



Chapter 12

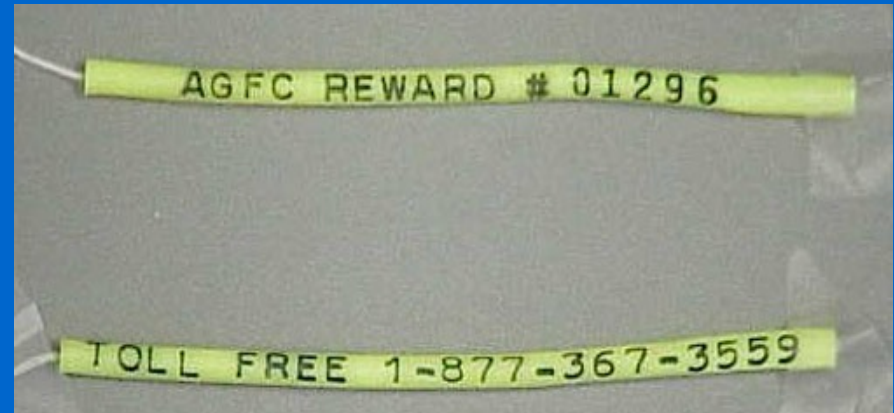


Tagging and Marking



12.1 Introduction

- **Marks = anything used for recognition**
 - External
 - Internal
 - Part of body tissue
- **Tags = contain specific id information**
 - External attachment
 - Internal attachment



Information obtained from mark/tag studies

- Label animal for special handling
- Movement and migration studies
- Population statistics
 - Growth
 - Exploitation and Natural Mortality

Study Growth



Tagged



Recaptured

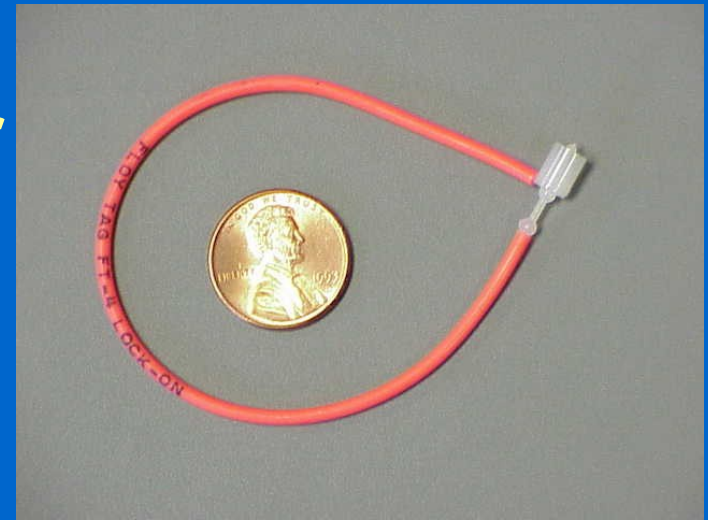
12.2 Assumptions



- A tagged fish looks like a tagged fish
- Tagged fish keep tags
- Tagged fish are recognized and reported

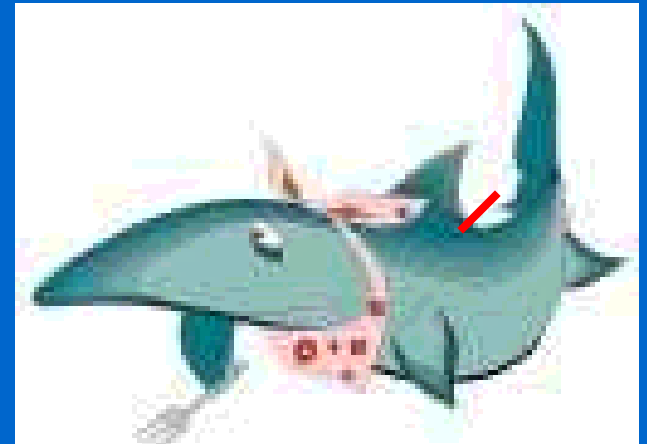
Tag Retention

- Type of tag (design, size, shape)
- Color - Red, Orange, or Yellow are best colors
- Attachment location
- Species being tagged
- Individual doing the tagging



Other Assumptions

- Mortality rates of marked and unmarked fish equal
- Handling leads to post-tagging mortality
- Tagging doesn't reduce growth
 - Interfere with consumption
 - Interfere with swimming
- Tagging doesn't alter behavior



