



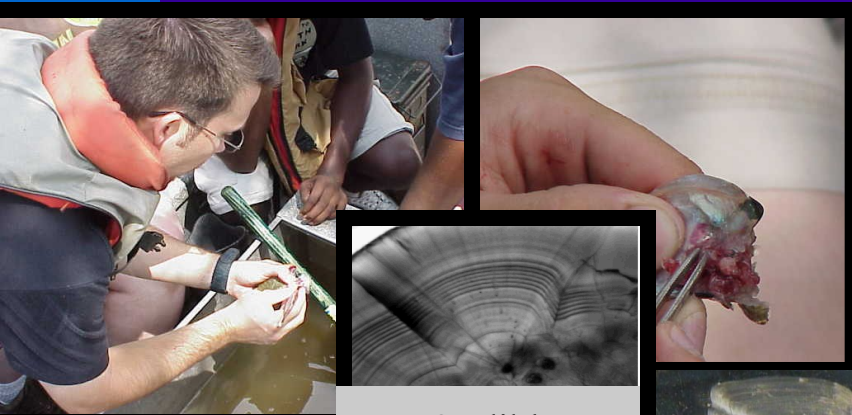
Chapter 14



Field Examination of Fishes



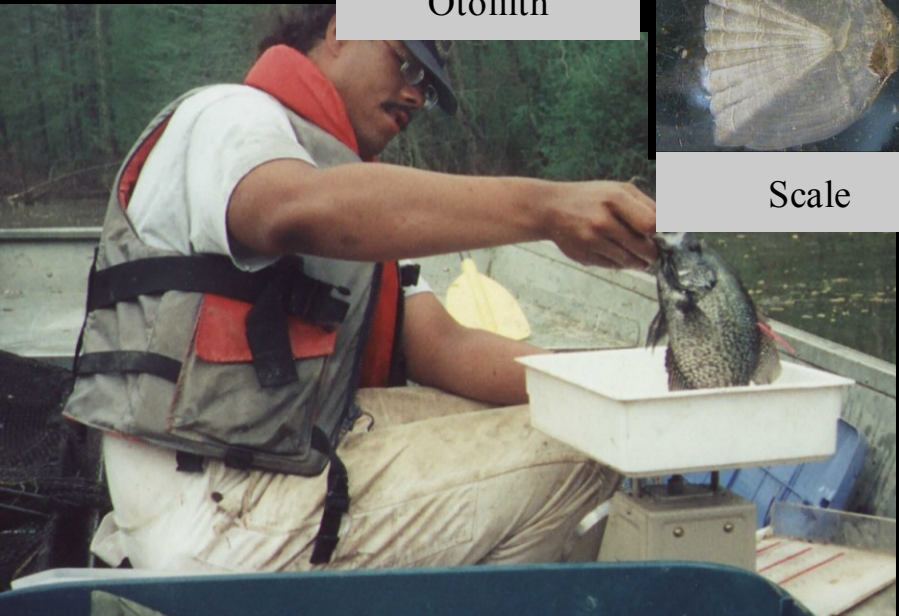
14.2 Routine Examination- Basic Observations (cont.)



Otolith



Scale



- Sorted by species
- Limit handling of live fish
- Weights and measures taken
- Scales taken for age and growth

Basic Observations



- **External sexing done (immature fish cannot be sexed externally)**
 - **Brighter coloration in males**
 - **Difference in genital opening**
 - **Difference in shape of head**
 - **Dissection can be used to sex**



Analyses of diet

- Stomach content preservation
- Lavage...non lethal
 - Washing out of gut contents

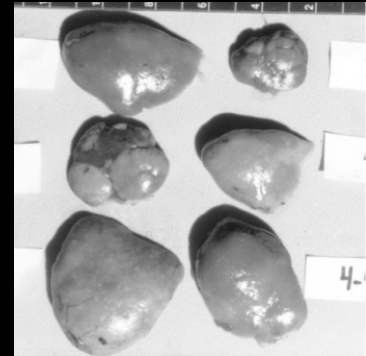


- If small, entire specimen (fish) preserved



Necropsy-Based Fish Health Assessment (cont.)

- Condition and organ indices
 - K or C- ratio of weight to the cube of length
 - The higher, the plumper the fish
 - Organosomatic indices- ratio of organ to entire body
 - Decrease in starved fish
 - Increase in fish subjected to toxins



Necropsy-Based Fish Health Assessment (cont.)

