



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



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National Conservation Training Center
Conserving the Nature of America

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Principles and Techniques of Electrofishing FIS2201

Principles & Techniques of Electrofishing
FIS2201

Chapter 2 answers.pdf
Chapter 2 electrical principles.pdf
Poertools for MS 2007



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

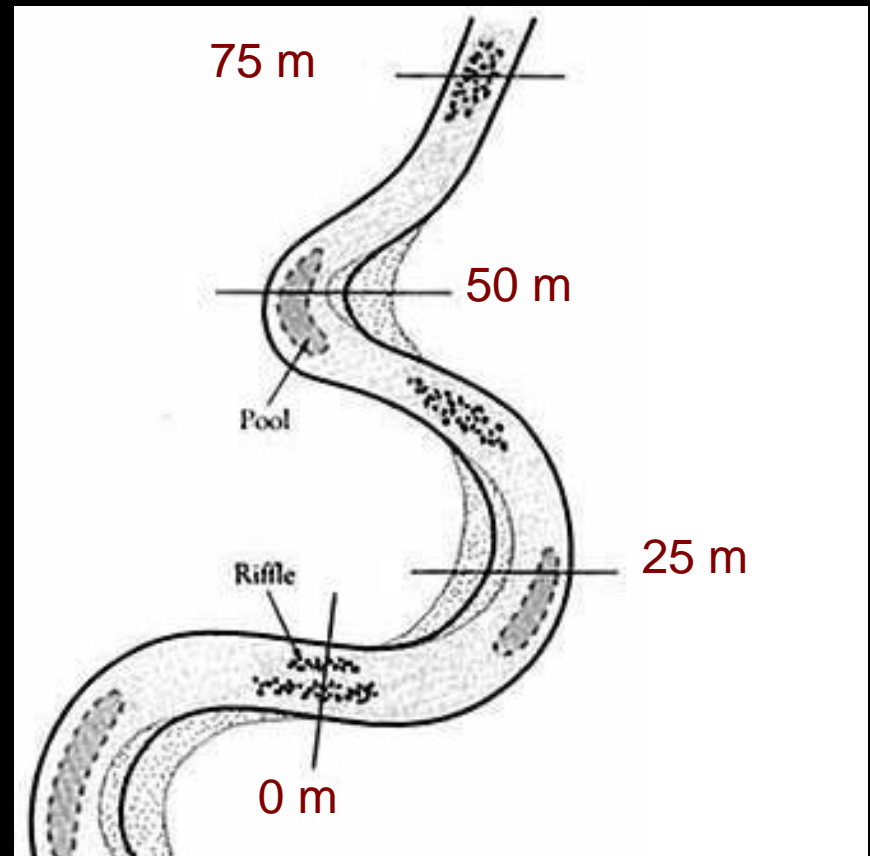
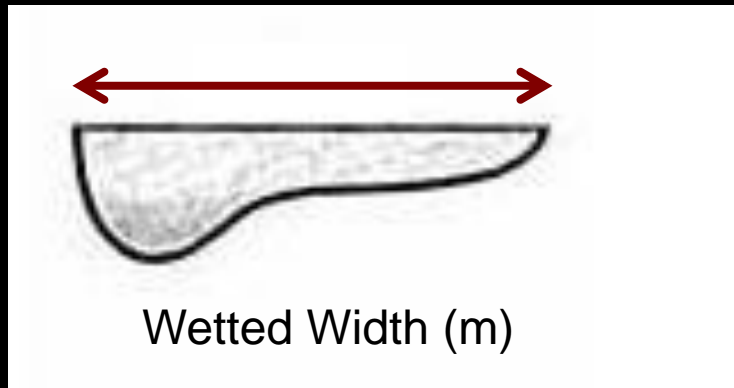
MBSS Site Length = 75 m



Measured following the deepest part of the channel (Thalweg)