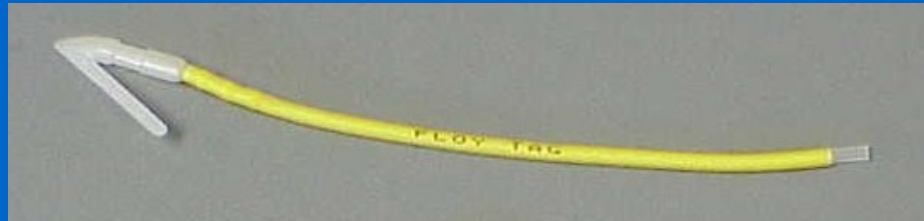
12.3 External Tags and Marks

- In 65% of 900 studies external tags were used
- Examples
 - Fin clips on soft dorsal, anal, caudal fin
 - Hole-punched or notched
 - Fin clips on pectoral or pelvic fins
- Still recognizable after regeneration



Dart and T-Bar Anchor Tags

- Anchor - Plastic or wire arrow (dart) or t-shaped (internal)



- Shaft - vinyl tube with unique information (external)



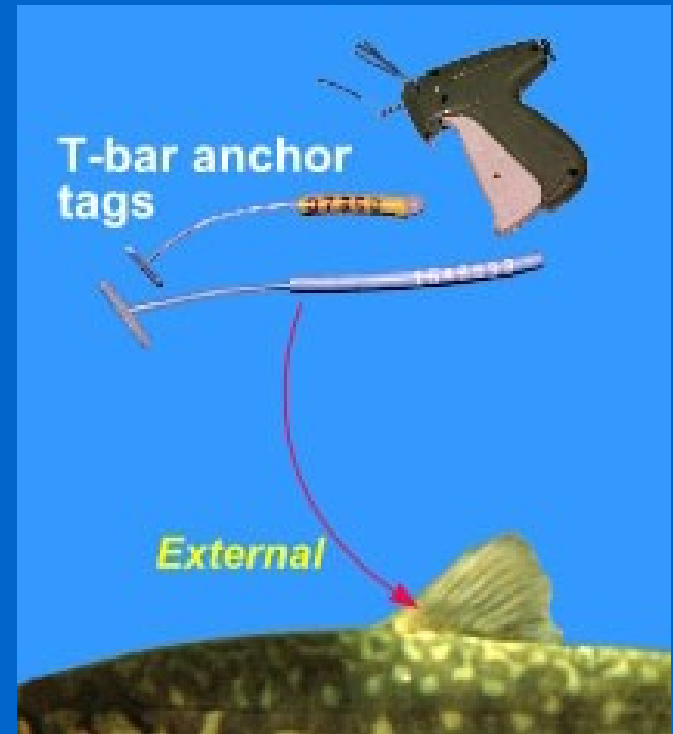
Dart and T-Bar Anchor Tags (cont.)

- T-bar inserted with special "gun" (clothing in a retail store)
- Anchor loaded into hollow metal tube.



Dart and T-Bar Anchor Tags (cont.)

- Repeatedly dip hypodermic portion in alcohol
- Inserted between pterygiophores below the dorsal fin.



Dart and T-Bar Anchor Tags (cont.)

- Insert under scales or remove scales at insertion point
- T or barb caught, shaft streams back along fish

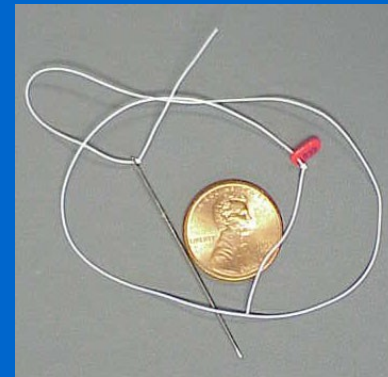


Dart and T-Bar Anchor Tags (cont.)

- Tug tag to ensure retention
- Don't re-tag fish, poor survival
- Hold sample for estimate of tagging mortality
- Double tag a fraction to examine tag loss rate

Transbody Tags - Peterson Disc Tag

- 2 round plastic tags
- either side of body
- wire through tag, muscle and second tag and back again



