

WF4133-Fisheries Science

Lecture 22 – Culture fisheries
continued & System interactions



Housekeeping

- Exam II – Done
- Question evaluation
- Will return Wednesday

Housekeeping

- Optional Lab
 - Group 1 @ 1
 - Group 2 @ 2:30
- Meet at south end of parking lot



Housekeeping

- 1st drafts due today 4/22 by 5pm
 - Learning objective: technical writing is bland, don't overthink it...
- Presentations will be Monday 4/24
 - 5 groups @ ~15 minutes per group = 1.25 hrs
- Final draft due May 4th 11 am.

Housekeeping

- Final Exam Wednesday May 3rd 8-11 am

MWTF, MW, M, W, F CLASSES					
If Class Meets			Exam Will Be		
8:00 am	MWTF	Thu	May 4	8:00 am to 11:00 am	○
9:00 am	MWTF	Wed	May 3	8:00 am to 11:00 am	●
10:00 am	MWTF	Tue	May 2	8:00 am to 11:00 am	○
11:00 am	MWTF	Thu	May 4	12:00 pm to 3:00 pm	○
12:00 pm	MWTF	Fri	Apr 28	12:00 pm to 3:00 pm	○
12:30 pm	MWTF	Fri	Apr 28	12:00 pm to 3:00 pm	○
1:00 pm	MWTF	Mon	May 1	12:00 pm to 3:00 pm	○
2:00 pm	F	Thu	May 4	3:00 pm to 6:00 pm	○
2:00 pm	W	Thu	May 4	3:00 pm to 6:00 pm	○

[http://www.registrar.mnstate.edu/students/schedules/exam-schedule/?year\(value\)=2017&semester=csping](http://www.registrar.mnstate.edu/students/schedules/exam-schedule/?year(value)=2017&semester=csping)

Homework (20 points)

- Provide 1 multiple choice question you believe is a good candidate for a final exam question
- Provide 1 question, that is not multiple choice, you believe is a good candidate for a final exam
- Provide 1 question or topic you would like to see reviewed prior to the final exam. (Optional)
- <http://goo.gl/forms/OppPJIMzOc>
- For full credit your responses are due by 5pm 4/24/2016.

WFA4133-Final Homework (20 Points)

Enter your name*

Enter your email*

1) Provide 1 multiple choice question you believe is a good candidate for a final exam question (10 points)

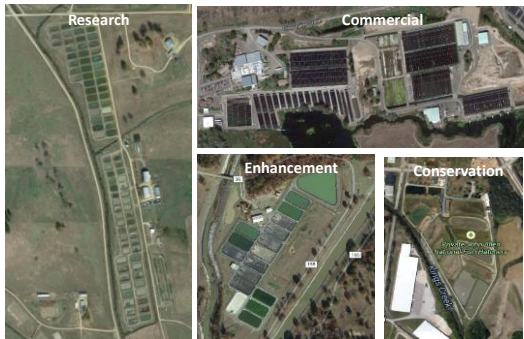
2) Provide 1 question, that is not multiple choice, you believe is a good candidate for a final exam (10 points)

3) Provide 1 question or topic you would like to see reviewed prior to the final exam.

Submit



Hatchery types



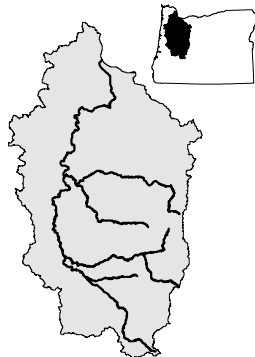
Conservation

- Mitigation- create or maintain a run that was lost due to dams
- Supplementation- supplement existing runs that have experienced declines due to habitat loss/modification or overfishing