- Condition and organ indices



- Hepasomatic index - liver weight/body weight

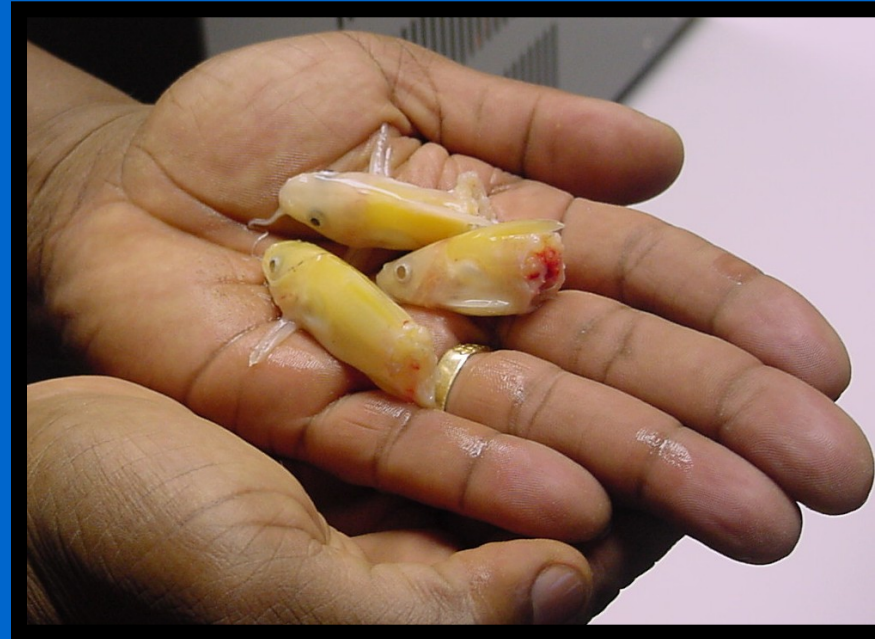
- Gonadosomatic index - ovary weight/body weight

- Indicates time of spawning



Necropsy-Based Fish Health Assessment

- **Systematic condition assessment**
 - **Comparison with past observations**
 - **Blood constituents** (hematocrit, leukocrit and plasma protein)
 - **State of maturity**
 - **Condition of gills, pseudobranch, mesenteric fat, spleen etc**



- **Damage to extremities**

14.3 Emergency Examination

- **Definition of Health and Illness in Wild Fishes:**
 - Healthy fish may have pathogens or stress
 - Diseased fish are affected to reduce growth, slow reproduction, or die
- Refer to box 14.1 for list of **Pathogen-Induced Fish Diseases**



Pathogens not the only cause of disease

- Degraded water quality
- Toxic pollutants
- Poor nutrition
- Overcrowding (encourages transmission of pathogens)
- Excessive competition



Limitations of Field Diagnosis

- Health cannot be completely assessed through clinical signs
- Laboratory examination necessary
- Pathogen must be identified before positive diagnosis



Investigations of Fish Kills

- Expertise in biology, chemistry, and statistics needed
- Requires immediate response
- Water samples inside and outside kill taken



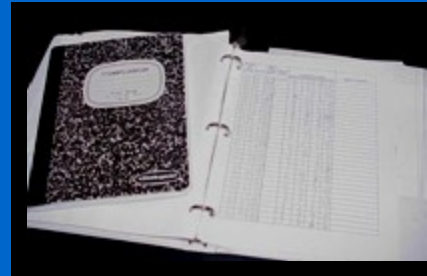
Investigations of Fish Kills

- Basic water quality characteristics measured on site
- Individual fish examined for ill health and frozen
- The cause of a kill is often not immediately known



Data may be used in legal proceeding (cont.)

- Data should:
 - be well documented
 - not easily lost or altered
- Identify person responsible for each measurement
- Notes should be duplicated and stored separately from original



Data may be used in legal proceeding



- Photos and videos can be valuable
- Use "chain of custody" for samples

Primary role of fisheries biologist in fish kills




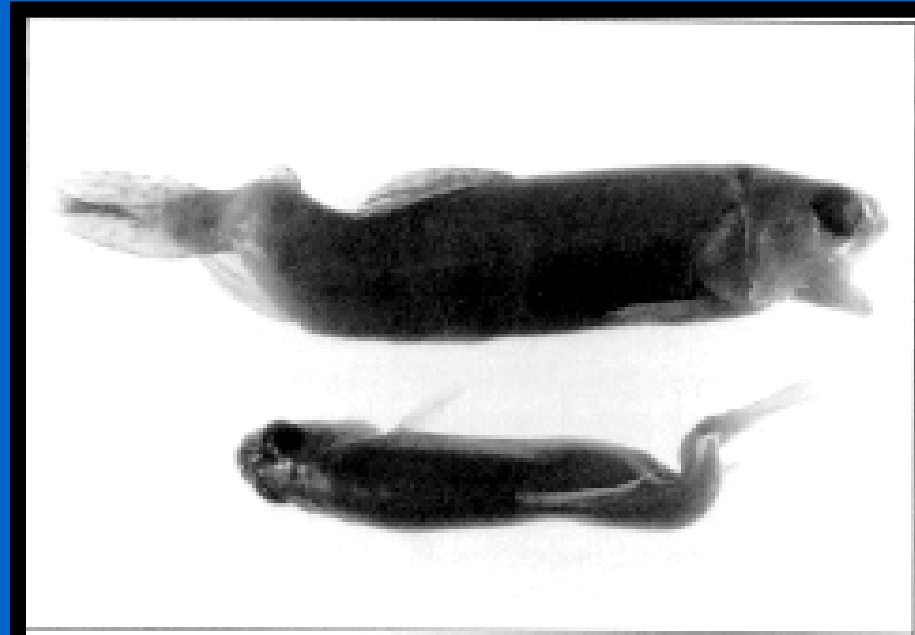
- Determine number, size and species killed
- Areal extent of kill
- Monetary value of fish kill

