MBSS Fish Sampling Protocols

Certification – Fish Crew Leader

Valid for three years, provided that you:

- Pass the written test and a field audit (Year 1)
- Attend the Fish Crew Leader Certification day of training each year
- Take and pass the written tests (Year 2 & 3)

Certification – Fish Taxonomy

Valid for one year, provided that you:

- Pass the taxonomy test on Day 4 of training
- Pass the field audit

- Pay for certification only after passing the written tests at training. No refunds!
- Schedule field audits by July 15
- Complete field audits by September 30

Electrofishing Basics and Safety:

- Neither this training nor the certification will teach you how to use an electrofishing unit
- USFWS Electrofishing Course, CPR, and First Aid are highly recommended

The crew leader is responsible for ensuring that all protocols are performed properly and safely

Collection Permits

- *Everyone* in MD conducting wildlife sampling must obtain a scientific collection permit
- Application fee - $10
- All permits expire December 31 of the year they were issued
- Contact: Richard Bohn at MDNR Boating and Fishing Services - (410) 260-8317

Sampling on State Lands

- Access to DNR state lands for stream sampling requires a Minimal Impact Use Agreement

- Contact: Jay Kilian (jay.kilian@Maryland.gov; 410-260-8617

Landowner Permission

- All streams, floodplains, and riparian corridors are NOT property of the state of Maryland.
- If the property owner of land adjacent to the site cannot be contacted, what should be done?
- Do not sample site without permission from all landowners whose property extends to the site or needs to be crossed to reach the site

Prior to Sampling, we recommend contacting:

- DNR Regional Fisheries managers

  Mark Staley: Central Region (410) 442-2080

  Alan Klotz: Western I Region (301) 334-8218

  Michael Kashiwagi: Western II Region (301) 898-5443

  Brett Coakley: Eastern Region (410) 260-8431

  Mary Groves: Southern Region (301) 888-2423

  Natural Resources Police

- County Environmental Control offices

Maryland Water Monitoring Council Round Table

Locality Information

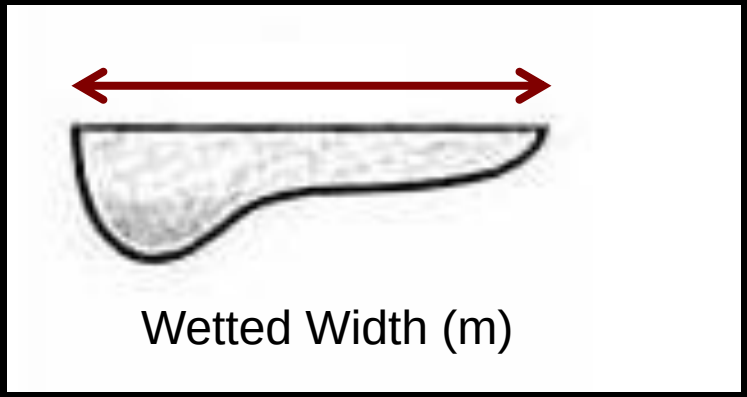
- Geographic Coordinates are required
  - Decimal degrees, NAD 83
- Stream Name
  - For unnamed tributaries, use mainstem name followed by UT
    - Ex. Deer Creek UT
- Locality
  - Reference nearby town or road crossing
    - Ex. ~3 air miles NE of Olney
- Site Access Route

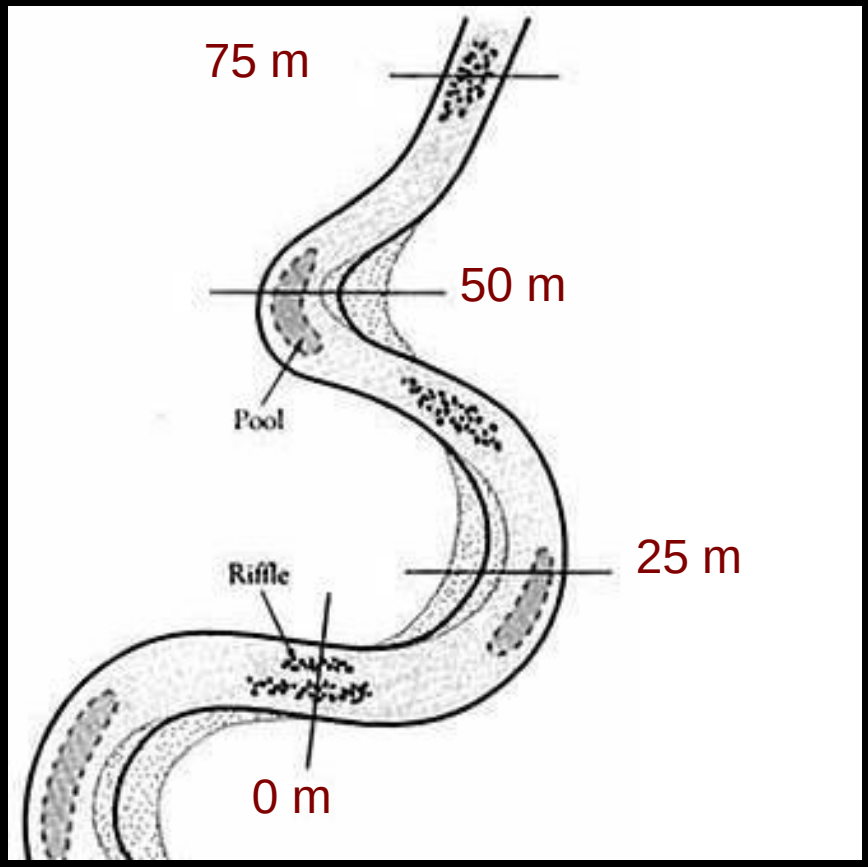
MBSS Site Length = 75 m

Measured following the deepest part of the channel (Thalweg)

If your data should be used in calculating an IBI…..

