Fisheries Management Techniques FT 211

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Chapter 5

Care and Handling
of Fish

This Module will Contain

This Module will Contain 8 Main areas

- Why proper handling is important
- Permits & Training
- Proper handling of Fish
- Fish Stressors
- Anesthesia
- Uses of anesthesia
- Euthanasia
- Preservation

Student Learning Outcomes

Students will be able to:

- Describe the importance of proper handling techniques and why they are important in Fisheries
- Summarize the types of permits required to capture and handle live fish
- Discuss proper fish handling techniques and outline ways to minimize harm
- Identify common stressors to fish and describe ways to minimize these stressors
- Describe anesthesia, the various stages of anesthesia and common analgesics in used in fisheries
- Outline common uses of anesthesia in fisheries
- Describe Euthanasia and common euthanasia techniques in fisheries
- Summarize fish preservation and the various preservation techniques

Care and Handling of Fish

- Care and handling of live fish
  - Don't want to kill specimens

Why is it important?

- Investigation or Management
  - Biology (length, weight) – Capture & Measure
  - Movement – Tag & Mark
  - Migration – Tag & Mark
  - Abundance – Capture & Count
  - Behavior – Capture/Tag Mark
  - Mortality – Tag & Mark
- Capture of brood stock
  - Immediate release after egg removal
  - Release in hatchery

All involve capture and **Not Death!**

What to do first - Permits?

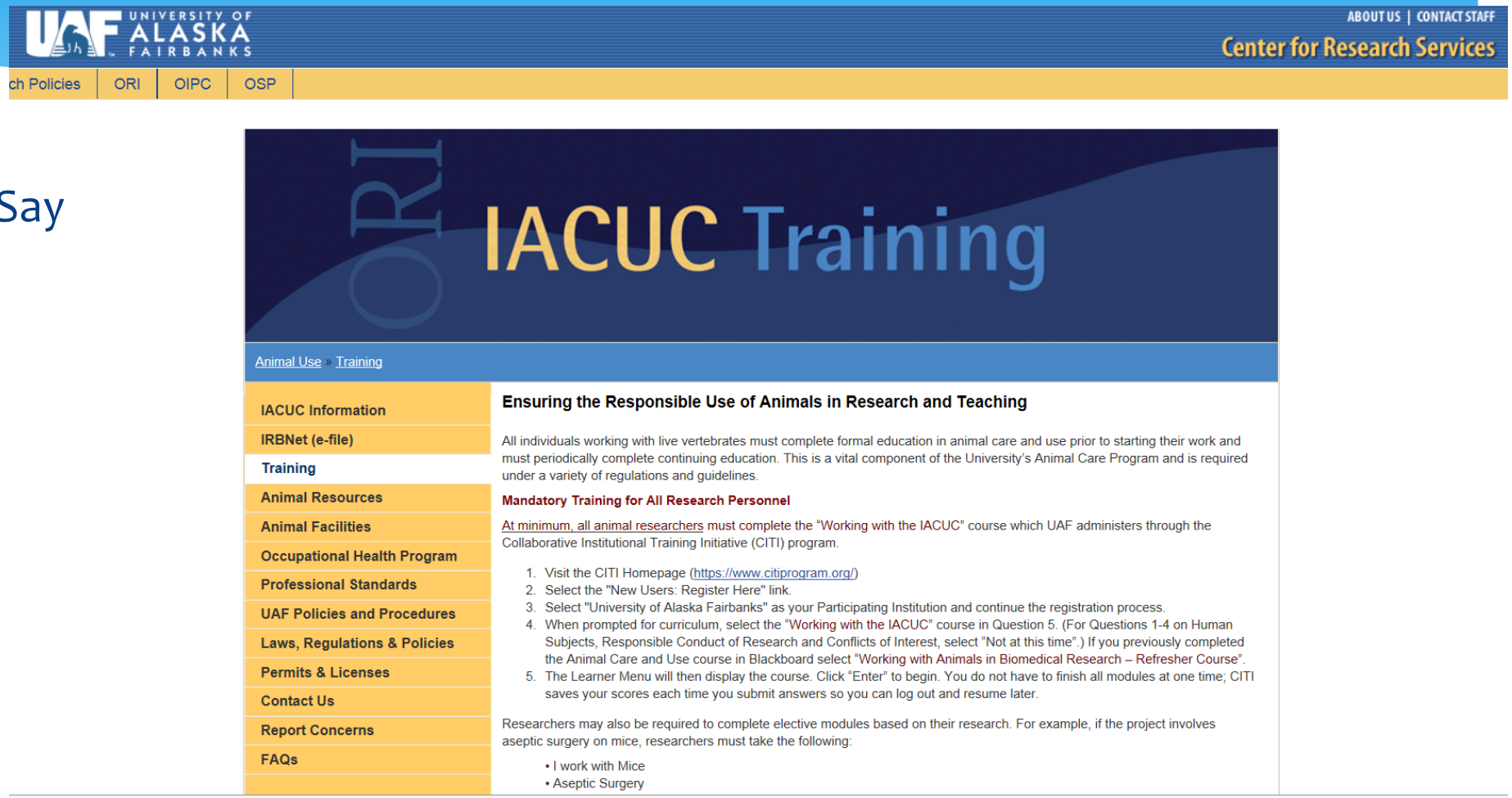
- IACUC - Universities
- ADFG
  - Fish Resource
  - Fish Transport
  - Salmon Incubation
- FWS – Endangered Species
  - ACOE – Construction or Dredging
  - EPA – Clean Water Act
  - FS – Special-use Permit
- All try and reduce harm and mortality

IACUC

- Institutional Animal Care and Use Committee
  - Every institution that uses animals for federally funded laboratory research must have an Institutional Animal Care and Use Committee (IACUC)
  - Universities, Government funding and agencies
- Ensures humane use and handling of animals
- Typically for laboratory research, but also for all vertebrates i.e. FISH
  - Monkeys, mice, livestock
- Training is a NIGHTMERE!

IACUC Training

- GOODNESS!
  - All I have to Say



ADF&G Permits

- Fish Resource Permit
  - Required for any activity to collect fish, shellfish, or aquatic plants
  - Not covered by sport, personal use, commercial, aquatic farm
  - Dictates whether specimens or water can be released back to the wild
  - Issued to scientific, educational, propagative, or exhibition organizations
  - Sampled then released, transported to captivity, Euthanized
  - 30-45 days
  - **REPORTING**

Transport & Possession Permits

- Transport & Possession Permits Home
- Mammal, Bird & Reptile Permits
- Fish, Amphibian & Aquatic Plants Permits

Fish, Amphibian, & Aquatic Plants Permits

Resource Permits

Overview | Fish Resource Permits | Salmon Incubation | Fish Transport Permits | Required Reports | Contacts

A Fish Resource Permit (FRP) is required for any activity to collect fish, shellfish, or aquatic plants that is not covered by current sport, personal use, aquatic farm, and commercial regulations. This requirement includes methods and means (i.e., gear), numbers of animals, locations, and seasons in which collection can occur. The permit may address whether or not any of the collected specimens, or the water in which they have been held, can be released back to the wild. The Alaska Department of Fish and Game (ADF&G) only issues FRPs to organizations and individuals engaged in legitimate scientific, educational, propagative, or exhibition activities, and who meet other requirements stated in the department's guiding policy.

Depending on your proposed activity or activities, one or more fish resource permits (FRPs) may be required. For example, you will need an FRP in order to collect or hold any fish species (legally defined as aquatic finfish, invertebrates or amphibians). Two other types of permit, called a fish transport permit (FTP) and an incubation permit, may be needed if one wishes to capture or transport fish, or acquire and hold salmon eggs in a classroom or vocational facility.

Collection Activities

Under this category of FRP, the department reviews and processes applications to collect fish, shellfish or aquatic plant specimens at a particular estuarine or freshwater site. The disposition of the specimens can vary; specimens are either: 1) killed at the collection site; 2) caught, measured, sampled and released unharmed at the collection site, or 3) transported live to an aquarium in a secure facility with the specimens never being allowed to leave that site alive.

The reasons for scientists or educators capturing and/or collecting fish are diverse. Most requests for scientific collection actions stem from a need to: (1) conduct impact analyses on proposed activities; (2) manipulate aquatic habitat features to improve fish productivity; or (3) obtain fish resource data that will support legitimate academic inquires (research). Done properly, the capture, collection, and disposition of fish can provide considerable educational value, for example in field ecology studies, aquatic education/dissection programs, and preparing voucher specimens from a specific location.

Holding Activities

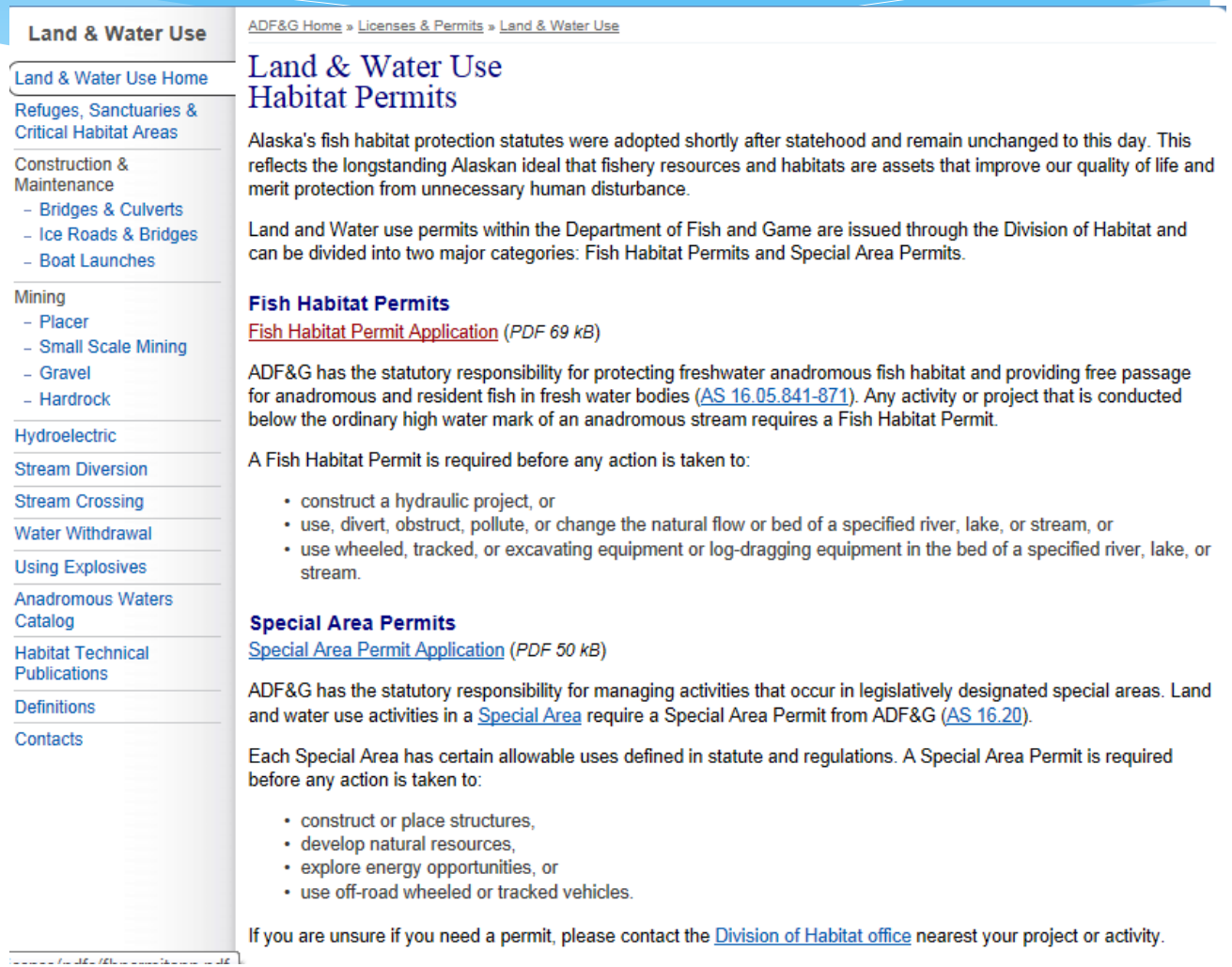
Under this category, permit applications are reviewed and processed for: non-propagative research that requires keeping live specimens for some duration after capture; exhibition of live freshwater specimens; or export of live fresh or saltwater specimens from the state. Exportation of live specimens from Alaska requires that you submit a valid importation permit issued by the appropriate resource agency of the importing state or country along with your

