WF4313/6313-Fisheries Management

Class 1 – Fisheries Management Overview & History

Announcements

No class or lab next week… AFS

Volunteer opportunities

- Paddlefish at the Refuge
- Enid habitat additions

Course preliminaries

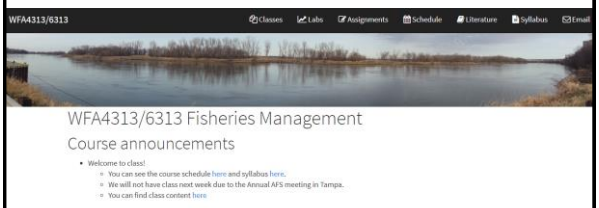
1. This is Fisheries Management
2. Fisheries Management ≠ Fisheries Techniques

I endeavor to expose you to techniques when possible but do not that this class will be a techniques class

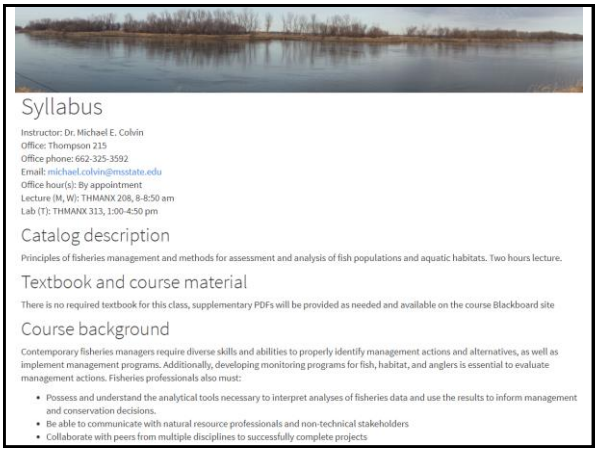
Class overview

1. Syllabus and class overview
2. What is fisheries management
3. Why is fisheries management important
4. What you can expect as a fisheries manager
5. History of fisheries management

Course Website



https://mcolvin.github.io/WFA4313-Fisheries-Management



Syllabus

Instructor: Dr. Michael E. Colvin
Office: Thompson 215
Office phone: 662-325-3592
Email: michael.colvin@msstate.edu
Office hour(s): By appointment
Lecture (M, W): THMANX 208, 8-8:50 am
Lab (T): THMANX 313, 1:00-4:50 pm

Catalog description

Principles of fisheries management and methods for assessment and analysis of fish populations and aquatic habitats. Two hours lecture.

Textbook and course material

There is no required textbook for this class, supplementary PDFs will be provided as needed and available on the course Blackboard site

Course background

Contemporary fisheries managers require diverse skills and abilities to properly identify management actions and alternatives, as well as implement management programs. Additionally, developing monitoring programs for fish, habitat, and anglers is essential to evaluate management actions. Fisheries professionals also must:

- Possess and understand the analytical tools necessary to interpret analyses of fisheries data and use the results to inform management and conservation decisions.
- Be able to communicate with natural resource professionals and non-technical stakeholders
- Collaborate with peers from multiple disciplines to successfully complete projects

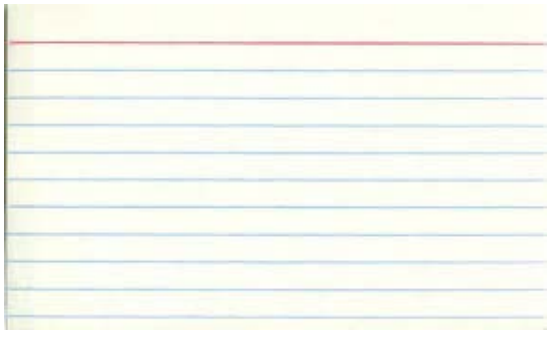
What is fisheries management?