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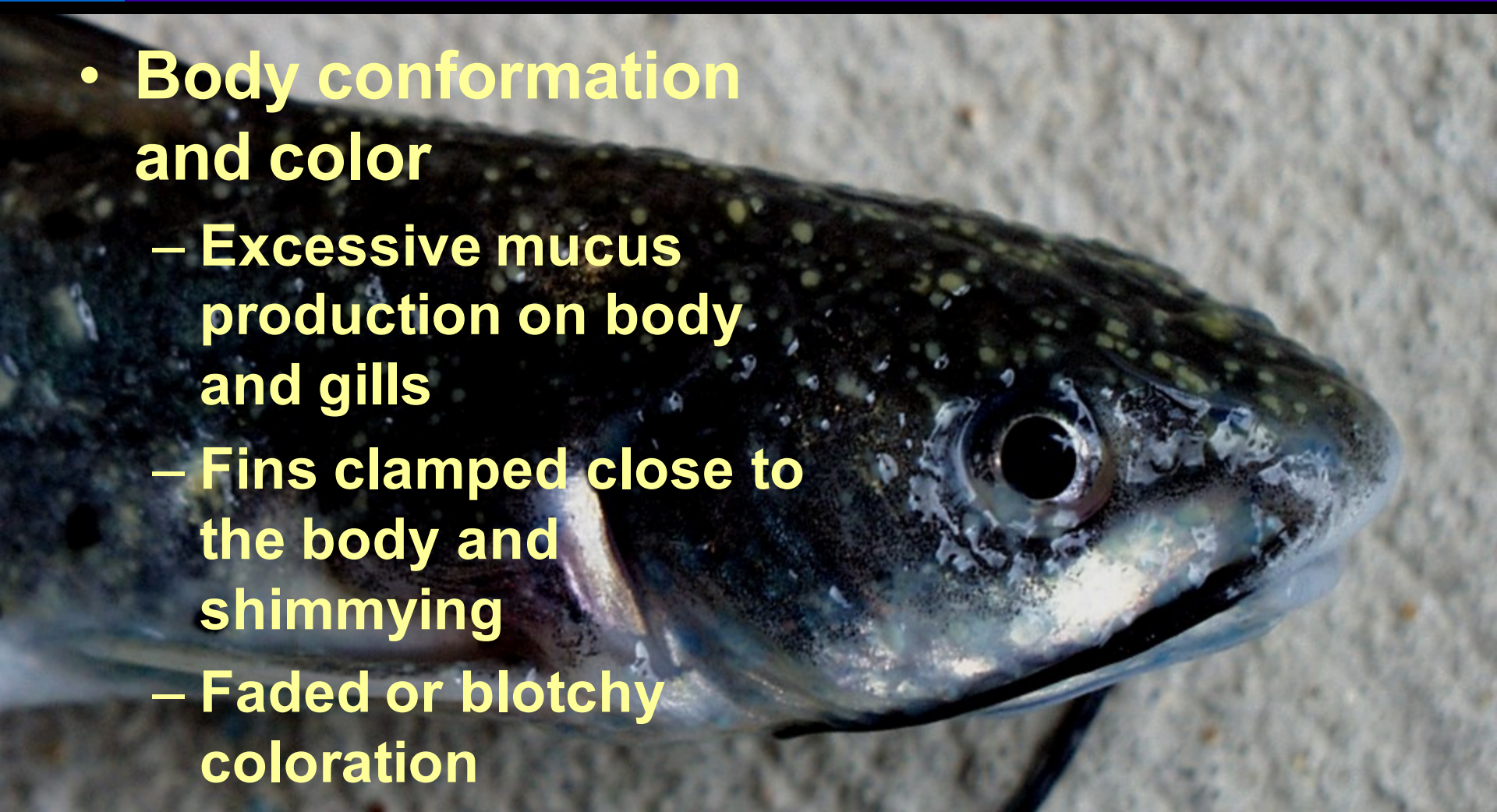
Behavioral Signs

- "Piping" or gulping air at surface
 - response to low DO
- "Flashing" ... fish rubbing itself against the bottom
- Convulsions
- Whirling 



External Signs (cont.)