ADF&G Permits

- Fish Transport Permit
  - Generally for fish propagation (hatcheries)
  - Required of anyone
    - transport, possess, export from the state, or release into the waters of Alaska,
  - Any live fish or their eggs

Fish Habitat Permit ADF&G

- Any activity or project that is conducted below the ordinary high water mark of an anadromous stream requires a Fish Habitat Permit.
  - Construct a hydraulic project, or
  - Use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream, or
  - Use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream.
- Stream Restoration



Land & Water Use

- Land & Water Use Home
- Refuges, Sanctuaries & Critical Habitat Areas
- Construction & Maintenance
  - Bridges & Culverts
  - Ice Roads & Bridges
  - Boat Launches
- Mining
  - Placer
  - Small Scale Mining
  - Gravel
  - Hardrock
- Hydroelectric
- Stream Diversion
- Stream Crossing
- Water Withdrawal
- Using Explosives
- Anadromous Waters Catalog
- Habitat Technical Publications
- Definitions
- Contacts

ADF&G Home » Licenses & Permits » Land & Water Use

Land & Water Use
Habitat Permits

Alaska's fish habitat protection statutes were adopted shortly after statehood and remain unchanged to this day. This reflects the longstanding Alaskan ideal that fishery resources and habitats are assets that improve our quality of life and merit protection from unnecessary human disturbance.

Land and Water use permits within the Department of Fish and Game are issued through the Division of Habitat and can be divided into two major categories: Fish Habitat Permits and Special Area Permits.

Fish Habitat Permits

Fish Habitat Permit Application (*PDF 69 kB*)

ADF&G has the statutory responsibility for protecting freshwater anadromous fish habitat and providing free passage for anadromous and resident fish in fresh water bodies (AS 16.05.841-871). Any activity or project that is conducted below the ordinary high water mark of an anadromous stream requires a Fish Habitat Permit.

A Fish Habitat Permit is required before any action is taken to:

- construct a hydraulic project, or
- use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream, or
- use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream.

Special Area Permits

Special Area Permit Application (*PDF 50 kB*)

ADF&G has the statutory responsibility for managing activities that occur in legislatively designated special areas. Land and water use activities in a Special Area require a Special Area Permit from ADF&G (AS 16.20).

Each Special Area has certain allowable uses defined in statute and regulations. A Special Area Permit is required before any action is taken to:

- construct or place structures,
- develop natural resources,
- explore energy opportunities, or
- use off-road wheeled or tracked vehicles.

If you are unsure if you need a permit, please contact the Division of Habitat office nearest your project or activity.

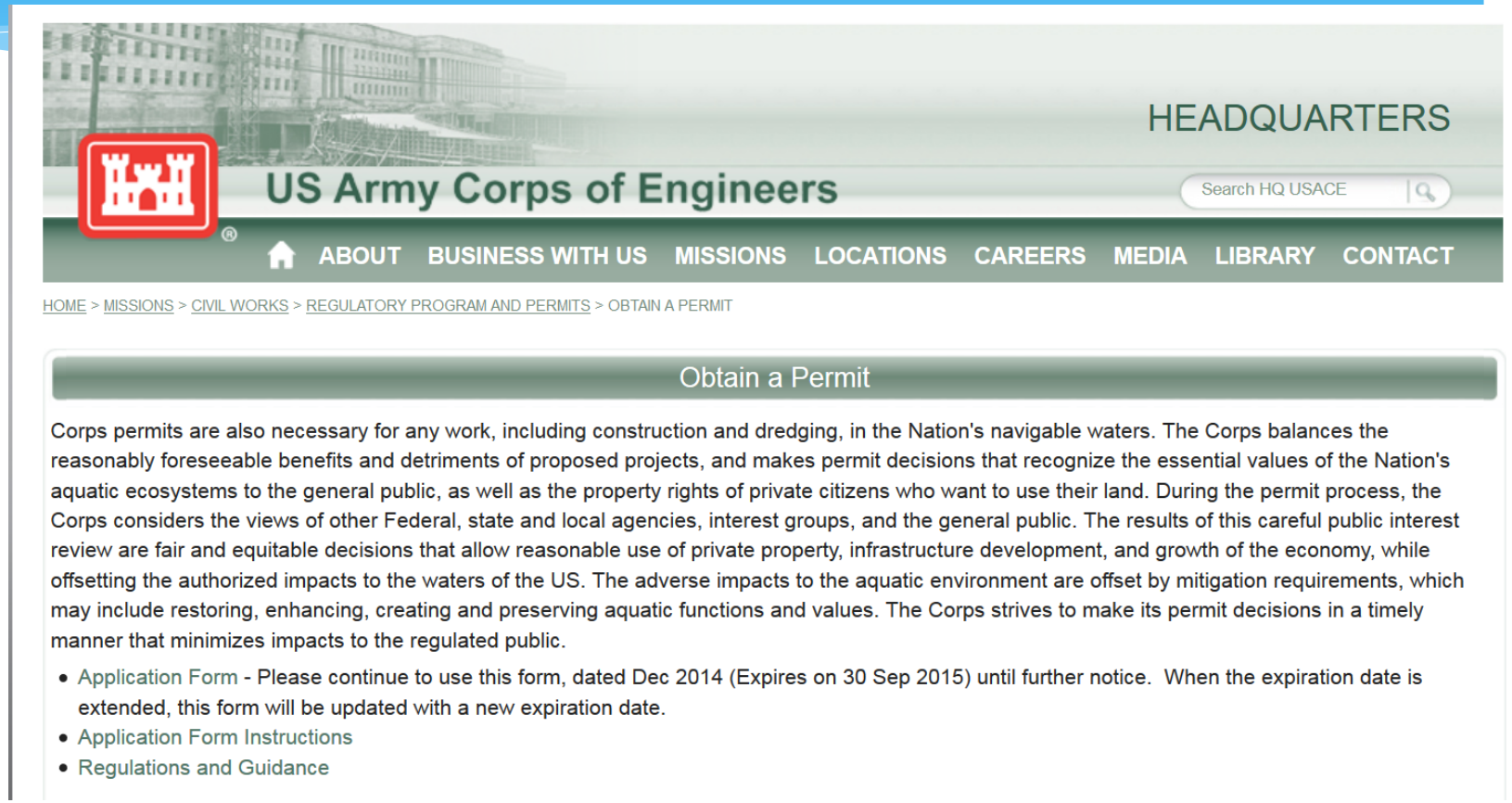
Endangered Species

- Take extra permitting
- No fish Spp in Alaska
  - Polar bear (threatened)
  - Beluga Whale (endangered)
  - Steller's eider (threatened)
  - Spectacled eider (threatened)
  - Short-tailed albatross (endangered)
  - Northern sea otter (threatened)
  - Aleutian shield fern (endangered)
  - Eskimo curlew (endangered)
  - Wood bison (threatened)

- 1 Threatened (maybe)
  - Snake River Fall-run Chinook

US ACOE

- Any work, including construction and dredging, in the Nation's navigable waters



HEADQUARTERS

US Army Corps of Engineers

Search HQ USACE

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HOME > MISSIONS > CIVIL WORKS > REGULATORY PROGRAM AND PERMITS > OBTAIN A PERMIT