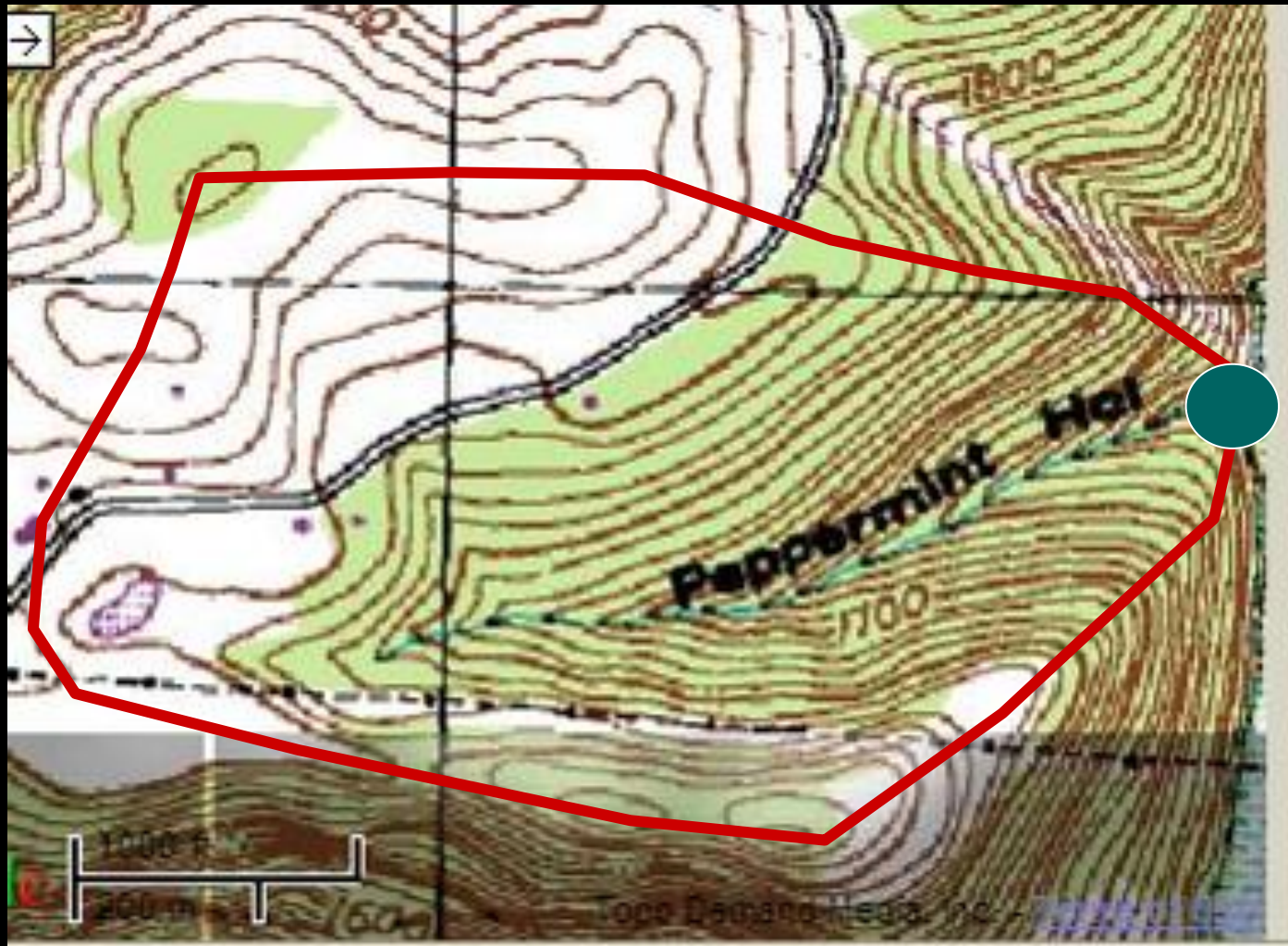
If your data should be used in calculating an IBI.....

