**Week-3**

**Part-3 Human Impact on Salmon Fishes Existence.**

Read the information carefully and make notes to be used for the upcoming Salmon Project.

Instructions for week 05/04/20 to 05/08/20.

Read the information about the life cycle of Salmon fish and threats to the existence. And Answer all the questions that are provided at the end.

**Standards:**

**MS-LS2-4.** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**MS-LS2-5.** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

**Learning Objective:** Students should be able to evaluate critically industrial development to current pandemic threatening existence of organisms on the earth.

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| **Salmon** |  |



Salmon are anadromous fish - they live in the sea but reproduce in fresh water (in a stream or lake). They are amazing fish that live in fresh water during their early life, mature in salt water, and then return to fresh water to breed (and then die). Some salmon (sockeye and chinooks) travel up to 1,000 miles (1,600 km) upstream in order to spawn.

**Life Cycle**:
**Reproduction**: Salmon live most of their life in the sea, but when they are mature and ready to breed, they enter fresh water to spawn (reproduce), traveling to a stream or pond high in oxygen. The female digs a nest in the gravel (called a redd) with her tail. She then pushes her thousands of eggs into the nest and the male milks the eggs, fertilizing them. Most salmon die after spawning.

**The Eggs Hatch and Grow**: The newly-emerged salmon (called alevins) still have a food sac attached to them. When the food sac is used up, the salmon fry emerges from the nest - and must find food (like insects) for the first time. As the fry matures, it becomes camouflaged (with parr marks) and is called parr . When it becomes silver-colored, it will be called a smolt. After growing for a while, the smolts swim downstream to the sea.

**Adapting to Salt Water**: When smolt reach the estuary (where the river meets the sea), a process begins in which their body changes, allowing them to soon live in salt water (this is called smoltification).

**Maturing at Sea, then Returning Home**: The salmon lives in the sea until maturity (1 to 7 years, depending on the species); some migrate thousands of miles in the sea. They then return to the place where they hatched and continue the cycle. No one knows how salmon return home -perhaps they remember the distinctive set of smells along the way. On their journey home, they do not eat at all, they often change color, their muscles soften, and they will die soon after spawning.

**Anatomy**: Salmons have silvery skin with spotted back and fins. The biggest salmon is the chinook, which weighs up to 120 pounds (55 kg).

**Diet**: Salmon are carnivores (flesh eaters) - they eat fish (like herring and pilchard), squid, and crustaceans (like shrimp).

**Predators**: Salmon are preyed upon by many animals, including bears, people, many birds (like wading birds and kingfishers), and other fish. For every 8000 eggs produced, 4500 alevin survive, from which 650 fry survive, from which 200 parr survive, from which 50 smolt survive, from which only 2 spawning adults survive (who produce thousands of eggs).

**Classification**: Kingdom Animalia, Phylum Chordata, Class Osteichthyes (bony fish), Family Salmonidae (salmon, trout, and char), Genus Salmo (Atlantic salmon - salmo means jumper) and Genus Oncorhynchus (Pacific salmon - 5 species; Oncorhynchus means "hooked snout").

***SIX WAYS TO SAVE CALIFORNIA’S TROUT AND SALMON***

**MAY 22ND, 2017 POSTED BY**[**CAMDEN FLATH-FUTURITY**](https://www.futurity.org/author/camden-flath/)

**(Credit:**[**Getty Images**](http://www.gettyimages.com/license/184638474)**)** [**UNIVERSITY OF CALIFORNIA, DAVIS**](https://www.futurity.org/university/university-of-california-at-davis/)

**A news report indicates that almost half of native California salmon, steelhead, and trout species are on track to be extinct in the next 50 years.**

The [**report**](http://caltrout.org/sos/)offers concerning data about the declining health of these fish populations and opportunities for stabilizing and even recovering many species. If present trends continue, 74 percent of California’s native salmon, steelhead, and trout species are likely to be extinct in 100 years, and 45 percent could be extinct in 50 years.

SOUNDING THE ALARM

A 2008 report established a baseline level of health for each of 32 types of native salmon, steelhead, and trout populations in the state, including the extinct bull trout.

Since that time, the number of California’s native fish species likely to be extinct within the next five decades nearly tripled, from 5 to 14 species. And after five years of historic drought, 81 percent of the remaining 31 species are worse off today than they were a decade ago.

“The health of our native fish is a reflection of the health of our rivers and streams,” says Curtis Knight, executive director of CalTrout. “Declining fish populations indicate degraded waters, which threaten the health and economic well-being of all Californians.”

‘WE MUST ACT NOW’

The report includes an analysis of key threats to the survival of each species, starting with the overarching threat of climate change, which is likely to reduce the availability of cold water habitat that salmon, steelhead, and trout all depend on for survival. It also highlights various other human-induced threats, such as dams, agriculture, estuary alteration, urbanization, and transportation.

The report notes that improving salmonid status throughout California requires investing in productive habitats that promote growth, survival and diversity. CalTrout notes it has developed an action plan to return the state’s salmon, steelhead, and trout to resilience to help many of these species thrive.

WHAT CAN BE DONE?

To reverse the trend toward extinction, the report suggests prioritizing protection and restoration efforts in three general areas:

1. Protecting the most productive river ecosystems remaining in California, such as the Smith and Eel rivers. These strongholds, among others, have the capacity to support diversity and abundance because they retain high-quality habitat and are not heavily influenced by hatcheries, supporting the persistence of wild fish.
2. Increasing focus on source waters will keep more water in streams and reduce stress on fish during drought, buffering the effects of climate change. Sierra meadow restoration, springs protection, and progressive groundwater management all contribute to this effort.
3. Restoring function to once productive—but now highly altered—habitats can greatly improve rearing conditions for juvenile fish, especially floodplains, coastal lagoons, estuaries, and spring-fed rivers.