What is Fisheries Management

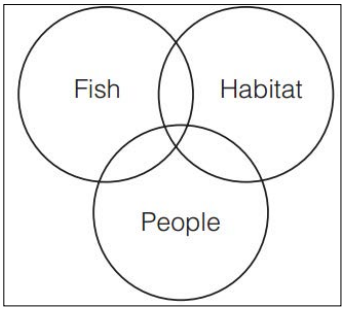
"The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives."

http://www.fao.org/docrep/005/y3427e/y3427e03.htm

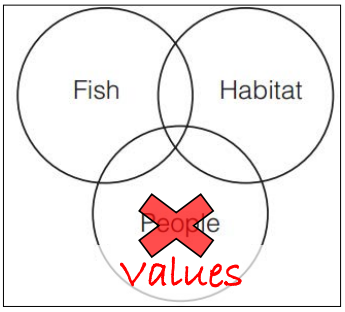
What is a Fishery?



The classic model



The classic model

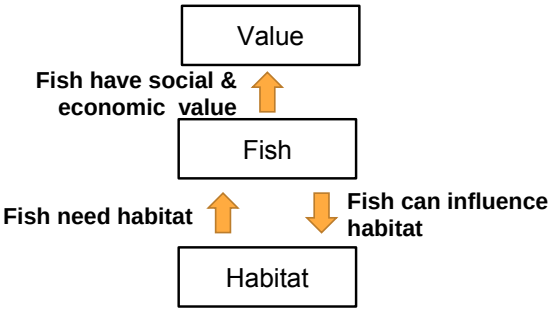


Thinking *inside* the box

Fish	Value	Habitat

These are quantifiable
100 fish
100 tons of harvest
25 acres of habitat

The boxes are related



Fisheries values

The seafood industry—harvesters, seafood processors and dealers, seafood wholesalers and retailers—generated $129 billion in sales impacts, $37 billion in income impacts and supported 1.2 million jobs in 2011

http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011

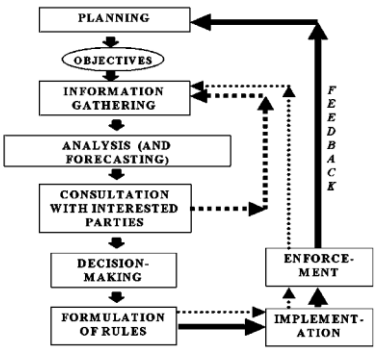
Fishery Benefits

- Commodity output — the weight or number of fish produced
  - –animals harvested by capture (fishing for wild animals) or
  - –culture (produced as captive animals)
- Commonly called the capture fisheries and the culture fisheries

Fisheries Management Goal

To produce sustainable biological, social, and economic benefits from renewable aquatic resources

Fisheries Management Conceptually

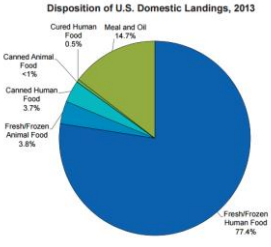


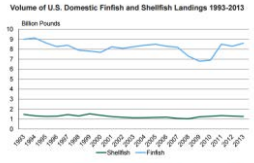
Why is fisheries management important?

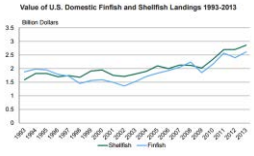
Why is all this important?

Why is all this important?

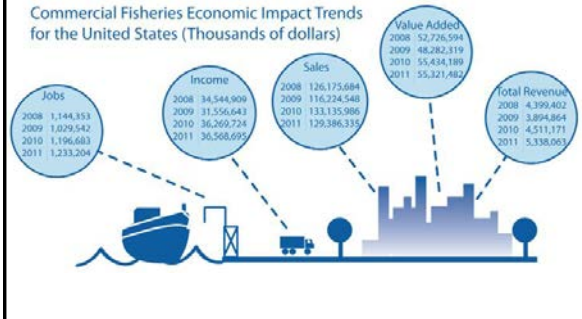
Economics





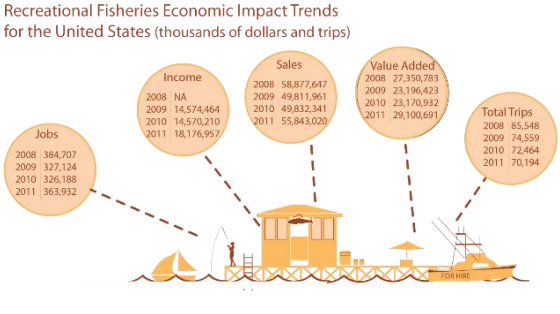


Why is all this important?



