Appendix A: Equipment & Supplies

Base Kit

A Base Kit will be provided to the field crews for all sampling sites that they will go to. Some items are sent in the base kit as extra supplies to be used as needed.

Base Kit Item	Quantity	Protocol
Antibiotic Salve	1	Fish Plug
Aspirator bulb	1	Fish Plug
Beaker (3 L, Nalgene)	1	Water Chemistry
Centrifuge tube stand	1	Chlorophyll A
Centrifuge tubes (sterile, green screw-top, 50-mL) (10/pack)	1 pack	Chlorophyll A Periphyton
Chlorophyll bottle (2 L, brown)	1	Chlorophyll A
Clinometer†	1	Physical Habitat
Compass†	1	Physical Habitat
Delimiter – 12 cm^2 area	1	Periphyton
Densiometer - Convex spherical (modified with taped V)†	1	Physical Habitat
D-frame Kick Net (500 µm mesh, 52" handle) †	1	Benthics
Dry ice label (Class 9)*	5	Shipping
Electrical tape - roll*	1	General
FedEx labels, 5 sets of each in file folder (T1, T2, T3, T5)*	1	Shipping
Filtration chamber adapter	3	Enterococci, Chlorophyll A, Periphyton
Filtration flask	1	Enterococci, Chlorophyll A, Periphyton
Filtration flask stopper (silicone, blue)	2	Enterococci, Chlorophyll A, Periphyton
Filtration unit (sterile 250 ml funnel, cap and filter holder) - spares	5	Enterococci, Chlorophyll A, Periphyton
Fish weigh scale, case and extra batteries†	1	Fish plug
Fish Voucher supplies (25 netting bags & 50 packaging ties/pack)	1 pack	Fish Voucher
Flagging tape (1 red, 1 blue) – rolls	2	Physical Habitat
Foil squares (aluminum, 5x5", 25/pack)*	2 packs	Chlorophyll A Periphyton
Forceps (sterile, disposable) – spares	5	Enterococci, Chlorophyll A, Periphyton
Funnel (15 cm diameter)	1	Periphyton
Gloves (nitrile)*	1 box	General
Graduated cylinder (25 mL)	1	Periphyton
Graduated cylinder (250 mL)	1	Chlorophyll A, Periphyton
HDPE bottle (1 L, white, wide-mouth) (extras)	12	Benthics, Fish Vouchers
HDPE bottle (500 mL, white, wide-mouth) with graduations	1	Periphyton
Measuring tape (50 meter)†	1	Physical Habitat
Microcentrifuge tubes with glass beads (extras or for filter blanks)	5	Enterococci

Base Kit Item	Quantity	Protocol
NRSA 2018-2019 Quick Reference Guide	1	General
NRSA 2018-2019 Field Operations Manual	1	General
Packing tape (extra rolls)*	2	Shipping
Packing tape dispenser (includes roll of tape)	1	Shipping
Petri dishes 60x15 (disposable, 20/pack)	1 pack	Filter Storage
Pipette (disposable, 2 mL)*	5	Periphyton
Rubbermaid Action Packer	1	General
Rubbermaid Roughneck tote (3 gallon)	1	General
Sieve bucket (500 µm)†	1	Benthics
Sounding rod (PVC 3 m , marked in 0.1 m increments)†	1	Physical Habitat
Sodium Thiosulfate Tablets ~30 tables (10 mL vial)*	1	Enterococci
Surveyor's telescoping leveling rod (rectangular, metric scale, 7.5m)†	1	Physical Habitat
Surveyor's level, CST Berger SAL 20†	1	Physical Habitat
Syringe (60 cc, with tip removed and tubing)*	1	Periphyton
Tape strips (25/pack)*	6 packs	General
Toothbrush (stiff-bristle, with handle bent at 90˚ angle)	1	Periphyton
Tripod for level†	1	Physical Habitat
Vacuum hand pump and clear plastic tubing†	1	Enterococci Chlorophyll A Periphyton
Wash bottles (1 L Nalgene) – 1 DI, 1 river water	2	General
Wiffle golf ball	1	Discharge
Whatman 47 mm glass fiber GF/F 0.7 µ filters (100/box)	1 box	Chlorophyll A, Periphyton
Whatman 47 mm glass fiber GF/C 1.2 µ filters (100/box)	1 box	Periphyton
47 mm polycarbonate 0.4 µ filters (100/box)	1 box	Enterococci

**Items may need to be replenished by field crews during field season*
† Some items are sent in base kit as stock or extra supplies to be used as needed.

