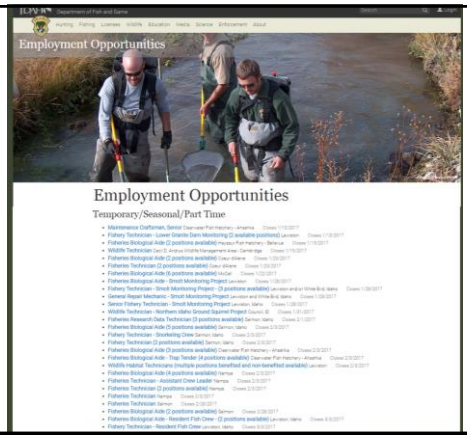
WF4133-Fisheries Science

Class 2 – Fisheries, Science & Sampling

Housekeeping

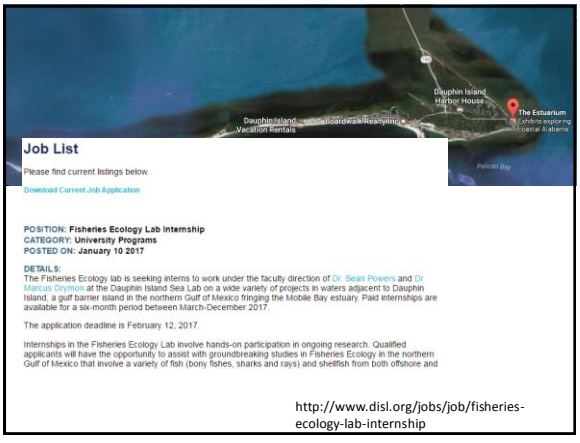
- Volunteers- Volunteer form
- Now is the time to be looking for jobs
  - State agency websites
  - Fisheries.org
  - Usajobs.gov



Temporary, Permanent

JOB #	TITLE	AGENCY, LOCATION	CATEGORIES
12110	Native Fisheries Technician	Utah Division of Wildlife Resources-Moab Field Station	Temporary
12101	Seasonal Fisheries Technician (position 06-7053)	South Dakota Game, Fish and Parks, Ft. Pierre, SD	Temporary
12096	Fishery Technician III	La Grande, Oregon	Permanent, Temporary
12094	Fisheries Biological Aide – Trap Tender Summer Satellite Relief Positions	Idaho Department of Fish & Game	Temporary
12091	Seasonal Technician	Southern Southeast Regional Aquaculture Association	Temporary
12088	Biological Technician	Integrated Statistics, MA	Temporary
12075	Biologist Technician - Fisheries	Wyoming Game and Fish Department, Fish Division	Temporary
12067	Multiple Technical Positions in Aquatic Ecology	Aquatic Ecology Lab at Ohio State University, Columbus, OH	Temporary

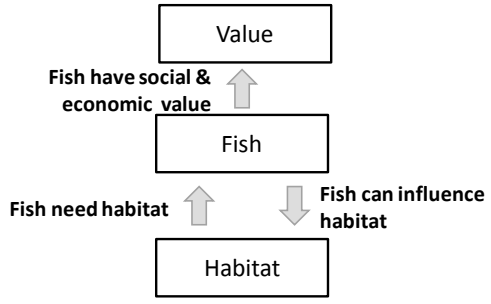
http://fisheries.org/employment/jobs/



http://www.disl.org/jobs/job/fisheries-ecology-lab-internship

WHAT IS FISHERIES?

What is fisheries?



What is fisheries?