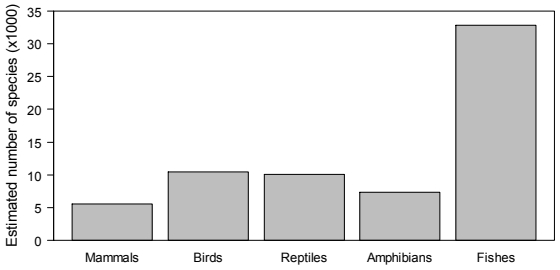
http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011

Why is all this important?



http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011

There are lots of fish…



And there are new fish being found…

- Terapontidae (grunters)
  16 new
- Eleotridae
  3 new
- Atherinidae (hardy heads)
  1 new

ScienceDaily
Your source for the latest research news

Twenty new freshwater fish species uncovered in Australia
Remote, iconic Kimberley unveiled as biodiversity hub

Date: January 6, 2016
Source: University of Melbourne
Summary: Researchers have discovered a record 20 new fish species while conducting fieldwork in the remote Kimberley, unveiling it as Australia's most biodiverse region for freshwater fish.

FULL STORY

Researchers have discovered 20 new species of freshwater fish during field work in the remote Kimberley region of Western Australia.

Credit: The University of Melbourne

It is the single greatest addition to the country's freshwater fish inventory since records began and boosts the total number of known species in Australia by almost ten per cent.

The research team included Associate Professor Tim Dempster, Professor Stephen Swearer, James Shelley, Matthew Le Feuvre (University of Melbourne), Dr Martin Gomon (Museum Victoria) and Dr Michael Hammer (NT Museum).

Team leader Dr Tim Dempster, from the University of Melbourne's School of BioSciences, says the discovery highlights the hidden wealth of biodiversity within the Kimberley.

"The freshwater ecosystems of the Kimberley are among the poorest known and least researched areas of Australia," Dr Dempster said.

"If we can double the number of known fish species unique to the Kimberley in just three years, it can only mean the entire biodiversity of life in Kimberley rivers is underestimated.

"Certainly, it is a treasure trove for freshwater fish – and the amazing thing is that we weren't even looking for it."

There are lots of fisheries associated with those fish

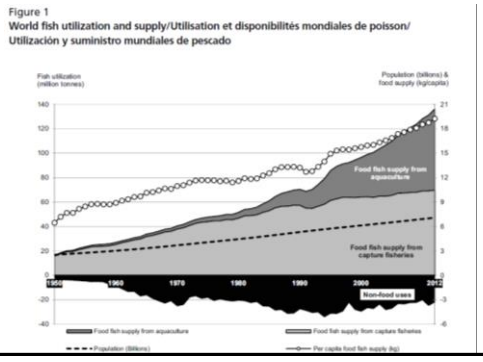


Figure 1
World fish utilization and supply/Utilisation et disponibilités mondiales de poisson/
Utilización y suministro mundiales de pescado

Fish are worth money…

Tsukiji market in Tokyo-*Sprawling wholesale fish market with an array of seafood & viewing areas for a popular tuna auction.*

Fish are worth money…

Kiyoshi Kimura, president of restaurant chain Sushi-Zanmai, poses with a 200-kilogram bluefin tuna he bought for $117,000 in Tokyo on Tuesday.—Reuters (*5 January 2016*)

Fish are worth money…

Bluefin tuna sells for £500,000 at Japan auction amid overfishing concerns

Huge fish sells for 74m yen as conservationists call for moratorium to help stabilise plunging Pacific stocks

636964.7060 US Dollar

A bluefin tuna has fetched 74.2m yen (£517,000) at the first auction of the year at Tsukiji market in Tokyo, amid warnings that decades of overfishing by Japan and other countries is taking the species to the brink of extinction.