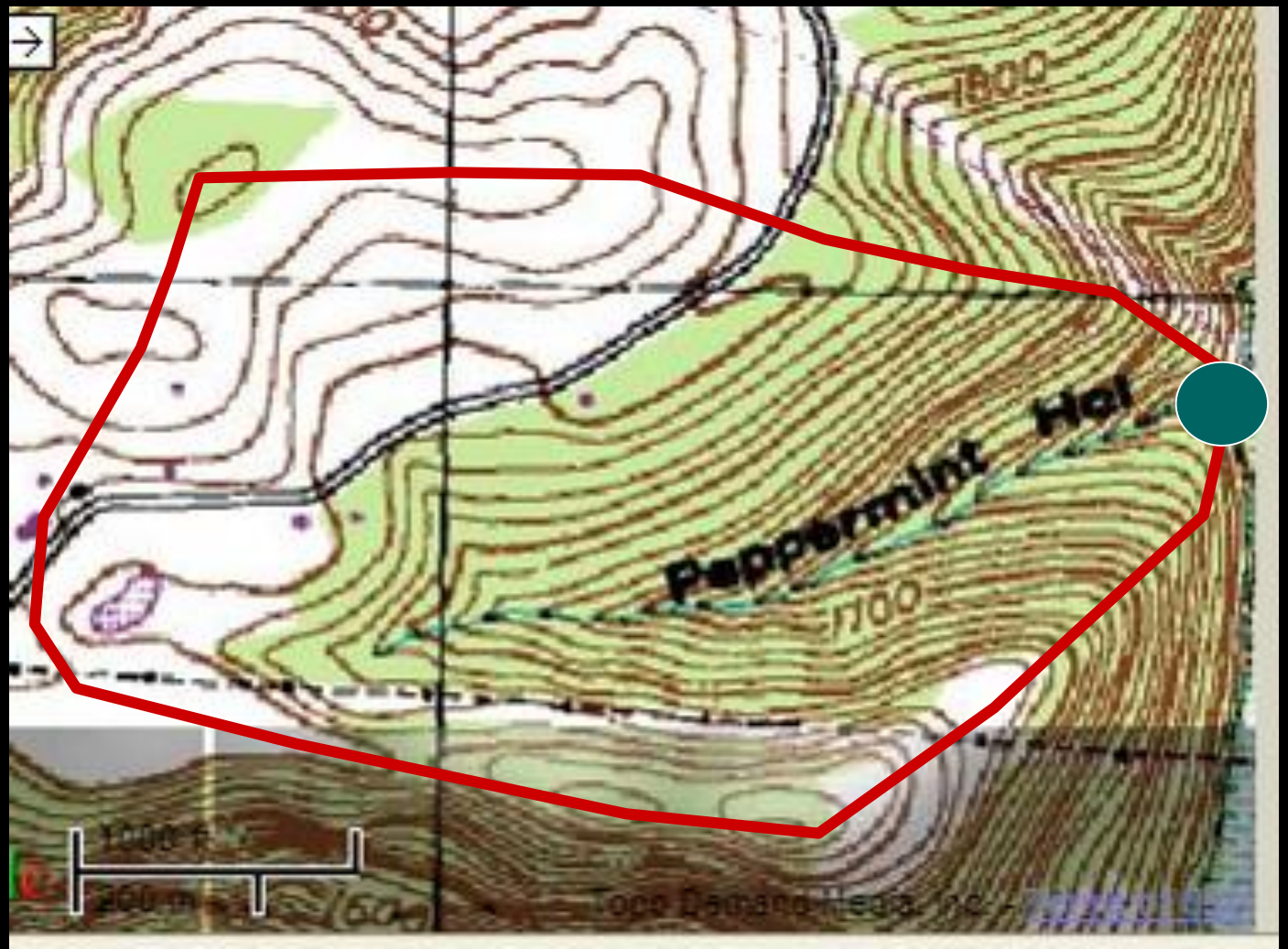
Measure wetted width at 4 locations





If your data should be used in calculating an IBI…..

Determine the catchment area for each site



Fish Sampling Protocols Overview

- All fish sampling conducted within index period (June 1 – September 30)
- 75 meter blocknetted reach
- Electrofish the 75 m site 2 times
- All fish identified to species, counted, and weighed for total biomass

Time of year for MBSS Fish Sampling (index period)

June 1 – September 30

Can the stream be sampled?

-Safety
-Depth
-Obvious tidal influence
-impounded
-Beaver dam
-Permission denied
-Visibility (except for blackwater)

Do not disturb the stream (chase fish out and make turbid) prior to sampling

List of necessary equipment for MBSS fish sampling crews

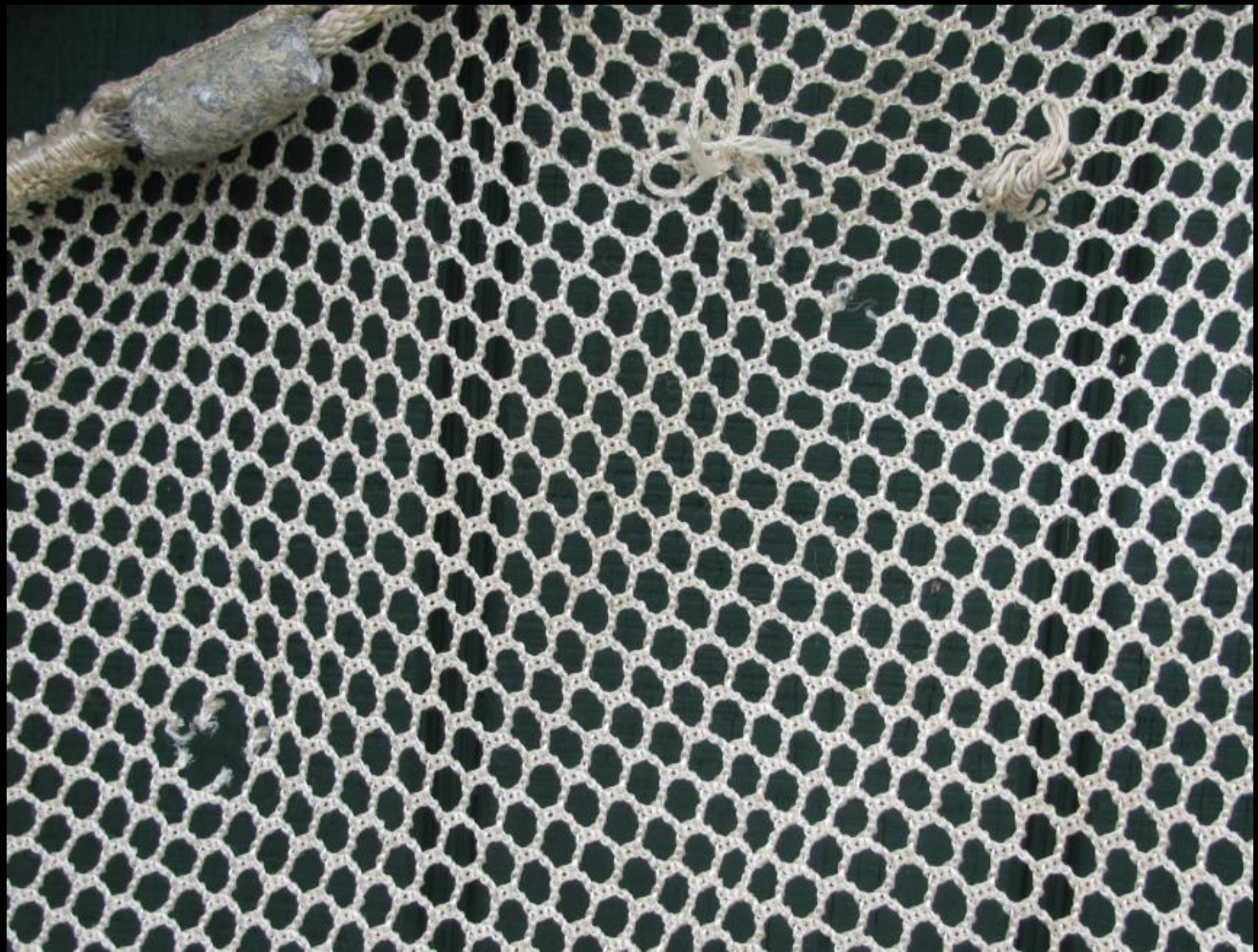
MBSS sampling manual
Scale calibrated to 10 g accuracy
Record of scale calibration
Backpack electrofishing Unit(s) (enough to sample the entire stream width sufficiently)
Anode rings fitted with 1/4" mesh netting
buckets (6 gallon size recommended)
Dip nets
Voucher containers
Block nets
Pre-printed voucher labels
Live cars (recommended)
Fish Taxonomic Key(s)
Formalin
Waders (no felt soles please)
measuring tape
Digital camera
G.P.S. unit
Polarized Glasses
Disinfectant lotion
Decontamination solution (10% bleach or Virkon)
Scientific collection permit

