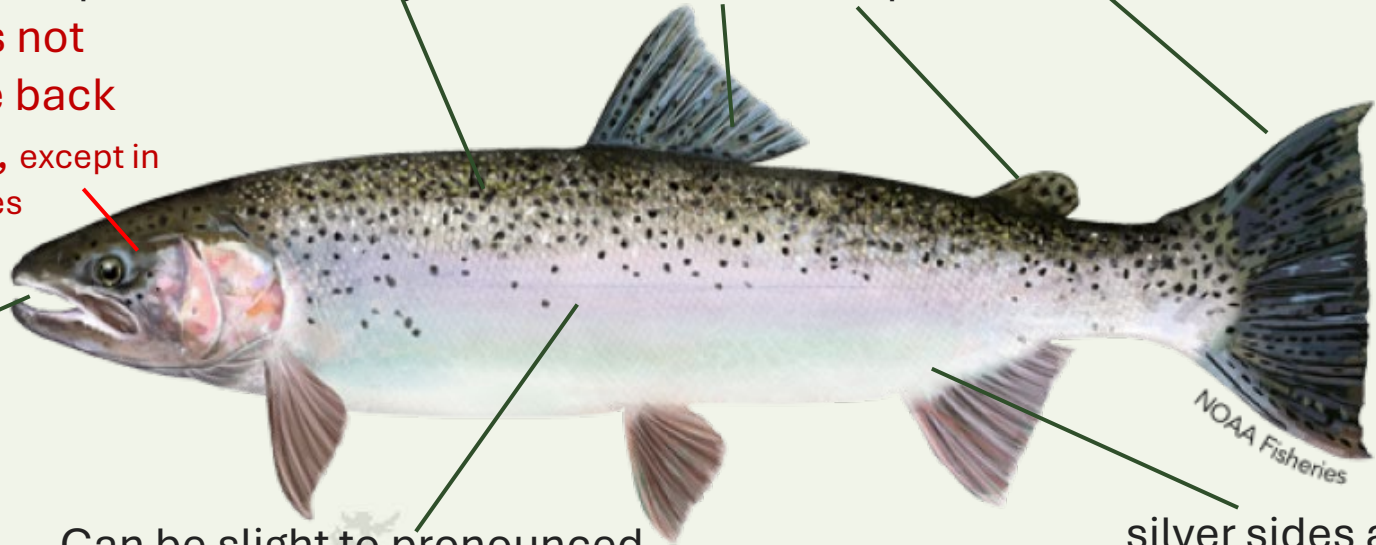
# Steelhead/Rainbow Trout



black spots on the body and on the dorsal , adipose, and caudal fins

Upper jaw does not extend past the back edge of the eye, except in individuals >20inches

No teeth on tongue



Can be slight to pronounced rainbow coloring

silver sides and belly

Steelhead on average weigh 8-11lbs, but can weigh up to 40 pounds or more!

# Steelhead/Rainbow Trout



**Steelhead spawning colors**

# Steelhead/ Rainbow Trout

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- Same species as Steelhead but completes lifecycle entirely in fresh water
- Have a varied diet and will feed on just about anything
- The most athletic leapers and swimmers
- Lifespan 4-6 years



# Steelhead/ Rainbow Trout



black spots on the body and on the dorsal , adipose, and caudal fins

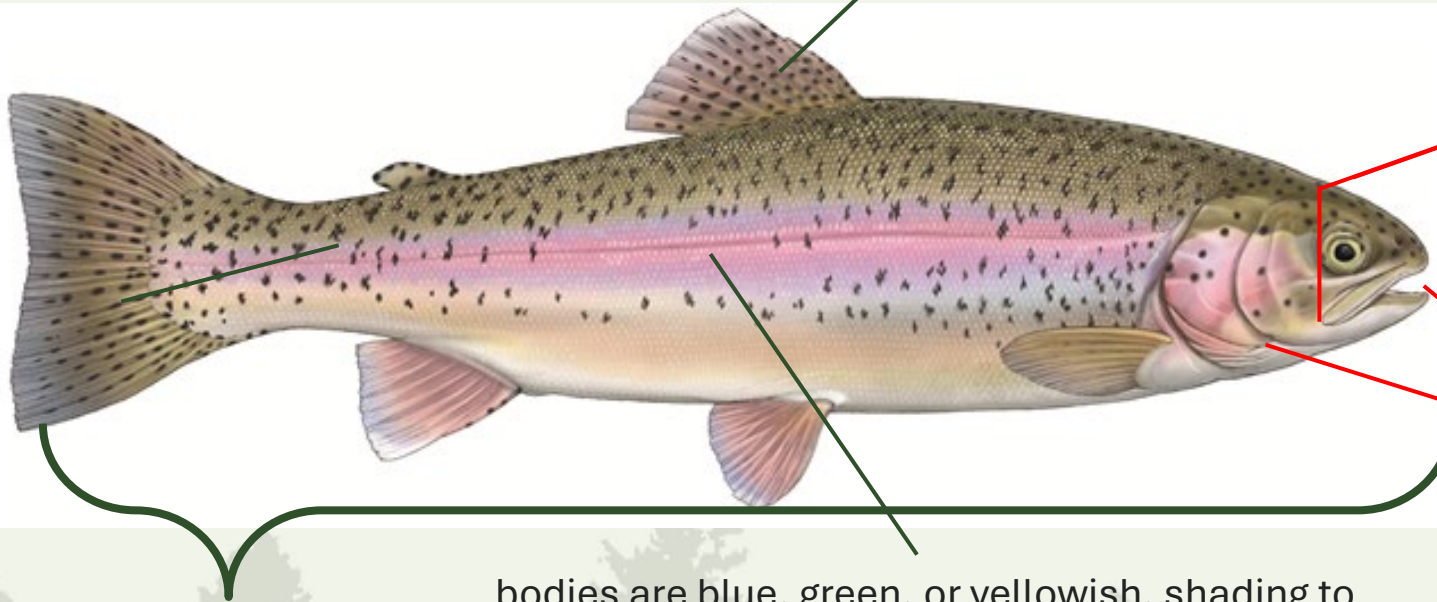
Upper jaw does not extend past the back edge of the eye, except in individuals >0.45m