- minimizes growth between tags

Transbody Tags

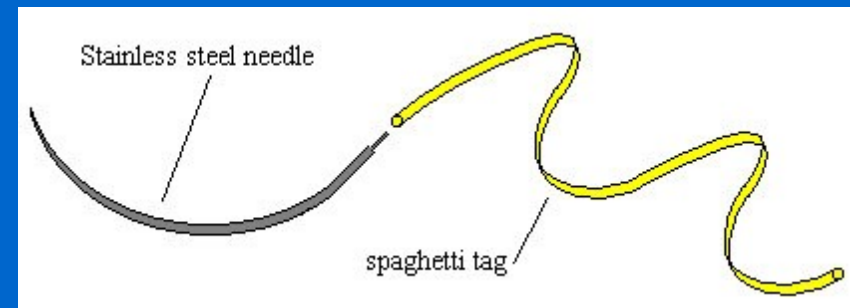
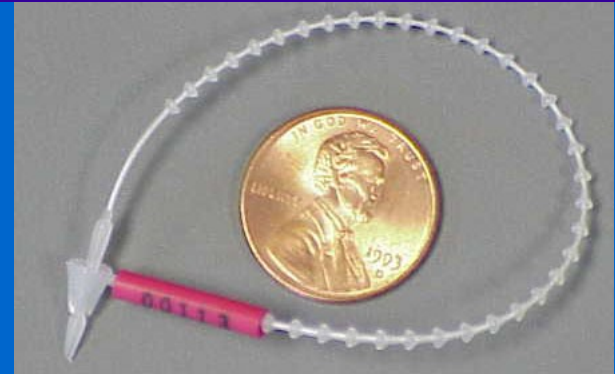
- Carlin Tag (a dangler tag)

- Cannula is hollow hypodermic needle
- Two cannula inserted through dorsal musculature
- U-shaped wire fed through the cannula
- Cannula removed, wire pulled tight, crimped
- Info on plate attached to side of fish

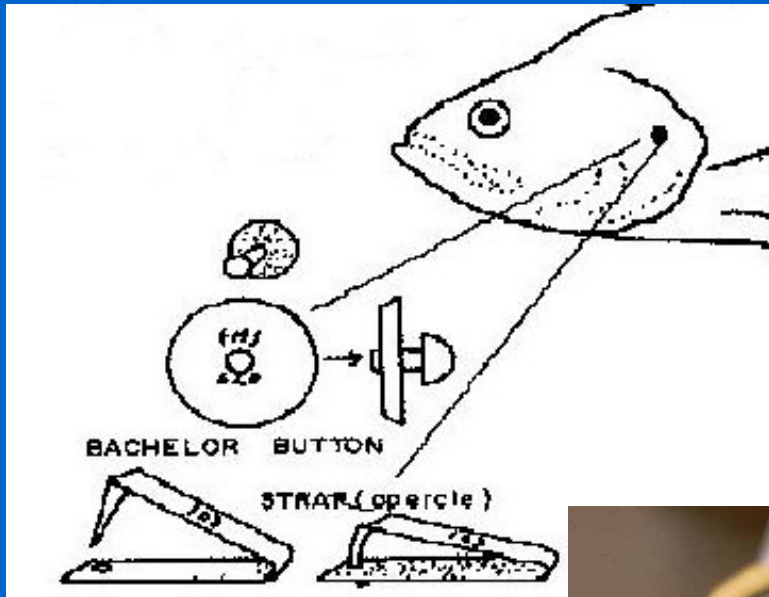


Transbody Tags - Spaghetti Tag

- Loop of thin vinyl tubing
- Cannula through dorsal muscle
- Pass tube through cannula, remove cannula
- Tube tied in a knot trailing behind fish