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

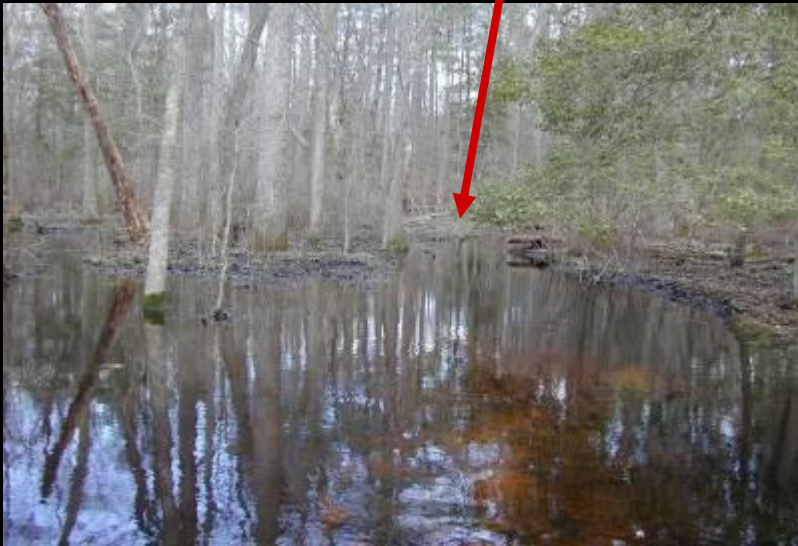
- All fish sampling conducted within index period (June 1 – September 30)
- 75 meter blocknetted reach
- Electrofish the 75 m site 2 times
- All fish identified to species, counted, and weighed for total biomass

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

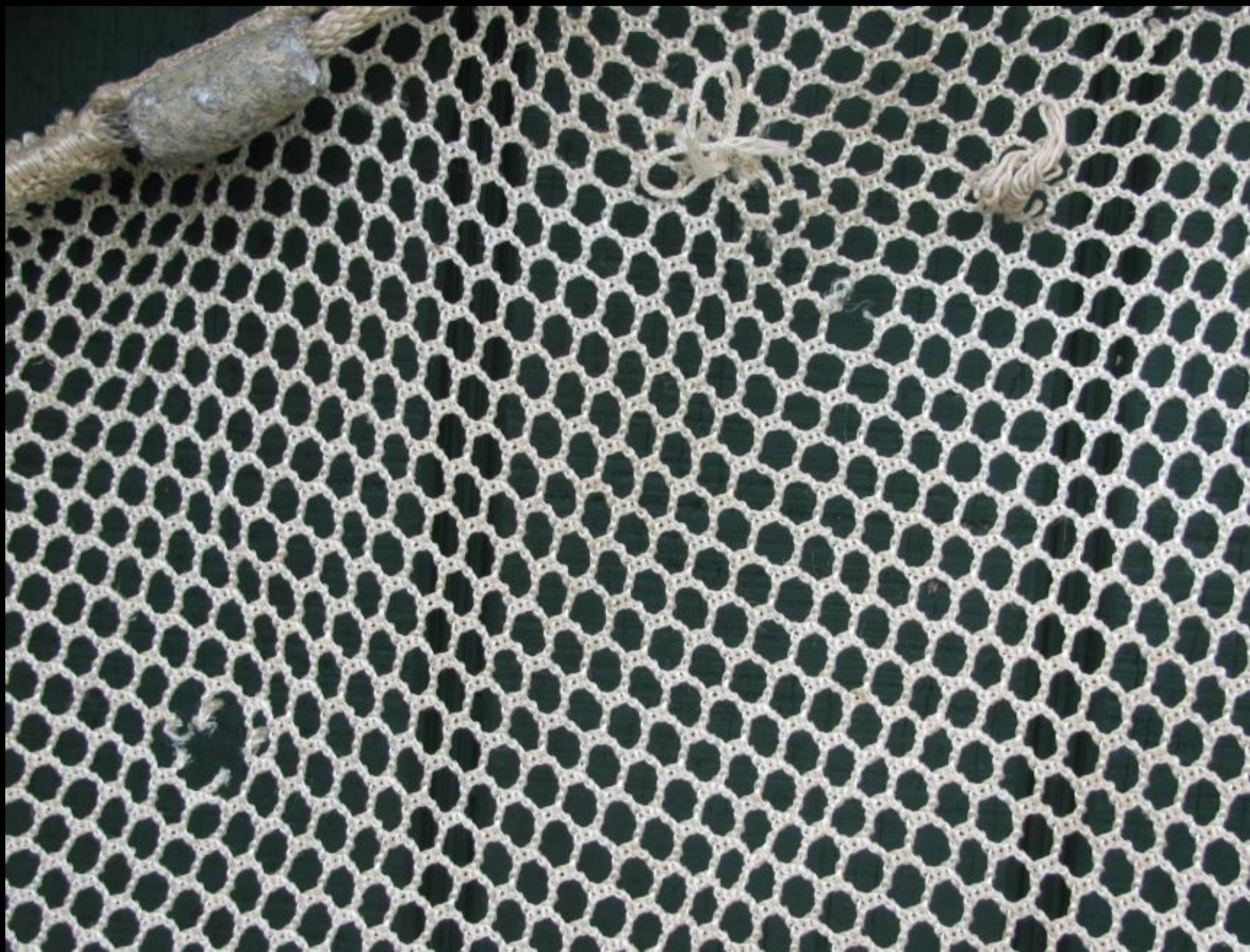


Block nets and dip nets

$\leq \frac{1}{4}$ " 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
 - 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 electrofishers downstream of the site