Site Kit

A **site kit** will be provided to the field crews for each sampling site. Please submit an electronic request form **well in advance** of field sampling. Kits must be requested at least two weeks before sampling is to take place. Each site kit will include sample labels and will also include necessary coolers and shipping supplies for all samples collected. Prior to sampling, inspect each site kit to ensure all supplies are included. Some items may not be used at all sites and should be held until the end of the field season and shipped back. These site kits include:

Site Kit Item	Quantity	Protocol
Centrifuge tubes (sterile green screw-top, 50-mL)	4	Chlorophyll A Periphyton
Cooler Liner	1	Shipping
Cubitainer (4 L)	1	Water Chemistry
Fish Tissue Plug Kit Sterile scalpel Sterile biopsy punch Sterile disposable forceps 20 mL acid washed glass scintillation vial	1 1 1 1 1	Fish Tissue Plugs
Forceps (sterile, disposable)	2	Enterococci Chlorophyll A

Site Kit Item	Quantity	Protocol
		Periphyton
HDPE bottle (1 L, white, wide-mouth)	2	Benthics
HDPE bottle (1 L, white, wide-mouth)	1	Fish Voucher
HDPE bottle (500 mL, white, round)	1	Algal Toxin
PETG bottle (500 mL, clear, square)	1	Algal Toxin
PETG bottle (125 mL, sterile, clear, square)	1	Periphyton Metagenomics
PET bottle (250 mL, sterile, clear, square)	1	Enterococci
Phosphate buffered saline (sterile PBS)	1	Enterococci
Microcentrifuge tubes w/glass beads (in bubble bag & Ziploc bag)	2	Enterococci
Filtration unit (sterile 250 mL filter funnel, cap, and filter holder)	1	Enterococci Chlorophyll A Periphyton
Zip ties	2	Shipping

Whole Fish Tissue Kit

A **whole fish tissue kit** will be provided to the field crews for selected whole fish tissue sampling sites (separately from site kits). Please submit an electronic request form **well in advance** of field sampling. Kits must be requested at least two weeks before sampling is to take place. Prior to sampling, inspect each site kit to ensure all supplies are included. These site kits include:

Whole Fish Tissue Kit Item	Quantity
Aluminum foil (solvent-rinsed and oven dried)	5 packs
Cable ties	24
Cooler	1
Dry Ice Information Sheet	1
Dry ice Shipping Label	1
FedEx airbill (Pre-addressed)	1
Frequently Asked Questions handout	1
Heavy-duty food grade polyethylene tubing	1 roll
Large plastic composite bag	1
Nitrile gloves	10
NRSA 2018/19 Fish Tissue Site List	1
Sampling Procedures handout	1
Tyvek tag	1

General Equipment

This equipment will need to be supplied by the field crew.

Crew Supplied Item	Quantity	Protocol
Barometer or elevation chart to use for calibration		Calibration
Batteries		General
Binoculars	1	Physical Habitat
Bleach (1-10 %, or bleach alternative)		Cleaning
Bucket	1	Benthics
Calibration cups and standards for multi-probe unit		Water Chemistry
Cell phone, 2-way radios, and/or walkie-talkies		General
Chest waders	2 pair	Benthics Physical Habitat
Clipboard	2	General

Crew Supplied Item	Quantity	Protocol
Compass (Bearing – backpacking type) †	1	Physical Habitat
Current velocity meter, probe, and operating manual	1	Physical Habitat
Digital camera with extra memory card & battery	1	General
Dip Nets (non-conducting, ¼" mesh)	2	Fish Collection
Dry Ice		Storage/Shipping
Electrofishing equipment (boat, barge, and/or backpack units, including variable voltage pulsator unit, wiring cables, generator, electrodes, dip nets, livewell and all safety equipment)	1	Fish Collection
Ethanol (95%)		Sample
Field gear (e.g., protective clothing, sunscreen, insect repellent, hat, water, food, backpack, cell phone)		General
Fisherman's vest (with lots of pockets and snap fittings)		General
Formalin (buffered, 10%)		Preserve Samples
GPS unit (with manual, reference card, extra battery)	1	Site Verification Physical Habitat
Knife or scissors	1	General
Laser rangefinder (400 ft. distance range) †	1	Physical Habitat
Linesman gloves		Fish Collection
Measuring board (millimeter scale)		Fish Collection
Measuring tape with reel (50- 100 m)	1	Physical Habitat
Meter stick (for bank angle measurements)	1	Physical Habitat
Multi parameter meter with pH, DO, temp, and conductivity probes)	1	Water Chemistry
Neutrally buoyant object (e.g., plastic golf ball, small rubber ball, stick)		Physical Habitat
Pen, Pencils (#2, for data forms), Permanent marker (fine tip, for labels)	1	General
Plastic Bags	2	Sample Storage
Plastic bucket (or similar container) with graduations (optional)	1	General
Portable Weir with 60° "V" notch (optional) and plastic sheeting	1	Discharge
Sampling permits and/or access permission letters (if required)		Site Evaluation
Scalpel for slitting open large fish before preservation		Fish Collection
Seine (10' or 20' x 6' minnow or bag seine - ¼ inch mesh) (optional)		Fish Collection
Site maps/access instructions		Site Evaluation
Small spatula, spoon, or scoop to transfer sample	1	Benthics
Surveyor's flagging tape and/or pin flags		Physical Habitat
Top-set wading rod for use with current velocity meter	1	Physical Habitat
Watch with timer or stopwatch	1	Discharge
Watchmakers' forceps	1	Benthics
Water (deionized)		General
Wet ice		Sample Storage

† Item may be requested with Base Kit if needed

Boat Equipment

This is suggested boat equipment that would be supplied by the field crew.