- **Body conformation and color**
 - Excessive mucus production on body and gills
 - Fins clamped close to the body and shimmying
 - Faded or blotchy coloration



External Signs (cont.)

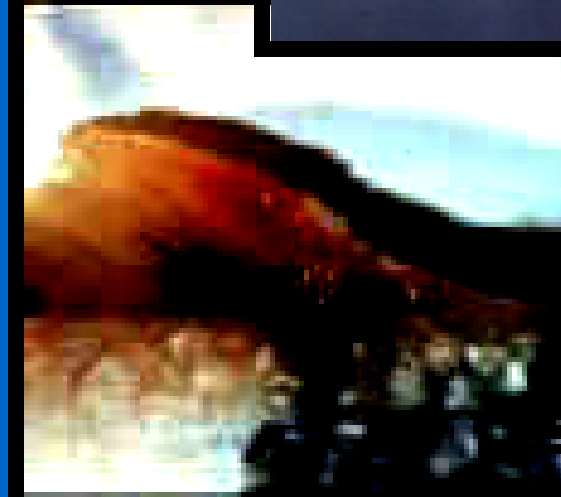
- Kill the fish in humane way
 - Is body shape normal?
 - Protruding eyeballs
 - Exophthalmia



External Signs (cont.)

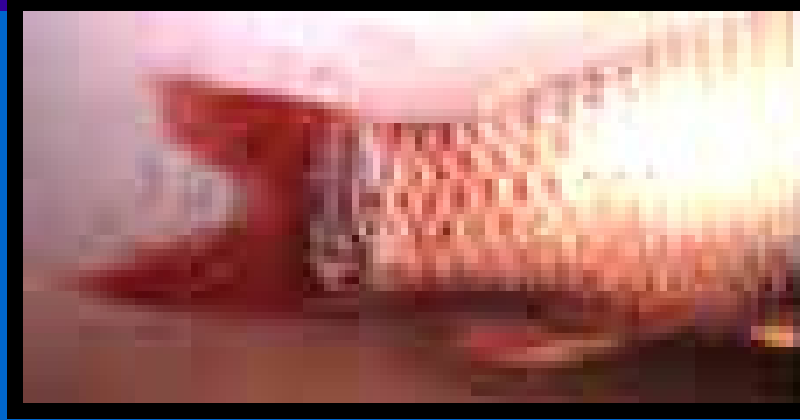
- **Fins**

- Should be intact to the end of the rays
- Free of slime or cottony fungus (*Saprolegnia* spp)
- No hemorrhagic areas
- Frayed fins (*Flexibactor* spp)



External Signs (cont.)

- **Skin, scales and mucus**
 - Scales- lie flat and firmly attached
 - Mucus- thin, clear and evenly distributed



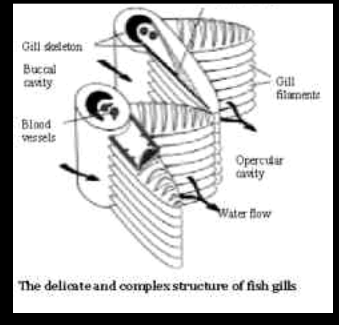
- Surface- free of Reddened areas (*Aeromonas* spp), bloody sores, nodular growths, fungus



External Signs

- **Gills**

- To inspect gills, pull operculum back
- If freshly killed, should be bright red, NO thick mucus covering
- Usual site for ectoparasites