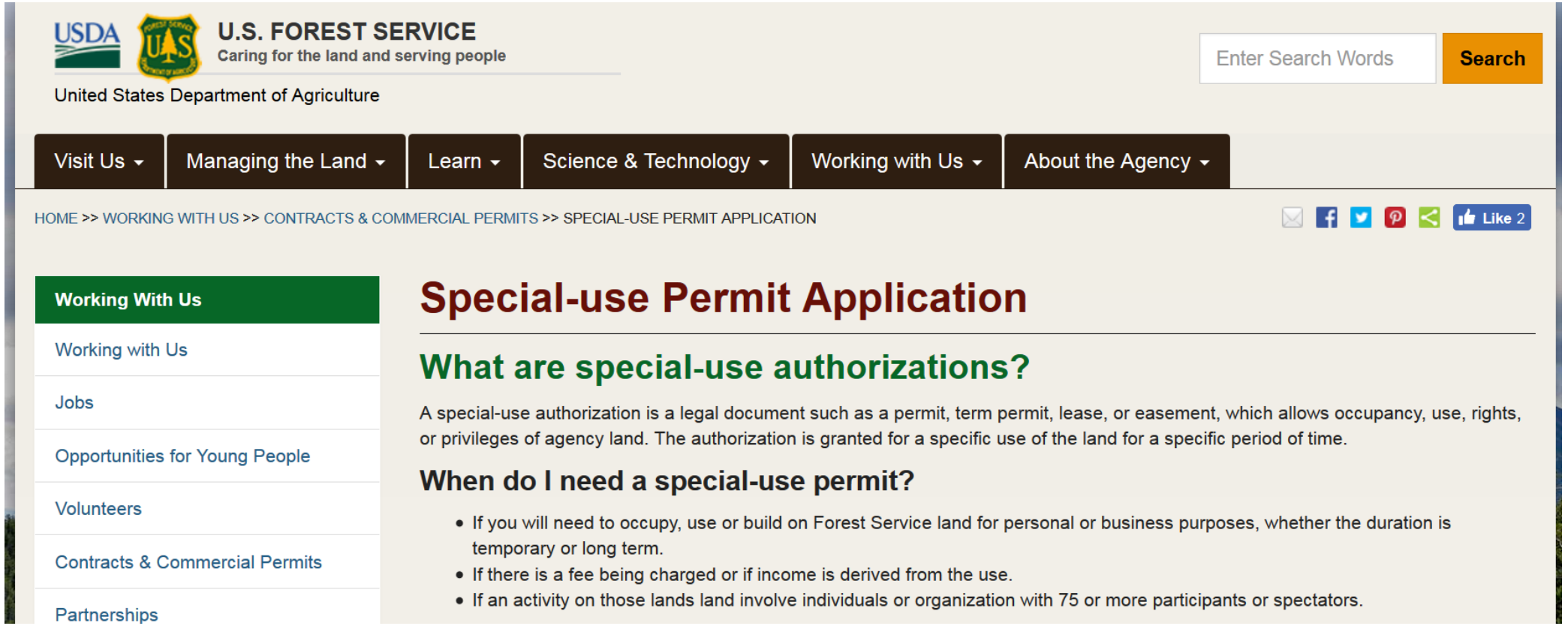
Obtain a Permit

Corps permits are also necessary for any work, including construction and dredging, in the Nation's navigable waters. The Corps balances the reasonably foreseeable benefits and detriments of proposed projects, and makes permit decisions that recognize the essential values of the Nation's aquatic ecosystems to the general public, as well as the property rights of private citizens who want to use their land. During the permit process, the Corps considers the views of other Federal, state and local agencies, interest groups, and the general public. The results of this careful public interest review are fair and equitable decisions that allow reasonable use of private property, infrastructure development, and growth of the economy, while offsetting the authorized impacts to the waters of the US. The adverse impacts to the aquatic environment are offset by mitigation requirements, which may include restoring, enhancing, creating and preserving aquatic functions and values. The Corps strives to make its permit decisions in a timely manner that minimizes impacts to the regulated public.

- Application Form - Please continue to use this form, dated Dec 2014 (Expires on 30 Sep 2015) until further notice. When the expiration date is extended, this form will be updated with a new expiration date.
- Application Form Instructions
- Regulations and Guidance

Projects on USFS Land

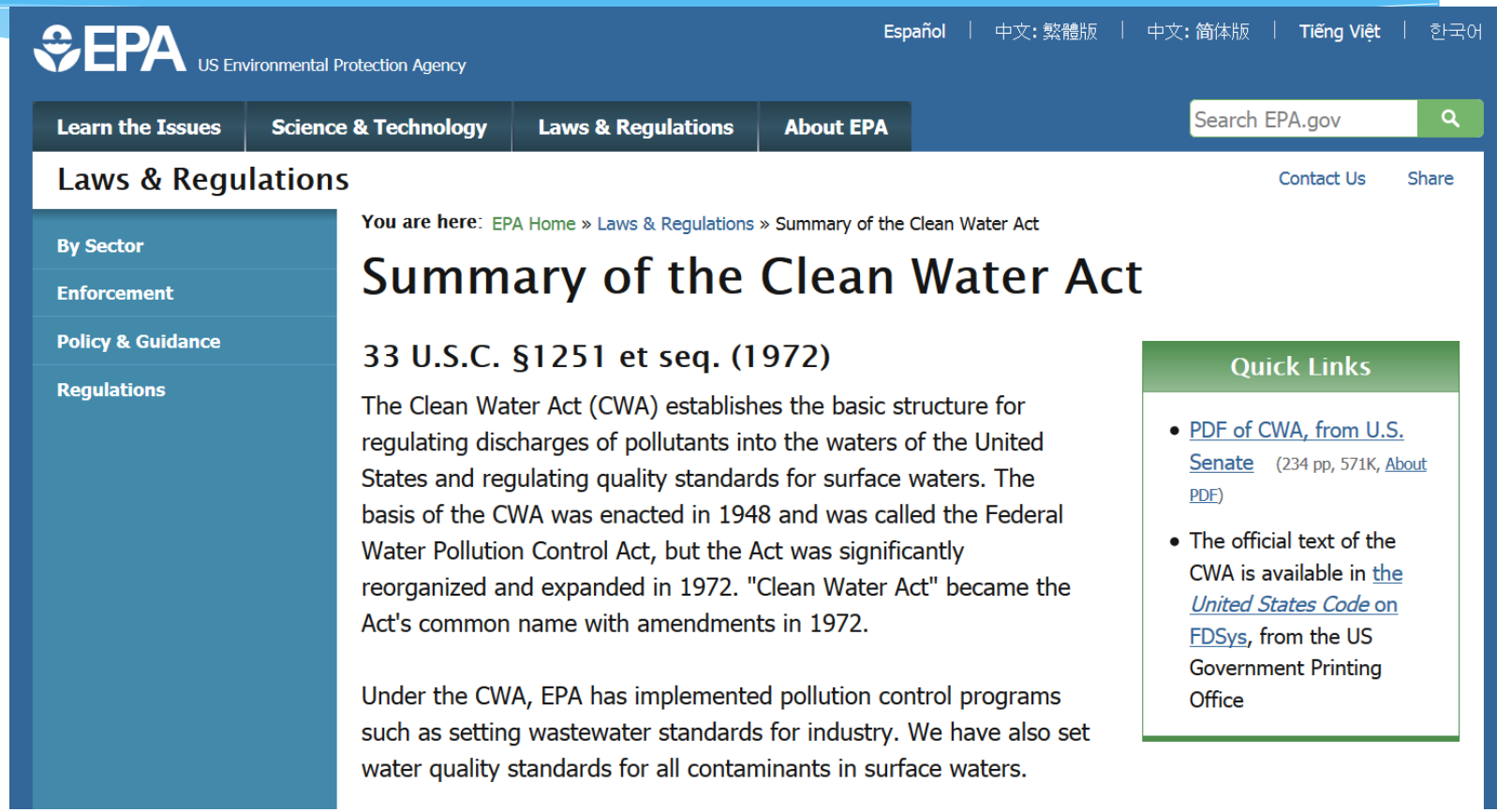
- If you will need to occupy, use or build on Forest Service land for personal or business purposes



US EPA

Clean Water Act

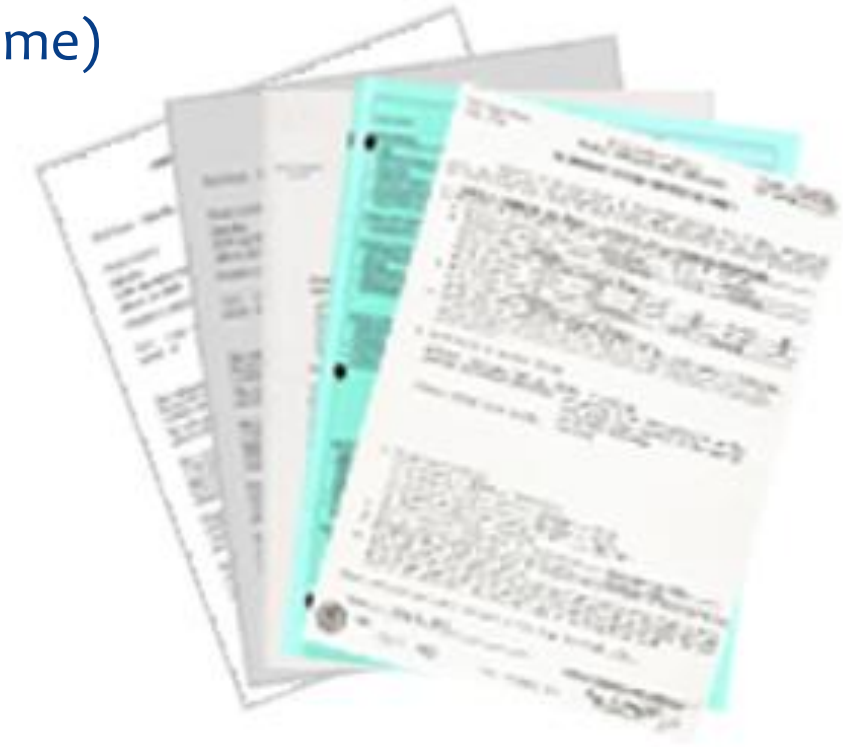
- Unlawful to discharge any pollutant from a point source into navigable waters, without a permit



Permits

Take Home

- Talk to who owns/manages the land
- Apply Early
- File Reports (On Time)
- Reduce fish kill



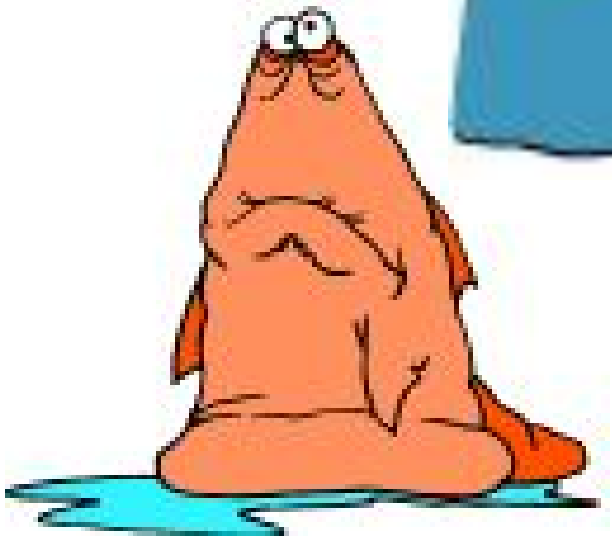
Self Check

- Proper care and handling of fish can reduce stress, harm, and mortality of fish
  - **True**
  - False

- All of the following EXCEPT _____ are permits that may be required before handling, hauling, or rearing fish
  - IACUC Permit
  - **Invasive Species Permit**
  - ADF&G Fish Resource Permit
  - ADF&G Fish Transport Permit
  - ADF&G Salmon Incubation Permit
  - US F&WS Endangered Species

Care and handling of live fish

- Follow guidelines
- Minimize stress
- Maintain water quality
- Overseen by professional



Handling fish

- Keep handling time to a minimal
- Avoid handling with bare hands
  - Bad for fish and you
- Possible to hurt yourself

Handling fish

- Keep fish in water
- Caudle peduncle & under pectoral fins

NO!

Fish Slime

Fish Slime – There first line of defense

- Avoid removing slime layer
  - Halibut release
  - Salmon release
- Staph infections are common – take precautions
  - FISH Poisoning
  - Gloves

Forms a synthetic slime coating and replaces the natural secretion of slime that is interrupted by handling, shipping, fish fighting, or other forms of stress. Helps reduce susceptibility to disease and infection. Helps heal torn fins and skin wounds. Reduces electrolyte loss.