The Guardian (*5 January 2017*)

https://www.theguardian.com/world/2017/jan/05/bluefin-tuna-sells-for-500000-at-japan-auction-amid-overfishing-concerns

World capture fisheries production in 2006 was about 92 million tons, with an estimated first sale value of $91.2 billion, comprising about 82 million tons from mar-
ine waters and 10 million tons from inland fisheries.-FAO

http://www.un.org/depts/los/convention_agreements/reviewconf/FishStocks_EN_A.pdf

Fish are worth big money here in Mississippi …

- Dockside value of caviar: $350K ($60 per pound)
- Retail value of caviar: $1.6 mil. ($228 per pound)

Fishing is worth money in Mississippi…

- Recreational fishing
- 773 Million USD
  - –772.6 Freshwater
  - –46.3 Marine
- 12.8k Jobs

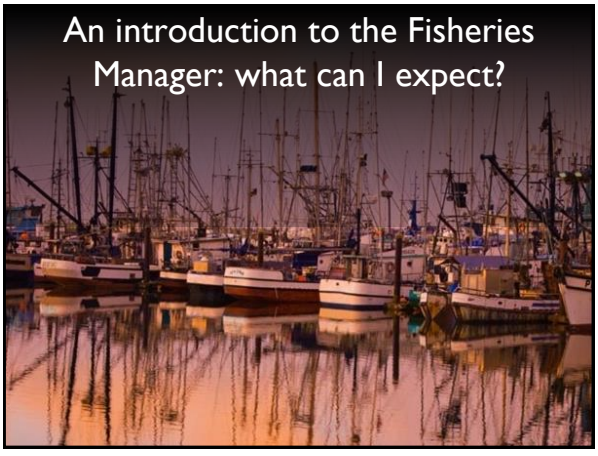
Henderson, J.E., S.C. Grado, I.A. Munn, W. D. Jones 2010. Economic Impacts of Wildlife- and Fisheries Associated Recreation on the Mississippi Economy: An Input-Output Analysis. Forest and Wildlife Research Center, Research Bulletin FO429, Mississippi State University. 21 pp.

Why is all this important?

Subsistence

People like to fish…

An introduction to the Fisheries Manager: what can I expect?



You can expect…

Interdisciplinary

"For fishery science is interdisciplinary. Rigid educational backgrounds for fishery biologists are impractical, and the continually increasing mass of scientific data makes it more and more likely that the solution of future problems will come from teams of specialists— teams that might include experts like the biometrician and the water chemist, whose cooperation is commonplace in fishery agencies today. "

Everhart et al 1975

Interdisciplinary & teams

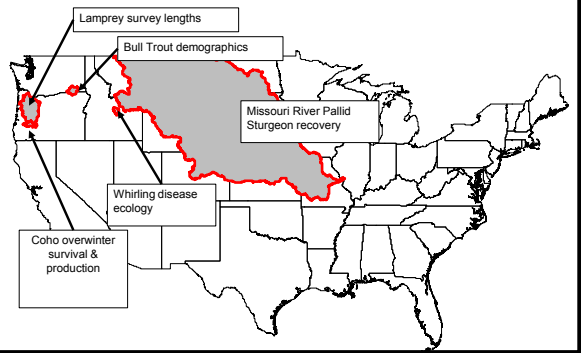
- Work with others:
  - –Within agency
  - –Among agencies
  - –Stakeholders: lake associations, fishing clubs
  - –Disciplines: fisheries, wildlife, water quality
- Do more with less
  - –Distance teams