Transstructural Tags - altered fish behavior, obsolete

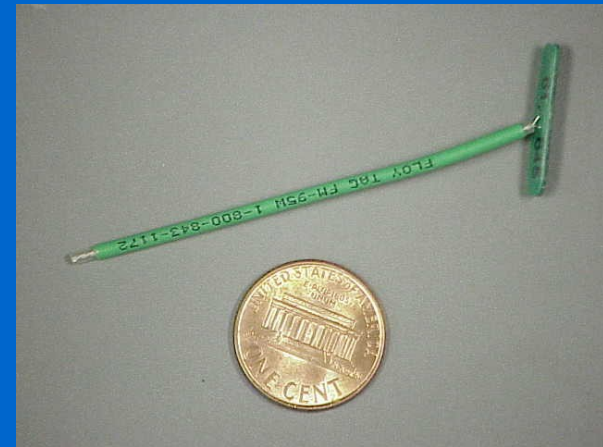


- Bachelor buttons - operculum
- Strap tags - operculum, jaw



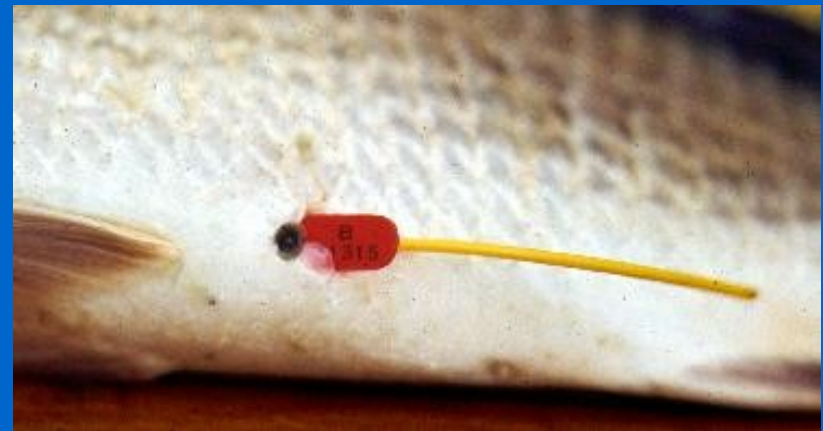
Internal anchor tag

- Prototype for all anchor tags
- Into body cavity

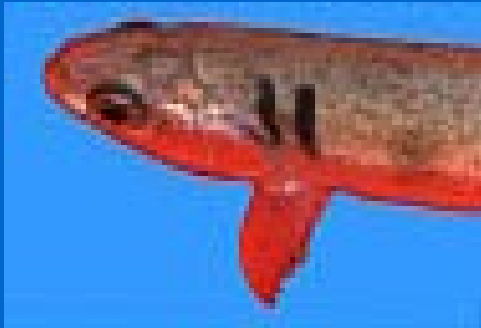


Advantages & Disadvantages

- **Advantage**
 - High retention rate
- **Disadvantages**
 - Abrasions internally and externally
 - Difficult to tag
 - Requires experience
 - Time consuming



Branding



- Scar on fish
- Hot and cold
- Cold preferred



Cold branding



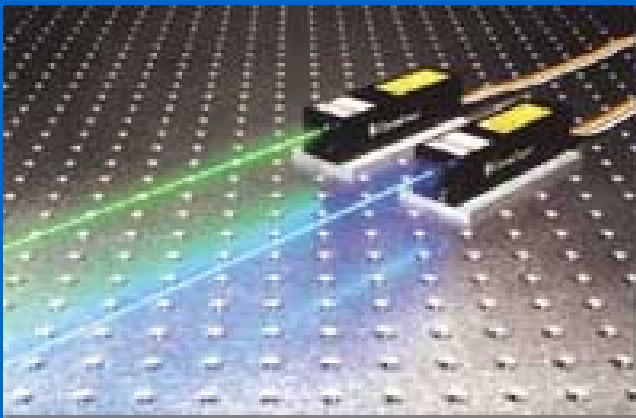
- Liquid nitrogen
- Pressurized carbon dioxide



Hot branding



- Boiling water
- Propane torch
- Soldering iron
- Lasers



Advantages & Disadvantages

- **Advantages -**
 - Quick
 - Body surface not penetrated
 - Mortality low
 - On any size fish
- **Disadvantage**
 - Short term mark

Pigment marks

- Dyes
- Stains
- Inks
- Paints
- Microscopic plastic chips



Applied by

- Immersion
- Spraying
- Injection
- Tattooing



Advantages & Disadvantages

- **Advantages**
 - Easy to apply
 - Inexpensive
- **Disadvantage**
 - Limited to number of available colors