No teeth on tongue

NO red-orange slash marks on the underside of the lower jaw

bodies are blue, green, or yellowish, shading to silvery white on the underside, with a horizontal pink-red stripe running from the gills to the tail and black spots along their backs

Rainbow trout average 0.30 – 0.45m length (1-1.5ft)





# Cutthroat Trout

- Can be anadromous - 'sea-run' coastal cutthroat, or resident
- Resident coastal cutthroat trout are widely distributed throughout western Washington (west of the Cascades)
- Although a resident cutthroat trout may be found throughout a stream, the majority of them are found in small headwater streams above impassable barriers
- Territorial with other fish
- Typically spawns in spring



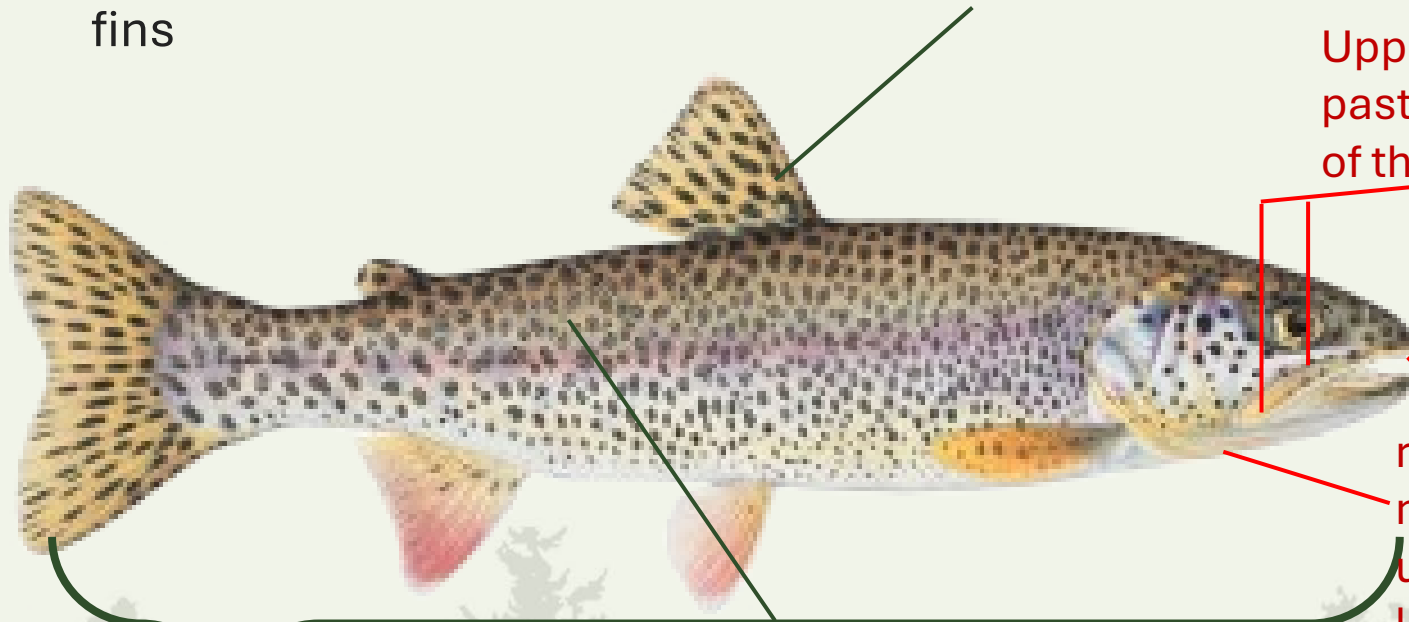
# Cutthroat Trout

black spots on the body and on the dorsal , adipose, and caudal fins

Upper does extend past the back edge of the eye

Teeth on tongue

red-orange slash marks on the underside of the lower jaw

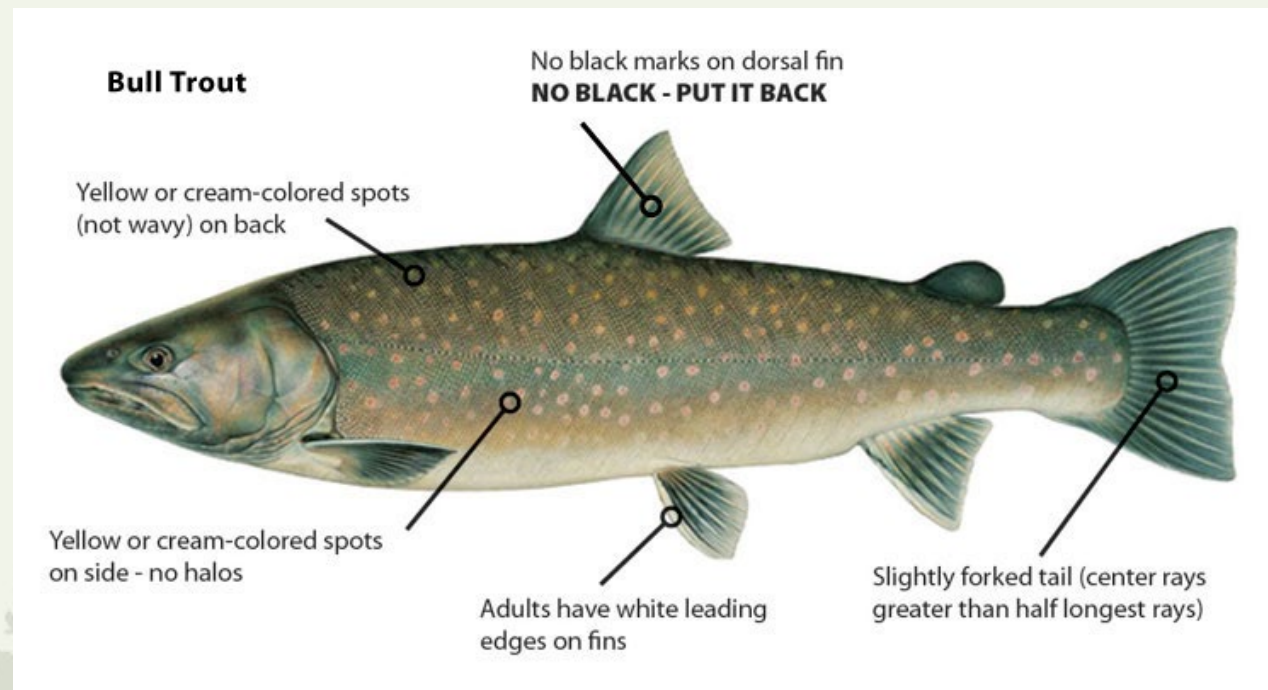


Average 0.06-0.18m

bodies are blue, green, or yellowish, shading to silvery white on the underside, with a horizontal pink-red stripe running from the gills to the tail and black spots along their backs

# Bull Trout

- Char/salmonid species
- Only salmonid with dark body and LIGHT spots
- Fall spawners
