



MBSS Fish Sampling Protocols



New this year

Fish Crew Leader and Fish Sampling certifications are valid for three years- provided:

- Pass the written test and a field audit year one
- Attend training each year
- Take written test each year (tentatively - only need to pass year one)

Cost = certification and training fee year one
+ training fee years two and three
(no certification fee for Fish Sampling certification)

Retroactive for persons certified during 2013

Certification Requirements

- Fish crew leader
 - attend training (years 1 -3)
 - pass written test (year 1)
 - pass field audit (year 1)
- Fish sampling
 - attend training (years 1 -3)
 - pass written test (year 1)
- Fish taxonomy
 - pass taxonomy test (annually)
 - pass field audit (annually)
 - provide vouchers for verification (annually)

MBSS Fish Taxonomy and Fish Crew Leader certification –

- Pay for certification only after passing the written test at training. No refunds!
- Schedule field audits by July 31
- Complete field audits by September 30



U.S. Fish & Wildlife Service

National Conservation Training Center

Conserving the Nature of America

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

Principles and Techniques of Electrofishing FIS2201

Principles & Techniques of Electrofishing FIS2201

[Chapter 2 answers.pdf](#)

[Chapter 2 electrical principles.pdf](#)

[Poptools for MS 2007](#)



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

A Permit from the Maryland DNR Fisheries Service is required before any fish sampling can be conducted in Maryland

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

Collection Permits

- Everyone in MD conducting wildlife sampling must obtain a scientific collection permit
- Application fee - \$25
- All permits expire December 31 of the year they were issued
- Contact: Richard Bohn at MDNR Fisheries Service (410) 260-8317

Recommendation

Contact DNR Regional Fisheries managers

Mark Staley Central Region (410) 442-2080

Alan Klotz Western Region (301) 334-8218

Rick Schaeffer Eastern Region (410) 260-8431

Mary Groves Southern Region (301) 888-2423

Natural Resources Police

Contact county Environmental Control offices

Maryland Water Monitoring Council Round Table



Locality Information

- Geographic Coordinates Required

Recommended:

- 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
- Coordinates
 - Decimal degrees, NAD 83
- Site Access Route

MBSS Site Length = 75 m



Measured following the deepest part of the channel (Thalweg)