12.4 Internal tags and marks

- within or beneath epidermis of animal

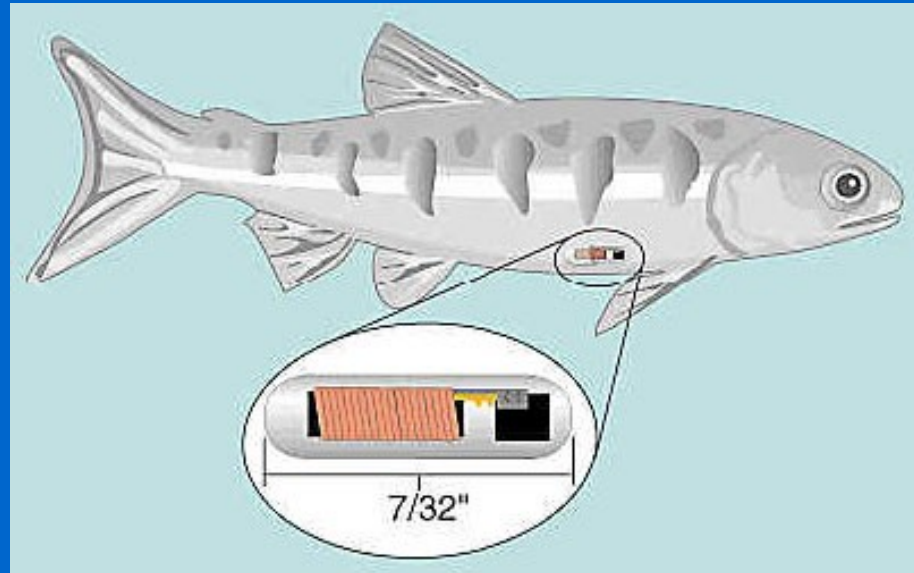


Advantages & Disadvantages

- **Advantages**
 - Does not require mutilation
 - Does not protrude from body
 - Very high retention
- **Disadvantage**
 - Not visible



Tags should be



- **Made of bio-compatible material**
- **Placed in non-obtrusive locations**
- **Small in relation to host**

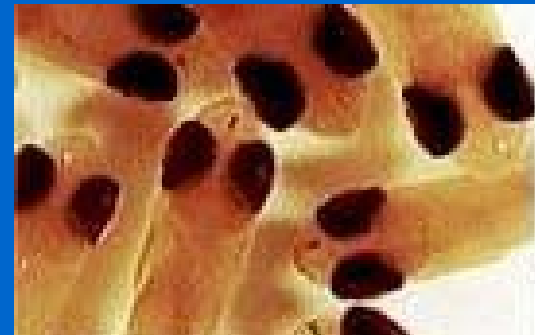
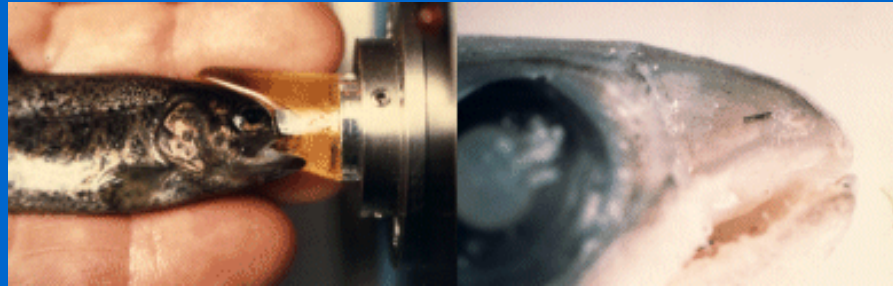
Types of internal tags

- **Visible implant tags (VIP)**
 - Alphanumerically coded
 - Polyester and diazo film
 - On un-pigmented tissue



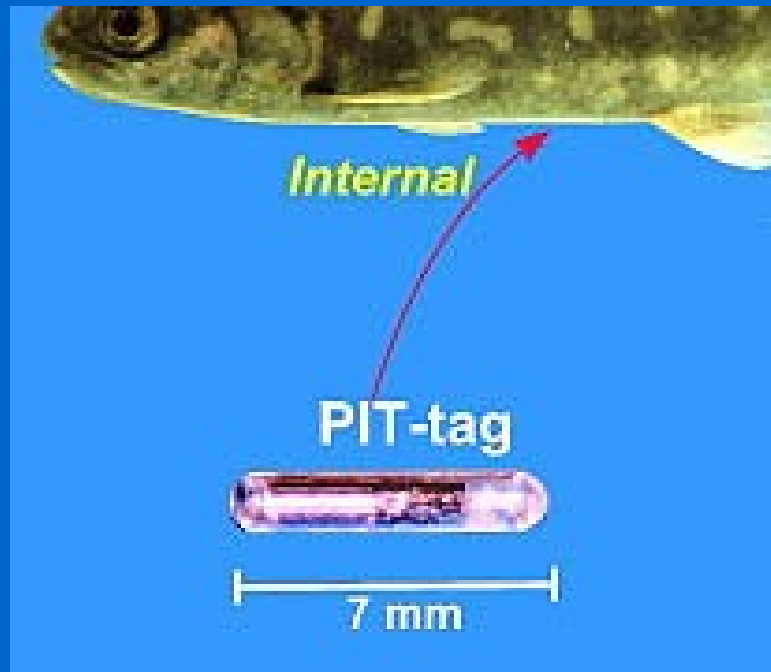
Types of internal tags (cont.)

