NOAA FISHERIES
West Coast Region

Smell Your Way Home

Ocean Literacy Principle: #6

The oceans and humans are inextricably interconnected.

Everyone is responsible for caring for the ocean. Individuals and collective actions are needed to effectively manage ocean resources for all.

Questions to draw people to your table?

Do you know how salmon find their way back to the stream they were born in?

2 Hypothesis about homing instincts of salmon:

- Magnetic orientation based on Earth's magnetic field
- Olfactory, smell

Also, emphasize that salmon rely on smell to detect prey and either move into protected areas or stay still to avoid being seen.

Background on the sensory effects of juvenile salmonids exposed to dissolved copper (think brake pads on cars) http://www.nmfs.noaa.gov/pr/pdfs/consultations/copper_salmon_nmfsnwfsc83.pdf

Target Audience: Outreach event, all ages

Purpose: Increase awareness of the endangered status of Salmon & Steelhead and sharing how toxins in our watersheds affect the olfactory function of salmon (finding natal stream, fail to respond to chemical predation cues (Cu study by Nat Scholz), & potentially pre-spawn mortality)

Objectives: Audiences will be able to…

1. Name the 6 species of salmon using hand technique.
2. Identify one river via smelling canister and interpret that fish need clean water to find their way home.
3. Share that toxins affect the olfactory cells potentially impairing their homing instincts; or prevent them from detecting predators; or may cause pre-spawn mortality.
4. Connect their habits at home (be a smart shopper; learn about chemical alternatives in and outside the home; avoid putting chemicals down the drain, etc.)

Space Requirements:

Need a table to put the salmon life cycle on, numbered canisters, poster of 6 species. Placing the table in a semi-open area will be key, then place the 6 watershed signs with letters & matching lettered canisters around the room or about 50 yd radius around the table.

Supplies Need:

- ☐ Table cloth with NOAA logo runner
- ☐ Smell Your Way Home Poster, Life Cycle Poster, ID guide, Answer Key
- ☐ 1 or 2 dice (not necessary, but nice at an outreach event)
- ☐ 12 film canisters (6 with numbers (stay at table) and 6 with letters)
- ☐ 6 River signs with letters (either on stakes or ready to tape to wall)
- ☐ Outreach brochures (I'm Counting on You) &/or factsheets
- ☐ Outreach SWAG (stickers, coloring sheet and/or trading cards)
- ☐ Outreach tub: Duct tape, blue painters tape, rubber bands, weights, string, business cards (stranding network), dry erase/vis-à-vis/regular

Tips for younger kids:

- If any of your participants can't read or have trouble differentiating sweet smells, give them as many hints as you can to make each person find success.
- Encourage them to keep trying if they can't match the smells or come back and smell the canister again, then tell them the name of the smell.

Salmon ID using your hand:

- ☐ First ask if they know the 5 species of salmon. Then have them hold up their hand and go through each species.
- ☐ Thumb: rhymes with Chum (Keta or dog salmon)
- ☐ Pointing finger: Perfect for "Socking" a salmon in the eye, the head and tail are green (Red salmon)
- ☐ Middle Finger: King of the Mountain, King salmon (Chinook, Blackmouth, Spring, or Tyee salmon)
- ☐ Ring Finger: Silver like a ring, Silver Salmon (Coho salmon)
- ☐ Pinkie Finger: Pink Salmon (Humpies)
- ☐ Optional (cutthroat trout and steelhead trout) use your other hand & say if you have the audacity to "sock" another fish in the eye, how about using your index finger & pretend to "cut" your throat & "steal" their head.

Smell Your Way Home Activity:

1. Once they know the species of salmon, ask them how salmon return to their natal stream. How do we know this? What other hypothesis have been proposed over the years? (Magnetic navigation, passive drift, random searching, temperature and salinity gradients, prior knowledge, etc.)
2. Tell them that salmon don't have noses like we do. They "breathe" by taking in water through their mouth, and then it goes over and out of the gills. However they do have NARES in which they can smell.
3. Have the first 6 students smell one of the numbered canisters, remember the # and smell.
4. Then have them visit all 6 rivers from your region and see which river that salmon would return to. Have them return to the table with the letter or river name. If they didn't get it right the first time, ask how similar that might be for salmon? Is that realistic, yes!
5. Conclude with the facts we know about this "home stream" hypothesis:
    a. That every stream has a unique smell
    b. Salmon can tell the difference between the odors of different streams
    c. Salmon retain a memory of their home stream odor, this is called imprinting.
6. After the group has successfully completed the game, reward them with an imprint of a salmon (stamp), sticker, or a high five!
7. Next ask them if all salmon successfully return every single time. The homing instinct is not perfect and some salmon do stray and are unable to make it back to spawn. However, they can be an important part of mixing the gene pool.
8. Ask the audience what may cause salmon not to smell or be confused with the odors? Toxins that enter our streams and rivers either by runoff or from sewage outfalls can affect the olfactory cells, reducing the surface area to smell.
9. Challenge them to consider the top 10 things to protect their habitat and reduce toxins from entering our waters in the first place.
10. Lastly, thank them for participating and try to put something in their hands as they walk away. Such as a brochure or sticker sheet to help remind them who NOAA is and what we are doing to promote salmon recovery, as well as Science, Service, and Stewardship.

Come play

SMELL YOUR WAY HOME

Can you smell as well as a Salmon?

Smell Your Way Home!

THE LIFE OF A SALMON

spawners need clean gravel & plenty of room to nest

parr need pools, shade, places to hide & lots of bugs to eat

carcasses fertilize the stream

smolts need fast, safe passage to the estuary

At every life stage, Salmon need abundant, clean, cold water to live.

returning adults need clear & safe passage upstream

places to rest & hide on the way home

What do Salmon need?

How can we protect Salmon?

places to hide & eat

juveniles in the estuary need safe passage out to the ocean

adults in the ocean need krill, squid & small fish to eat

" " OCEAN - - - - ESTUARY - - - - FRESHWATER STREAMS & RIVERS " "

Illustrations by Blane Bellerud

How to play like a returning salmon:

1. Roll a die
2. Sniff the shaker with the same number - That is your home river.
3. Now sample each of the 6 different rivers.

Which one smells like your home river?