Full Definition of FISHERY

plural **fish·er·ies**

1 : the occupation, industry, or season of taking fish or other sea animals (as sponges, shrimp, or seals) : FISHING
2 : a place for catching fish or taking other sea animals
3 : a fishing establishment; *also* : its fishermen
4 : the legal right to take fish at a particular place or in particular waters
5 : the technology of fishery —usually used in plural

Fisheries types

1. Culture
2. Capture

http://www.fao.org/fishery/topic/12306/en

Culture fisheries

1. Production
2. Ranching
3. Farming
4. Enhancement & mitigation
5. Conservation

http://www.fao.org/fishery/topic/4350/en

Production

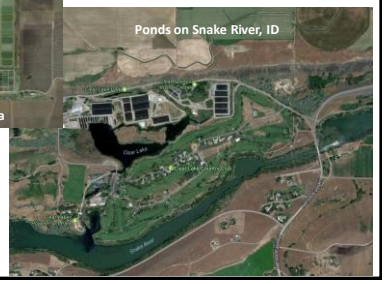
Intensive culture to produce biomass & protein

- Trout
- Catfish

Production

Ponds on MS Delta

Long growing seasons
Efficient protein- catfish, rainbow trout

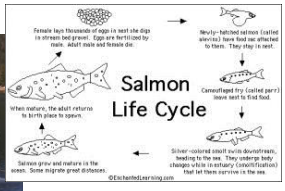


Ponds on Snake River, ID

Ranching

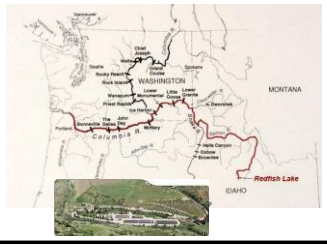
Fish are prduced in hatchery & released in ocean to be harvested when return.

- Salmon



Enhancement & mitigation

Fish produced to enhance a population or mitigate for loss of habitat



Conservation

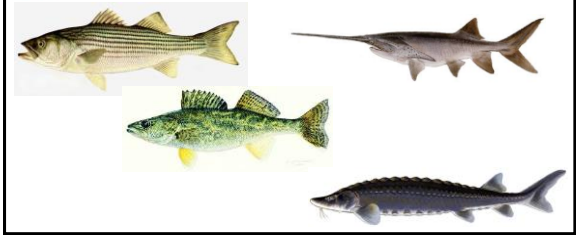
Fish produced to reestablish population

Private John Allen National Fish Hatchery, Tupelo

About our Fish

Current programs involve the restoration of interjurisdictional fishes (paddlefish, sturgeon and alligator gar); recovery of endangered and threatened species; restoration of Gulf Coast Striped Bass populations; restoration of gulf coast walleye in the Tennessee-Tombigbee Waterway to achieve self-sustaining populations and fishery management and stocking recreational fish on national wildlife refuges.

200,000 Phase I (one-two inch) Gulf Coast Striped Bass; 30,000 Phase II (six-eight inch) Gulf Coast Striped Bass; 40,000 paddlefish; 150,000 walleye; approximately 500,000 largemouth bass and/or bluegill as needed for National Wildlife Refuge programs; 4,000 lake sturgeon.



Capture fisheries

1. Subsistence
2. Recreational
3. Commercial
   1. Industrial
   2. Small scale
   3. Artisanal

http://www.fao.org/fishery/topic/12306/en

Subsistence fisheries

A fishery where the fish caught are shared and consumed directly by the families and kin of the fishers rather than being bought by intermediaries and sold at the next larger market. Pure subsistence fisheries are rare as part of the products are often sold or exchanged for other goods or services

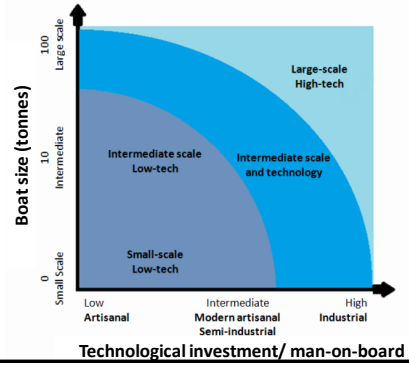
Recreational fisheries

Harvesting fish for personal use, leisure, and challenge (e.g. as opposed to profit or research). Recreational fishing does not include sale, barter or trade of all or part of the catch.