Methods for care and handling

- Minimize stress
- Avoid changing variables away from the optimum
- If optimum is unknown, avoid changing conditions from original
- Allow time for acclimation

Self Check

- It is important to remove the slime layer when handling fish
  - True
  - False

- The proffered method for holding a fish is with one or two fingers inserted under the gills and one hand around the tail
  - True
  - False

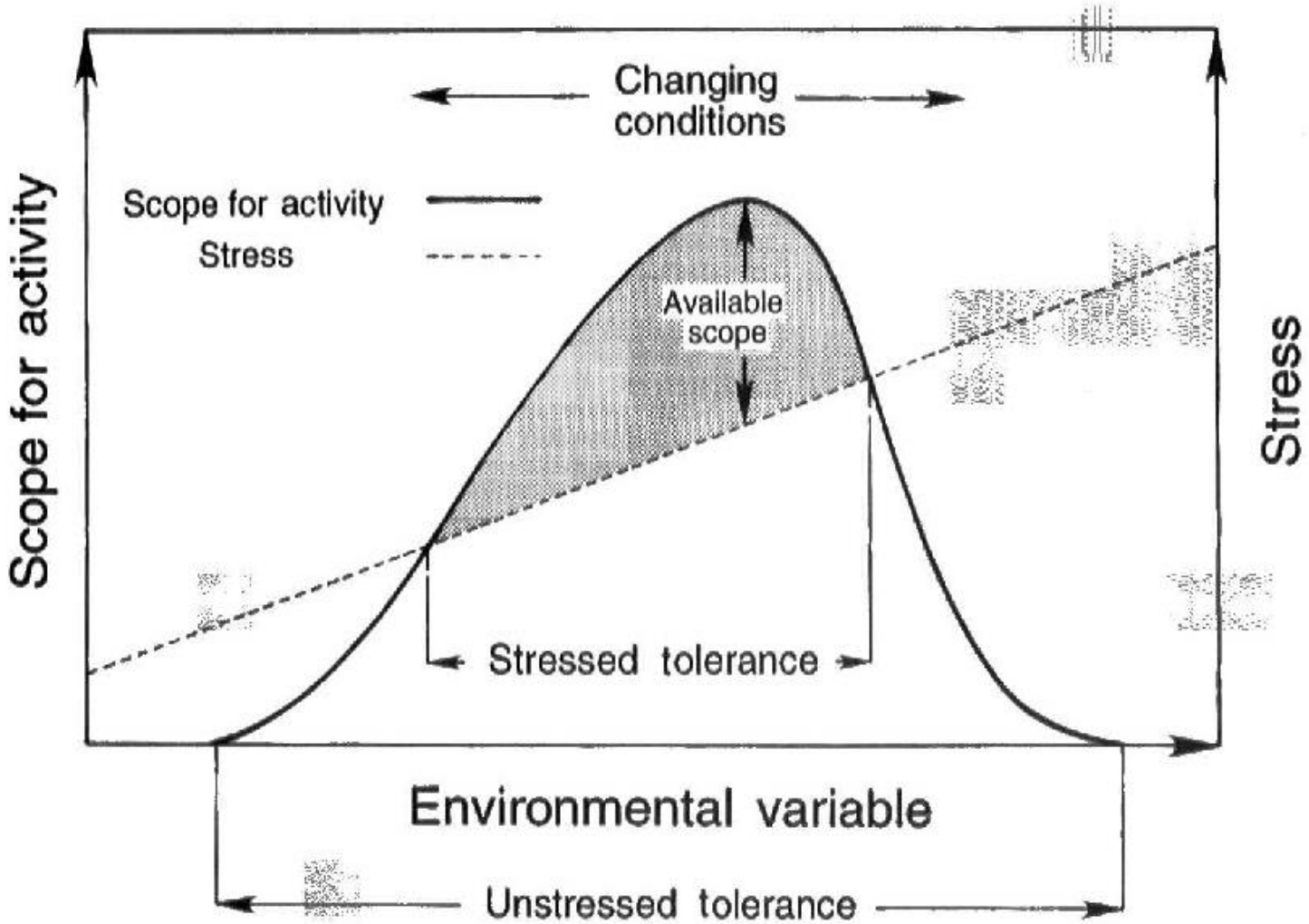
Stress in Fish

- Reduces survival & ability to handle other stressors
- "cannot maintain normal physiological state"
  - Chemical changes - contaminants, low oxygen and acidification
  - Physical changes - handling, capture, confinement and transport
  - Perceived changes - startling or predators
- Some spp more susceptible than others
  - Pinks & Sockeye vs Blackfish

And you thought there was stress in *your* life !

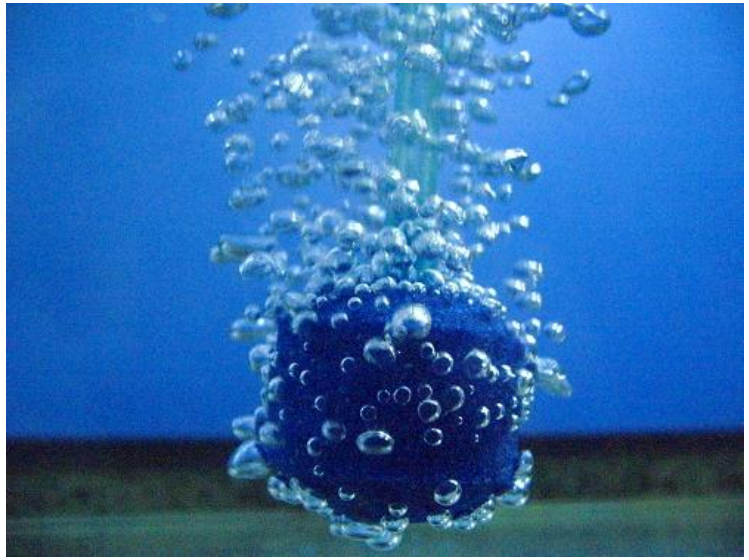
Environmental factors

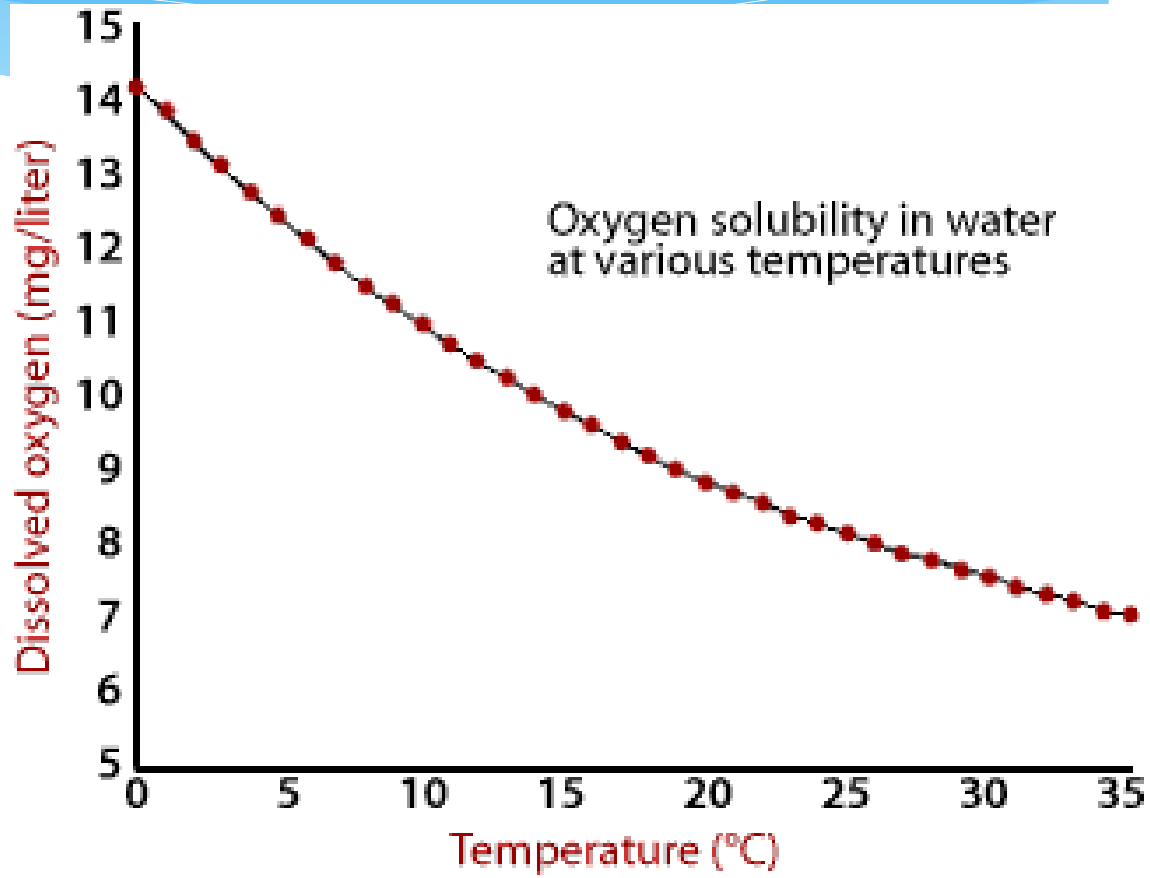
- **Dissolved Oxygen**
- **Temperature**
- Light
- Salinity
- Ammonia / pH



Dissolved Oxygen

- Warmer water holds less O2
- Increase O2 with air stones
- Increase O2 with circulation
- Increase O2 with agitation/ H2O change
- **MOST IMPORTANT**





Dissolved Oxygen

- **Hypoxia** – low oxygen
- Stages of Hypoxia
  - Increased ventilation rate
  - Gulping air at surface
  - Loss of equilibrium
  - Death
- Too much oxygen can also be bad!