- Can spawn more than once
- ESA Listed, if you think you see one we want lots of pictures!



# Pacific Lamprey

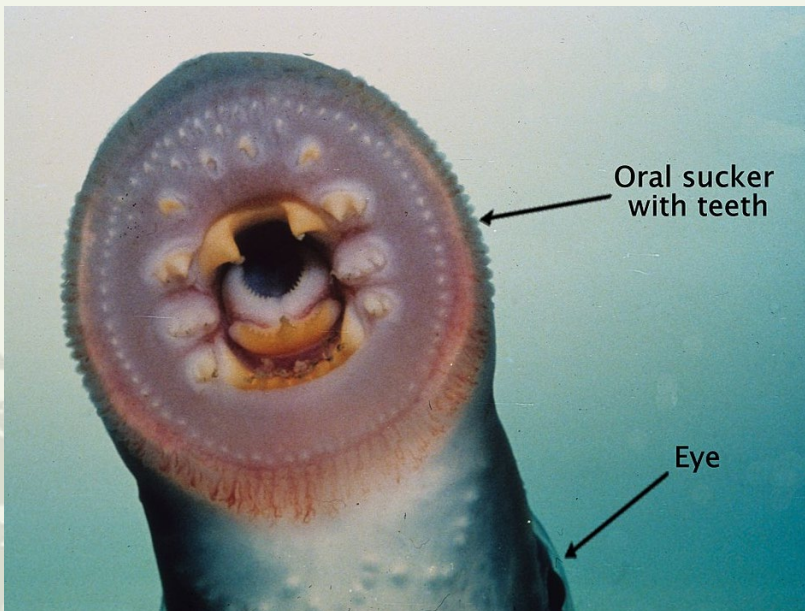


- They're older than TREES
- Adults: 0.37m to 0.63m (15 to 25 inches)
- Spend 1-3 years at sea
- Stop feeding when they return to freshwater
- Spawn March to July
- Eggs hatch into larvae (ammocoetes) and drift downstream to slow velocity area.
- Ammocoetes live in silt/sand substrates and filter feed for 3 - 7 years.



# Lampetra spp.

- Adults: 0.21m to 0.31m (8 to 12 inches)
- Spend ~10 weeks at sea
- Stop feeding when they return to freshwater
- Spawn March to July
- Eggs hatch into larvae (ammocoetes) and drift downstream to slow velocity area.
- Ammocoetes live in silt/sand substrates and filter feed for 2 - 7 years.



# Invasive Species!

If you surveying multiple creeks, or take your waders in other streams, clean your wader boots first!

- 409
- Freezing for 48hrs

Then visually check them over.

**IDENTIFYING THE NEW ZEALAND MUDSNAIL**



**Size:** A mature snail is usually less than 5 mm (.2 in) long. (Photo by Jane and Michael Liu.)



**Shape:** Shell is elongated and dextral (its whorls or spirals lean toward the right). Snail typically has between 5 to 6 whorls on its shell. (Photo by D. L. Gustafson, <http://www.esg.montana.edu/aim/mollusca/nzms>.)