Maryland DNR can NOT provide field crews and sampling equipment to persons seeking MBSS Fish Crew Leader certification.

Felt soled waders are banned in Maryland! Alternatives are available

Polarized lenses and waders are required

Block nets and dip nets
<= ¼” mesh
No holes bigger than ¼”



Site Preparation

Block each end of the 75 m site with blocknets

Secure block nets to bottom

Blocknets Cont.

- Secure the Lead Line
  - Lead line should lay flat over stream bottom
  - Lead line should be weighted down and secured with rocks or sticks
  - Eliminate Fish movement into or out of the site

Raise and prop the top
(no fish should be able
to get through or over)

Blocknets Cont.

- Secure Sides
  - Tie nets to stable bank structure
  - Make sure the lead line is secure all the way to the bank!

Block tributaries too

Culverts

Sampleable vs Unsampleable

If a site includes a culvert that is too small to sample throughout its entire length, what adjustments should be made to the site's location?

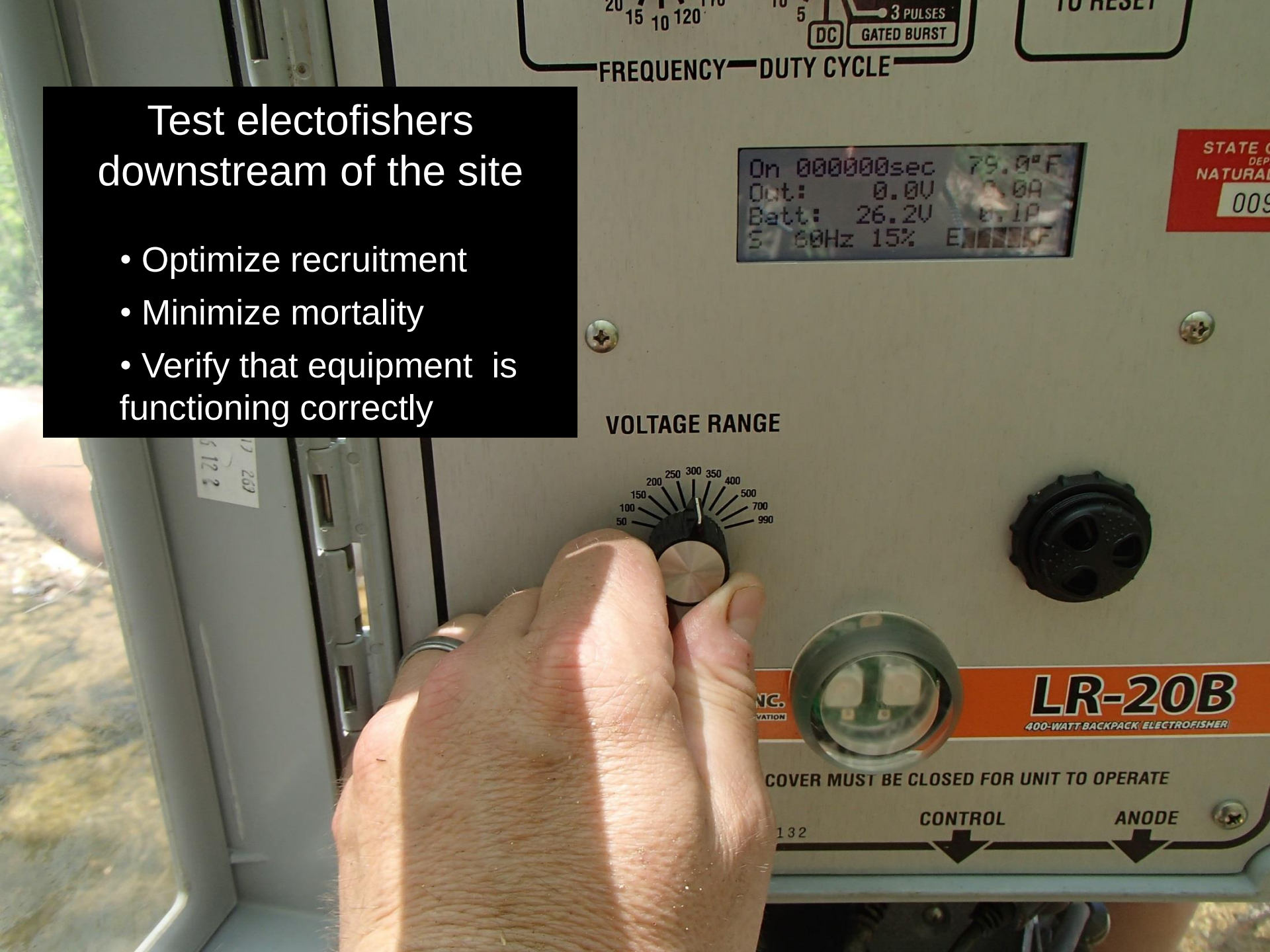
-Block the culvert and add the length of the culvert to the upstream or downstream end of site