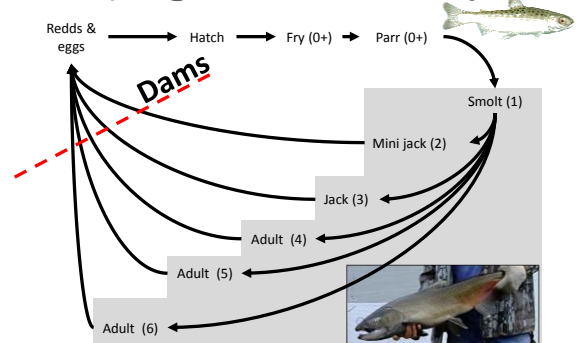
Willamette basin spring Chinook

Anadromous species of conservation need

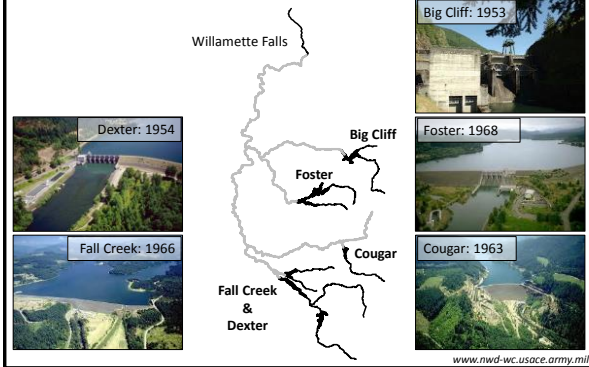
- Threatened status 1999
- Anthropogenic modifications