1 whorl

**Color:** Most snails have a light- to dark-brown shell that may appear to be black when wet. (Photo by Jane and Michael Liu.)



**Embryos:** Upon dissection, mature snails will have brooded embryos. (Photo by D. L. Gustafson, <http://www.esg.montana.edu/aim/mollusca/nzms>.)



**Operculum:** The mudsnail operculum (a rounded plate that seals the mouth of the shell when the animal's body is inside) can be seen on live snails but is not easily visible on dead or preserved snails. (Photo by D. L. Gustafson, <http://www.esg.montana.edu/aim/mollusca/nzms>.)





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# BREAK TIME

# 10 mins



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## HOUSEKEEPING







# Data



# What makes good data?



- Complete
  - We need data from every 7-10 days on each assigned creek
  - If you will miss a week, let us know and we will substitute
- Accurate
- Legible

**SKAGIT FISHERIES ENHANCEMENT GROUP**  
Spawning Survey Data Sheets

Stream Name: ..... Crew Members: .....

Crew Leader: \_\_\_\_\_ Date \_\_\_\_\_  I certify that all team members have all required PPE necessary for today's survey including high visibility vests.

**TOTAL**

Species	Live	Carcass	Redd
Chinook (CK)			
Chum (CH)			
Coho (CO)			
Pink (PK)			
Sockeye (SO)			
Kokanee (KK)			
Other			

**FLOW TYPE:**

\_\_\_ 1 - Dry

\_\_\_ 2 - Low

\_\_\_ 3 - Medium

\_\_\_ 4 - High

\_\_\_ 5 - Flooding

\_\_\_ 6 - Medium-low

\_\_\_ 7 - Medium-high

**VISIBILITY:**

\_\_\_ 1 - Excellent

\_\_\_ 2 - Very Good

\_\_\_ 3 - Good

\_\_\_ 4 - Fair

\_\_\_ 5 - Poor

\_\_\_ 6 - Not Survey-able

**WATER CONDITIONS:**

\_\_\_ 20 - Low-Clear

\_\_\_ 21 - Med Color

\_\_\_ 22 - Low-Muddy

\_\_\_ 23 - Med Clear

\_\_\_ 24 - Med - Med Color

\_\_\_ 25 - Med - Muddy

\_\_\_ 26 - High - Clear

\_\_\_ 27 - High - Med Color

\_\_\_ 28 - High - Muddy

**VIEWING CONDITIONS:**

\_\_\_ 30 - Dark

\_\_\_ 31 - Dark in pools

\_\_\_ 32 - High Glare

\_\_\_ 33 - Some Glare

\_\_\_ 34 - Raining

\_\_\_ 35 - Snowing

\_\_\_ 36 - Frozen

\_\_\_ 37 - Partly Frozen

\_\_\_ 38 - Water Turbid

\_\_\_ 39 - Other:

**NOTES:**

# Protocol

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1. Walk your creek to get familiar with it before collecting data.
2. Collect data every 7 to 10 days
3. Walk up-stream and on the stream bank to avoid disturbing fish and redds
4. Don't survey if the flow is too high to survey safely, the creek may also be too turbid
5. If you cannot walk your creek let us know; NO survey is different than NO fish!
6. Near the end of the season, walk until you have not seen any new fish (alive or dead) for **two weeks**.

# If you miss a week

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- **DO:** notify Devon [dbedard@skagitfisheries.org](mailto:dbedard@skagitfisheries.org) (let us know as soon as you do so we can arrange a substitute surveyor)
- **DON'T:** write a 0 on your datasheet

# Suggested Notes

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- Predation/observed predators
- How old/fresh are the carcasses, where were they found, in general? (ex: old and fuzzy, in a log jam)
- Any notable interactions with landowners or pets?
- Any hazards in the creek?
- Any geomorphological changes? (e.g. landslides)
- Other wildlife observations

# Collecting data

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We're going to go over data collection in the field.

Stay tuned!



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# QUIZ TIME



# Salmon carcasses









SKAGIT FISHERIES  
ENHANCEMENT  
GROUP





# Collecting data: redds



Tie flagging near redd

Description on flagging:

1. Date
2. SFEG
3. Species Code:

CO = Coho

CK = Chinook

CH = Chum

SO = Sockeye

PK = Pink

KK = Kokanee

UNKNOWN

Other

**SKAGIT FISHERIES ENHANCEMENT GROUP**  
Spawning Survey Data Sheets

Stream Name: ..... Crew Members: .....

Crew Leader: \_\_\_\_\_ Date \_\_\_\_\_  I certify that all team members have all required PPE necessary for today's survey including high visibility vests.

**TOTAL**

Species	Live	Carcass	Redd
Chinook (CK)			
Chum (CH)			
Coho (CO)			
Pink (PK)			
Sockeye (SO)			
Kokanee (KK)			
Other			