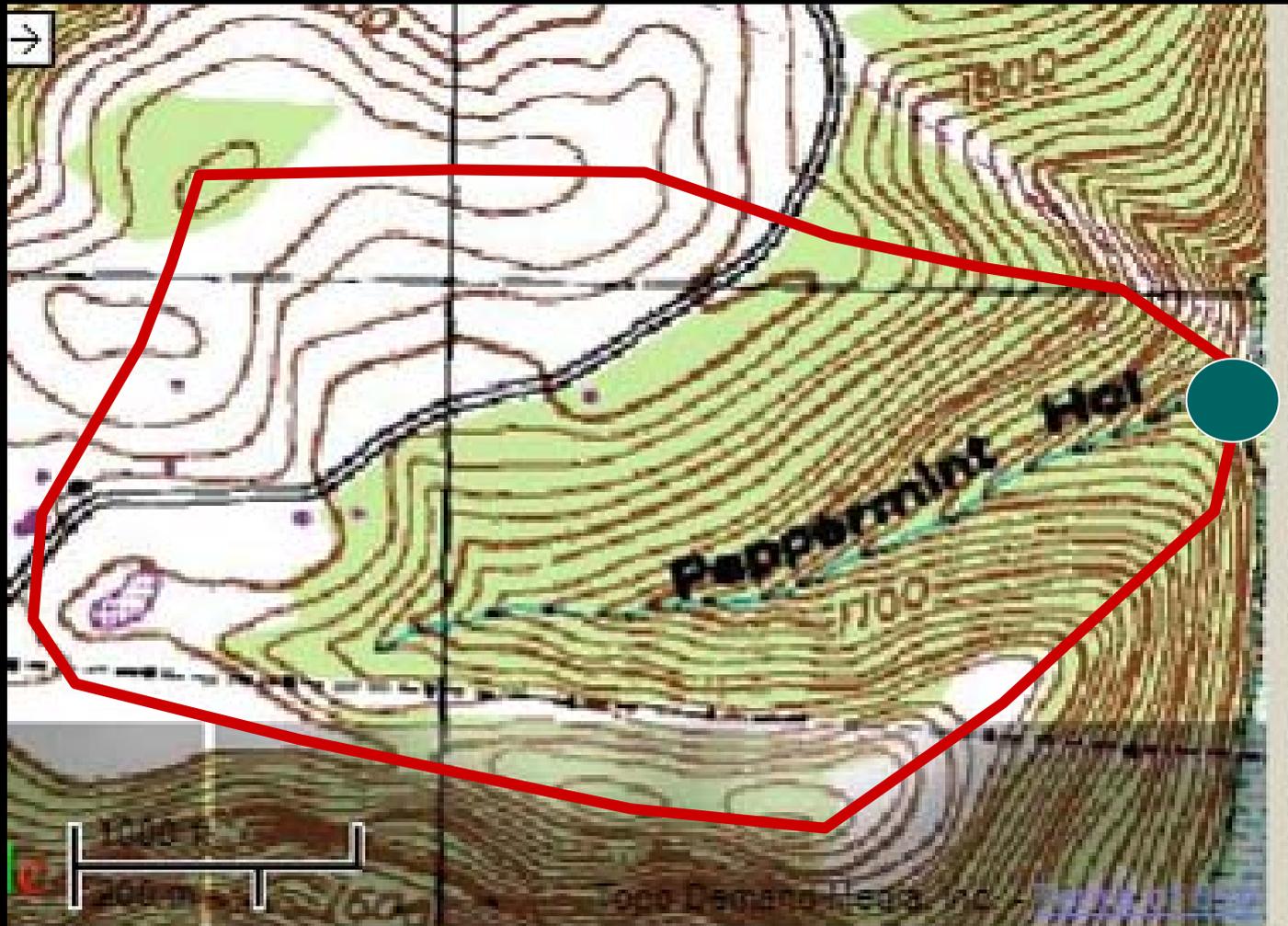
If your data should be used in calculating an IBI.....