- **Coded wire tags (CWT)**
 - Most popular in the world
 - Magnetized stainless steel
 - Used widely in salmonids



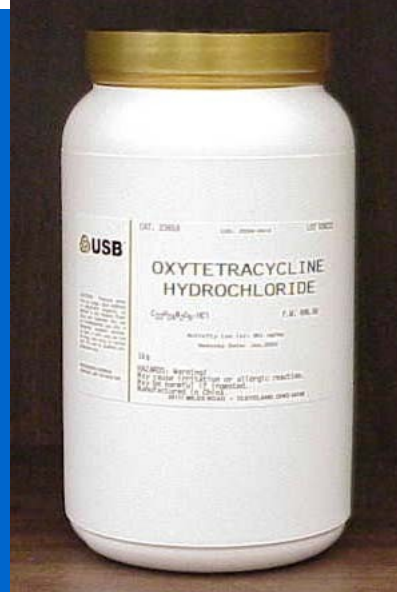
Types of internal tags (cont.)

- **Passive integrated transponder tags (PIT)**
 - **Electronic identification system**
 - **Computer chip and antenna in glass tube**
 - **Injected into animal**
 - **Expensive**



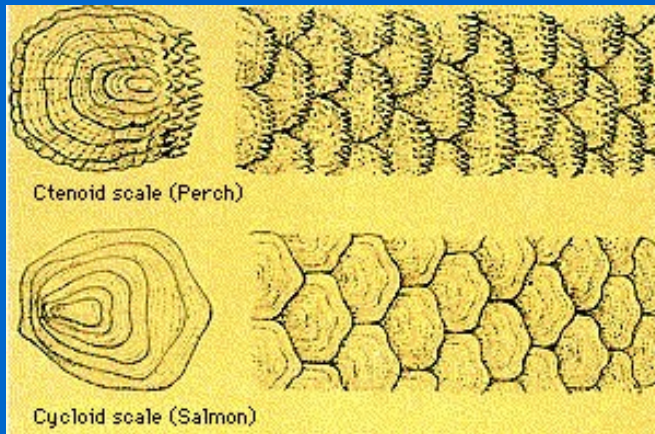
12.5 Chemical marks

- Induced by

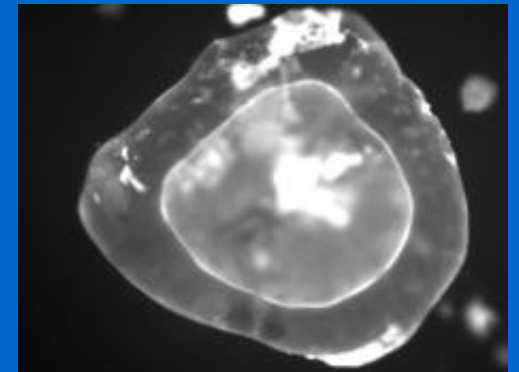
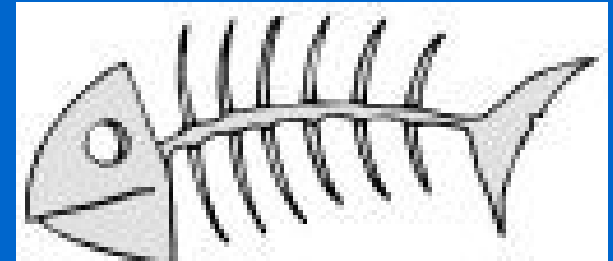


- Immersion
- Injection
- Ingestion

Tissues and Types



- **Tissue**
 - Otoliths
 - Bones
 - Scales
- **Types**
 - Elemental
 - Fluorescent