Boat Equipment Item
Anchor (with line)
Boat horn
Boat plug (extra)
Bow/Stern lights
Emergency Tool kit
Gas Can
Hand Bilge pump
Lifejackets (1 per person)
Motor
Oars or Paddles
Sonar Unit
Spare Prop Shear Pin
Type IV PFD (Throwable Life Saving device)

Safety Equipment

Waders
Gloves
Sun-blocking Hat
Other appropriate field clothing
Safety glasses
First aid kits
Fire extinguishers
Blankets
Cellular/satellite phones or portable radios
Anti-bacterial soap
Clean water or ethyl alcohol
Medications

Sample/Data Collection

This is a summary of the supplies that will be used in sample/data collection. Items are supplied in the Base Kit, Site Kit or by the Crew as indicated.

	Item	Quantity	Protocol
BASE KIT	Beaker (3 L, Nalgene)	1	Water Chemistry
	Chlorophyll bottle (2 L, brown)	1	Chlorophyll A
	Clinometer	1	Physical Habitat
	Densiometer - Convex spherical (modified with taped V)	1	Physical Habitat
	Delimiter – 12 cm^2 area	1	Periphyton
	D-frame Kick Net (500 µm mesh, 52" handle)	1	Benthics
	Electrical tape	1	General
	Funnel (15 cm diameter)	1	Water Chemistry
	Gloves (nitrile)		General
	Graduated cylinder (25 mL)	1	Periphyton
	Graduated cylinder (250 mL)	1	Chlorophyll A
	HDPE bottle (500 mL, white, wide-mouth) with graduations	1	Periphyton
	Sieve bucket (500 µm mesh)	1	Benthics
	Sounding rod (PVC 3 m , marked in 0.1 m increments)	1	Physical Habitat
	Surveyor's rod (rectangular, metric scale, 7.5m extended)	1	Physical Habitat
	Syringe (60 cc, tip removed and tubing)	1	Periphyton
	Toothbrush (stiff-bristle, with handle bent at 90˚ angle)	1	Periphyton
	Wash bottle for stream water (1 L)	1	General
	Wash bottle containing deionized water (1 L)	1	General
SITE KIT	PET bottle (250 mL, sterile, clear, square)	1	Enterococci
	Gloves (nitrile)	1 Pair	Enterococci
CREW SUPPLIED *(some items may be in base kit if requested)*	Bearing compass (Backpacking type)	1	Physical Habitat
	Binoculars	1	Physical Habitat
	Buckets (plastic)	1	Benthics
	Current velocity meter, probe, and operating manual	1	Physical Habitat
	Dip nets (non-conducting, 1/4" mesh)	2	Fish Collection
	Electrofishing equipment (boat, barge, and/or backpack units, including variable voltage pulsator unit, wiring cables, generator, electrodes, dip nets, and all safety equipment)	1	Fish Collection
	Linesman gloves		Fish Collection
	Livewell and/or buckets		Fish Collection
	Measuring board (millimeter scale)		Fish Collection
	Meter stick (for bank angle measurements)		Physical Habitat
	Minnow net for dipping small fish from live well	1	Fish Collection
	Multi-parameter meter with pH, DO, temp., and conductivity	1	Water Chemistry
	Neutrally buoyant object (e.g., wiffle golf ball)		Discharge
	Plastic bucket (or similar) with volume graduations (optional)	1	Discharge
	Portable Weir and plastic sheeting to use with weir	1	Discharge
	Seine (10' or 20' x 6' minnow/bag with ¼" mesh) (optional)		Fish Collection
	Tape measure (in centimeters) (optional)	1	Physical Habitat
	Top-set wading rod for use with current velocity meter	1	Physical Habitat
	Watch with timer or stopwatch	1	General
	Watchmakers' forceps	1	Benthics

Sample Processing/Preservation

This is a summary of the supplies that will be used in sample processing/preservation. Items are supplied in the Base Kit, Site Kit, Whole Fish Tissue Kit or by the Crew as indicated.