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

Rubber gloves are recommended, - but not required

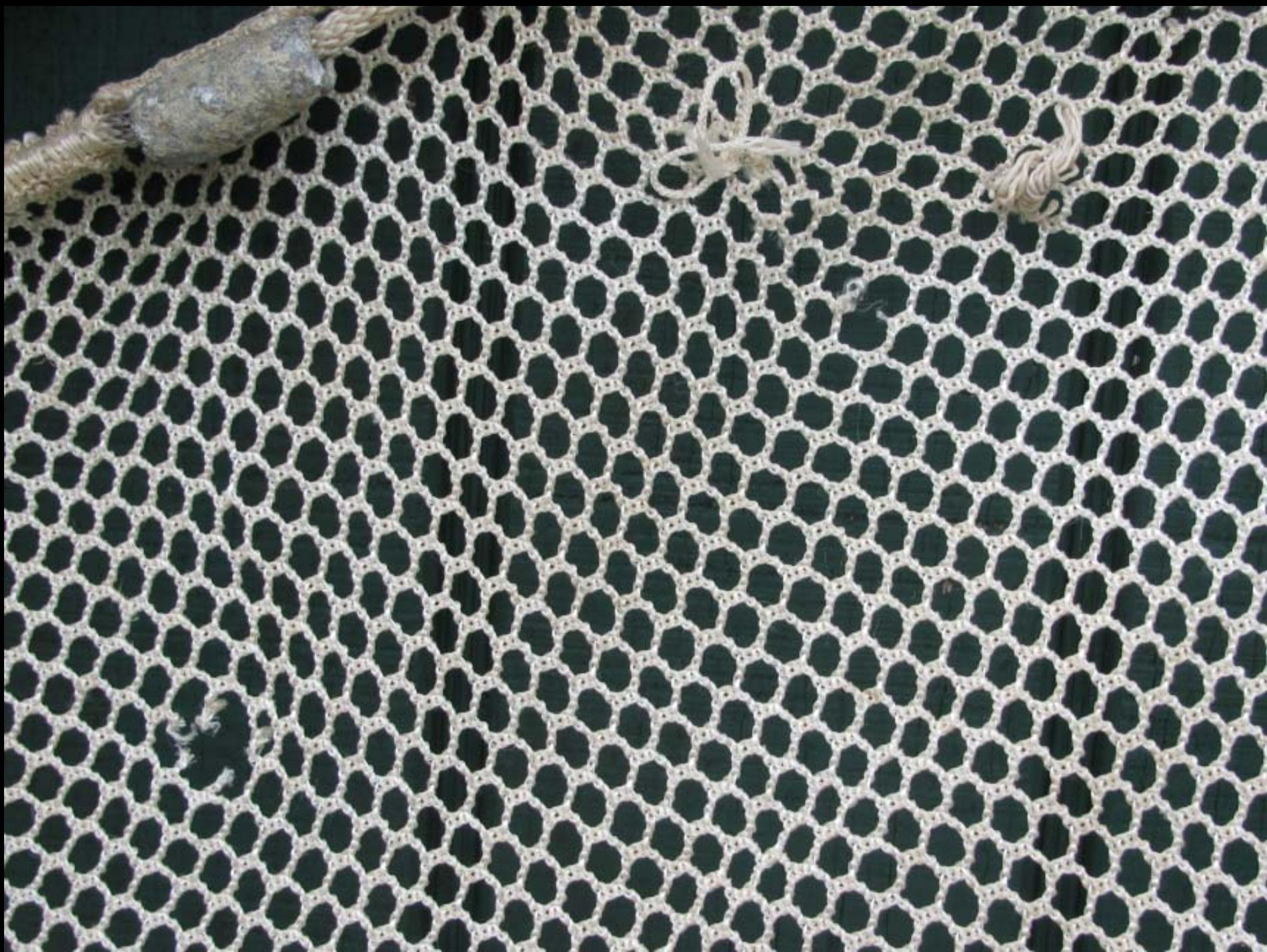


Block nets and dip nets

$\leq \frac{1}{4}$ " mesh

No holes bigger than $\frac{1}{4}$ "