**FLOW TYPE:**

\_\_\_ 1 - Dry

\_\_\_ 2 - Low

\_\_\_ 3 - Medium

\_\_\_ 4 - High

\_\_\_ 5 - Flooding

\_\_\_ 6 - Medium-low

\_\_\_ 7 - Medium-high

**VISIBILITY:**

\_\_\_ 1 - Excellent

\_\_\_ 2 - Very Good

\_\_\_ 3 - Good

\_\_\_ 4 - Fair

\_\_\_ 5 - Poor

\_\_\_ 6 - Not Survey-able

**WATER CONDITIONS:**

\_\_\_ 20 - Low-Clear

\_\_\_ 21 - Med Color

\_\_\_ 22 - Low-Muddy

\_\_\_ 23 - Med Clear

\_\_\_ 24 - Med - Med Color

\_\_\_ 25 - Med - Muddy

\_\_\_ 26 - High - Clear

\_\_\_ 27 - High - Med Color

\_\_\_ 28 - High - Muddy

**VIEWING CONDITIONS:**

\_\_\_ 30 - Dark

\_\_\_ 31 - Dark in pools

\_\_\_ 32 - High Glare

\_\_\_ 33 - Some Glare

\_\_\_ 34 - Raining

\_\_\_ 35 - Snowing

\_\_\_ 36 - Frozen

\_\_\_ 37 - Partly Frozen

\_\_\_ 38 - Water Turbid

\_\_\_ 39 - Other:

**NOTES:**



Photo by Betty Connor

# Identifying Redds



- What is a redd?
- Location of redds
- Substrate size 1.3-10.2 cm
- Redd Identification
  - More on this during the afternoon session!!



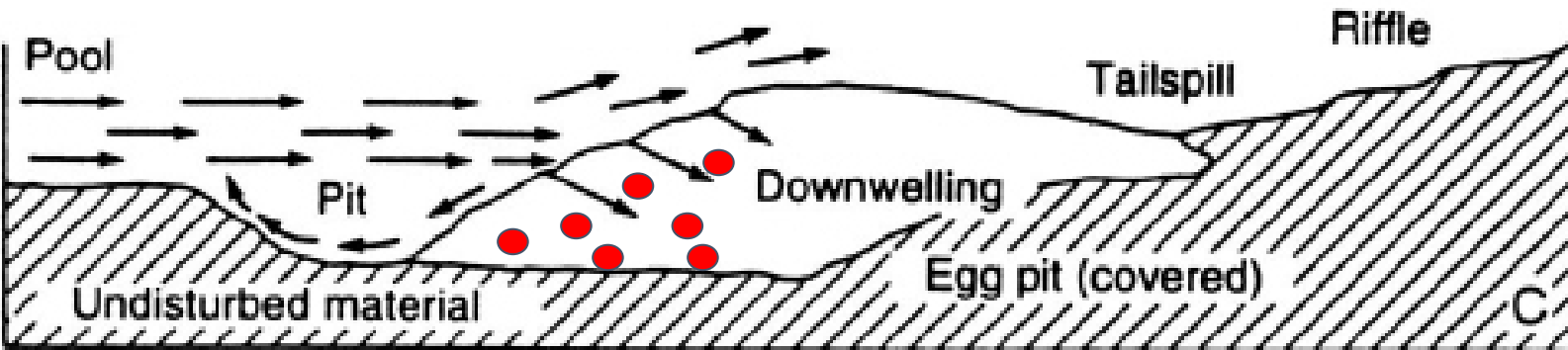
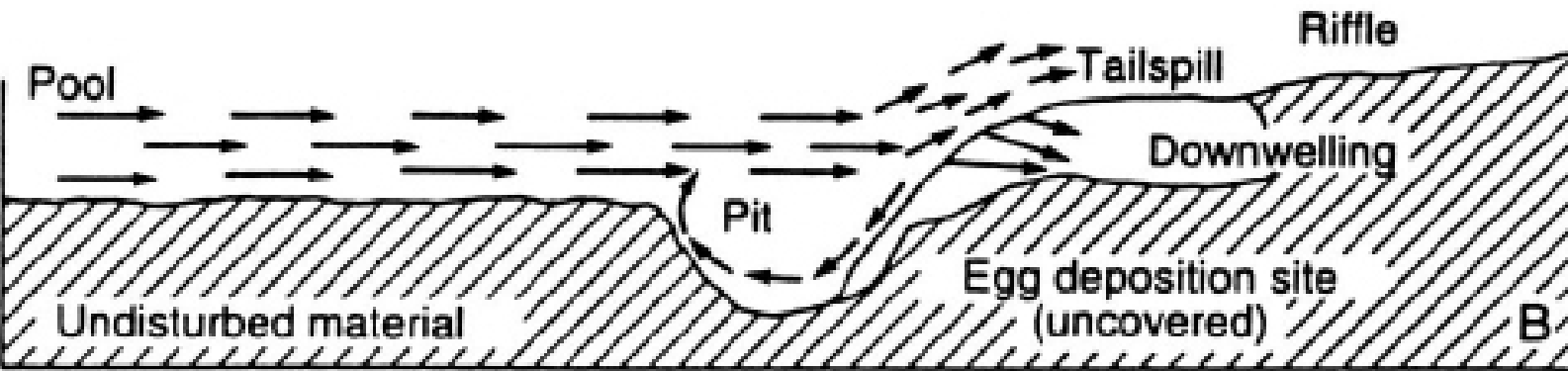
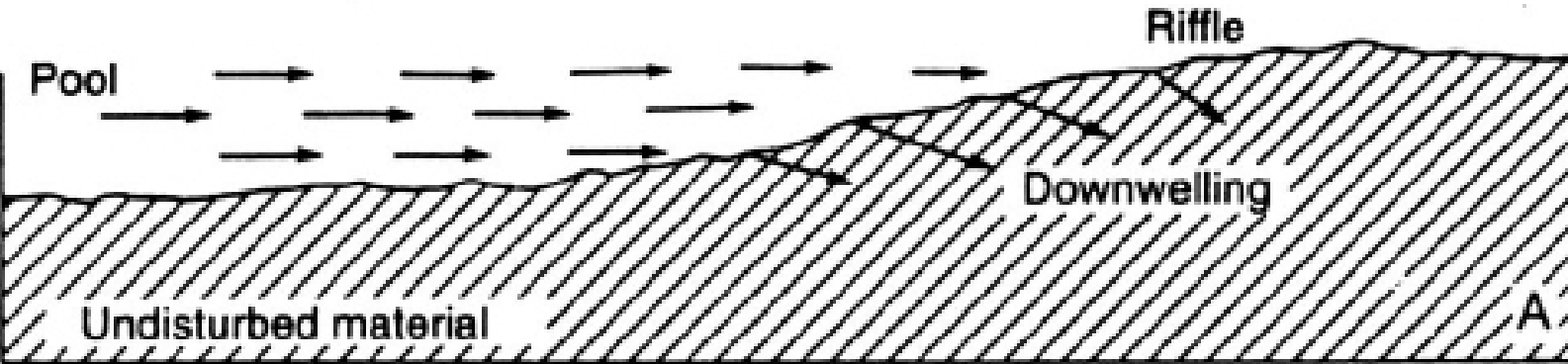