Work with interesting folks

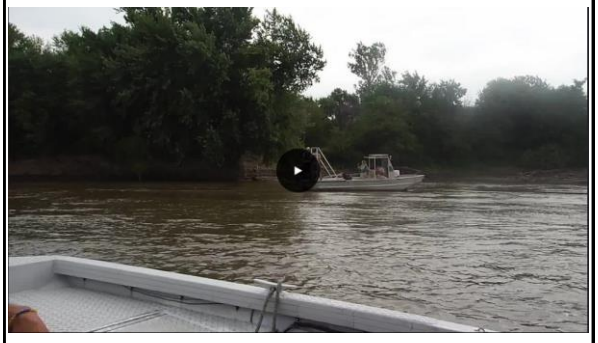
- Federal agencies: Army Corps of Engineers, Forest Service, Bureau of Reclamation,
- State agencies: MDWFP
- Conservation entities: Nature conservancy, Trout Unlimited, American Rivers
- Private companies: Cramer & associates, Battelle, Timber companies

Work for and with interesting folks!

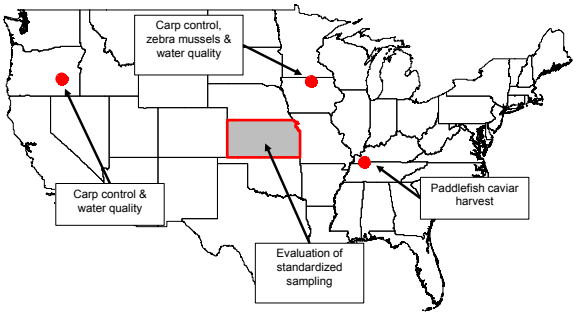
Work on streams



Recent river fun



Work on lakes and reservoirs

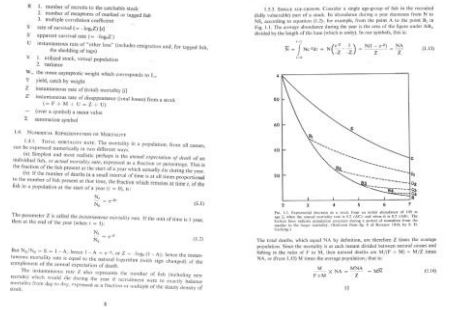


Use things like this…?

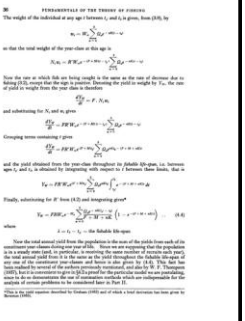
$$\frac{dB}{dt} = -Z \cdot B$$

Fisheries textbooks…

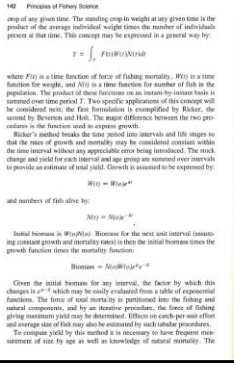
Fisheries textbooks…

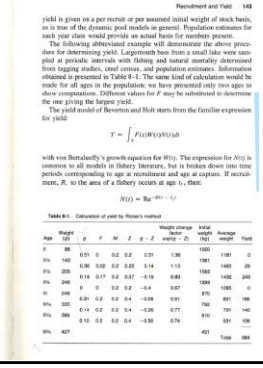


Fisheries textbooks…



Fisheries textbooks…

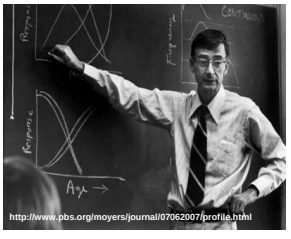




Use models

E. O. Wilson's (1998:269) observation that "we are drowning in information" and that successful conservation and resource management depend ultimately on the rigorous synthesis of information.

- Ainsworth et al. 2010



http://www.pbs.org/moyers/journal/07062007/profile.html

Ainsworth, C. H., I. C. Kaplan, P. S. Levin, and M. Mangel. 2010. A statistical approach for estimating fish diet compositions from multiple data sources: Gulf of California case study. Ecological Applications 20(8):2188-2202.

Wilson, E. O. 1998. Consilience: the unity of knowledge. Alfred A. Knopf, New York, New York, USA.