Commercial fisheries

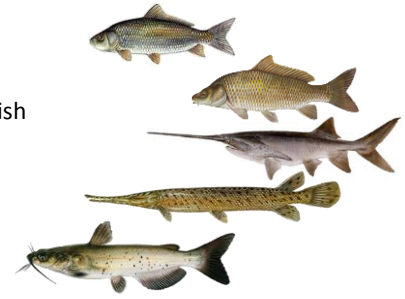
Fisheries undertaken for profit and with the objective to sell the harvest on the market, through auction halls, direct contracts, or other forms of trade.

Commercial fisheries & investment



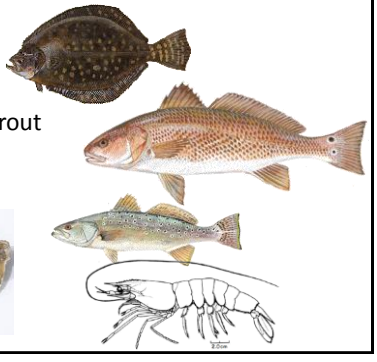
Commercial fish species in MS FW

- Buffalo
- Carp
- Paddlefish
- Gar
- Catfish



Commercial fish species in MS SW

- Flounder
- Red drum
- Spotted seatrout
- Shrimp
- Oysters



Industrial fisheries

Capital-intensive fisheries using relatively large vessels with a high degree of mechanization and that normally have advanced fish finding and navigational equipment. Such fisheries have a high production capacity and the catch per unit effort is normally relatively high.


Small-scale

Labor-intensive fisheries using relatively small crafts (if any) and little capital and equipment per person-on-board. Most often family-owned. May be commercial or for subsistence (see below). Usually low fuel consumption. Often equated with artisanal fisheries.

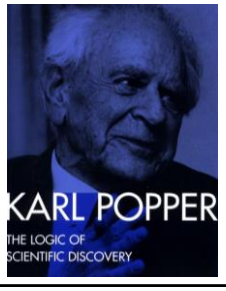


Artisanal

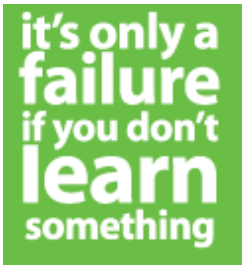
Typically traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital, relatively small fishing vessels, making short fishing trips, close to shore, mainly for local consumption.


WHAT IS SCIENCE?

"Science is the acquisition of reliable but not infallible knowledge of the real word, including explanations of the phenomena."



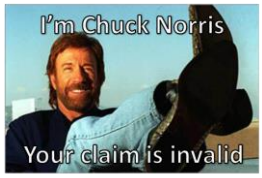
Science is not without error, but the scientific method allows us to learn from our mistakes.



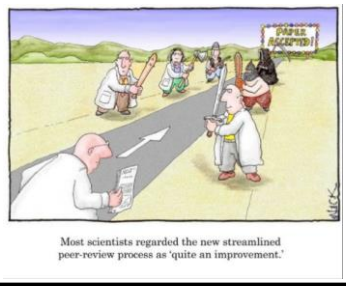
Science is based on empirical evidence, NOT value judgments.

Claim

Supported by evidence!

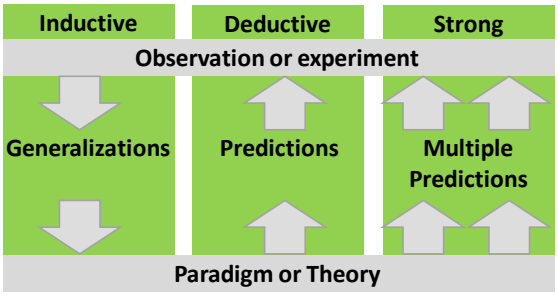


Science should be objective, not subjective. Peer-review process helps maintain scientific integrity.