Temperature

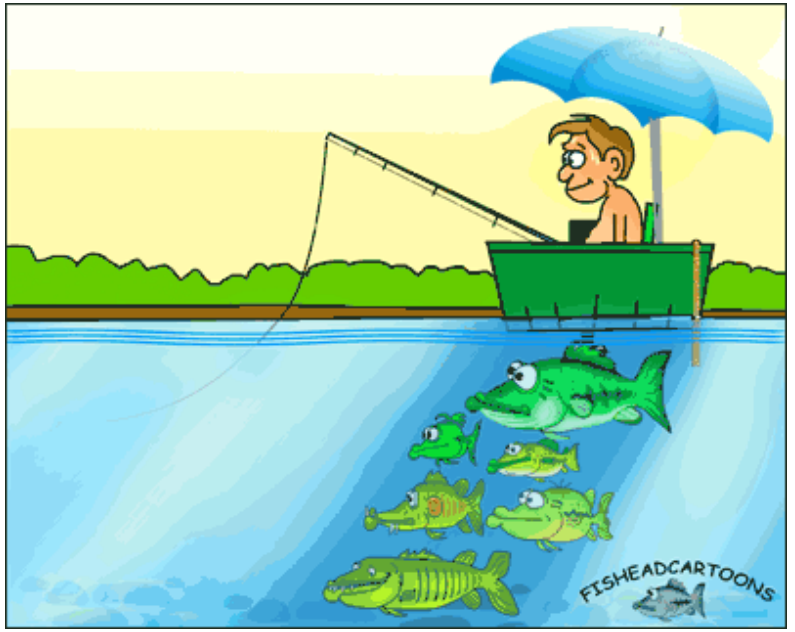
- Controls metabolic rate of fish
- Avoid changes in temperature
- Exceeding limit causes death
- Affects other water quality parameters

Temperature

- Keep holding tanks out of the sun
- Use insulated coolers
  - Light colors
- Artificially alter temperature
  - Heat and cold packs

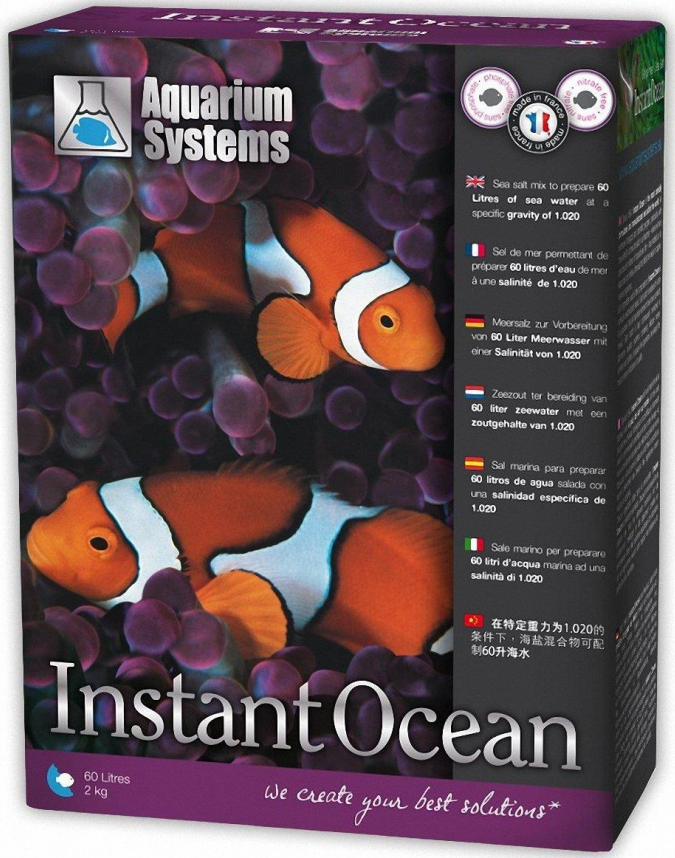
Light

- Direct sunlight is bad!
- Use precautions to shade fish and holding tanks



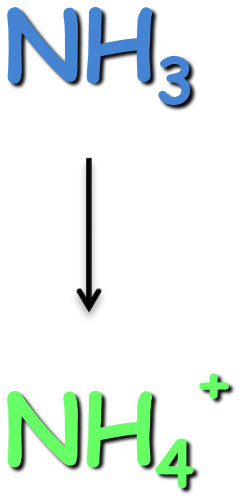
Salinity

- Especially important for marine spp
- Can also reduce stress
- Electrolyte balance



Ammonia

- Concern when holding fish in a closed system
  - Longer periods of time
- Waste product of respiration
- Highly toxic to fish
- Un-ionized ammonia is toxic
- Ionized ammonia is not
  - Cold acidic water better

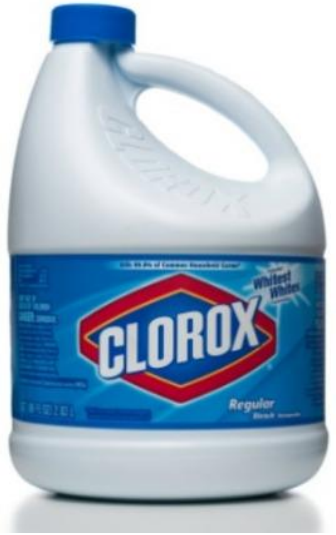


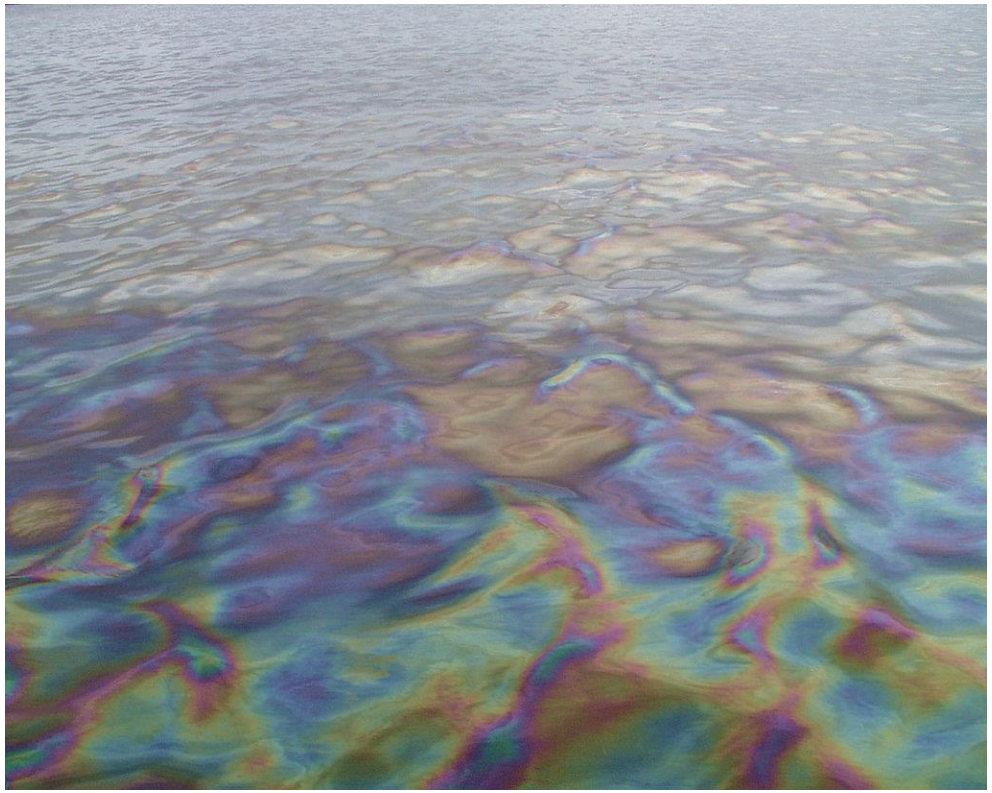
Total Ammonia Nitrogen (TAN) – (ppm)											
Temp (°C)	pH										
	6.0	6.4	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4
4	200	67	29	18	11	7.1	4.4	2.8	1.8	1.1	0.68
8	100	50	20	13	8.0	5.1	3.2	2.0	1.3	0.83	0.5
12	100	40	14	9.5	5.9	3.7	2.4	1.5	0.95	0.61	0.36
16	67	29	11	6.9	4.4	2.7	1.8	1.1	0.71	0.45	0.27
20	50	20	8.0	5.1	3.2	2.1	1.3	0.83	0.53	0.34	0.21
24	40	15	6.1	3.9	2.4	1.5	0.98	0.63	0.4	0.26	0.16
28	29	12	47	2.9	1.8	1.2	0.75	0.48	0.31	0.2	0.12
32	22	8.7	3.5	2.2	1.4	0.89	0.57	0.37	0.24	0.16	0.1

Pollutants

Ensure fish are not exposed to:

- Chlorine
- Detergents
- Petroleum hydrocarbons
- Ammonia
- Sunscreen





Capture and stress

- Long period gear- high stress
- Short period gear- low stress
  - Shorter = better

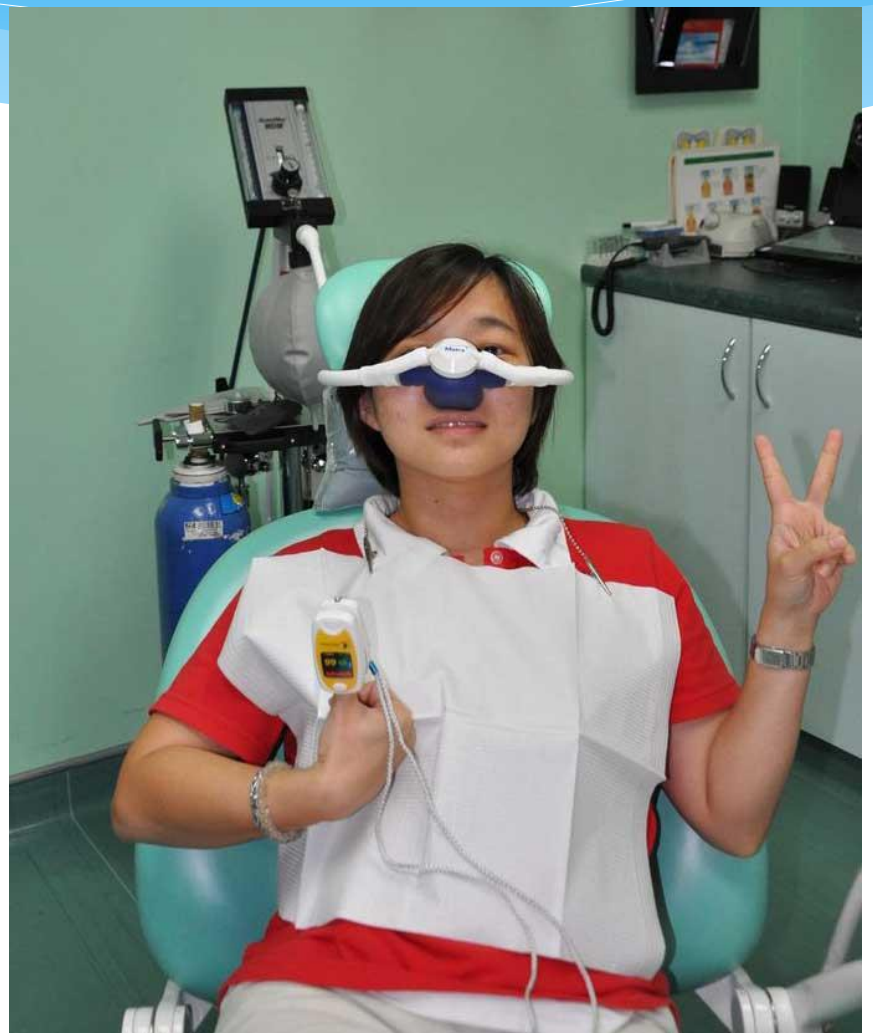
Break

Self Check

- Select the most important environmental variable when handling fish
  - Dissolved Oxygen
  - Temperature
  - Light
  - Salinity
  - Ammonia / pH
- Adding small amounts of salt to freshwater fish can help reduce stress
  - True
  - False