What others think…

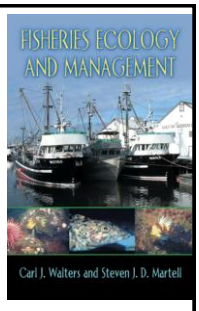
- Modeling is a great and perhaps necessary way for scientists to force themselves to think clearly and to put claims to understanding on the table in the form of specific predictions
- Prediction in some form is required for management choice
- There are some predictable regularities in the way natural populations and ecosystems respond to human disturbance, so … some kinds of useful predictions are not as likely to fail as they appear

Walters and Martell 2004 p. 3

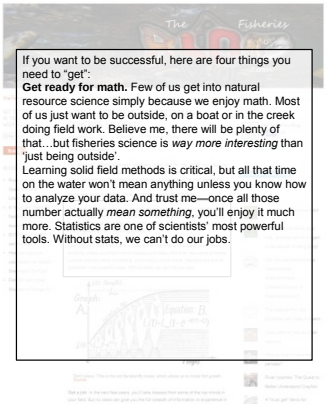
- "It is useful to test prospective management strategies against ecosystem models: if they don't work on simple models why should they work in reality"

Keith Sainsbury (ICES/SCOR Conference, Montpellier March 1999)

"…we make no apologies for demanding that people who would engage in fisheries assessment and management should at least be able to read and understand some basic mathematics. (Walters and Martell 2004, Preface)"



Walters, C. J., and S. J. D. Martell. 2004. Fisheries Ecology and Management. Princeton University Press, Princeton, NJ.



If you want to be successful, here are four things you need to "get":
Get ready for math. Few of us get into natural resource science simply because we enjoy math. Most of us just want to be outside, on a boat or in the creek doing field work. Believe me, there will be plenty of that…but fisheries science is *way more interesting* than 'just being outside'.
Learning solid field methods is critical, but all that time on the water won't mean anything unless you know how to analyze your data. And trust me—once all those number actually *mean something*, you'll enjoy it much more. Statistics are one of scientists' most powerful tools. Without stats, we can't do our jobs.

http://thefisheriesblog.com/2014/09/22/4-must-get-items-for-freshman-fisheries-students/

Deal with mental models?

http://guide.cred.columbia.edu/guide/sec1.html

You will spend time at a computer

Work with others

Work with the public

Be interdisciplinary

"For fishery science is interdisciplinary. Rigid educational backgrounds for fishery biologists are impractical, and the continually increasing mass of scientific data makes it more and more likely that the solution of future problems will come from teams of specialists— teams that might include experts like the biometrician and the water chemist, whose cooperation is commonplace in fishery agencies today. "

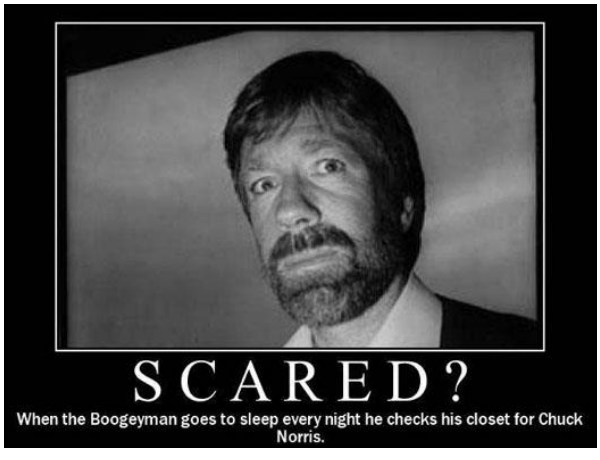
Everhart et al 1975

Be a team player

- Work with others:
  - –Within agency
  - –Among agencies
  - –Stakeholders: lake associations, fishing clubs
  - –Disciplines: fisheries, wildlife, water quality
- Do more with less
  - –Distance teams
  - –Webex, Skype, conference calls