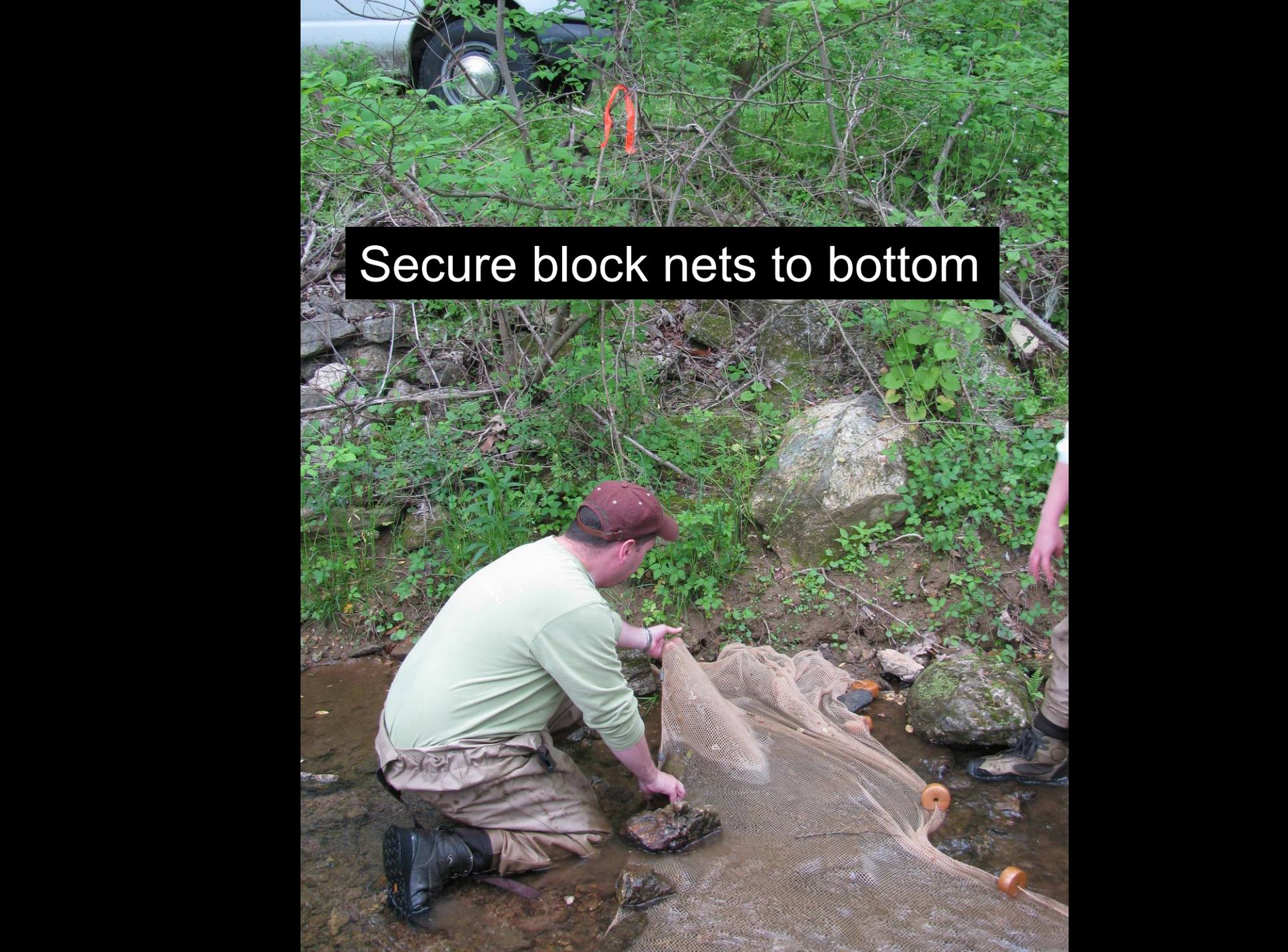




Site Preparation

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





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

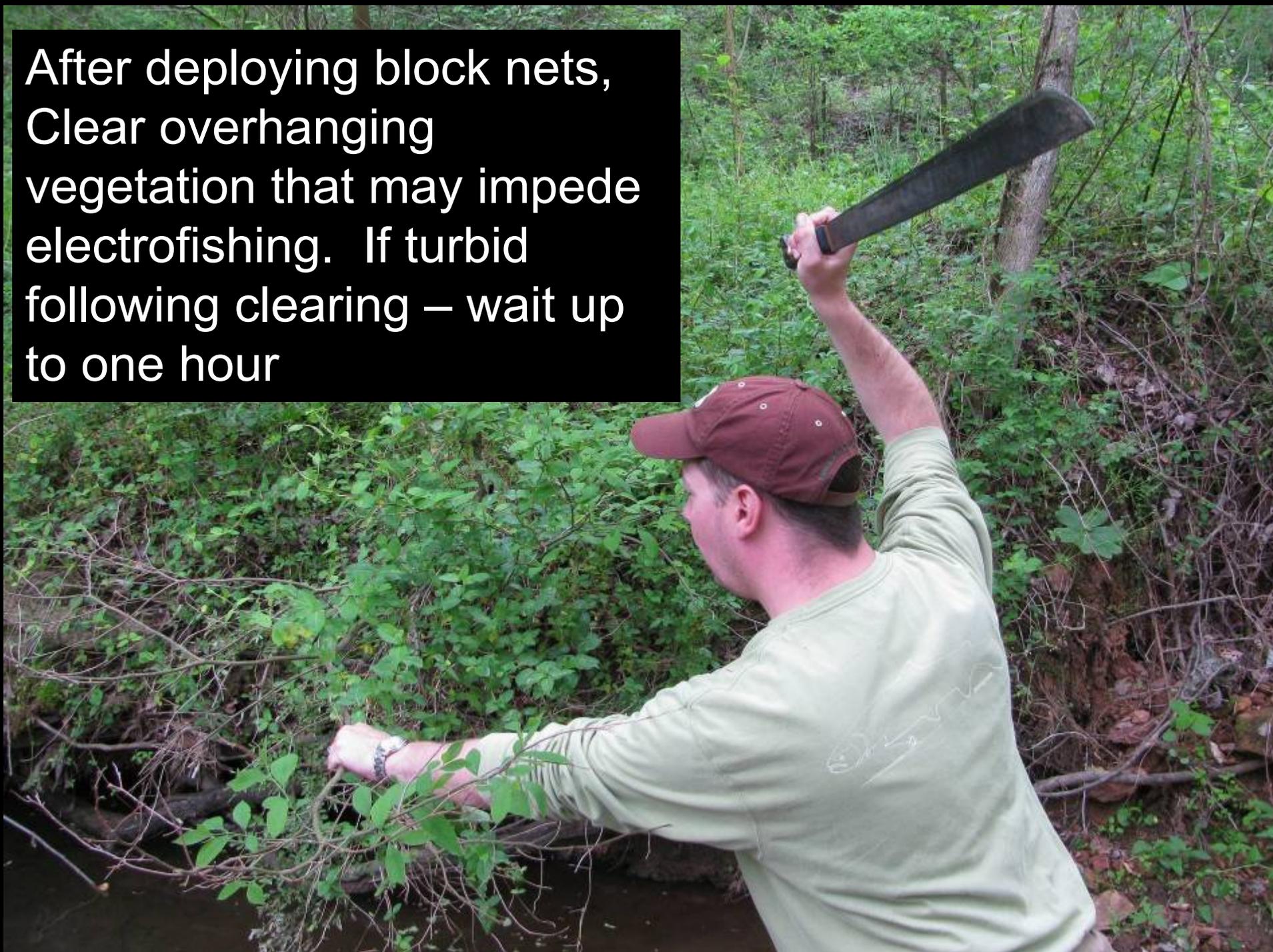


If a site includes a culvert that is too small to sample throughout its entire length, what adjustments should be made to the site's location?

t

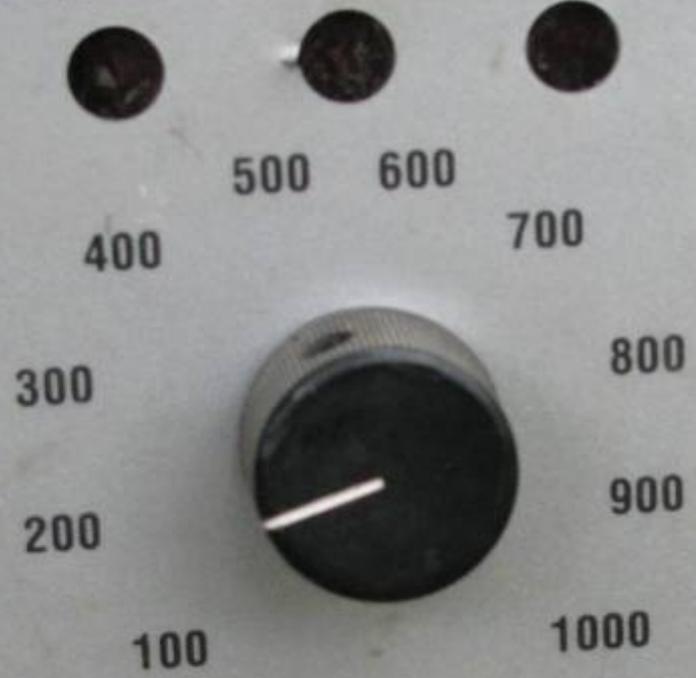


After deploying block nets,
Clear overhanging
vegetation that may impede
electrofishing. If turbid
following clearing – wait up
to one hour



Electrofishing

BATT/GEN OVERLOAD SELF TEST



Adjust voltage to optimize recruitment of fish, while minimizing mortality

OUTPUT VOLTAGE RANGE

STATE OF MARYLAND
DEPARTMENT OF
NATURAL RESOURCES
0068099



Test the electrofishing unit downstream first

Then 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-nets
 - Stay close to shocker to provide assistance
 - Net fish, receive fish, clear path, watch BPEF
- Buckets
 - Stay several 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.

Anode in the water



A photograph of a shallow stream with a rocky bed. A person's hand is visible in the upper left corner, pointing towards a rock. A black text box with white text is overlaid on the image, pointing to the rock. The water is clear and flows over the rocks. A thin wire or cable is visible in the water, extending from the left side towards the center. The rocks are of various sizes and colors, some covered in moss. The overall scene is outdoors in a natural setting.