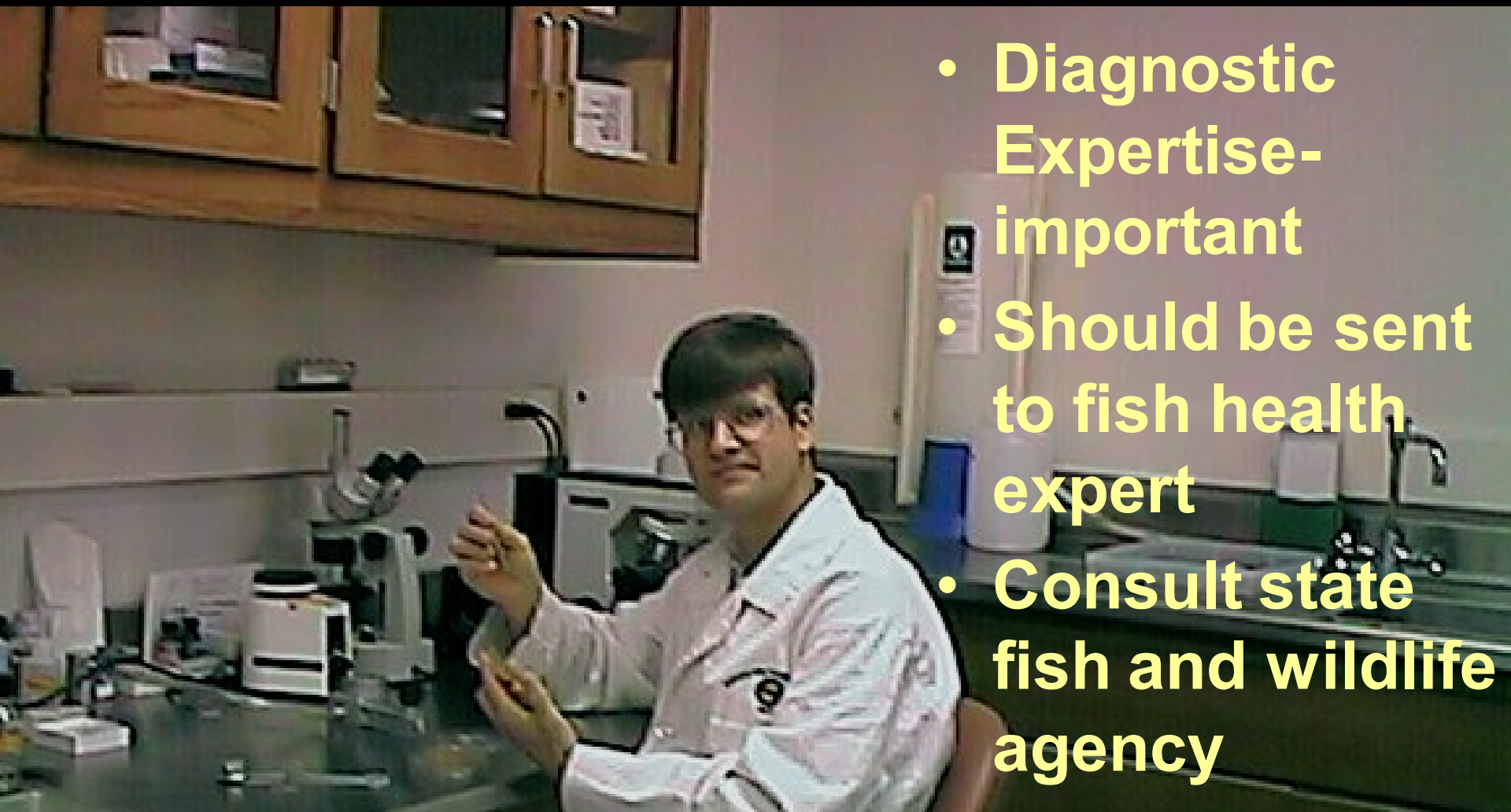


Internal Signs



- **Technique for opening fish**
 - Lay fish on side
 - Make incision above vent, along rib cage
 - Scissors work best up to 0.5 kg
- **Check digestive tract, kidney, and muscle**