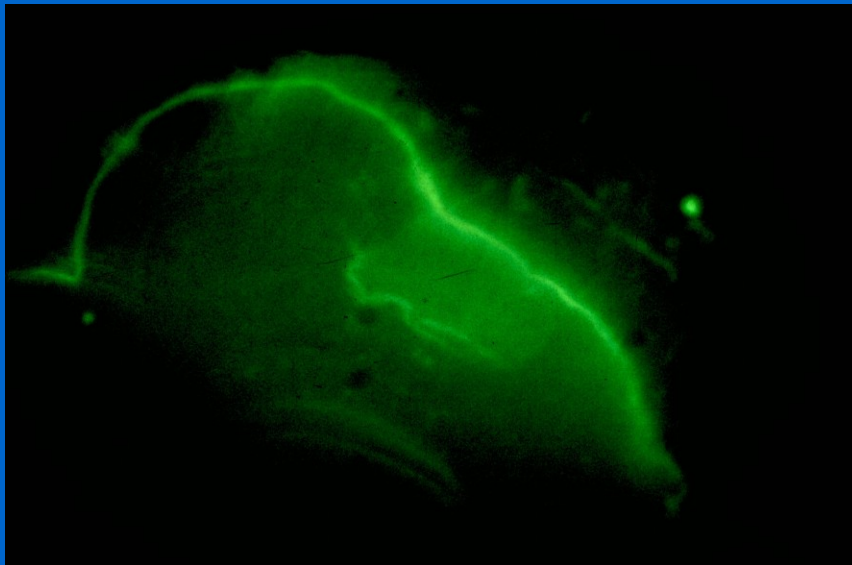


Elemental analytical techniques

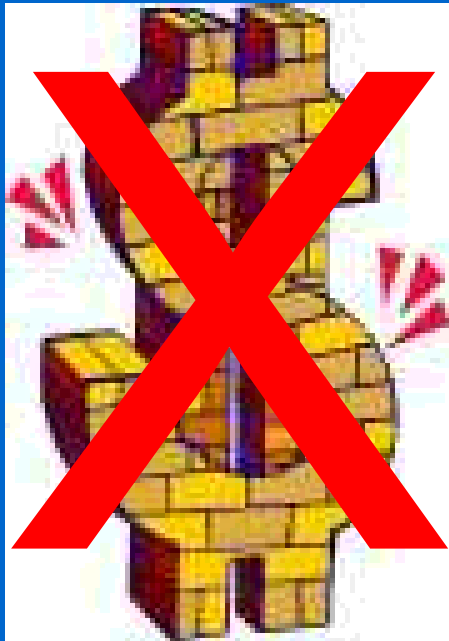
- Atomic absorption spectrometry
- Inductively coupled plasma mass spectrometry
- X-ray fluorescence spectrometry
- Neutron activation analysis

Fluorescent compounds

- Tetracycline
- Calcein
- Seen under UV light



Advantages



- **Advantages**
 - Large numbers marked easily
 - Quick
 - Inexpensive
 - Long lasting

Disadvantages

- **Disadvantages**
 - **Expensive lab equipment required**
 - **Time consuming tissue preparation**
 - **Expensive**



12.6 Natural marks

- from natural processes
 - genetically inherited
 - from environment
- Example: black-nosed crappie



Examples

- Otolith or scale growth
- Body size
- Color



Assumptions

- Present and stable throughout study
- Sure way to identify animals

Morphology and Morphometric Marks

- **Morphometric**
 - Body Shape
 - Size
 - Color
- **Meristic...on number of**
 - Fin rays
 - Myomeres
 - Lateral line scales

Scale and otolith marks

- **Size**
- **Shape**
- **Circulus**



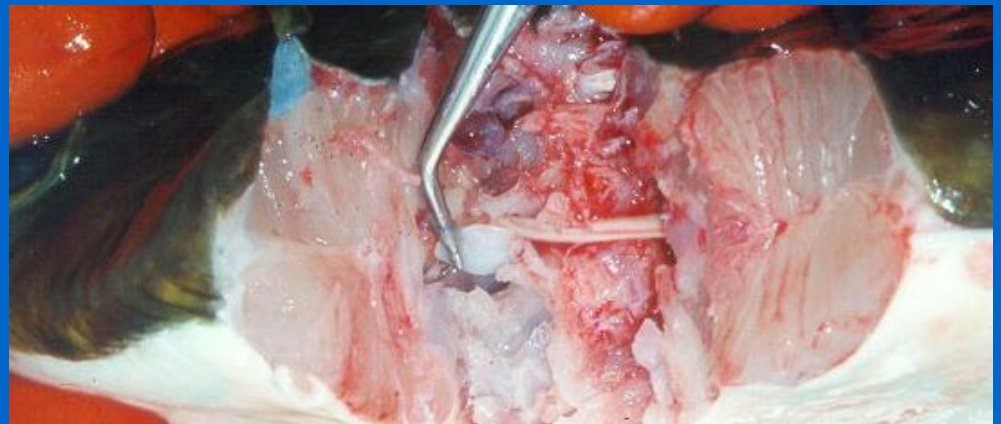
Advantages & Disadvantages

- **Advantages**

- Naturally produced
- No stress
- Less handling and injury
- Nearly all fish carry mark

- **Disadvantage**

- Scales and otoliths have to be removed



Genetic marks

- Advantages & Disadvantages

- Advantage
 - Natural mark
- Disadvantages
 - Requires large number of fish
 - Passed on to next generation
 - Complex
 - Requires fish to be harvested