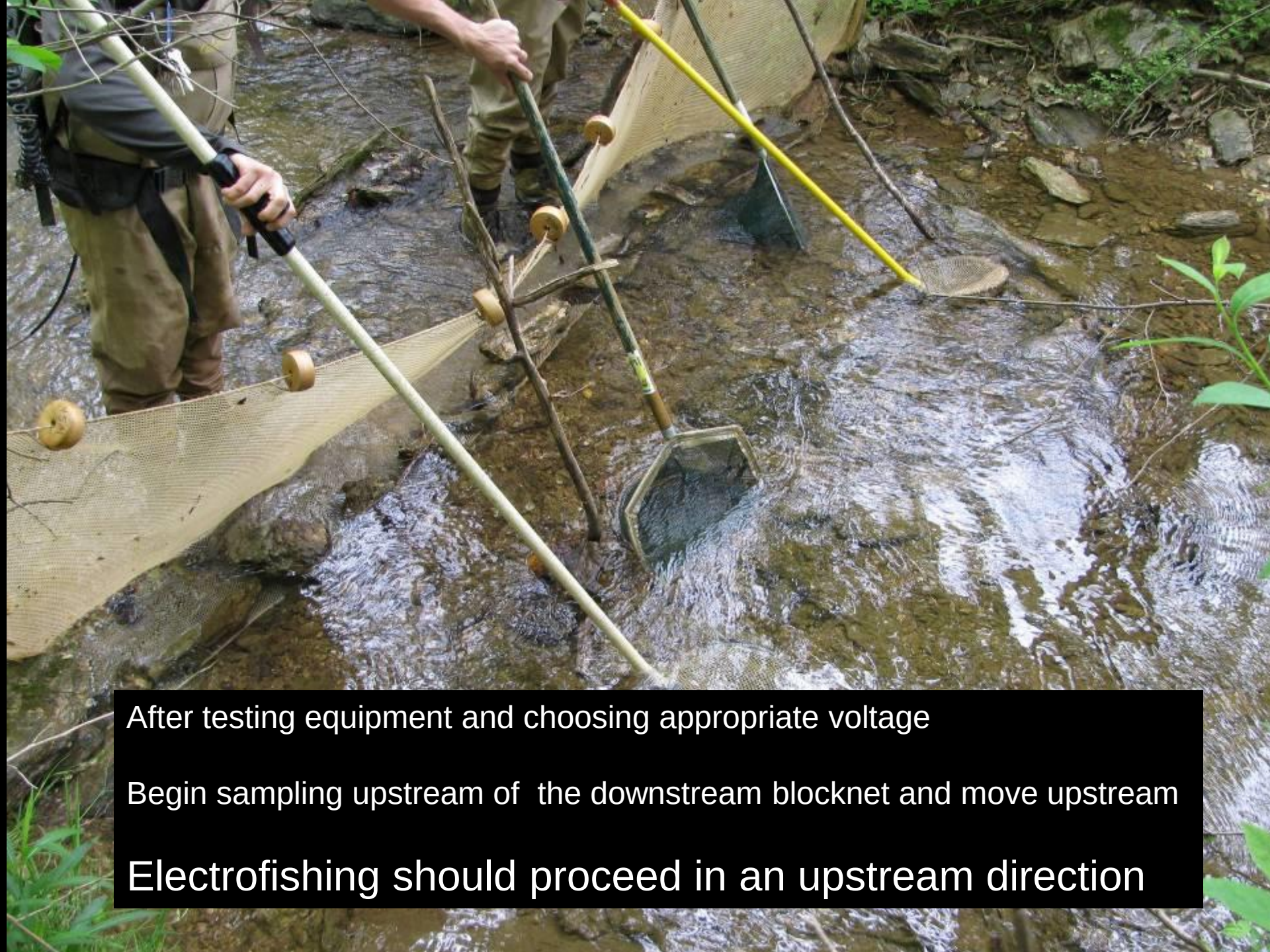
Add nine meters to one end of site

After deploying block nets, Clear overhanging vegetation that may impede electrofishing. If turbid following clearing – wait up to one hour

Electrofishing

- Two Pass Electrofishing
- Sampling all habitats
- Collecting all fish, salamanders, and crayfish
- Same effort both passes


Test electofishers downstream of the site
• Optimize recruitment
• Minimize mortality
• Verify that equipment is functioning correctly
FREQUENCY
DUTY CYCLE
3 PULSES
GATED BURST
DC
On 000000sec 79.0°F
Out: 0.0V
Batt: 26.2V
60Hz 15%
VOLTAGE RANGE
50
100
150
200
250
300
350
400
500
700
990
LR-20B
400-WATT BACKPACK ELECTROFISHER
COVER MUST BE CLOSED FOR UNIT TO OPERATE
CONTROL
ANODE



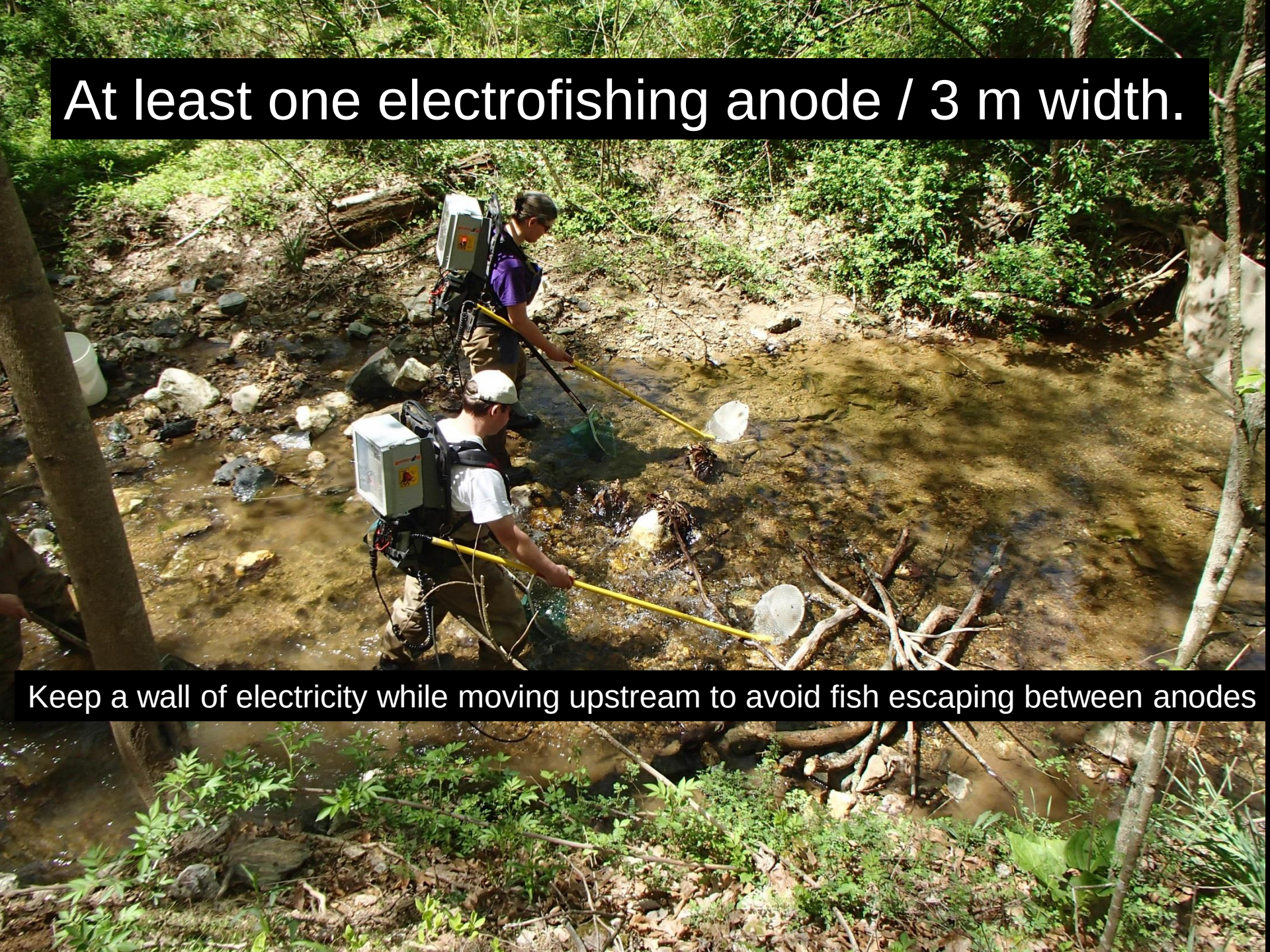
After testing equipment and choosing appropriate voltage