14.4 Sampling for Disease Organisms



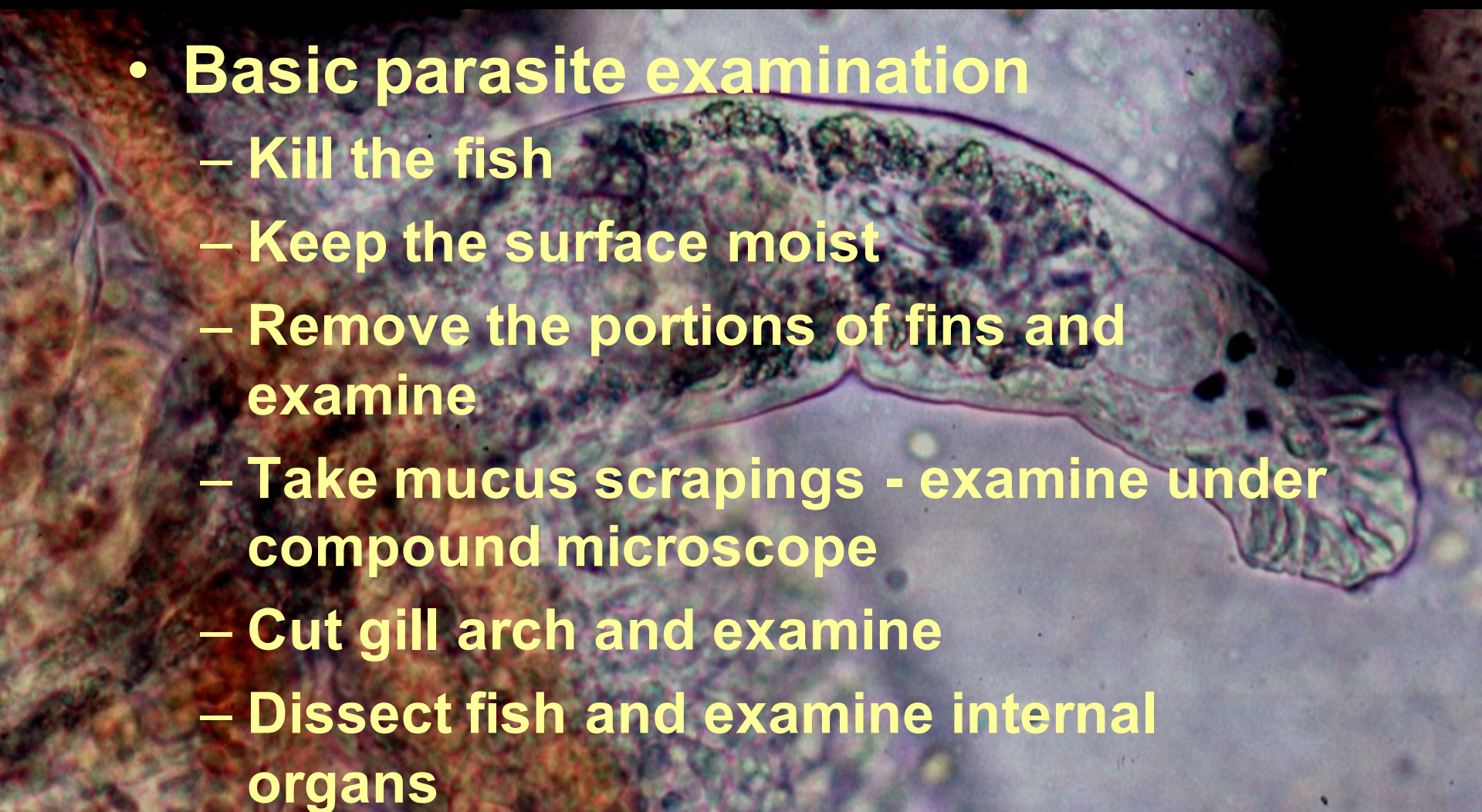
- Diagnostic Expertise- important
- Should be sent to fish health expert
- Consult state fish and wildlife agency

Sampling for parasites (cont.)

- Selection and care of specimens
 - Live fish mandatory for parasite identification
 - Requires good dissection microscope
 - Thorough examination requires compound microscope



Sampling for parasites

- **Basic parasite examination**
 - Kill the fish
 - Keep the surface moist
 - Remove the portions of fins and examine
 - Take mucus scrapings - examine under compound microscope
 - Cut gill arch and examine
 - Dissect fish and examine internal organs
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Sampling for bacteria (cont)

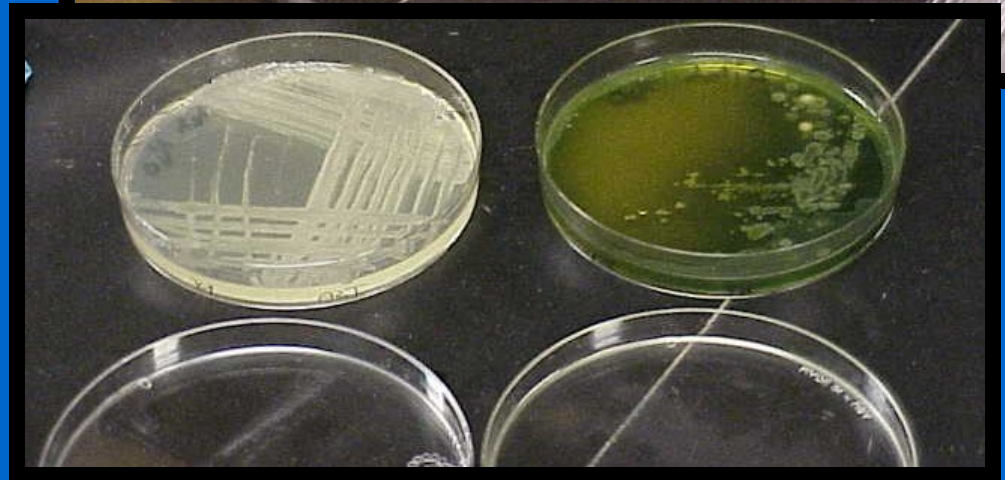
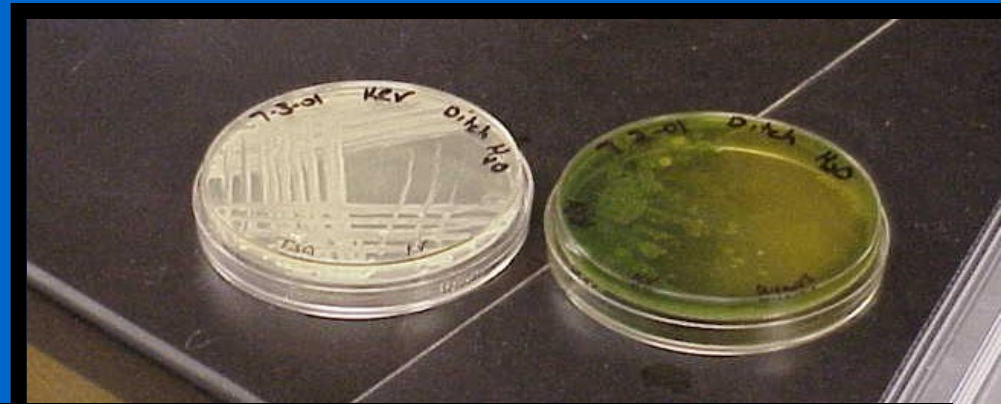