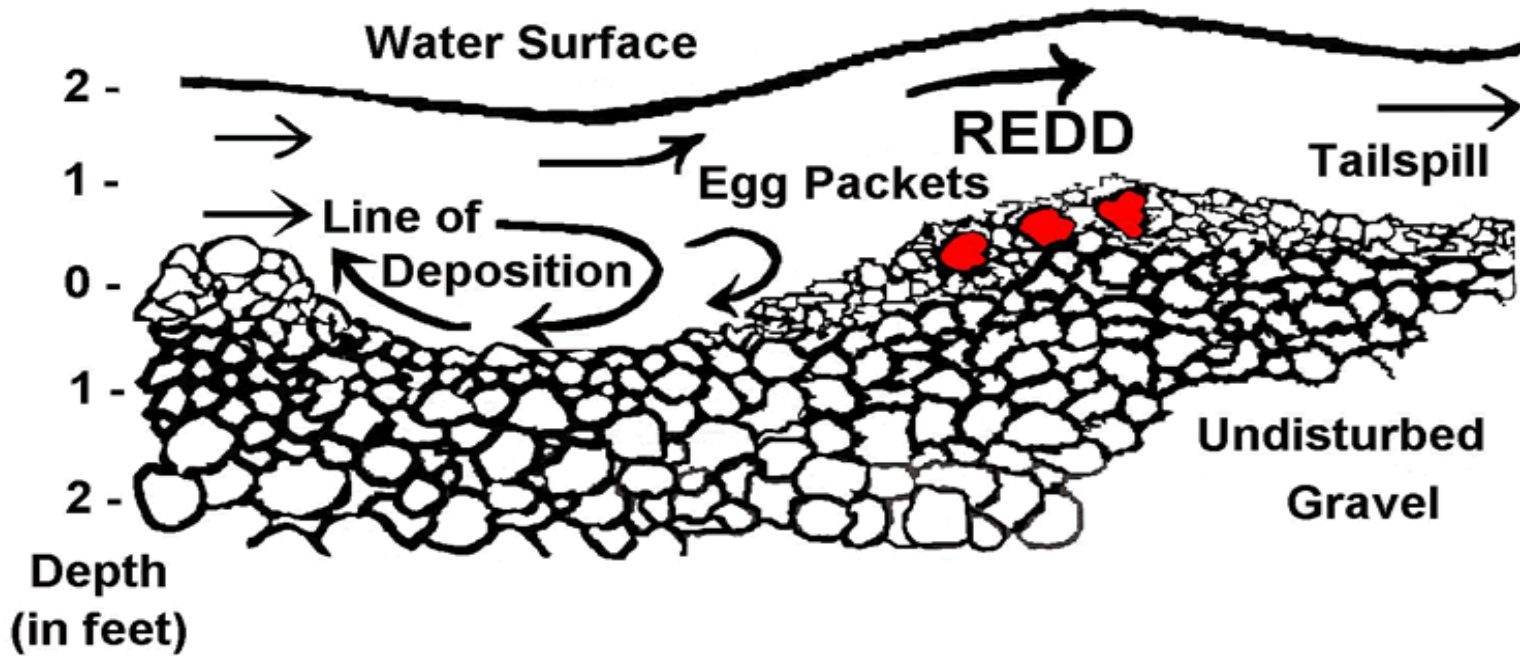


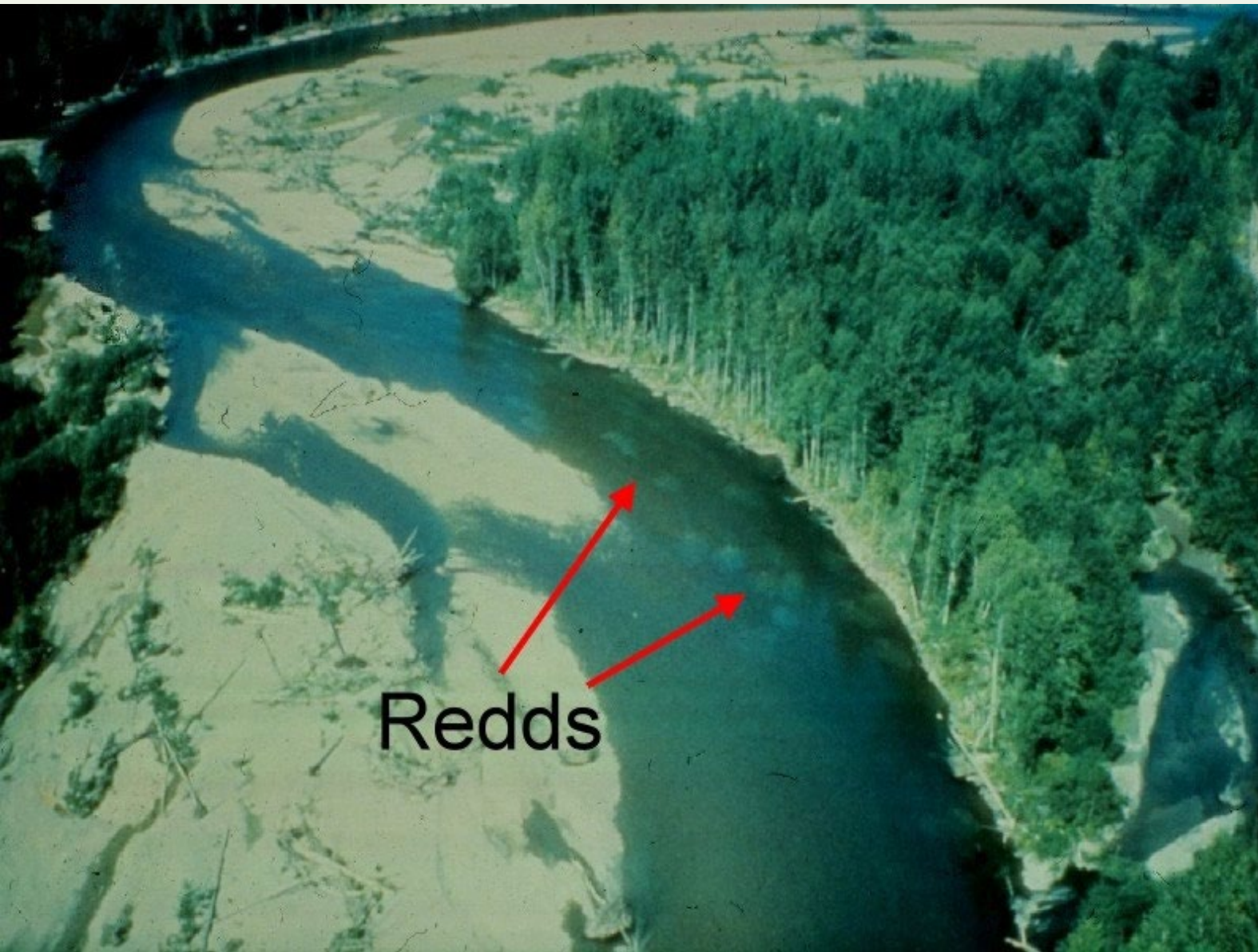
Upstream

Waterflow

Downstream







Redds







# Pre-Spawner Mortality

**Male**



**Female**



# Pre-Spawn Mortality:

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- Some salmon die before they spawn
- Reasons:
  - Predation
  - Sudden water level changes
  - Pollution (problem in urban areas)
- Skagit River = ‘index watershed’ because of healthi(er) streams
- Check each Coho carcass for eggs/milt
  - Pruners or boot check
  - 6PPD-quinone



# Pre-Spawn Mortality:

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# Finally:

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Some volunteers in some years may not spot salmon during spawner surveys.

**This data is still very important!**

If you'd like to see more salmon...

Come to our Salmon Sightings or join others on their survey days!