	Item	Quantity	Protocol
BASE KIT	Aluminum foil squares (5"x 5")	1	Chlorophyll A
	Petri dishes (60 x 15, disposable)	20	Filters
	Vacuum hand pump and clear plastic tubing	1	Chlorophyll A
	47 mm polycarbonate 0.4 micron filters	1 box	Enterococci
	Whatman 47 mm 0.7 micron GF/F glass fiber filters	1 box	Chlorophyll A
	Whatman 47 mm 1.2 micron GF/C glass fiber filters	1 box	Periphyton
SITE KIT or WHOLE FISH TISSUE KIT	Aluminum foil (solvent-rinsed and baked)		Whole Fish Tissue
	Plastic Bags (large)	1	Shipping
	Coolers		Storage/Shipping
	Polyethylene tubing (Heavy-duty food grade)		Whole Fish Tissue
	Forceps (sterile, disposable)	2	Enterococci
	Filtration unit (sterile 250 mL filter funnel, cap, and filter holder)	1	Enterococci
	Phosphate buffered saline (sterile PBS)	1	Enterococci
	Zip ties	10+	Whole Fish Tissue
CREW SUPPLIED	Dry ice		Microcystin Enterococci Fish Tissue Plug Whole Fish Tissue
	Ethanol (95 %)		Benthics
	Fish Plug implements		Fish Plug
	Formalin (buffered, 10%)		Periphyton Fish Voucher
	Knife or scissors	1	General
	Scalpel for slitting open large fish before preservation	1	Fish Collection
	Small spatula, spoon, or scoop to transfer sample	1	Benthics
	Water (deionized)	1	General
	Water (stream)	1	General
	Wet ice		Water Chemistry Chlorophyll A

Stock Solutions (provided by Sampling Crew)

SOLUTION	USE	PREPARATION
Bleach (1%)	Clean nets, other gear, and boat.	Add 40 mL bleach to 4 L distilled water.
Bleach (10%)	Clean periphyton sampling equipment	Add 40 mL bleach to 400 mL distilled water.
10% Buffered Formalin†	Preservation of periphyton ID sample and fixing Fish Vouchers	Formaldehyde (37-40%) 100 ml Distilled water 900 ml NaH_2PO_4 4.0 g Na_2HPO_4 (anhydrous) 6.5 g Mix to dissolve
95% Ethanol	Preservative for benthic invertebrate samples and fish vouchers.	No preparation needed (use stock solution as is).

† 10% Buffered Formalin can also be purchased pre-mixed from various sources

Sample Storage

This is a summary of the supplies that will be used in sample storage, i.e. the container used in shipping. These items are all provided in the site kit.

Item	Quantity	Protocol
Centrifuge tubes (sterile green screw-top, 50-mL)	4	Chlorophyll A Periphyton
Cubitainer (4 L)	1	Water Chemistry
Scintillation glass vial (20 mL, acid washed)	1	Fish Tissue Plugs
HDPE bottle (1 L, white, wide-mouth)	1-2	Benthics
HDPE bottle (1 L, white, wide-mouth)	1	Fish Voucher
HDPE bottle (500 mL, white, round) PETG bottle (500 mL, clear, square)	1	Microcystin/ Cylindrospermopsin
PETG bottle (125 mL, sterile, clear, square)	1	Periphyton PDNA
PET bottle (250 mL, sterile, clear, square)	1	Enterococci (*temporary*)
Microcentrifuge tubes containing sterile glass beads (sterile)	2	Enterococci

Packaging/Shipping

This is a summary of the supplies that will be used in the shipping of samples.

Item	Quantity	Protocol
Coolers Water Chemistry Frozen Batched Non-Chilled Batched Whole Fish Tissue (at select sites only)	4	Shipping
Cooler liners (for water chemistry & non-chilled batched shipments)	2	Shipping
Dry Ice Cooler Liner/Pad (for frozen batched shipments)	1	Shipping
Dangerous Goods label (Class 9, for dry ice shipments)	1-2	Shipping
Dry ice (~20 lbs per frozen batched shipment) (~50 lbs per whole fish tissue shipment)		Shipping
FedEx airbills (for specific sample groups)	3-4	Shipping
Packing tape	1	Shipping
Wet ice (~50 lbs per site; additional for shipping)		Shipping

Appendix B: Forms & Labels

The NRSA app will be preloaded on supplied iPads to record field data. Field crews will receive labels packets with the site kits they request through the electronic Supply Request Form. Do not mix labels from different sites.

Paper field forms will be supplied by NARS IM as backups to the App or for crews who choose not to use the App. Please submit an electronic Supply Request Form well in advance of field sampling – indicate if you would like wadeable or nonwadeable packets. For each site you will receive a paper form packet with paper tracking forms. Prior to sampling, inspect each packet to ensure all forms are included.