Begin sampling upstream of the downstream blocknet and move upstream

Electrofishing should proceed in an upstream direction

Maximize Crew Efficiency

- Shockers
  - Maintain solid line of electricity
    - Keep appropriate distance, stay in line, keep shocking
- Dip-netters
  - Stay close to shocker to provide assistance
    - Net fish, receive fish, clear path, watch electrofisher status
- Bucketters
  - Stay a few feet behind shocker
    - Carry bucket and receive fish, net last-chance fish, change water


At least one electrofishing anode / 3 m width.
Keep a wall of electricity while moving upstream to avoid fish escaping between anodes

Minimum of one dip netter/ 2 shockers
Ideally, 1 dip netter / 1 shocker

Electrofish the 75 m site 2 times (2 passes)

At least one electrofishing anode / 3 m width.

Critical to keep anode and cathode in the water

Electrofish everywhere - ALL habitats.

Keep nets on the stream bottom in fast water to ensure the collection of small benthic fish

Try to limit mortality while electrofishing and handling fish

Precautions taken to minimize fish mortality

Quick transfer of fish out of dip nets

Use of flow-through live wells

Use of appropriate voltage

Use the same effort (# of anodes, netters, etc. for both passes)

Check downstream blocknet after each pass
Include those fish captured in the downstream blocknet with each pass's catch

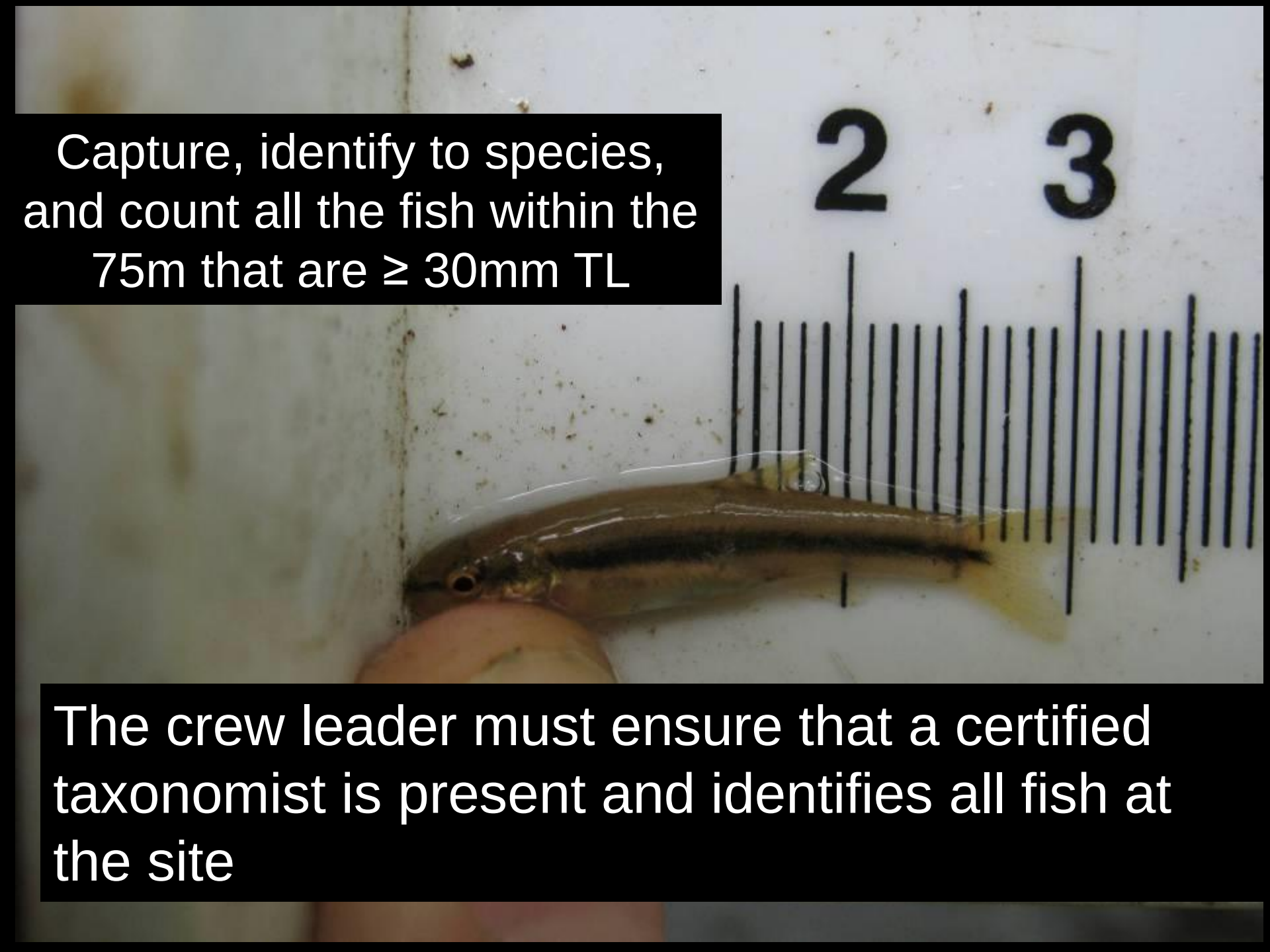
Fish Processing

- Count and identify all individuals >30mm to species
- Weigh all fish in aggregate to nearest 10g
- Voucher (specimen or photo) any unknown specimens or unique records
- Measure total length (TL) of gamefish

Wait (up to one hour) for stream water to be clear enough so the bottom is visible before starting the second pass

Record electrofishing time for each unit
and record the number of anodes per unit

Do this for each electrofishing pass
separately


Capture, identify to species, and count all the fish within the 75m that are ≥ 30mm TL
2
3
The crew leader must ensure that a certified taxonomist is present and identifies all fish at the site