Mitigating Stress

- Anesthetics
- Variety of options



Anesthetics-effects

- Tranquilization
- Non-response to external stimuli
- Loss of equilibrium
- Cessation of ventilation
- Death

Anesthesia

Stages of Anesthesia

1. Loss of equilibrium
2. Loss of gross body movements but with continued opercular movements
3. As in Stage II with cessation of opercular movements

Stages of Recovery

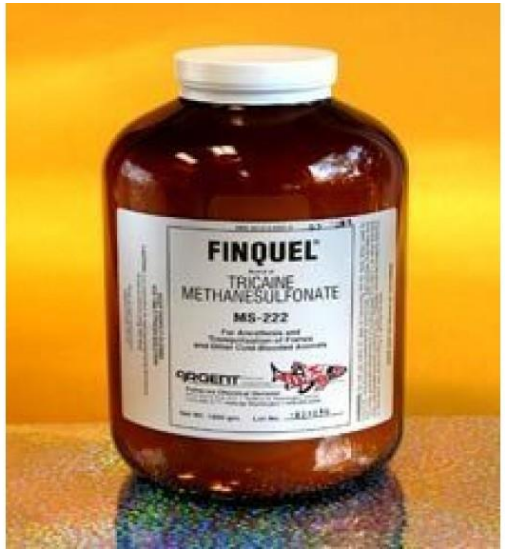
1. Body immobilized but opercular movements just starting
2. Regular opercular movements and gross body movements beginning
3. Equilibrium regained and preanesthetic appearance

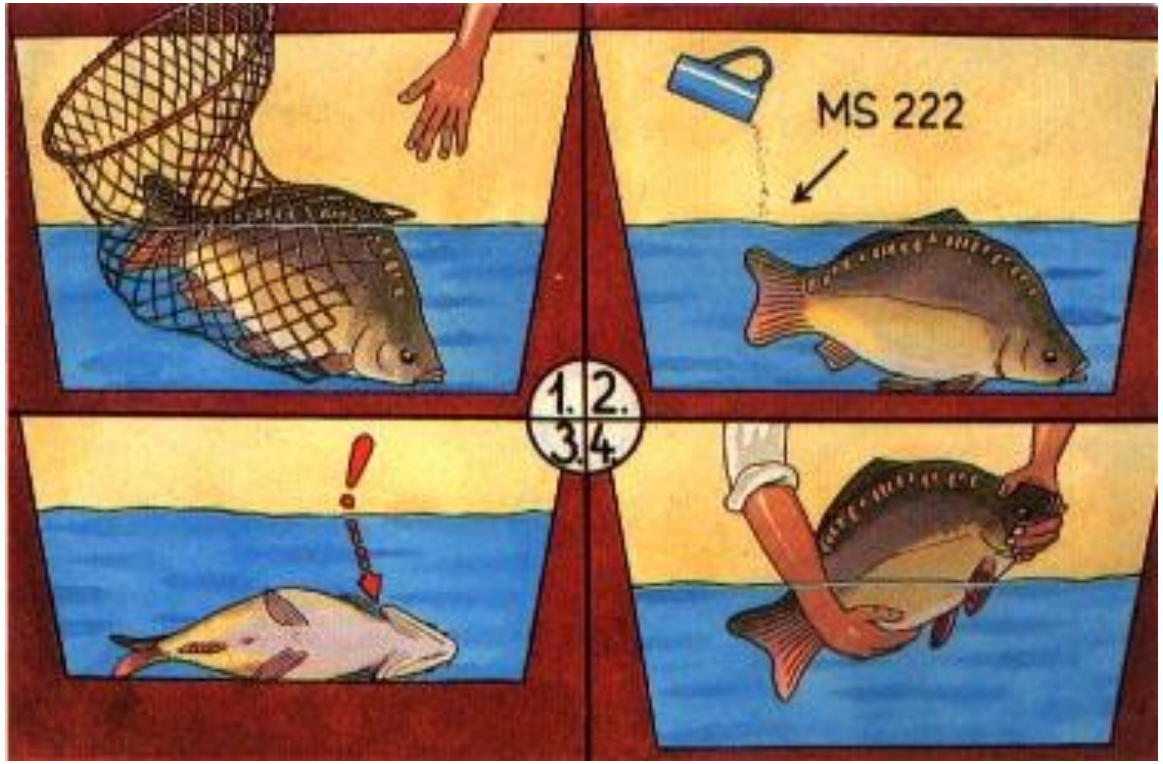
Commonly used Anesthetics

- MS-222
- Aqui-S
- Clove Oil
- Electricity
- Tons More…

Tricaine mesylate MS-222

- White powder
- anesthesia, sedation, or euthanasia
- Blocks action potentials
  - no sensory input or muscle contractions
- Easy to use
- Quick recovery
- Effective
- Carcinogen





Aqui – S

Pharmaceutical Clove oil

- anesthesia, sedation, or euthanasia
- Light sensitive
- Poor in cold water
- Long recovery
- **Not FDA Approved – USFWS Study**
  - If fish will be consumed
- Oily
  - Dilute 95% ETOH 9:1

AQUI-S®

Clove Oil

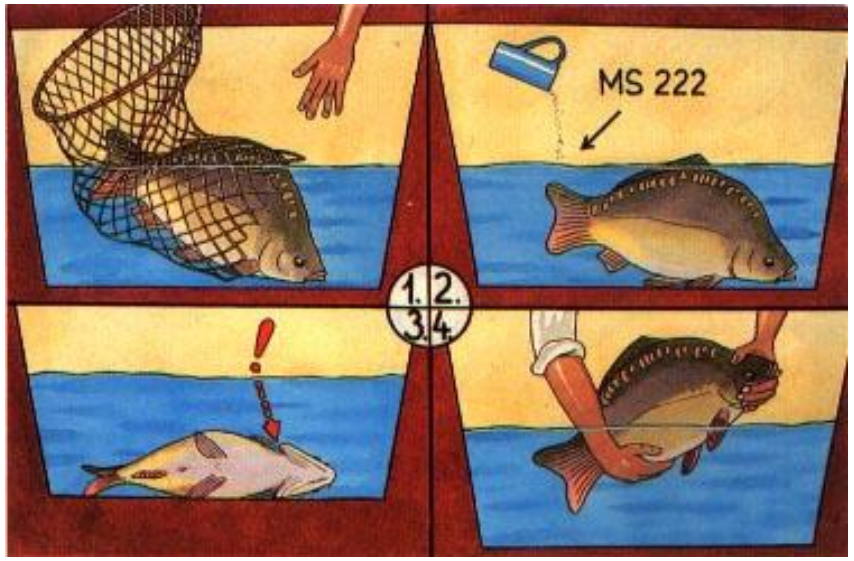
- Oil from cloves
- anesthesia, sedation, or euthanasia
- Light sensitive
- Poor in cold water
- Long recovery
- **Not FDA Approved**
  - If fish will be consumed
- Oily
  - Dilute 95% ETOH 9:1

Electricity

- Electroanesthesia / Electrosedation
  - Becoming more common in fisheries
  - Tag-implantation
  - Spawning
  - Measurement

Anesthesia process

- Capture fish
- Apply Anesthesia
- Perform task
- Recovery
- Release (if applicable)



Kelt being anesthetized prior to surgery

Inserting a tag into the abdominal cavity

ASF biologist Steve Tinker sutures the incision closed

Master's student Keelan Jacobs releases a kelt into the river after it has recovered

Self Check

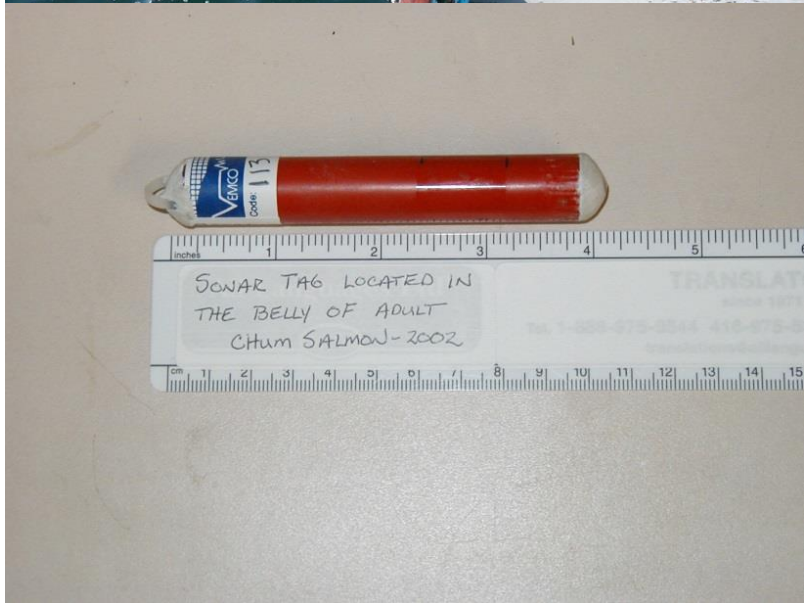
- Electrical shock is an appropriate method of anesthesia for fish
  - **True**
  - False

- Which of the following anesthetics comes in the form of a white powder and is a carcinogen?
  - **MS-222**
  - Aqui-S
  - Clove Oil
  - Electricity

Use of Anesthesia

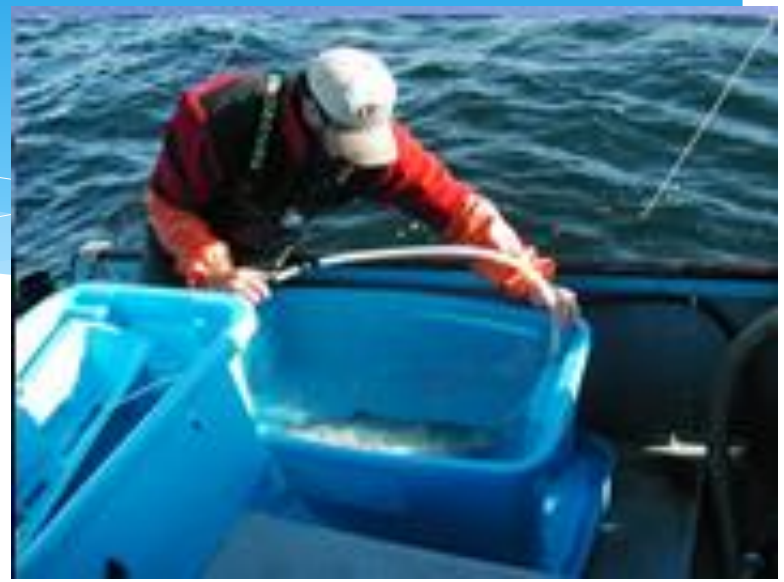
- Handling
- Measuring
- Tagging
- Marking
- Hauling

Capture and Tagging



Tagging cont.