Item	Quantity	Protocol
Field forms packet (wadeable):		General
Verification (front & back)	1	
Field Measurement	1	
Sample Collection (front & back)	1	
Fish Gear & Sampling Info (front & back)	1	
Fish Collection	1	
Whole Fish Tissue Collection (used at selected sites)	1	
Physical Habitat: Channel/Riparian Cross-section – Wadeable Only	11+	
Physical Habitat: Thalweg Profile & Woody Debris – Wadeable Only	11+	
Physical Habitat: Slope & Bearing – Wadeable Only	1	
Channel Constraint	1	
Discharge – Wadeable Only	1	
Torrent Evidence Assessment	1	
Assessment	1	
Field forms packet (nonwadeable):		General
Verification (front & back)	1	
Field Measurement	1	
Sample Collection (front & back)	1	
Fish Gear & Sampling Info (front & back)	1	
Fish Collection	1	
Whole Fish Tissue Collection (used at selected sites)	1	
Physical Habitat: Channel/Riparian Transect – Nonwadeble Only	10	
Physical Habitat: Thalweg Profile – Nonwadeable Only	10	
Channel Constraint	1	
Torrent Evidence Assessment	1	
Assessment	1	
Packing Slips / Tracking forms & labels packet (all sites):		Shipping
T1 - Tracking: Site and Sample Status/Water Chemistry Lab Tracking	1	
T2 - Tracking: Frozen Batch Samples – Overnight (dry ice)	1	
T3 - Tracking: Non-Chilled Batch Samples – Ground (no ice)	1	
T4 - Tracking: Whole Fish Tissue – Overnight (dry ice)	1	
T5 - Tracking: Packs	1	
Labels (for samples)	1	
Other forms (provided by NARS IM as needed):		General
Fish Collection (additional)	10	
Seining Information (optional, if needed)	3	
Other forms (sent as update, if needed, by NARS IM after data packet received): Fish Identification & Count	1	Fish

NRSA 2018/19 VERIFICATION (Front)

Reviewed by (initial): ____

Site ID: _____ Visit: O 1 O 2 Date: ____ / ____ / ____

Site Name: _____ State of Site Location: _____ Field Crew: _____

O This is a special State site

STREAM/RIVER VERIFICATION INFORMATION

Stream/River verified by (Mark all that apply): O GPS O Local Contact O Signs O Roads O Topo. Map

O Other (Describe Here):

Coordinates	Latitude	Longitude	# of Satellites	Elevation at transect A
Decimal Degrees GPS NAD 83	____.____	–____.____	O ≤3 O ≥4	____ O ft O m

Location: O X-Site (wadeable) O Transect A (non-wadeable)

DID YOU SAMPLE THIS SITE?

O YES If Yes, check one below

SAMPLEABLE (Choose method used)

- O Wadeable - Continuous water, greater than 50% wadeable
- O Boatable
- O Partial - Sampled by wading (>50% of reach sampled). Explain below.
- O Partial - Sampled by boat (>50% of reach sampled). Explain below.
- O Wadeable Interrupted - Not continuous water along reach
- O Boatable Interrupted - Not continuous water along reach
- O Altered - Stream/River Channel Present but differs from Map

ADDITIONAL SITE CHARACTERISTICS

O Tidally Influenced O Blackwater O Not Applicable

O NO If No, check one below

NON-SAMPLEABLE-PERMANENT

- O Dry - Visited
- O Dry - Not visited
- O Wetland (No Definable Channel)
- O Map Error (No evidence channel/waterbody ever present)
- O Impounded (> 7 day residence time)
- O Tidal (exceeds salinity threshold)
- O Other (explain in comments)

NON-SAMPLEABLE-TEMPORARY

- O Not boatable - Need a different crew - Reschedule regardless of year
- O Not wadeable - Need a different crew - Reschedule regardless of year
- O Other (explain in comments)

NO ACCESS

- O Access Permission Denied
- O Permanently Inaccessible (Unable/Unsafe to Reach Site)
- O Temporarily Inaccessible-Fire, etc. - Reschedule regardless of year
- O Other (explain in comments)

GENERAL COMMENTS

DIRECTIONS TO SITE

02/28/2018 NRSA18 Verification 7734319701

Reviewed by (initial): _____

NRSA 2018/19 VERIFICATION (Back)

Site ID: _____ Visit: ○ 1 ○ 2 Date: ____ / ____ / ____

STREAM/RIVER REACH DETERMINATION

Channel Width Used to Define Reach (m)	DISTANCE (m) FROM X-SITE		Total Reach Length Intended (m):	Comment:
	Upstream Length:	Downstream Length:		

PERSONNEL

Crew Leader:		Name:	
Fish Taxonomist:		Name:	
Name:		Name:	
Name:		Name:	

02/28/2018 NRSA18 Verification 2492319707

NRSA 2018/19 FIELD MEASUREMENT

Reviewed by (initial): ____

Site ID: _____ Date: ____ / ____ / ____

CALIBRATION INFORMATION

Instrument manufacturer and model: _____

Instrument ID number: _____

TEMPERATURE	Thermometer Reading (°C)	Sensor Reading (°C)		
	.	.		
	Comments			
DO	Elevation (m)	OR Barometric Pressure (mm Hg)	Calibration Value	Displayed Value
			. O mg/L O %	. O mg/L O %
	Comments			
pH	Cal. STD 1 Description	Cal. STD 1 Value	Cal. STD 2 Description	Cal. STD 2 Value
		.		.
	Comments			
CONDUCTIVITY	Cal. STD 1 Description	Cal. STD 1 Value	Cal. STD 2 Description	Cal. STD 2 Value
	Comments			