- Optimize recruitment
- Minimize mortality
- Verify that equipment is functioning correctly

FREQUENCY DUTY CYCLE

On 000000sec 79.0°F
Out: 0.0V 0.0A
Batt: 26.2V 0.1A
S: 60Hz 15% E

STATE OF
DEPT. OF
NATURAL
009

VOLTAGE RANGE

50 100 150 200 250 300 350 400 500 700 990

NC.
VATION

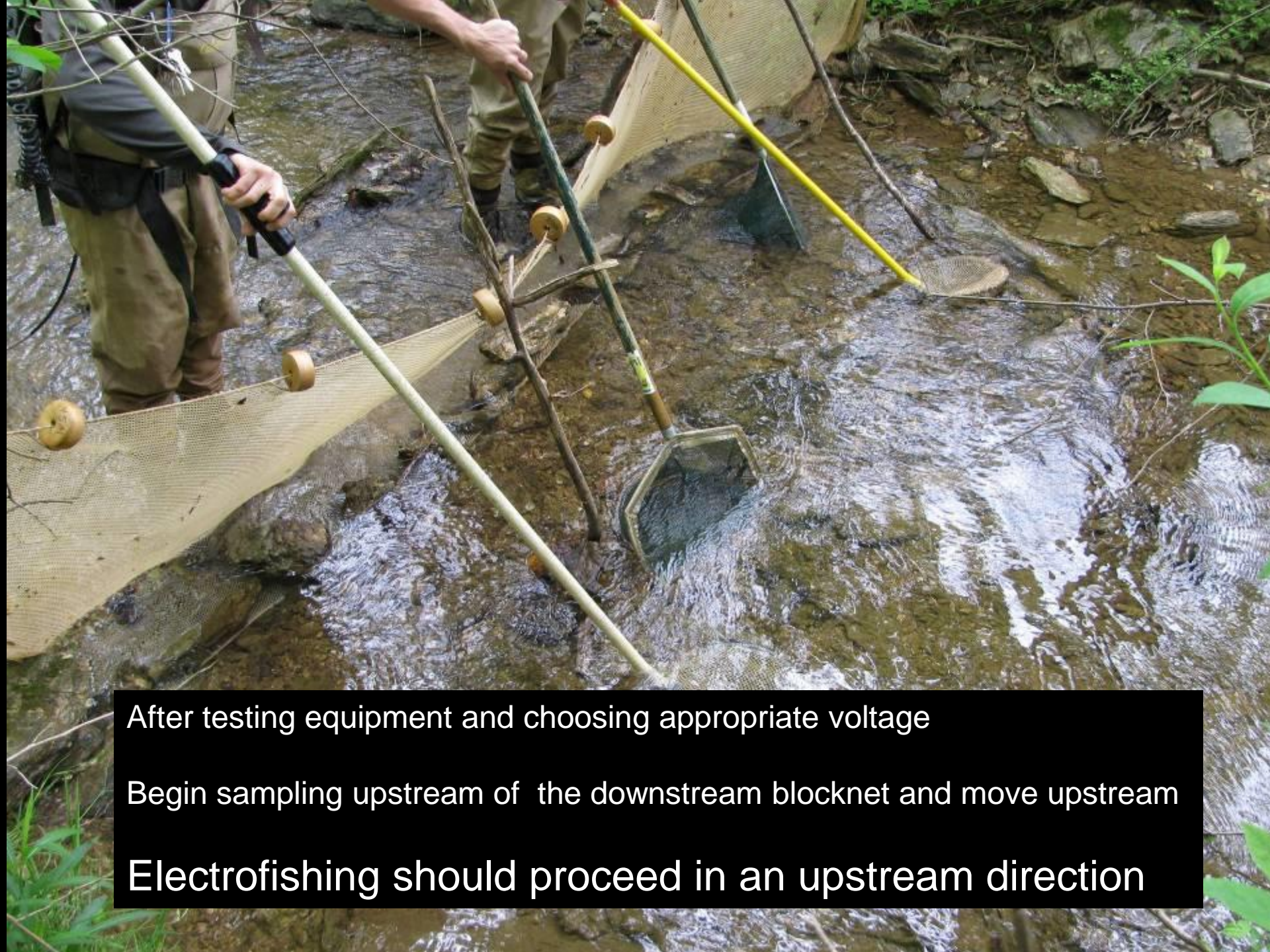
LR-20B
400-WATT BACKPACK ELECTROFISHER

COVER MUST BE CLOSED FOR UNIT TO OPERATE

132

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



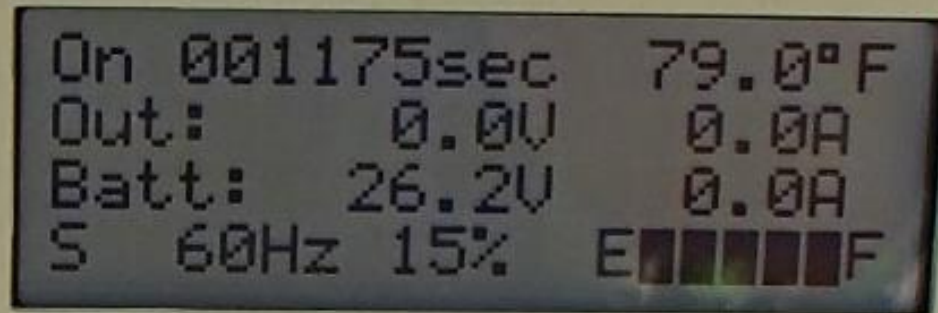
- Count and identify all individuals $>30\text{mm}$ to species
- Weigh all fish in aggregate to nearest 10g
- Voucher (specimen or photo) any unknown specimens or unique records
- Measure total length (TL) of gamefish

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



On 001175sec 79.0°F
Out: 0.0V 0.0A
Batt: 26.2V 0.0A
S 60Hz 15% E■■■■■F

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



ACCULAB
sartorius group

VICON



ON / OFF

ZERO

OK

F1

ENTER

PRINT

4-06





-Release fish downstream

-Exceptions :