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



Please try to limit mortality while electrofishing and handling fish

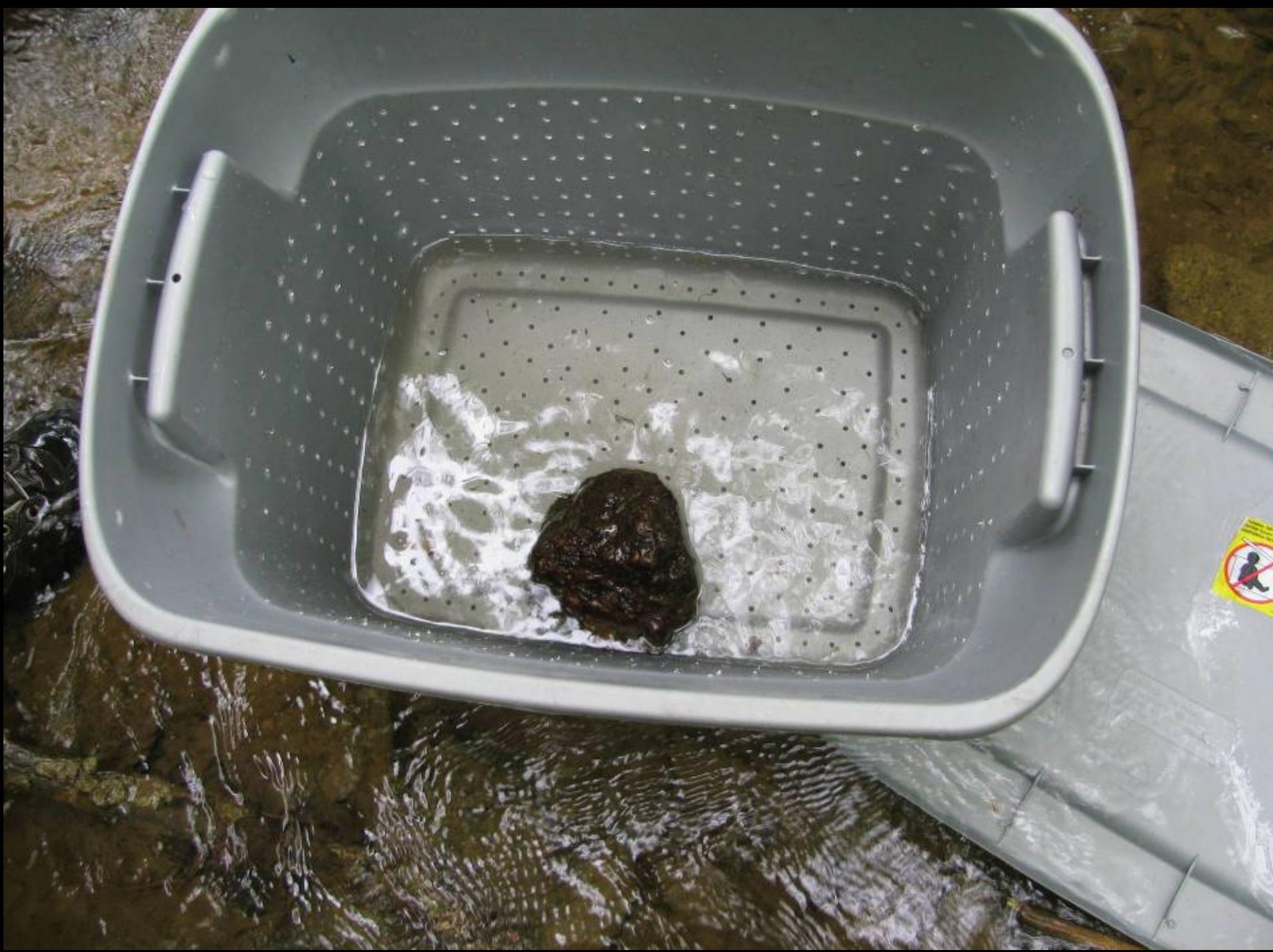


What precautions should be taken to minimize fish mortality?