- Capture
- Anesthesia
- Procedure (tag implantation)
- Recovery
- Release



Handling fish

Tagging and marking

- Care taken to reduce scale loss
- Minimize time out of water
- Minimize slime removal (antibacterial barrier)

Holding and Hauling

Stressors include

- Low DO
- Extreme temperatures
- Rapid temperature changes
- Diseases
- Intense light
- Physical shock

Holding and Hauling Fish

Hauling fish

Hauling fish

Holding and hauling Fish

- Pay close attention to environmental conditions when transporting fish
- Monitoring is Key

Mitigation of Stress By

- Anesthetics
- Starvation prior to transport
- Minimization of crowding
- Reduced sloshing in tanks
- Reduce osmotic costs
- Use cool temperatures relative to species tolerances

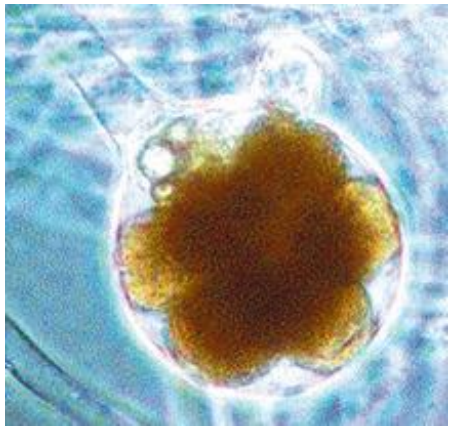
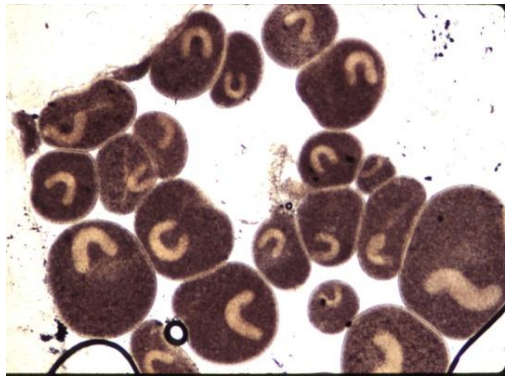
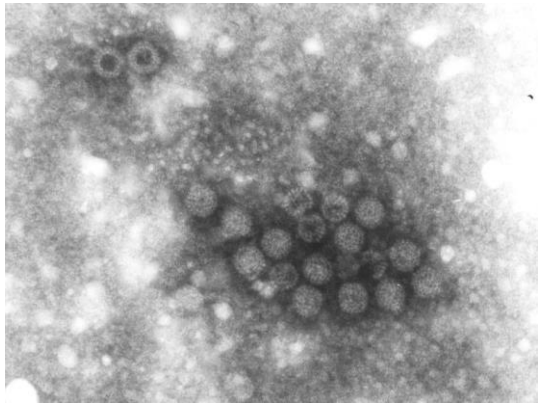
Know your animal

TABLE 2. SUGGESTED CHEMICAL VALUES FOR HATCHERY WATER SUPPLIES. CONCENTRATION ARE IN PARTS PER MILLION (PPM). (SOURCE: HOWARD N. LARSEN, UNPUBLISHED.)

VARIABLE	TROUT	WARM WATER
Dissolved oxygen	5–saturation	5–saturation
Carbon dioxide	0–10	0–15
Total alkalinity (as $CaCO_3$)	10–400	50–400
% as phenolphthalein	0–25	0.40
% as methyl orange	75–100	60–100
% as ppm hydroxide	0	0
% as ppm carbonate	0–25	0–40
% as ppm bicarbonate	75–100	75–100
pH	6.5–8.0	6.5–9.0
Total hardness (as $CaCO_3$)	10–400	50–400
Calcium	4–160	10–160
Magnesium	Needed for buffer system	
Manganese	0–0.01	0–0.01
Iron (total)	0–0.15	0–0.5
Ferrous ion	0	0
Ferric ion	0.5	0–0.5
Phosphorous	0.01–3.0	0.01–3.0
Nitrate	0–3.0	0–3.0
Zinc	0–0.05	same
Hydrogen sulfide	0	0

Prophylactic treatments (Drugs)

- Minimize infection
  - bacteria, fungi, parasites and viruses
- Effectiveness varies by
  - Concentration
  - Duration
- Important not to transmit disease!

Treatments administered by

- Feed
- Baths
- Adding treatment to water

Pond PolyAqua

This liquid water conditioner is formulated to reduce the possibility of disease outbreak among injured or sick fish. It is ideal for pond hobbyists as well as professionals (shippers, dealers, wholesalers) who transport and handle large numbers of fish that frequently incur physical damage during capture and handling. Using synthetic polymers, Pond PolyAqua provides a "bandaging effect" for damaged tissue that reduces the possibility of infection by bacteria or external parasites. It also contains Vitamin B12. Recommended dosage: 1 teaspoon per 10 gallons. Not FDA-approved. Not for food fish.

WESTERN CHEMICAL INC.

VIDALIFE

Our Price: $28.00

Choose Size:

Quantity: 1

ADD TO WISHLIST | ADD TO BASKET

VIDALIFE Product Information:

- VIDALIFE, Directions for Use
- VIDALIFE MSDS

For Additional Sizes: Call for quote on 55 gallon drums.

Description

Vidalife is a specially formulated water conditioner for use in fish hatcheries, broodstock facilities, transport tanks, and on handling equipment and handling surfaces. When applied as directed, Vidalife will help protect fish from abrasions by preserving the fish's natural mucous layer and can be used whenever fish are handled or moved.

Features:

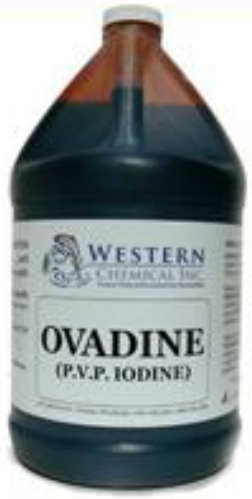
Vidalife is a water conditioner used in fish transport and during any handling events.

Vidalife forms a coating on contact surfaces to reduce friction and abrasion when handling.

Vidalife helps to form a protective barrier between fish and handling equipment.

Vidalife reduces the toxicity of heavy metals.

OVADINE® (PVP Iodine)



Self Check

- Starving fish prior to transportation can minimize some of the stress associated with transport
  - **True**
  - False

- When holding fish for longer periods of time it may be necessary to treat for disease with prophylactics
  - **True**
  - False

Euthanasia

- Humanly Killing
  - Pithing
    - Metal rod in brain
  - Spinal cord dislocation
  - Decapitation
  - **Overdose of immobilizing drugs**
  - Ice slurry bath
- IACUC has standards written

Self Check

- Which of the following methods of euthanasia is most commonly accepted
  - Pithing
  - Metal rod in brain
  - Spinal cord dislocation
  - Decapitation
  - **Overdose of immobilizing drugs**
  - Ice slurry bath

- Euthanasia is an alternative to Anesthesia
  - True
  - False

Fixation

- Voucher specimens
- Unsure identification
- Teaching

Preserved specimens and tissues

Include in documentation

- Collection information
- Collector information
- Specimens
- Preservation method

Make duplicate labels – one inside and one outside!

Whole specimen preparation

- Fixation
- Skeleton preparation
- Freezing
- Photography
- Clearing and staining
- Freeze drying
- Lyophilization
- Radiography

Fixation

- Cells and tissue treated to prevent decomposition
- Maintains structural integrity
- Formalin is a **carcinogen** – use protective gear!
- 10% Formalin
- Buffer with borax or $CaCO_3$
  - Formalin vs ethanol

Alternatives to Formalin

There are two alternatives to formalin currently available:

- Carosafe – Carolina Biological Supply Company

  http://www.carolina.com

  – Propylene glycol-based material serves as a safer, far less toxic substitute for preserved specimens

- Formalternate – Flinn Scientific

  http://www.flinnsci.com

  – Also propylene glycol-based product

  – sold as a concentrate to be diluted with water

  – It is recommended for **storage** of preserved specimens, but **not actual fixation**

Fixation (cont.)

- If you must use formalin:
  - Use in well ventilated area
  - Wear eyewear
  - Use waterproof or latex gloves
  - Can cause allergic reactions!

  - Also used for ichthyoplankton preservation

Skeletonization

- For large specimens
- All desired information recorded before skeletonization
- Skeletons are frozen, salted or fixed

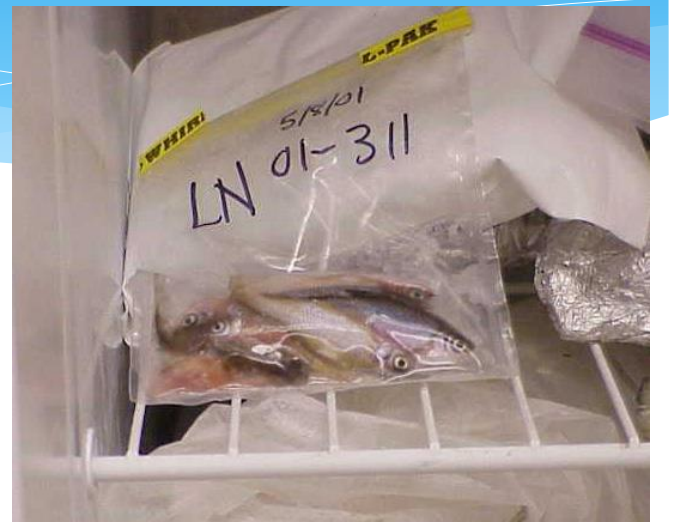
Adult

Larva

Other ideas:
Dermestid beetles
Sand fleas

Freezing

- Most convenient method
- Good for specimens of uncertain use
- **TAGGED, TAGGED, TAGGED**
- Plastic bag to prevent lyophilisation – freezer burn
- Freezers full of fish…



Photography

- Endangered species
- Maintains color
- Very large specimens-sharks
- Take left side
- Tag

Genetic samples

Stock identification

Species Identification

ADF&G

Maintaining the genetic integrity of wild fish populations

- Establish genetic baselines
- Estimate the composition of mixed stock fishery harvests
- Examine genetic effect of human activities (**Hatcheries**)

General considerations

- Minimize risk of cross-contamination
  - Wear gloves
  - Wash gloves with alcohol
  - Instruments should be unused or sanitized
- Genetic Grade ETOH
- Everclear works
- Mainly fins & Axillary Process

- Samples should not be fixed with formalin for genetic testing!