FIELD MEASUREMENT O **X-Site (wadeable)** O **Transect A (non-wadeable)** O **Other Transect:** ____

	Comments
Time of Day (hh:mm) :	
DO(mg/L) XX.X .	
Temp. (°C) XX.X .	
pH XX.XX .	
Cond. (µS/cm) XX.X	
Corrected to 25°C ? O Y O N	

02/28/2018 NRSA18 Field Measurement 2683415065

NRSA 2018/19 SAMPLE COLLECTION (Front)

Reviewed by (initial): _____

Site ID: Date: / /

CHEMISTRY (CHEM) **(Target Volume = 4L)**

STATION COLLECTED: ○ X-Site (wadeable) ○ Transect A (non-wadeable) ○ Other Transect: [ ] No Sample Collected ○

Sample ID	Chilled	Comments
	Y	

WATER COLUMN CHLOROPHYLL (WCHL) (GF/F Filter)
(Target Volume = 1000 mL; max vol = 2000 mL) No Sample Collected ○

Sample ID	Volume Filtered (ml)	Frozen	Comments
		Y	

ALGAL TOXIN (Microcystin) (MICX) (PETG bottle)
(Target Volume = 500 mL) No Sample Collected ○

Sample ID	Frozen	Comments
	Y	

ALGAL TOXIN (Microcystin) (MICZ) (HDPE bottle)
(Target Volume = 500 mL) No Sample Collected ○

Sample ID	Frozen	Comments
	Y	

COMPOSITE PERIPHYTON

Composite Volume	No. of Transects	Comments

PERIPHYTON ASSEMBLAGE ID (PERI) (50-mL tube) No Sample Collected ○

Sample ID	Volume (ml)	Preserved	Comments
		Y	

PERIPHYTON CHLOROPHYLL (PCHL) (GF/F Filter) No Sample Collected ○

Sample ID	Volume Filtered (ml)	Frozen	Comments
		Y	

PERIPHYTON BIOMASS (PBIO) (GF/C Filter) No Sample Collected ○

Sample ID	Volume Filtered (ml)	Frozen	Comments
		Y	

PERIPHYTON METAGENOMIC (PDNA) (PETG bottle) No Sample Collected ○

Sample ID	Frozen	Comments
	Y	

ENTEROCOCCI (ENTE)
(Target Volume = 250 mL (Filter blank is collected during visit 1 at all revisit sites.)) No Sample Collected ○ Blank Collected ○

Sample ID	Time Collected (hhmm)	Depth Collected (m)	Sample Volume (mL)	Filt. Start Time (hhmm)	Volume Filtered (Target = 50 mL) Filt. 1	Volume Filtered (Target = 50 mL) Filt. 2	Filt. End Time (hhmm)	Time Frozen (hhmm)	

Comments

03/21/2018 NRSA18 Sample Collection 7157226369

NRSA 2018/19 SAMPLE COLLECTION (Back)

Site ID: _____ Date: ___ / ___ / _____

BENTHIC MACROINVERTEBRATES (BERW) - WADEABLE

No Sample Collected ○

Sample ID	Number of jars	Preserved (ETOH)	No. of Transects	Comments
		○ Y		

REACH-WIDE BENTHOS - WADEABLE

TRANSECT		A		B		C		D		E		F		G		H		I		J		K	
SUBSTRATE	CHAN.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.	Sub.	Chan.
Fine/Sand	Pool	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P	○ F	○ P
Gravel	Glide	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL	○ G	○ GL
Coarse	Riffle	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI	○ C	○ RI
Other:	Rapid	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA	○ OT	○ RA
If other, flag and explain in comments		Flag		Flag		Flag		Flag		Flag		Flag		Flag		Flag		Flag		Flag		Flag	

BENTHIC MACROINVERTEBRATES (BETB) - BOATABLE

No Sample Collected ○

Sample ID	Number of jars	Preserved (ETOH)	No. of Transects	Comments
		○ Y		

TRANSECT BENTHOS - BOATABLE

Habitat: C = Coarse Substrate / LWD L = Leaf Pack F = Organic Fine Muds / Sand M = Macrophyte beds OT = Other (Flag and explain in comment section below)
Substrate: F = Fine / Sand G = Gravel C = Coarse substrate OT = Other (Flag and explain in comment section below)
Channel: P = Pool GL = Glide RI = Riffle RA = Rapid OT = Other (Flag and explain in comment section below)

TRANSECT Location (L/R):	A ○L ○R	B ○L ○R	C ○L ○R	D ○L ○R	E ○L ○R	F ○L ○R	G ○L ○R	H ○L ○R	I ○L ○R	J ○L ○R	K ○L ○R
Dominant Habitat: (ONE PER TRANSECT)	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT
Secondary Habitat: (ONE PER TRANSECT)	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT	○C ○L ○F ○M ○OT
Substrate: (ONE PER TRANSECT)	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT	○F ○C ○G ○OT
Channel: (ONE PER TRANSECT)	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT	○P ○RA ○RI ○GL ○OT
	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag