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

There are three approaches to scientific inference: inductive, deductive, strong



Additive and compensatory mortality are two hypotheses describing how harvest effects population dynamics

Compensatory: Harvest will not effect the population—increased survival will compensate

Additive: Harvest will decrease the population—harvest is adding to the naturally occurring mortality

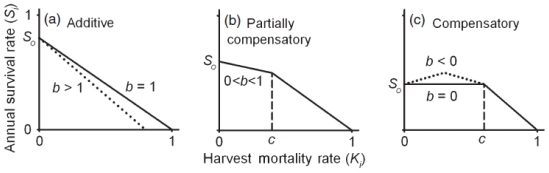
The inductive approach allows us to collect data, analyze data, draw conclusions

1. Estimate annual survival
2. Harvest the population
3. Estimate post-harvest annual survival
4. Find that annual harvest survival was the same
5. Conclude harvest mortality was compensatory

The deductive approach allows us to start with a theory, make predictions, collect data to evaluate predictions

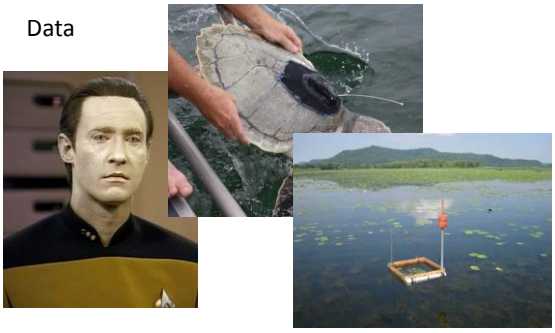
1. Make predictions from harvest theory
   1. If mortality is compensatory, annual mortality will remain the same, even with harvest
   2. If mortality is additive, annual survival will decrease with increasing harvest
2. Estimate annual survival
3. Harvest the population
4. Estimate post-harvest survival
5. Determine which hypothesis is best supported, do predictions match the data/experiment?

Strong inference emphasizes multiple working hypotheses rather than a single hypothesis

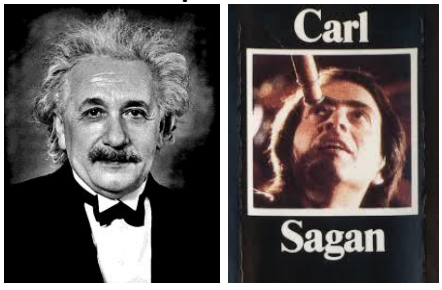


How do we remain objective?

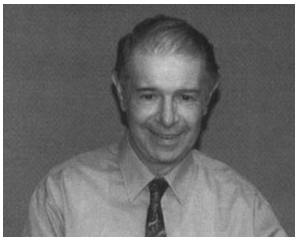
Data

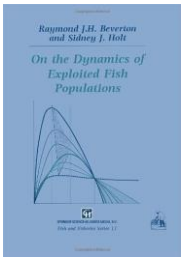


Science is implemented by people and they are the most important part of the scientific process.



Ray Beverton (1922-1995) was one of the most influential and respected fish population dynamicist of the century!

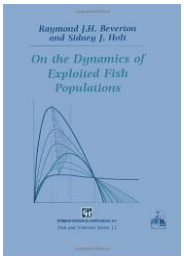


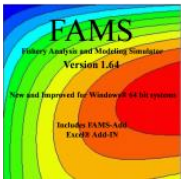


Pedigree

- Forest School
- Snaresbrook
- Downing College
- Joined operations research as part of the war effort
- Professor at Bristol, Southampton, University of Wales

Beverton is famous for the seminal book
Famous for Dynamics of exploited fish populations, yield-per-recruit model, stock recruit function





$$n_{t+1} = \frac{R_0 \cdot n_t}{1 + \frac{n_t}{M}}$$

Therefore, *fisheries science* is the process of obtaining reliable knowledge about fisheries through scientific inquiry.

Thinking ***inside*** the box

Fish	Value	Habitat

Stock aka state variable

Something **measureable & can stored or lost over time**:

- Abundance
- Biomass

Thinking ***inside*** the box

Fish	Value	Habitat

10 Fish or 28 Kilograms