Tissue preservation for genetic analysis

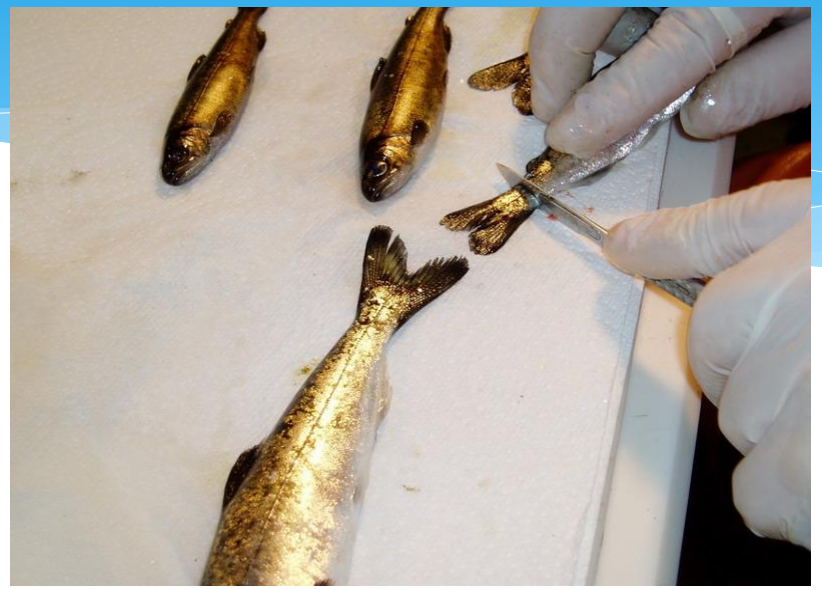
- Freezing
- Drying - dehydration
- Liquid preservation
  - Genetic Grade ETOH
  - Everclear works

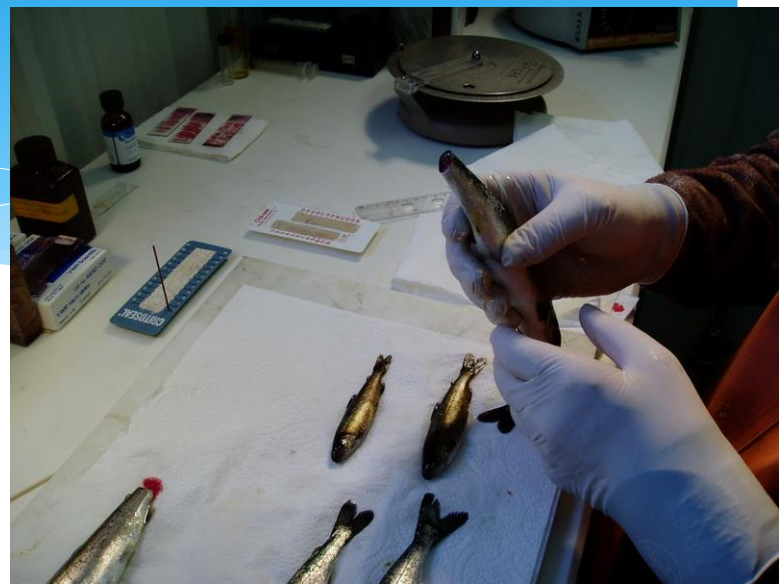
Blood drawing

- Caudal blood vessel
- Fish placed on back
- Hypodermic needle inserted towards vertebral column
- Blood cooled on ice before processed

Blood

- Easier with dead fish
  - want the heart still beating





Ichthyological collections

- All over the country/world
- What are they used for?

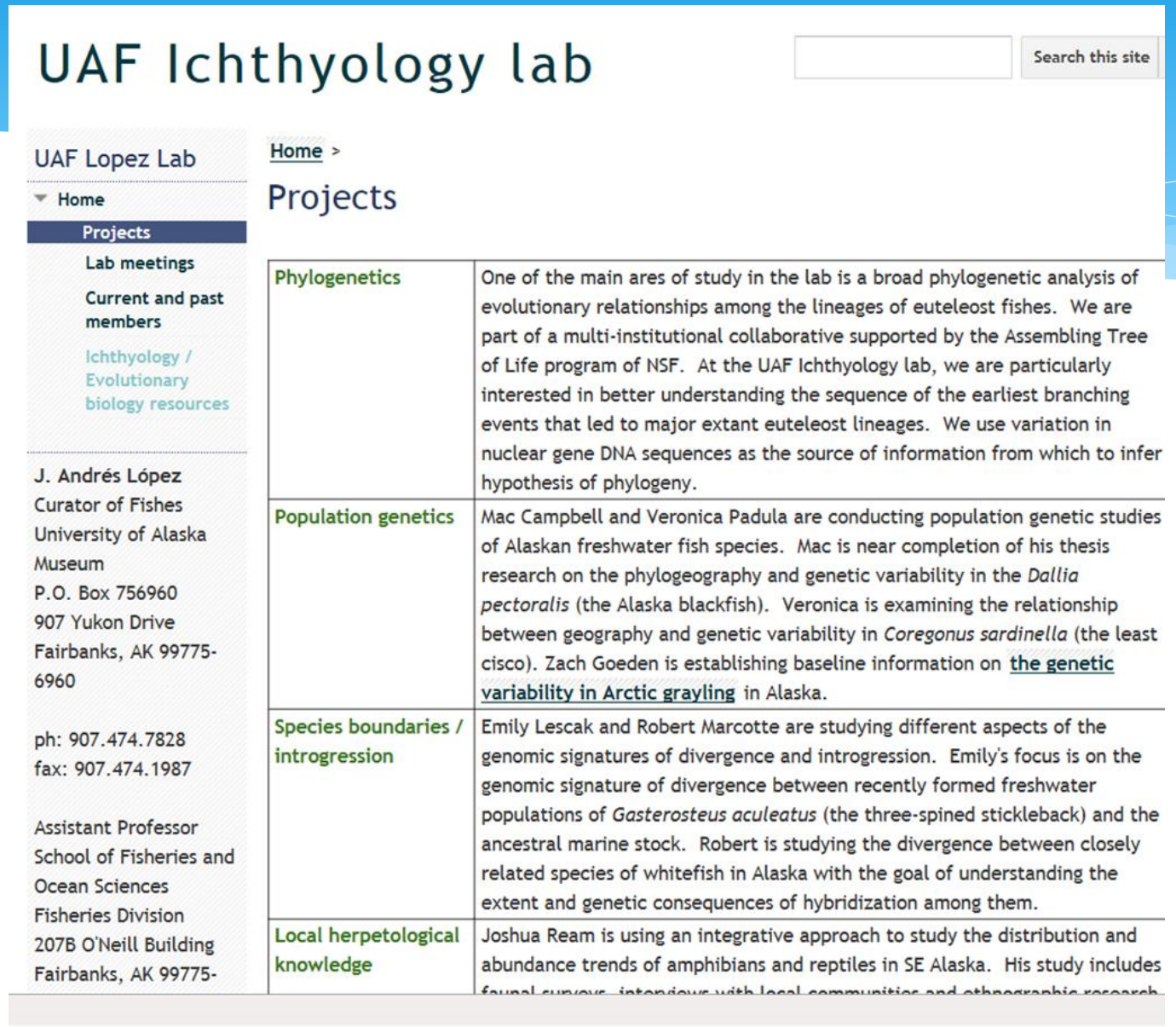
Aquatics: Fishes, Marine Invertebrates, Amphibians, Reptiles

Collections of fishes, amphibians, reptiles and marine invertebrates:

A set of collections presently consisting of over 8,000 lots of marine invertebrates and close to 5,000 lots of marine and freshwater fishes has been housed at the Museum since the 1970s. James Morrow, Ron Smith, and several other University of Alaska researchers established and built the nucleus of the collection. Amphibians and reptiles (Herpetology) are in a separate catalog of about 300 lots. Most of the data associated with both collections are in the Arctos database, however a significant number of records for marine invertebrates housed in the museum's collections remain to be incorporated into this electronic resource.

These collections were under the care of Nora Foster until 1998 and of Dr. Gordon Haas until 2006. Andrés López joined the Museum of the North as curator of fishes in the Fall of 2008. Recent additions to the collection include valuable voucher specimens used by Dr. Katherine Mecklenburg in her Arctic marine fish biodiversity research and in the development of the comprehensive Fishes of Alaska volume. Thanks to collaborative relationships with State and

Some examples……



UAF Ichthyology lab

Search this site

UAF Lopez Lab

- Home
  - Projects
  - Lab meetings
  - Current and past members
  - Ichthyology / Evolutionary biology resources

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Home >

Projects

Phylogenetics	One of the main ares of study in the lab is a broad phylogenetic analysis of evolutionary relationships among the lineages of euteleost fishes. We are part of a multi-institutional collaborative supported by the Assembling Tree of Life program of NSF. At the UAF Ichthyology lab, we are particularly interested in better understanding the sequence of the earliest branching events that led to major extant euteleost lineages. We use variation in nuclear gene DNA sequences as the source of information from which to infer hypothesis of phylogeny.
Population genetics	Mac Campbell and Veronica Padula are conducting population genetic studies of Alaskan freshwater fish species. Mac is near completion of his thesis research on the phylogeography and genetic variability in the *Dallia pectoralis* (the Alaska blackfish). Veronica is examining the relationship between geography and genetic variability in *Coregonus sardinella* (the least cisco). Zach Goeden is establishing baseline information on the genetic variability in Arctic grayling in Alaska.
Species boundaries / introgression	Emily Lescak and Robert Marcotte are studying different aspects of the genomic signatures of divergence and introgression. Emily's focus is on the genomic signature of divergence between recently formed freshwater populations of *Gasterosteus aculeatus* (the three-spined stickleback) and the ancestral marine stock. Robert is studying the divergence between closely related species of whitefish in Alaska with the goal of understanding the extent and genetic consequences of hybridization among them.
Local herpetological knowledge	Joshua Ream is using an integrative approach to study the distribution and abundance trends of amphibians and reptiles in SE Alaska. His study includes faunal surveys, interviews with local communities and ethnographic research

Use of Ichthyological collections

- Personal safety
  - Wear gloves – they always leak
  - Ensure adequate ventilation – they smell
  - Wear safety glasses – they splash

Self Check

- Tagging and documentation is an important part of any type of fixation
  - **True**
  - False

- Genetic samples should be preserved in Formalin
  - True
  - **False**

Review

- Before we handle fish
- Proper handling
- Fish Stressors
- Anesthesia
- Use of Anesthesia
- Euthanasia
- Preservation

The End