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



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

Status LED Table

Status	Batt/Gen	Overload	Self Test	Comments
Normal Off	Off	Off	Off	Output Off
Normal On	Off	Off	On	Output On
Check Batt/Gen	On	Off	Pole	Cleared B
Ave. Current Overload	Off	On	Pole	Cleared B
Peak Current Overload	Off	Flash	Pole	Cleared B
Tilt	Off	Off	Flash	Cleared B
Operator Error	Off	Flash	Flash	Cleared B
Over Temp	Flash	Flash	Flash	Self Clea
Startup Fail	Flash	Off	Flash	Cycle Power
Immersion	→Flash →	Flash →	Flash →	Clean/Dry Contacts

Pole = On When Pole Switch Engaged, Off Otherwise

49

TIME SECONDS

WARNING!
DO NOT USE WITHOUT PROPER TRAINING AND SAFETY EQUIPMENT.

**R
e
s
e
t**

MODE SWITCHES

Rotary switches with positions E, F, G, H, I, J, K and numerical positions 5, 6, 7, 8, 9, 10, 11, 12.

Capture, identify to species,
and count all the fish within the
75m that are ≥ 30 mm TL



The crew leader must ensure that a certified
taxonomist is present and identifies all fish at
the site

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



... must remain
... ON PRE-
... ENVIRONMENTAL
... BLOOD/BODY SOILED
... BODY SOILED WITH

... in which there is an
... of soiling of
... surfaces/objects with
... blood or body fluids, and in
... with blood or body
... transmission of
... (HIV-1) (associated with
...)

... instructions for
... disinfection and decontamination
... of surfaces or
... soiled with blood or
... body fluids.

... blood and body
... should be avoided by use
... of gloves.
... and impervious
... should be worn if
... of blood or body fluids.

... COMPANY, INC.
... 710 N. Westwood Avenue/Toledo, OH 43607

... with disposable
... etc. before
... of DMC.

... REGULATIONS
... DISPOSAL

DANGER PRECAUTIONARY STATEMENTS
Hazard to Humans and Domestic Animals
Keep out of reach of children. Causes eye damage and skin irritation. Do not get in eyes, skin or on clothing. Harmful if swallowed. Wear goggles or face shield and rubber gloves when handling.

STATEMENT OF PRACTICAL TREATMENT: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. For eyes call a physician. Remove and wash all contaminated clothing before reuse. If swallowed, drink large quantities of water. Call a physician.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

STORAGE AND DISPOSAL
Do not contaminate water, food, or feed by storage or disposal.
Pesticide Disposal: Pesticide wastes and sludge (hazardous) must be disposed of by use according to label instruction, contact your state waste representative, or the nearest EPA regional office for guidance.
Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a primary landfill, or incinerate, or if allowed by state and local authorities burn, if burned stay out of smoke.



WEIGHT 0.1

ACCULAB VL-4800

OFF
CAL MODE
TARE/PRINT

ACCULAB
sartorius group

VICON



ON / OFF

ZERO

OK

F

ENTER

PRINT

11-06





-Release fish downstream

-Exceptions :