FISH CRIB SHEET

Page ___ Of ___

	Watershed Code	Segment	Type	Year
SITE	M P A X		R	2 0 0 2

	YY	MM	DD
DATE	0 2		

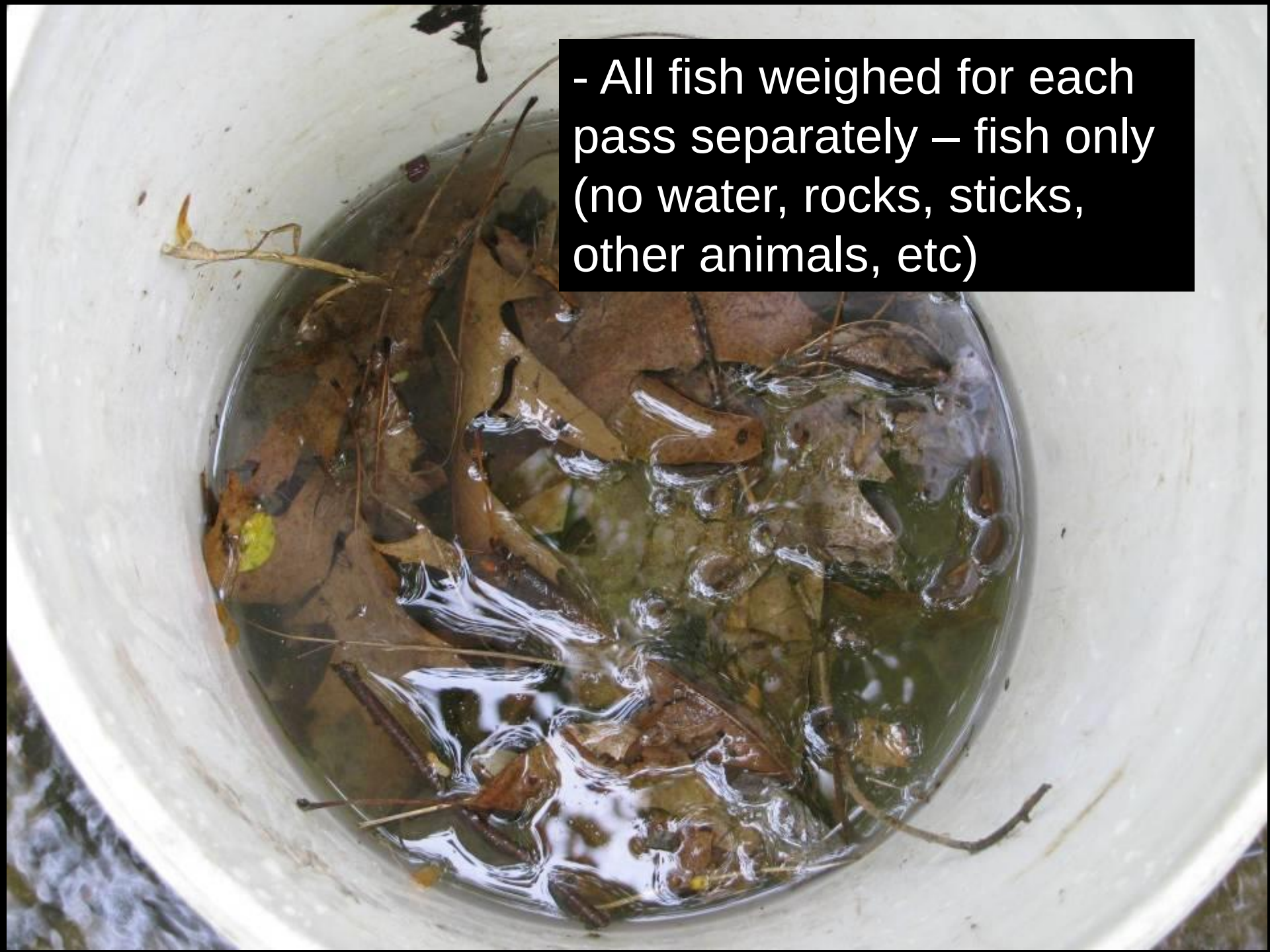
____ PASS			____ PASS		
Species	Tally	Anomalies	Species	Tally	Anomalies

Weighing fish

-weigh fish in aggregate to the nearest 10 g

-Calibrated scale, accurate to + - 10 g

-Bucket tared


- All fish weighed for each pass separately – fish only (no water, rocks, sticks, other animals, etc)

Remove all non-fish animals

ACCULAB
sartorius group
VICON
ON
OFF
ENTER
PRINT
CAL

-Release fish downstream

-Exceptions :