-Eels after 1st pass

-Vouchers that cannot be represented by photographs



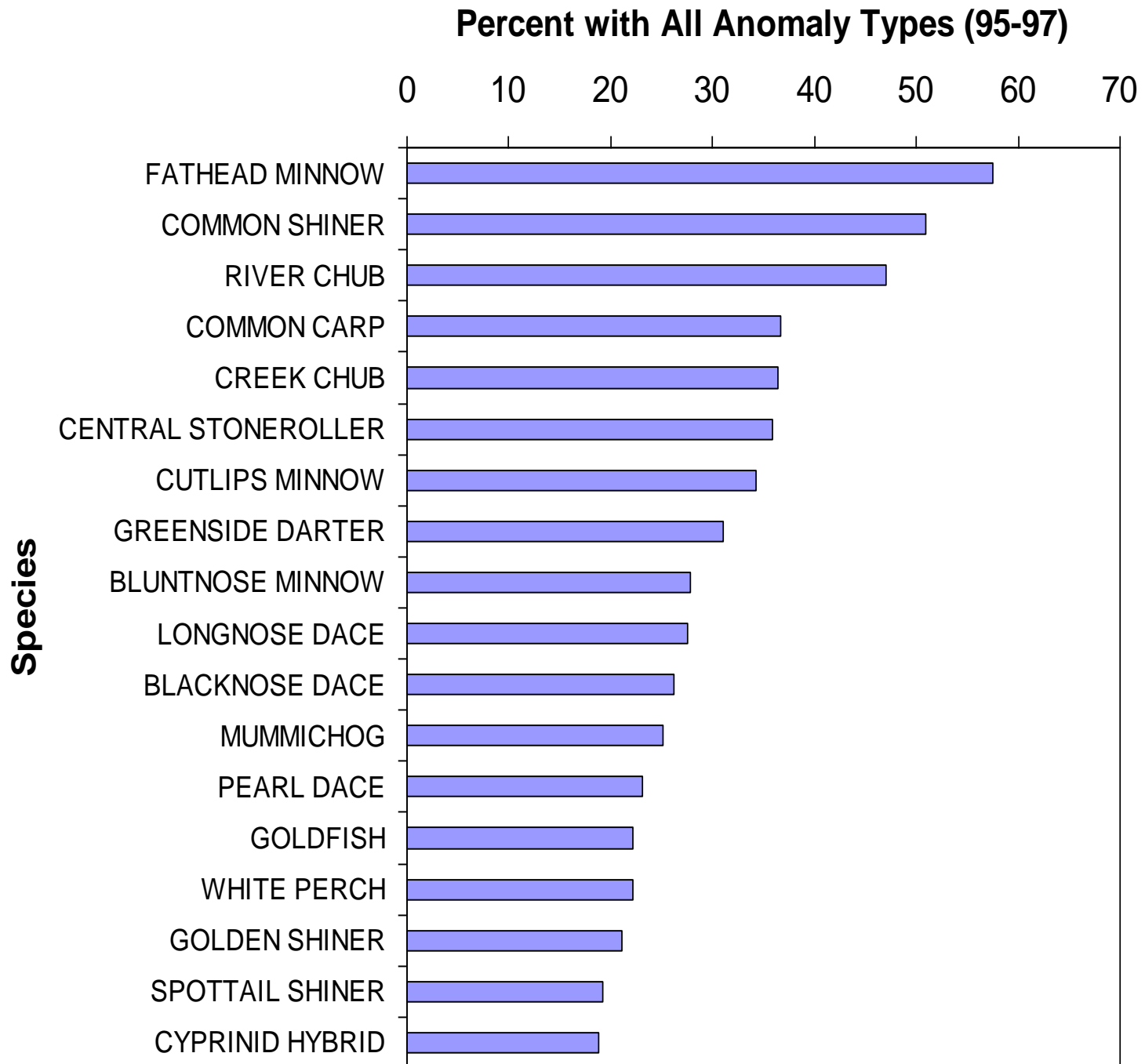
Hold eels between passes



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



Beginning
in 2015,
anomaly
searches at
Round One
repeat sites



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/m ²

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)

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



Voucher specimens

v. 2009

MBSS FISH DATA SHEET

Page Of

	Watershed Code	Segment	Type	Year		First	Second
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Fish Move. During Net Installation? <input type="checkbox"/> (Y/N) Bottom Visible in all Areas of Seg.? <input type="checkbox"/> Same Water