- Selection and care of specimens
 - Fish must be alive or freshly killed
 - If cannot be kept alive, freeze in individual plastic bags



Sampling for bacteria

- Bacterial identification requires training
- Bacterial isolation fairly simple
 - see page 443 of text for protocol



Sampling Viruses

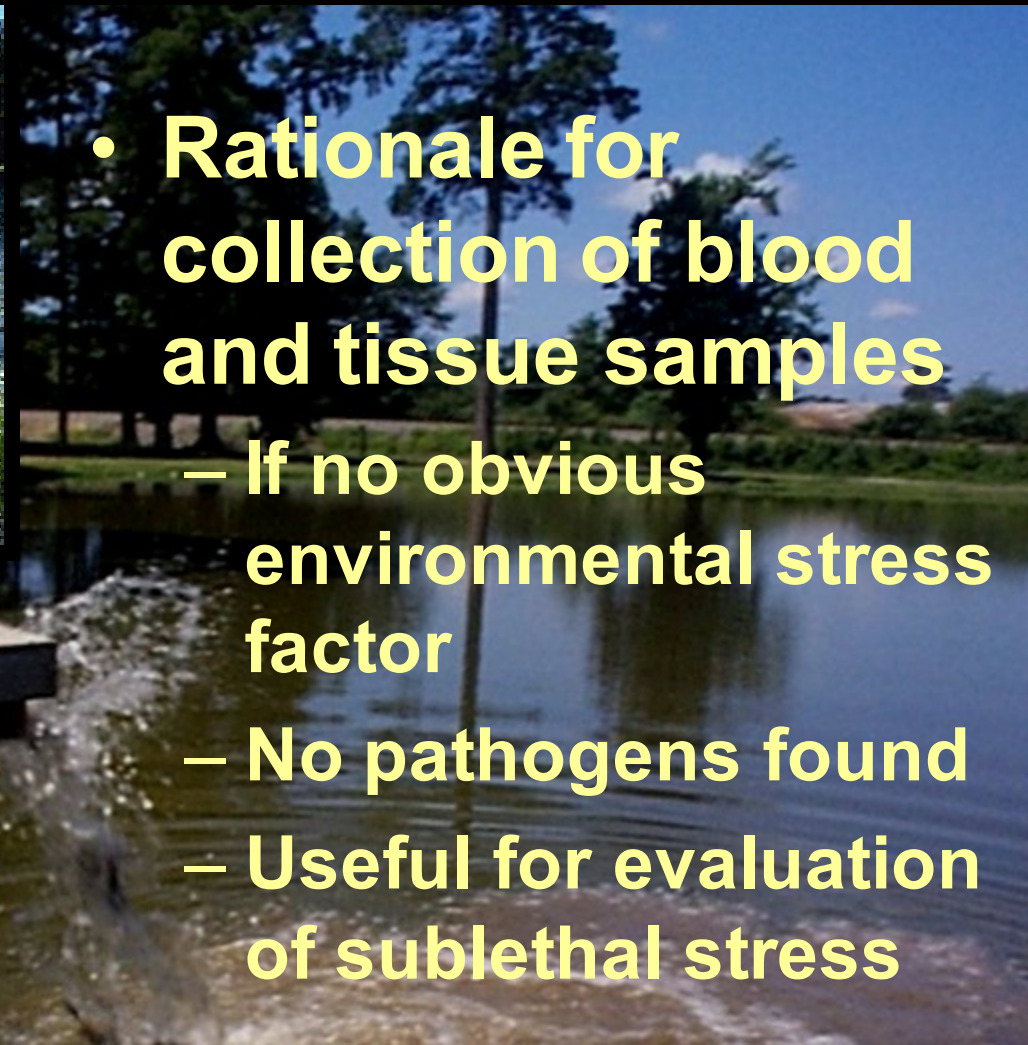
- Requires specialized procedures and equipment
- Select fish suspected of viral disease
- Transport to fish health laboratory