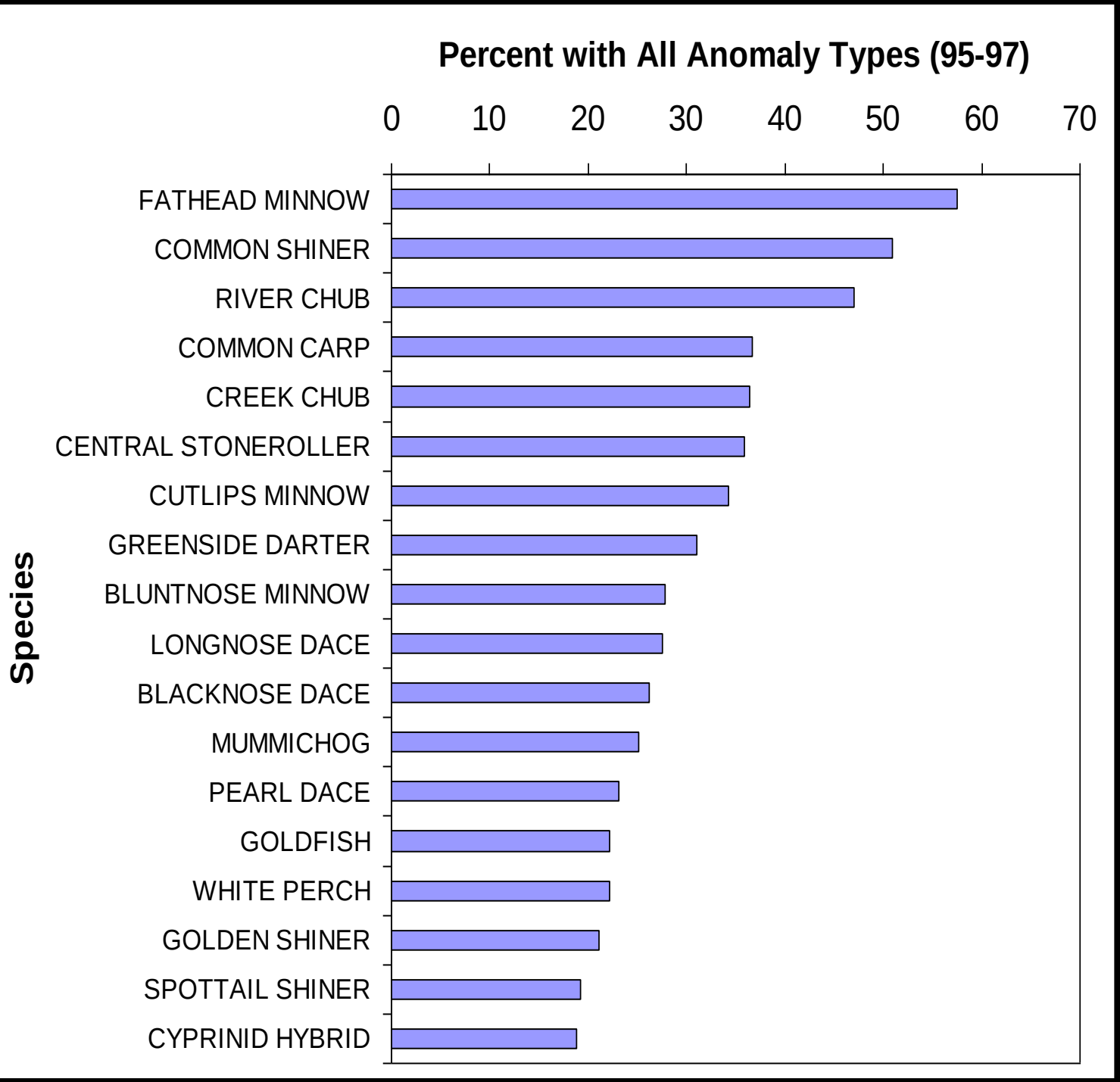
-Eels after 1st pass

-Vouchers that cannot be represented by photographs

Hold eels between passes

- Record any unusual anomalies (if in doubt write it down and take a picture)

Beginning in 2015, anomaly searches at Round One repeat sites



MBSS FISH DATA SHEET

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SITE Watershed Code ____ Segment ____ Type ____ Year 2008

Reviewer: First ____ / Second ____

	(Y/N)
Fish Move. During Net Installation?	
Bottom Visible in all Areas of Seg.?	
Same Water Clarity - 2nd Pass?	
Length of Seg. Sampled (m)	

	(Y/N)	(Y/N)
Fish Captured?		Gamefish?

	Unit___	Unit___	Unit___	Unit___	Unit___
Anodes/Unit					
Time (sec) Begin 1st p.					
Begin 2nd p.					
End 2nd p.					
Volt.					

SPECIES	Number Retained?	1st Pass Catch (Total)	2nd Pass Catch (Total)	Anomalies (Y/N)	Comments

Aggregate Fish Biomass ____ ____ (g)

DECONTAMINATION PROTOCOL

To prevent the spread of invasive species and/or diseases, each crew member should decontaminate their waders and other sampling equipment that has contacted stream water After each site.

Equipment Disinfection

Equipment Disinfection	Dilution Rate	Application
Routine cleaning and disinfection of movable equipment	1:100 (10 grams of Virkon® S to every 1 litre of water)	Spray all equipment with Virkon® S solution at an application rate of 300ml/m²

Disinfectant Footdips and Wheeldips

Disinfection Foot & Wheeldips	Dilution Rate	Application
Disinfection Foot & Wheeldips	1:100 (10 grams of Virkon® S to every 1 litre of water)	Replace solution once it has either become soiled or after a period of 4-5 days. The dilution of the disinfectant solution can be checked for potency at the time of preparation using a Virkon® S dilution test kit.

Fish Vouchering Protocols

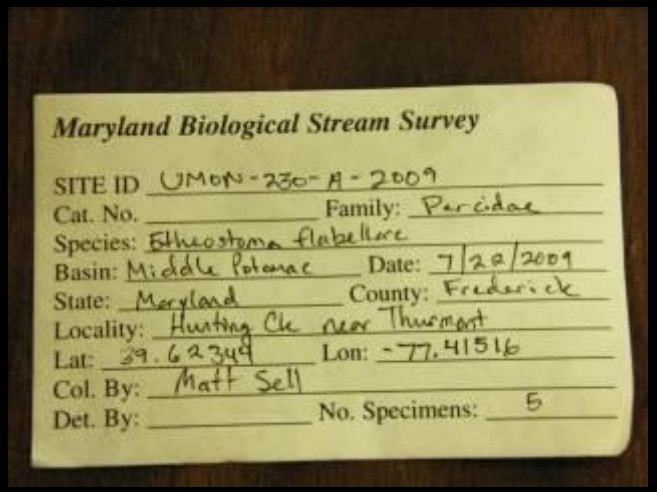
2018 MBSS Summer Training

Specimen voucher collection

- Provides measure of Quality Control (QC)
- Verifies new, odd, questionable records
- Complete voucher collection: at least 5 specimens or photo-vouchers of each fish species identified throughout the year
- Verified by **independent taxonomist**
- Refer to “Procedure for vouchering…”

Voucher specimens

- Voucher labels
  - Acid-free, water proof material
  - Alcohol proof, permanent ink
  - Information verified
- Specimens promptly placed in screw top jars containing 10% buffered formalin solution
  - 9:1 ratio of formalin to water
    - 100% formalin = 37-40% aqueous formaldehyde
  - At least 2:1 fixative to fish ratio, ideally 5:1 ratio
- Slit abdominal cavity on the RIGHT side of large specimens (>150 mm)



Voucher specimens

- Rinse specimens after **at least 48 hour** fixation with water for **at least three days up to a week**
  - Change rinse water **at least four times**
  - Hazardous material, dispose of properly
- Final storage solution
  - 70% EtOH
  - 50% isoproponal
  - Proper voucher label and documentation

Voucher specimens

v. 2009

MBSS FISH DATA SHEET

Page ☐ Of ☐

SITE Watershed Code ☐☐☐☐ Segment ☐☐☐ Type ☐ Year ☐☐☐☐

Reviewer: First _____ / Second _____

	(Y/N)
Fish Move. During Net Installation?	
Bottom Visible in all Areas of Seg.?	
Same Water Clarity - 2nd Pass?	
Length of Seg. Sampled (m)	
Fish Captured? (Y/N) Y	Gamefish? (Y/N) N

Time (sec)	Unit ___	Unit ___	Unit ___	Unit ___	Unit ___
Anodes/Unit	☐	☐	☐	☐	☐
Begin 1st p.	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
Begin 2nd p.	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
End 2nd p.	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
Volt.	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐

SPECIES	Number Retained?	1st Pass Catch (Total)	2nd Pass Catch (Total)	Anomalies (Y/N)	Comments
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐	
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐	
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐	
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐	
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐	

Photographic vouchers

- What to photo-voucher
  - Any RTE species (**DO NOT PRESERVE!**)
    - http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Animal_List.pdf
    - SEE ATTACHMENT
  - Invasive and nuisance species
    - SEE ATTACHMENT
  - Large or very common species
- Why photo-voucher
  - Suitable in lieu of specimens
    - May be inappropriate for very small, immature fishes (e.g., *Notropis* spp.)