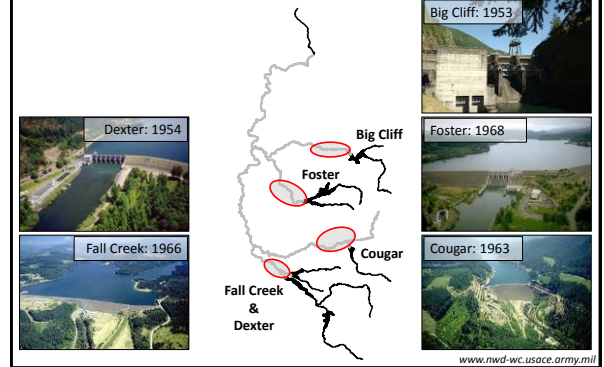
Spring Chinook life history



1950-60s Barriers to adult migration



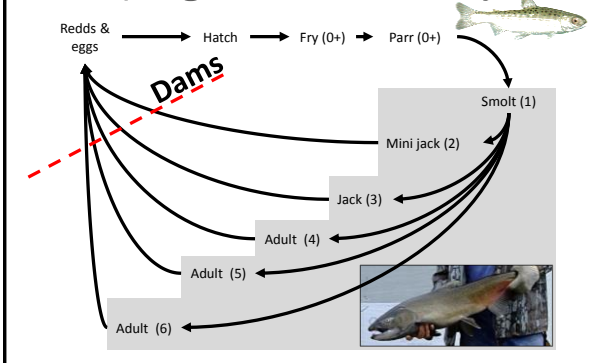
Limited natural reproduction



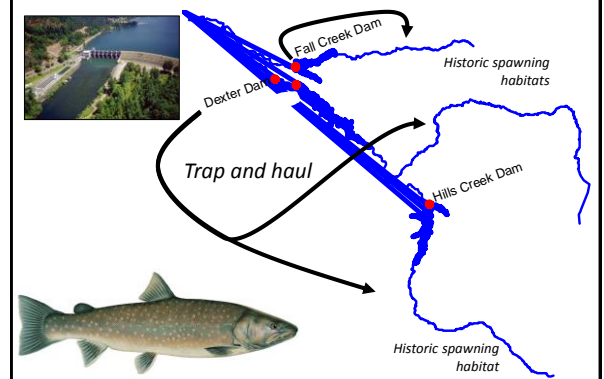
Dexter Dam

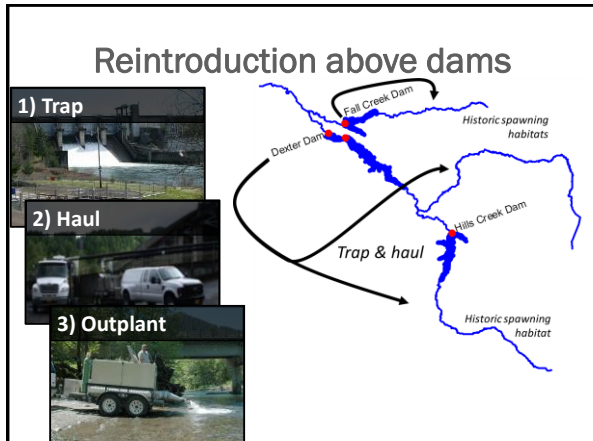
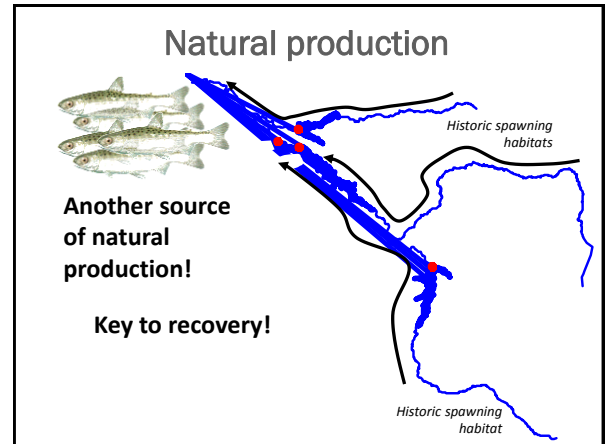
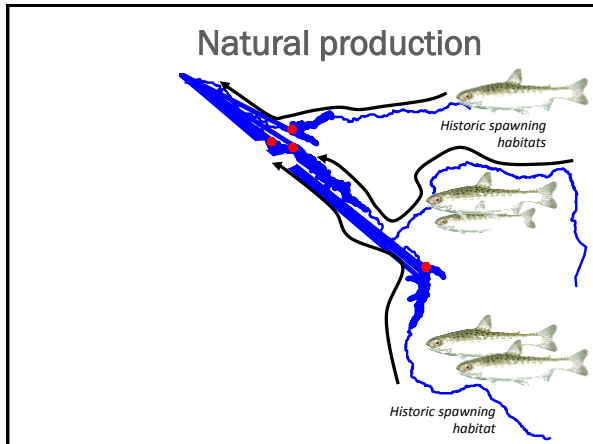


Spring Chinook life history



Natural production





Issues with conservation?

- Domestication
- Reduced fitness
- Unnatural selection
- Behavior differences

Domestication

- Change genetics
- Rapidly select for fish that excel in hatchery environment
- Shorter time scale relative to environmental variability

Reduced fitness

- Survival of hatchery origin fish may be lower than naturally produced fish
- Relative reproductive success half of natural fish (Milot et al.)

Est Appl 2013 Apr 6(3): 472-485.
Published online 2013 Mar 22 doi: 10.1111/est.12208

Reduced fitness of Atlantic salmon released in the wild after one generation of captive breeding

Emmanuel Milot^{1,*}, Charles Pénier^{1,2}, Lucie Poirier¹, Julian J. Dutton² and Louis Bernatchez¹

Author information • Article notes • Copyright and license information

This article has been placed by other articles in PMC.

Abstract

Salmonids rank among the most socioeconomically valuable fishes and the most targeted species for stocking with hatchery-reared individuals. Here, we used molecular parentage analysis to assess the reproductive success of wild- and hatchery-born Atlantic salmon over three consecutive years in a small river in Quebec. Yearly restocking in this river follows a single generation of captive breeding. Assessing the adults returning to the river for the summer, between 1995 and 1998, we found that hatchery-born fish had a lower reproductive success than wild-born fish.

Unnatural selection

- Spring chinook return to the Imnaha
- June to September

North American Journal of Fisheries Management 28:148-166, 2008
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DOI: 10.1577/M06-043.1

[Article]

Run Timing, Spawn Timing, and Spawning Distribution of Hatchery- and Natural-Origin Spring Chinook Salmon in the Imnaha River, Oregon

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Oregon Department of Fish and Wildlife, Northeast Oregon Fisheries Research and Development, 203 Badgley Hall, Eastern Oregon University, La Grande, Oregon 97850, USA

Abstract.—We evaluated 16 years (1990–2005) of weir collection and spawning ground survey data to examine differences in run timing, spawn timing, and spawning distribution between naturally and hatchery-reared chinook salmon *Oncorhynchus tshawytscha* in the Imnaha River, Oregon, and to look for changes in

Study area

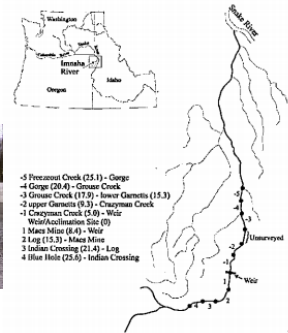


FIGURE 2.—Map of the Imnaha River, Oregon, with study reaches and boundaries (boundary locations are designated as RKM above or below the weir site at which hatchery spawned chinook salmon were acclimated before release).