Clarity - 2nd Pass? <input type="checkbox"/> Length of Seg. Sampled (m) <input type="text"/> <input type="text"/> Fish Captured? <input checked="" type="checkbox"/> (Y) Gamefish? <input checked="" type="checkbox"/> (N)	Time (sec)	Anodes/Unit	Unit <u> </u>	Unit <u> </u>	Unit <u> </u>	Unit <u> </u>	Unit <u> </u>
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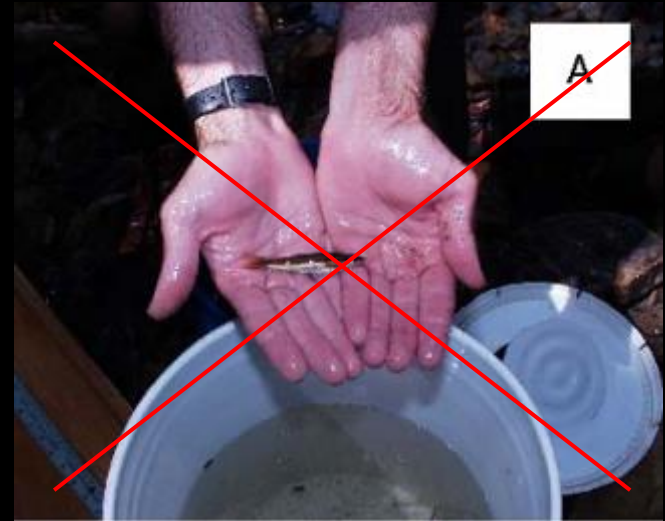
SPECIES	Number Retained?	1st Pass Catch (Total)	2nd Pass Catch (Total)	Anomalies (Y/N)	Comments
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Photographic vouchers

- 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)

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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