Photographic voucher basics

- Camera settings
  - 1024 x 768 pixels or higher
  - Macro setting
  - Flash (when needed)
- Specimen should occupy as much of field of view as possible
- All photo vouchers should be of the left side of the specimen

Photographic vouchers

- Show reference to scale
  - fish board, pencil, coin
- On light background
  - hand is acceptable

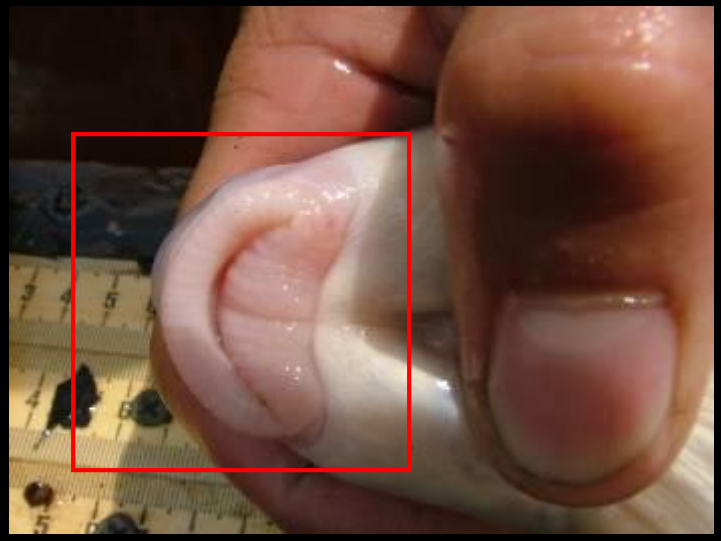
Photographic vouchers

- Show at least full-body image, **specimen oriented to the left**, and other necessary, **key features** for certain species

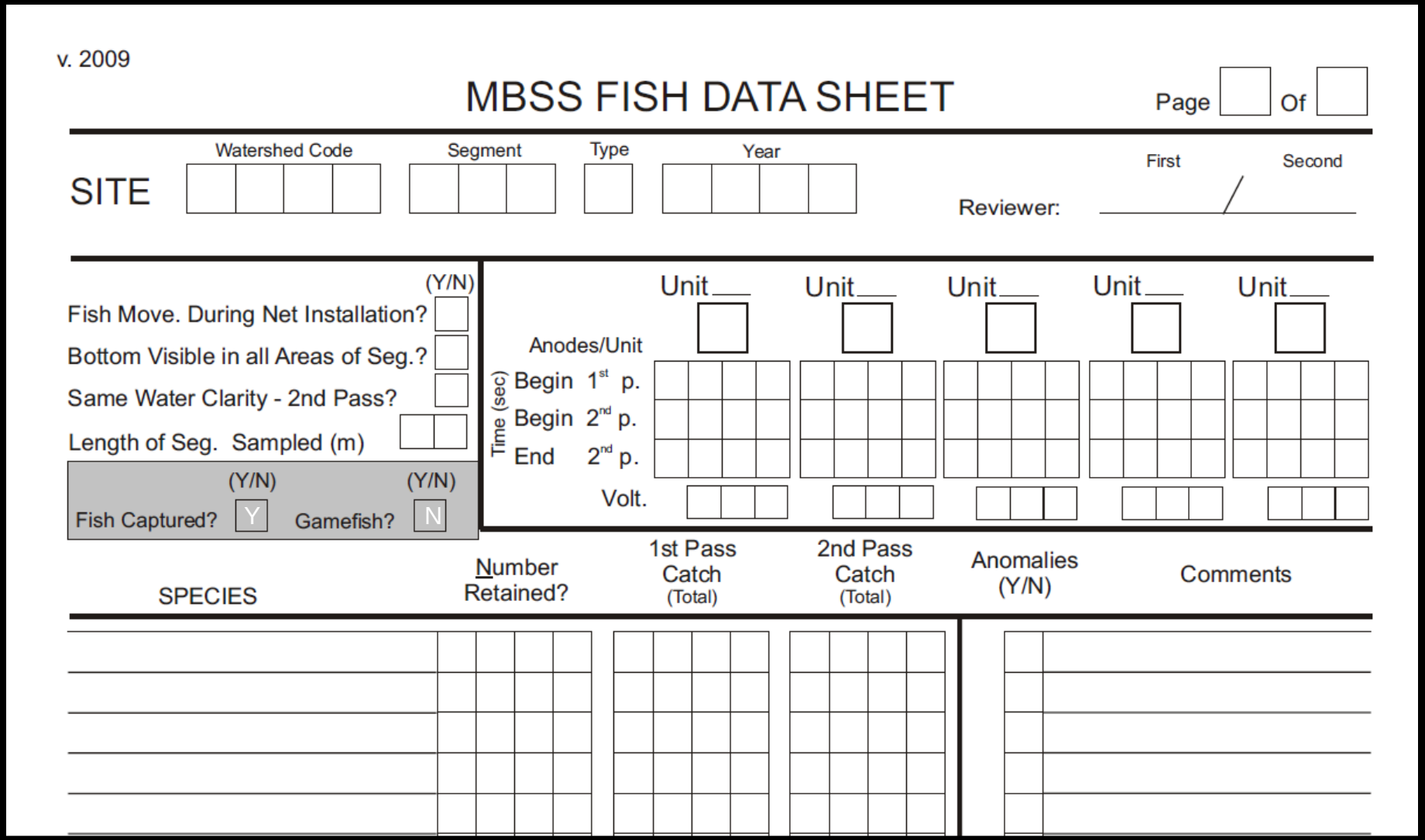
Ironcolor shiner 2 - lateral view

Ironcolor shiner 2 - anterior view of head

Examples of key features



Documenting photo-vouchers



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MBSS FISH DATA SHEET

Page ☐ Of ☐

SITE ☐☐☐☐ Watershed Code ☐☐☐ Segment ☐ Type ☐☐☐☐ Year

Reviewer: First / Second

(Y/N)

Fish Move. During Net Installation? ☐

Bottom Visible in all Areas of Seg.? ☐

Same Water Clarity - 2nd Pass? ☐

Length of Seg. Sampled (m) ☐☐

(Y/N) (Y/N)

Fish Captured? Y Gamefish? N

	Unit ☐	Unit ☐	Unit ☐	Unit ☐	Unit ☐
Anodes/Unit					
Time (sec) Begin 1st p.					
Begin 2nd p.					
End 2nd p.					
Volt.					

SPECIES	Number Retained?	1st Pass Catch (Total)	2nd Pass Catch (Total)	Anomalies (Y/N)	Comments

Documenting photo-vouchers

All photographs taken of left side of fish

Number	PHOTODOCUMENTATION	Voucher (Y/N)
001	Eastern mudminnow	N
002	Ironcolor shiner 1	Y
003	Ironcolor shiner 2- lateral view	Y
004	Ironcolor shiner 2- anterior view of head	Y

Recording and tracking files

- Standard file naming convention
  - Site, species, individual, aspect
- Saved as digital image files (.jpg)
- Transferred to independent taxonomist via CD/DVD ROM, flash drive, etc.

ABCD-999-R-2012_Ironcolor shiner_2_lateral.jpg

ABCD-999-R-2012_Ironcolor shiner_2_anterior head.jpg