14.5 Sampling Blood and Tissue



- Rationale for collection of blood and tissue samples
 - If no obvious environmental stress factor
 - No pathogens found
 - Useful for evaluation of sublethal stress



Sampling Blood (cont.)



- **Techniques of obtaining blood**
 - Tapping blood vessels in hemal arch
 - If less than 15cm, must be sacrificed
 - Larger than 15cm, may use syringe on anesthetized fish

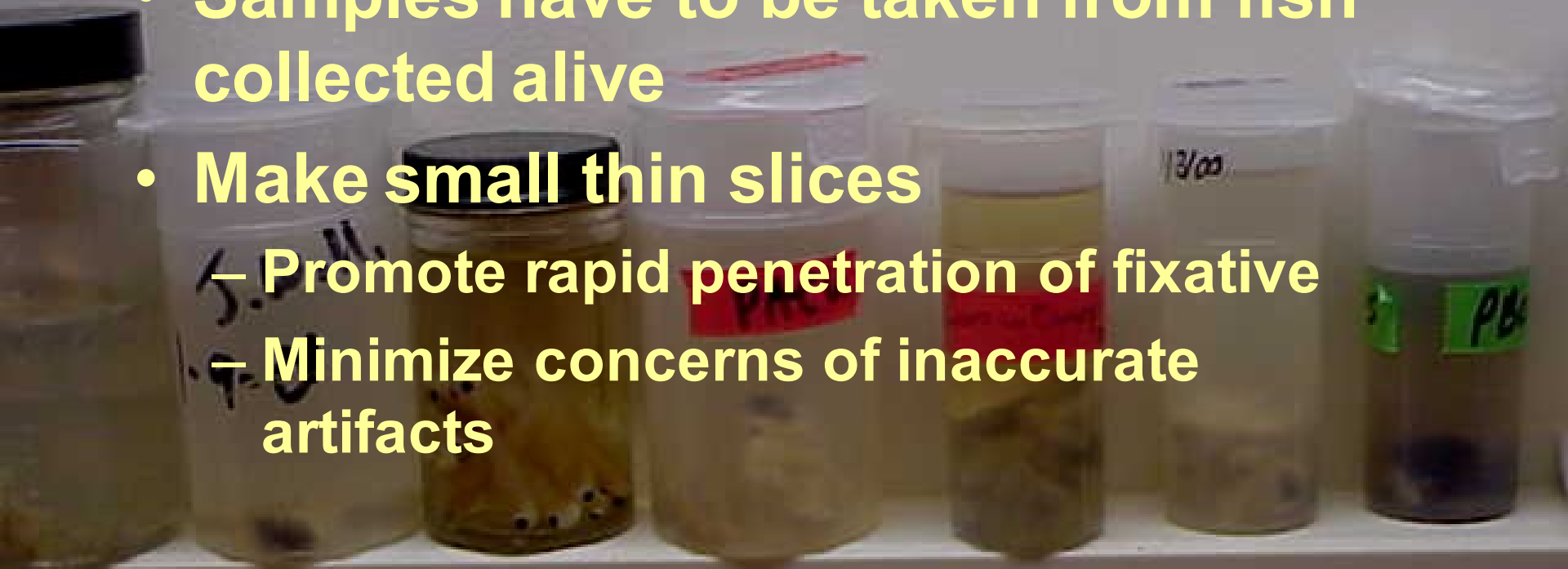
Sampling Blood

- Preservation of samples
 - Could be stored for several hours
 - Hematocrit should be run within minutes of blood collection
 - Most blood characteristics determined from plasma
 - Centrifuge and separate immediately



Sampling for Histology (cont.)

- Postmortem changes histological features
- Samples have to be taken from fish collected alive
- **Make small thin slices**
 - Promote rapid penetration of fixative
 - Minimize concerns of inaccurate artifacts



Sampling for Histology

- Drop in labeled vials of fixative
 - Bouin's fluid excellent fixative
 - Ten per cent formalin
 - Volume of fixative should be 10 times that of tissue



Sampling for Residue Analysis



- Tissue taken from any fish that is not putrid
- Heavy metal- store in plastic
- Organic compounds- store in foil
- Sample white muscle, as is edible portion