Process



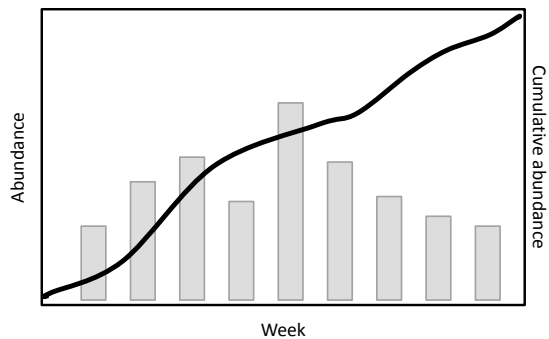
Spawning run:
Week 23-37
June – mid September

Objectives
- Get sufficient number
of fish to meet hatchery
quotas

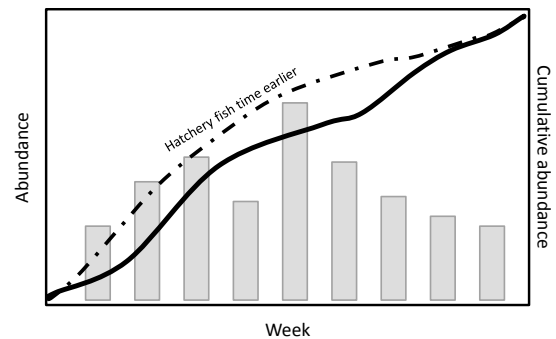
Spawning



Expectation: no selection effect



Expectation: selection effect



Hatchery effects

- In some years, hatchery fish arrived earlier
- In others natural origin fish returned earlier

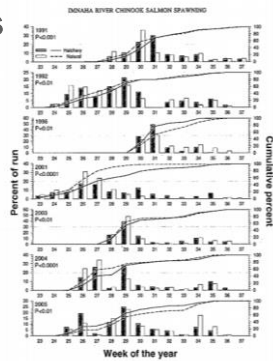


FIGURE 5.—Percent (bars) and cumulative percent (lines) of Chinook salmon captured at the Imnaha River, Oregon, over several years (1991-2005). Hatchery fish (solid line) generally arrive earlier than natural fish (dashed line).

Consequences

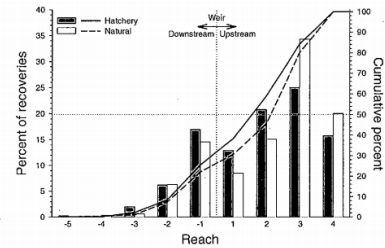


FIGURE 6.—Percent (bars) and cumulative percentage (lines) of carcass recovery for hatchery- and naturally spawned female Chinook salmon in nine reaches of the Imnaha River, Oregon (pooled data for 1991-2005). Horizontal dotted line indicates 50% cumulative (right y-axis) recovery.

State of the science

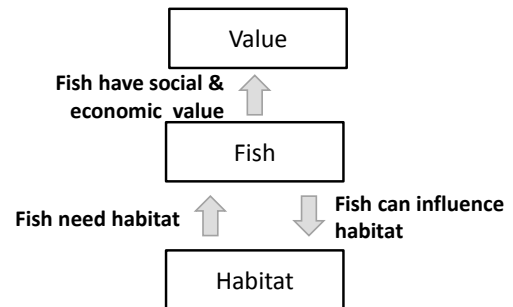
Spawning protocols

- Timing
- Genetic diversity & pedigree

Rearing conditions

- Diet
- Density
- Substrate
- Predators

The big picture



BACK IN
MY DAY ...

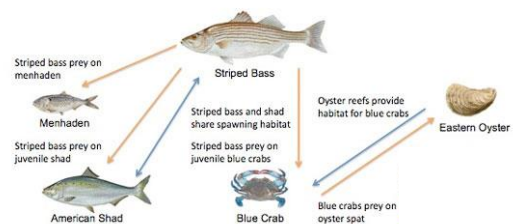


Old school: single
species management

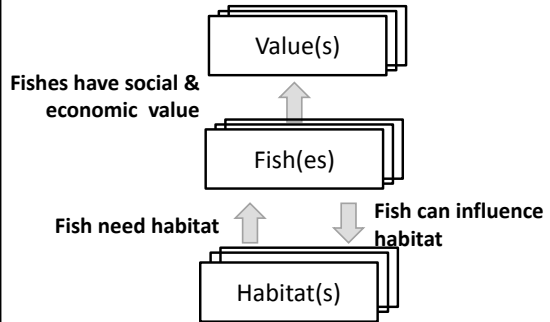
New school: multi species
& ecosystem management

Holistic view

Ecosystem Connections among the Five Key Species



The even bigger picture



Fisheries are embedded in aquatic ecosystems