# Group Quiz!



# Group quiz!



**What salmon species will be spawning in December?**

Coho

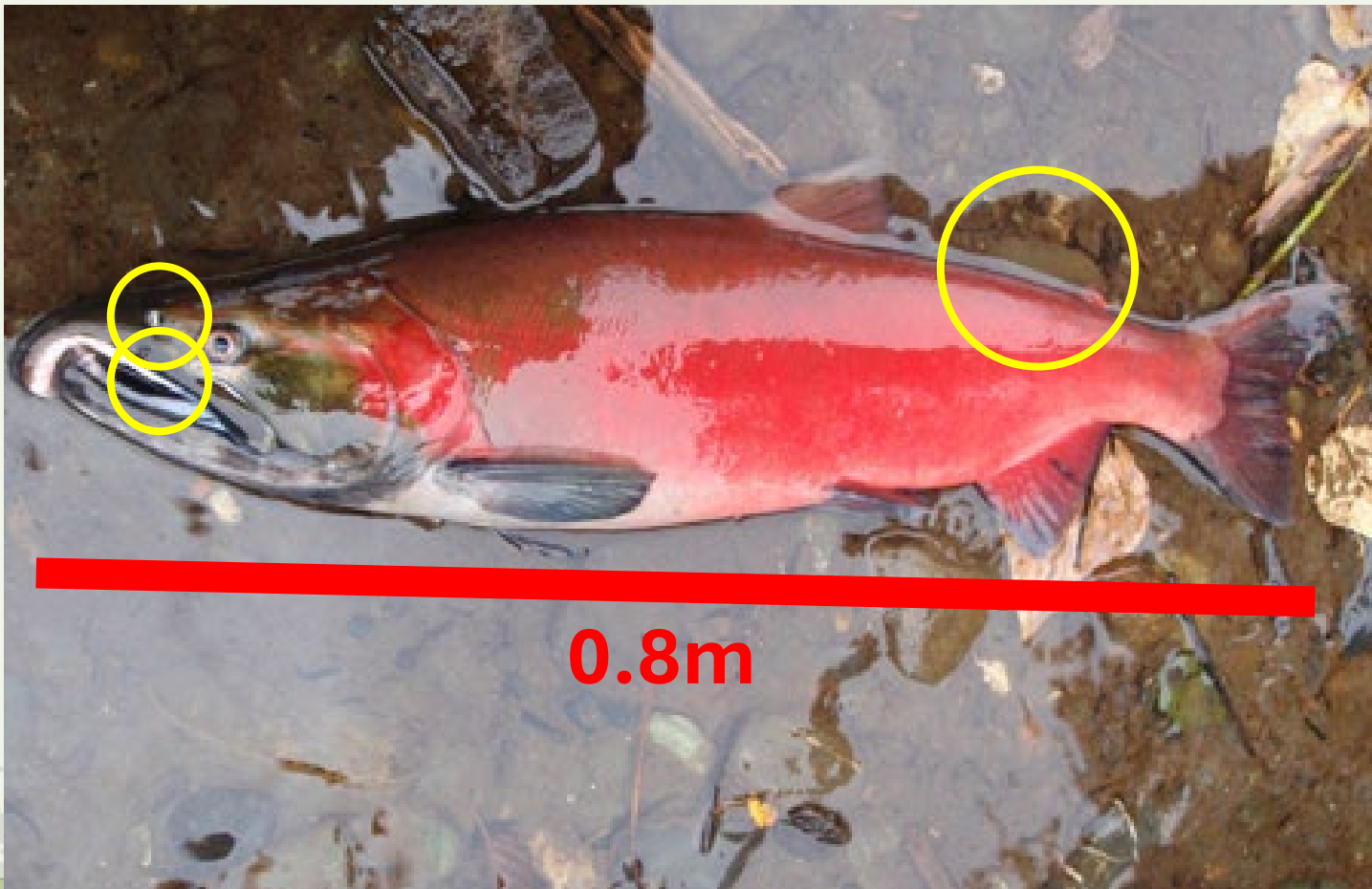
and...

Chum



# Group quiz!

- **What salmon is this? How do you know?**



# Group quiz

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## Which is the **CORRECT** protocol if you cannot survey your creek?

- A) Write a 0 into your data sheet and email it to [cgarrod@skagitfisheries.org](mailto:cgarrod@skagitfisheries.org)
- B) Report it to Skagit Fisheries ASAP so we can try to find a substitute team to survey
- C) Skip surveying that week and return next week

# Group quiz

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**When is the correct time to put a 0 on your data sheet?**

→ When you walk your stream and count zero fish of a particular species or zero redds

# Volunteer Paperwork

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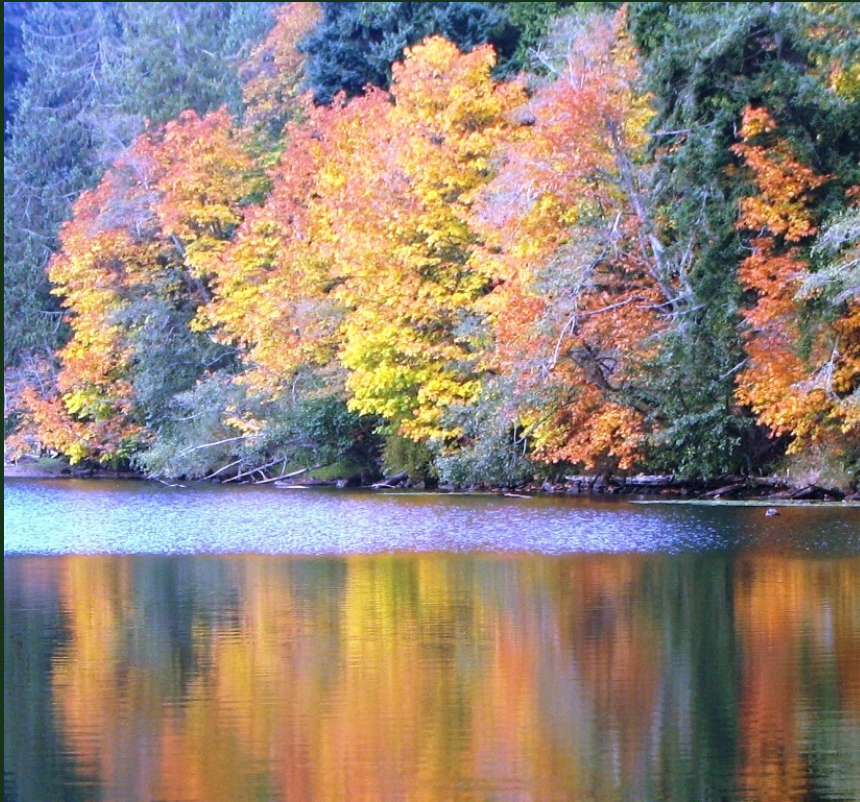
## We Need from YOU



Before you start:

- Signed Volunteer Registration
- Weekly
  - Spawner Survey Data Sheets
- Volunteer Monthly Reporting
  - Volunteer Time Sheets





Thank  
You  
Volunteers  
!!!