Work in urban environments

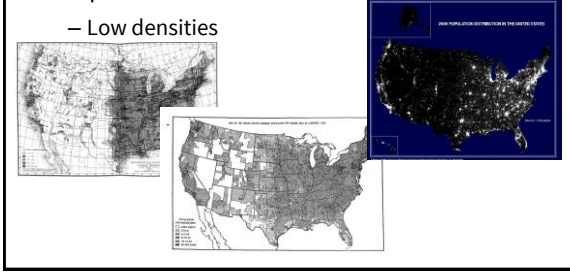
Deal with politics



Fisheries and fisheries management history

History of the human-fish relationship in NA

- Pre-European Settlement: Natives not a big impact due to
  - Low densities



T. H. H. Opening Fisheries Exhibition(1882)

B.B.C. Hulton Picture Library

Inaugural Address

Fisheries Exhibition, London (1883)
The Fisheries Exhibition Literature (1885)
Scientific Memoirs V

"I believe, then, that the cod fishery, the herring fishery, the pilchard fishery, the mackerel fishery, and probably all the great sea fisheries, are inexhaustible; that is to say, that nothing we do seriously affects the number of the fish. And any attempt to regulate these fisheries seems consequently, from the nature of the case, to be useless."

Estimating the Size of Historical Oregon Salmon Runs[1]

Chad C. Meengs
Environmental Sciences Program
Oregon State University

and

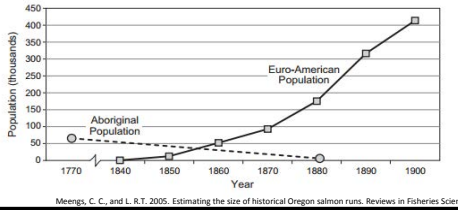
Robert T. Lackey
National Health and Environmental Effects Research Laboratory
U.S. Environmental Protection Agency

Abstract

Increasing the abundance of salmon in Oregon's rivers and streams is a high priority public policy objective. Salmon runs have been reduced from pre-development conditions (typically defined as prior to 1850), but it is unclear by how much. Considerable public and private resources have been devoted to restoring salmon runs, but it is uncertain what the current recovery potential is because much of the freshwater and estuarine habitat for salmon has been altered and there is no expectation that it will be returned to a pre-development condition. The goals of all salmon recovery efforts are based on assumptions about the size of the runs prior to significant habitat alteration, coupled with an estimate of the amount and quality of freshwater and estuarine habitat currently available. We estimated the historical aggregate salmon run size

Meengs, C. C., and L. R.T. 2005. Estimating the size of historical Oregon salmon runs. Reviews in Fisheries Science 13:51-66.

Because of their close nutritional tie to salmon (and therefore salmon runs loosely regulated aboriginal population size), it is possible to roughly extrapolate salmon run size using the estimated aboriginal population size and likely consumption rate. The extent of aboriginal dependence on salmon is well documented (Craig and Hacker, 1940).



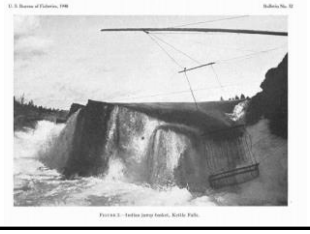
Meengs, C. C., and L. R.T. 2005. Estimating the size of historical Oregon salmon runs. Reviews in Fisheries Science 13:51-66.

"The precipitous decline in the aboriginal population likely affected the size of salmon runs. Salmon runs may have been larger in the 1850s than just about any other time in postglacial history because the aboriginals were no longer harvesting large quantities of fish (Craig and Hacker, 1940; Hewes, 1947). Another hypotheses, however, is that salmon runs would briefly increase, but then fall to a new equilibrium due to the increased intraspecific competition on the spawning grounds (Van Hyning, 1973; Chapman et al. 1982)."

Meengs, C. C., and L. R.T. 2005. Estimating the size of historical Oregon salmon runs. Reviews in Fisheries Science 13:51-66.

History of the human-fish relationship in NA

- Natives not a big impact due to
  - Capable of overfishing bug didn't due to complex social and cultural traditions (Taylor 1999)



Pre-European Settlement

- Aquatic sources of protein