-Eels after 1st pass

-Vouchers that cannot be represented by photographs



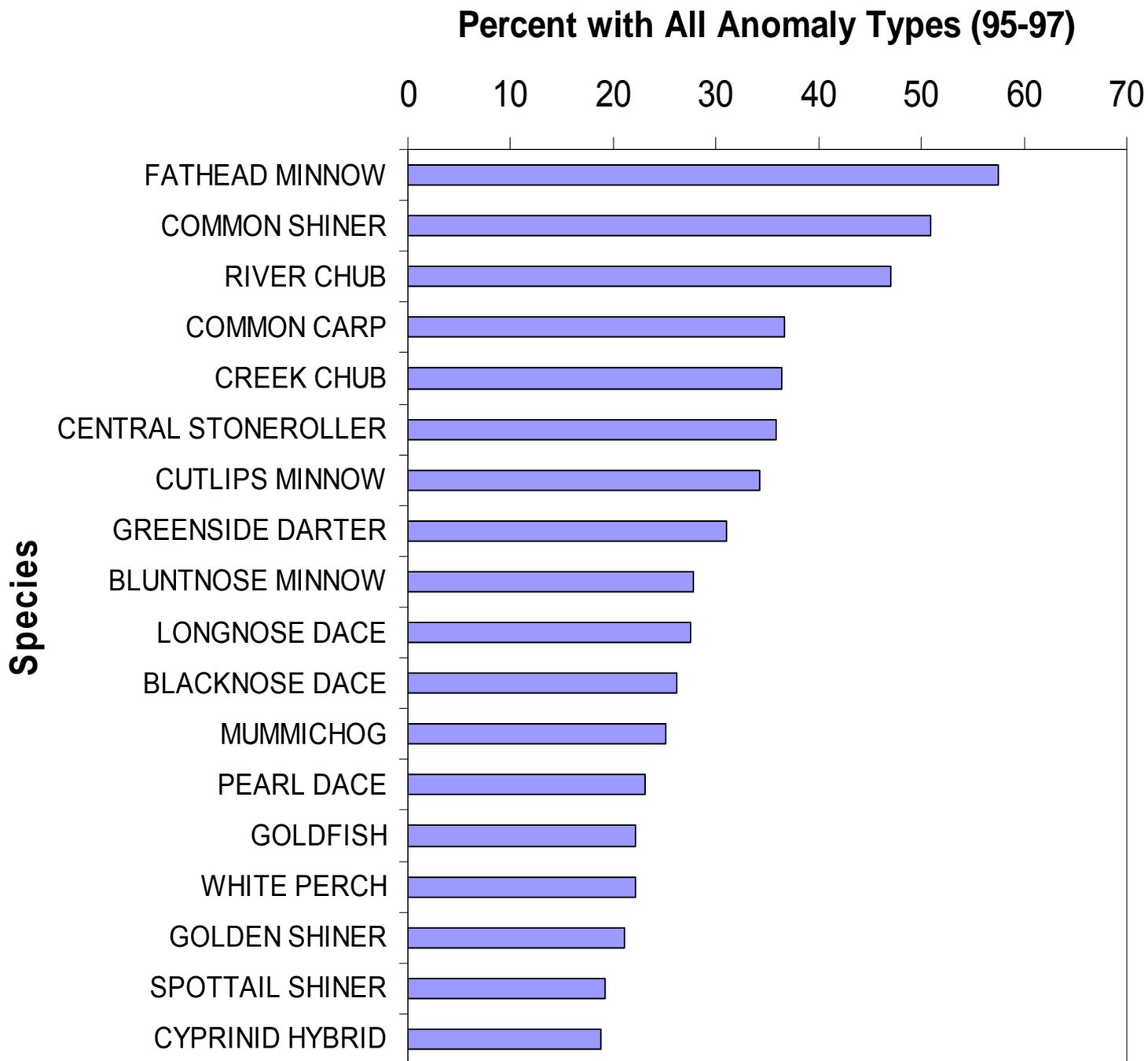
Hold eels between passes



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



Beginning
in 2015,
anomaly
searches at
Round One
repeat sites



DECON

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.







Fish Vouchering Protocols

2012 MBSS Summer Index Period 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 formic acid to water
 - At least 2:1 fixative to fish ratio, ideally 5:1 ratio
- Slit abdominal cavity on the RIGHT side of large specimens (>150 mm)

Maryland Biological Stream Survey

SITE ID UMON-230-A-2009
Cat. No. _____ Family: Percidae
Species: Etheostoma flabellare
Basin: Middle Potomac Date: 7/22/2009
State: Maryland County: Frederick
Locality: Hunting Ck near Thurmont
Lat: 39.62344 Lon: -77.41516
Col. By: Matt Sell
Det. By: _____ No. Specimens: 5



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% isopropanol
 - Proper voucher label and documentation



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

v. 2009

MBSS FISH DATA SHEET

Page Of

SITE Watershed Code Segment Type Year First Second

Reviewer: _____ / _____

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

	Unit <input type="text"/>				
Anodes/Unit	<input type="text"/>				
Time (sec)					
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Volt.	<input type="text"/> <input type="text"/> <input type="text"/>				

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

All photographs taken of left side of fish

Number	PHOTODOCUMENTATION	Voucher (Y/N)
0 0 1	Eastern mudminnow	N
0 0 2	Ironcolor shiner 1	Y
0 0 3	Ironcolor shiner 2- lateral view	Y
0 0 4	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