Additionally, the report identifies three science-based strategies to support a return to abundance for California’s native salmonids:

1. First, focus on opportunities to mimic natural processes within altered landscapes. For example, off-season farmland can mimic traditional floodplains and support rapid growth of juvenile salmon.
2. Second, prioritize improving fish passage to historical spawning and rearing grounds that have been cut off over time.
3. And pursue strategies that increase genetic diversity of wild fish.

“We know we are not going to turn back the clock to a time before rivers were dammed or otherwise altered for human benefit,” Knight says. “Using the best available science, we can make landscape-level changes that will allow both people and fish to thrive in California.”

California’s native salmonids facing the most immediate threat include:

* Central California coast coho salmon
* Sacramento River winter-run chinook salmon
* Southern steelhead
* Kern River rainbow trout
* McCloud River redband trout

A longer, more detailed report is expected this summer.

The water resources managers continue to work with Mr. Vogel to develop and implement a series of actions, summarized below, that will improve fish habitat in the region and help us better understand the actions necessary to help advance the recovery efforts for anadromous fish.

1. **Fish Passage Improvements.**Over the past several decades there has been tremendous effort to build fish screens and siphons on major diversions in the Sacramento Valley to protect fisheries while assuring water supply reliability for farms, refuges, cities and rural communities. There is an ongoing effort to finalize fish screens on the few remaining high priority diversions in the Sacramento Valley.
2. **Instream Flows.**The Sacramento Valley has instream flow agreements or requirements on every major part of the Sacramento River hydrologic region, which is summarized in “[Instream Flow Requirements in the Sacramento River Hydrologic Region](https://norcalwater.org/efficient-water-management/instream-flows/).” These various arrangements will continuously be evaluated over time to assure they provide water supply reliability and benefit fisheries.
3. **Spawning Habitat.** A gravel recruitment program in key reaches of the river system would help provide spawning habitat for salmon.
4. **Salmon Smolt Escapement Plan.**Water resources managers, working with various partners, are developing a “Salmon Smolt Escapement Plan” to maximize the escapement of natural and hatchery salmon smolts through the Delta with a coordinated program of water storage releases, fish releases, additional strategic pulse flows, and the timing of diversions. This will help avoid the primary problem of predation, the main source of mortality.
5. **High Priority Streams.**The California Legislature in 2009 required the State Water Resources Control Board to develop a prioritized schedule to complete instream flow studies for high priority streams by 2018. (Water Code §85087.) To help jumpstart this process, there is an interest in accelerating the implementation of agreements and programs on two high-priority tributaries to the Sacramento River, both of which contain important habitat for spring run salmon: Mill and Antelope Creeks.

**Name: Period: Date:**

**Questions**:
1. Where do salmon fishes hatch their eggs? (salt water or fresh water)

2. After maturing enough to swim well, does the young salmon swim upstream or downstream?

3. Where do salmon live until they are mature and ready to reproduce?

4. What sense Salmon fish use to return to their birthplace?

5. Name the stages of Salmon Fish life cycle.

7. What happens to the fish after spawning?

8. Out of 8,000 eggs produced by Salmon Fish, how many survive to Adult spawning stage.?

9. What are 5-point Action Plan suggested by Mr. Vogel?

10. What are key threats to the survival of Salmon Species?

11. What are human induced threat for the existence of Salmon species.

12. Draw / Label and color Salmon fish

**Fill In the Blanks**

Spawn, anadromous, Sea Water -Fresh Water, Alevin, parr, smolt, estuary, 4500, 450, 2, herring, squid, crustaceans and shrimp, bears, people-wading birds-kingfishers and other fish, Smith - Eel rivers, drought-buffering the effects of climate change, Fish Passage Improvements-Instream Flows-Spawning- Habitat-Salmon Smolt Escapement Plan-High Priority Streams, Salmon Smolt Escapement Plan.

1. Salmon are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fish - they live in the sea but reproduce in fresh water (in a stream or lake).
2. Some salmon (sockeye and chinooks) travel up to 1,000 miles (1,600 km) upstream in order \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Salmon fish live in fresh water during their early life, mature in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and then return to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to breed (and then die).
4. The newly-emerged salmon from egg are called \_\_\_\_\_\_\_\_\_\_\_\_.
5. As the fry matures, it becomes camouflaged (with parr marks) and is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. When it becomes silver-colored, it will be called a \_\_\_\_\_\_\_\_\_\_\_\_.
7. The place where river meets the sea is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. Salmons have silvery skin with spotted back and fins, weighs about \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
9. Salmon feeds on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
10. Predators for Salmon fish are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
11. For every 8000 eggs produced, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ alevin survive, from which 650 fry survive, from which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ parr survive, from which 50 smolt survive, from which only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spawning adults survive (who produce thousands of eggs).
12. Protecting the most productive river ecosystems remaining in California, such as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
13. Increasing focus on source waters will keep more water in streams and reduce stress on fish during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
14. List the five Actions plans to protect the Salmon Fish from extinction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
15. Water resources managers, working with various partners, are developing a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” to maximize the escapement of natural and hatchery salmon smolts through the Delta.