Other natural marks

- Parasites
- Chemical marks

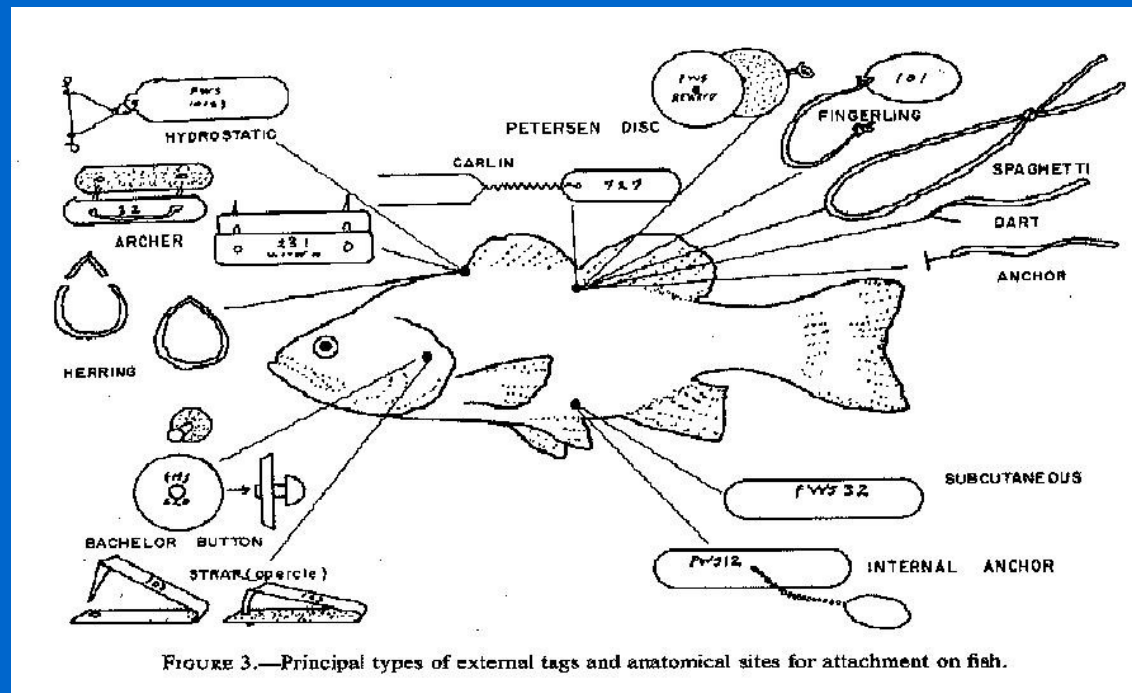


12.7 Choice of Technique - Considerations

- Objectives
- Behavior and biological functions
- Mark retention
- Informational capacity
- Tagging requirements
- Recovery requirements

12.8 Design of Program - Planning

- Need
- State goal/objective
- Develop methodology
- Choose tags



Data management and analysis

- Codes for species
- Select computer programs
- Consult with expert



Public relations

- News releases
- Distribute posters
- Cash rewards (\$5, \$20, \$100)

REWARD



SEVERAL HUNDRED CRAPPIE HAVE BEEN TAGGED WITH PINK STREAMER TAGS BELOW THE DORSAL FIN AND RELEASED INTO LAKE CHICOT. THIS IS PART OF ONGOING RESEARCH BY THE ARKANSAS GAME AND FISH COMMISSION IN CONJUNCTION WITH THE UNIVERSITY OF ARKANSAS AT PINE BLUFF TO ENHANCE CRAPPIE FISHING IN LAKE CHICOT.

ANGLERS WHO CATCH ONE OF THESE FISH AND RETURN THE TAG WILL RECEIVE A REWARD OF \$5, \$20, OR \$100.

TO BE ELIGIBLE, ANGLERS MUST PROVIDE THE TAG ITSELF ALONG WITH THE FOLLOWING INFORMATION: NAME AND ADDRESS OF ANGLER, TAG NUMBER, DATE, TIME, AND LOCATION (BE SPECIFIC) OF CATCH, LENGTH AND WEIGHT OF FISH IF POSSIBLE, AND WHETHER THE FISH WAS KEPT OR RELEASED. TAGS SHOULD BE CLIPPED OFF, NOT PULLED OUT, FROM THOSE FISH YOU WISH TO LIVE RELEASE.

RETURN TAGS AND ABOVE INFORMATION TO:
AQUACULTURE AND FISHERIES CENTER, UAPB
ATTN: MIKE CARLSON
P.O. BOX 4912

PINE BLUFF, AR 71611

OR YOU MAY STOP AT NEARBY STORES OR GAS STATIONS TO PICK UP A RETURN CARD