Flag	Comments

02/28/2018 NRSA18 Sample Collection

8904226360

NRSA 2018/19 FISH GEAR AND SAMPLING INFORMATION (Front)

Reviewed by (initial): _____

Site ID: _____ Date: ___ / ___ / _____

FISH SAMPLING PROTOCOL (select one):

- O Large Nonwadeable - (≥ 13m wide)
- O Small Nonwadeable - (≤ 12m wide)
- O Large Wadeable - (≥13m wide)
- O Small Wadeable - (≤12m wide)
- O **Fast flowing high gradient site**

FISH SAMPLING - NOT CONDUCTED OR SUSPENDED (select one):

- O Fished - None Collected
- O Not Fished/Fishing suspended - Can't sample ≥ 50% of required reach:
  - Nonwadeable and Lg. Wadeable (at least 10 CW)
  - Wadeable (at least 20 CW)
- O Not Fished - No Permit
- O Not Fished - Site Conditions Prohibit Sampling (Describe in comments)
- O Fishing Suspended - Permit Restriction (Listed species encountered)
- O Not Fished - Equipment Failure
- O Not Fished - No fish observed (applies to small wadeable streams only)

Did conditions allow for sufficient sampling? O Y O N O Not Sure

Fish Response to Electrofishing O Immobilized O Inhibited Swimming O Escape

Final Length of Fishing Reach (m): _____

Sampling Protocol Comments: _____

FISH GEAR INFORMATION

Water Visibility: O Good O Poor **Water Temp (°C):** _____ **Specific Conductivity (uS/cm):** _____ Corrected to 25°C ? O Y O N

Primary Electrofishing Gear **Model:** _____

- O BOAT (Motor)
- O RAFT (No motor)
- O BACKPACK
- O BANK OR TOWED UNIT

# of Netters (1): _____ **Wave Form:** O AC O DC O Pulsed DC

Anodes Number: _____ **Diameter:** _____ O in. O cm **% of Power:** (Smith Root GPP only) _____

Volts: (50-1000) _____ OR O High O Low **Pulse Width (ms):** _____

Watts: likely 400 (bp), 2500 or 5000 (boat/raft) _____ **Total Shock (button) Time (s):** _____

Pulse Rate: pps or Hz _____ **Total Fishing Time (min):** _____

Amps: (may not be provided for bp) _____ **Length Sampled (m):** _____

Secondary Electrofishing Gear **Model:** _____

- O BOAT (Motor)
- O RAFT (No motor)
- O BACKPACK
- O BANK OR TOWED UNIT

# of Netters (1): _____ **Wave Form:** O AC O DC O Pulsed DC

Anodes Number: _____ **Diameter:** _____ O in. O cm **% of Power:** (Smith Root GPP only) _____

Volts: (50-1000) _____ OR O High O Low **Pulse Width (ms):** _____

Watts: likely 400 (bp), 2500 or 5000 (boat/raft) _____ **Total Shock (button) Time (s):** _____

Pulse Rate: pps or Hz _____ **Total Fishing Time (min):** _____

Amps: (may not be provided for bp) _____ **Length Sampled (m):** _____

Primary Seine Net: O BAG SEINE O MINNOW SEINE **No. of crew members:** _____

Height (m): _____ **Length (m):** _____ **Mesh (mm):** _____ **Avg. Haul Length (m):** _____ **No. of Hauls:** _____ **Total Seining Time (min):** _____ **Length Sampled (m):** _____

Secondary Seine Net: O BAG SEINE O MINNOW SEINE **No. of crew members:** _____

Height (m): _____ **Length (m):** _____ **Mesh (mm):** _____ **Avg. Haul Length (m):** _____ **No. of Hauls:** _____ **Total Seining Time (min):** _____ **Length Sampled (m):** _____

GEAR INFORMATION COMMENTS

03/28/2018 NRSA18 Fish Gear and Sampling Information 0788063181

NRSA 2018/19 FISH GEAR AND SAMPLING INFORMATION (Back)

Reviewed by (initial): _____

Site ID: _____ Date: ____ / ____ / ____

QA VOUCHER SAMPLE INFORMATION (VERT)

NO VOUCHERS PRESERVED ○

Sample ID	# of Jars	Preserved	Comments
		⊙	

PHOTO VOUCHER FILE INFORMATION

Page	Line	Photo File Name (SiteID_V(Visit#)_Tag#) (e.g.: NRS18_OR_11158_V1_Tag01)	Sequence (e.g. a-c)	Comments	Page	Line	Photo File Name (SiteID_V(Visit#)_Tag#) (e.g.: NRS18_OR_11158_V1_Tag01)	Sequence (e.g. a-c)	Comments

FISH TISSUE PLUG SAMPLES (FPLG)

NO SAMPLE COLLECTED ○

Collection Method: ○ ELECTROFISHING ○ HOOK & LINE ○ SEINING ○ OTHER:

Sample ID	Common Name	Length(mm)	Weight(g)	Comments

03/28/2018 NRSA18 Fish Gear and Sampling Information

1604063189

NRSA 2018/19 FISH COLLECTION

Reviewed by (initial): _____

Site ID: _____ Date: ___ / ___ / _____ Page ____ of ____

I did not evaluate the native/ introduced status for fish collection. ○ Y

Line #	Common Name	Hybrid?	Introduced?	Tally and Counts <150 mm	Tally and Counts 150-300 mm	Tally and Counts 300-460 mm	Tally and Counts >460 mm	Anom Count	Mortality Count	VOUCHER Unk/Rng	VOUCHER QA	VOUCHER Photo	Voucher Tag #	Vouchers Retained	Flag
1		○	○							○	○	○			
2		○	○							○	○	○			
3		○	○							○	○	○			
4		○	○							○	○	○			
5		○	○							○	○	○			
6		○	○							○	○	○			
7		○	○							○	○	○			
8		○	○							○	○	○			
9		○	○							○	○	○			
10		○	○							○	○	○			
11		○	○							○	○	○			
12		○	○							○	○	○			
13		○	○							○	○	○			
14		○	○							○	○	○			

Flag	Comments	Flag	Comments

Flag codes: K = No measurement made, F1,F2, etc. = flags assigned by each field crew. Explain all flags in comments.

09/12/2017 NRSA18 Fish Collection

2194249191

Do not use in field

NRSA 2018/19 WHOLE FISH TISSUE COLLECTION

Reviewed by (initial): ____

○ WADEABLE ○ BOATABLE

Site ID: _____ Date: ___ / ___ / _____ PAGE: ___ OF ___

WHOLE FISH TISSUE FILLET SAMPLE (FTIS) **SAMPLE ID:** _____ NO SAMPLE COLLECTED ○

○ FISH ARE ALL THE SAME SPECIES ○ FISH ALL WITHIN 75% OF LARGEST SPECIMEN

	Common Name	Total Length (mm)	Frozen	Comments
.01			○	
.02			○	
.03			○	
.04			○	
.05			○	
.06*			○	
.07*			○	
.08*			○	
.09*			○	
.10*			○	

*Additional specimens for smaller fish species to ensure sufficient tissue is available for chemical analysis of fillet tissue.

03/28/2018 NRSA18 Fish Tissue Collection 9371581329

Reviewed by (initial): ____

NRSA 2018/19 PHAB: CHANNEL/RIPARIAN TRANSECT (Front) - NONWADEABLE ONLY

Site ID: _____ Date: ____ / ____ / ____

TRANSECT: O A O B O C O D O E O F O G O H O I O J O K

Chosen bank side: (Facing down stream) O Left O Right

BANK	Decimal Degrees Latitude ____.____	Longitude -	____.____
MIDSTREAM	Decimal Degrees Latitude ____.____	Longitude -	____.____

"LITTORAL" and SHORELINE SUBSTRATE INFORMATION

SHORE DOM	SHORE SEC	BOTTOM DOM	BOTTOM SEC	CLASS — BOTTOM SUBSTRATE FROM (X ONE): O Judgement -or- O OBS. @ 5 Littoral Depths — Flag ____
O	O	O	O	RS = Bedrock (Smooth) - (Larger than a car)
O	O	O	O	RR = Bedrock (Rough) - (Larger than a car)
O	O	O	O	XB = Large Boulder (1000 to 4000 mm) - (Meterstick to car)
O	O	O	O	SB = Small Boulder (250 to 1000 mm) - (Basketball to Meterstick)
O	O	O	O	CB = Cobble (64 to 250 mm) - (Tennis ball to Basketball)
O	O	O	O	GC = Coarse Gravel (16 to 64 mm) - (Marble to Tennis ball)
O	O	O	O	GF = Fine Gravel (2 to 16 mm) - (Ladybug to marble)
O	O	O	O	SA = Sand (0.06 to 2 mm) - (Gritty - up to Ladybug size)
O	O	O	O	FN = Silt / Clay / Muck - (Not Gritty)
O	O	O	O	HP = Hardpan - (Firm, Consolidated Fine Substrate)
O	O	O	O	WD = Wood - (Any Size)
O	O	O	O	OT = Other (Write comment below)

LARGE WOODY DEBRIS
(10 x 20m Plot) Tally each piece

FILL IN IF UNMARKED BOXES ARE ZERO O FLAG: ____

DIAMETER LARGE END	Wood All/Part in Wetted Channel: Length 5-15m	15-30m	>30m	Dry by All/Part in Bankfull Channel: Length 5-15m	15-30m	>30m
0.3-0.6 m						
0.6-0.8 m						
0.8-1.0 m						
> 1.0 m						

INTENDED transect spacing xxx (m): ____ ACTUAL transect spacing xxx (m): ____

DEPTH O ft O m

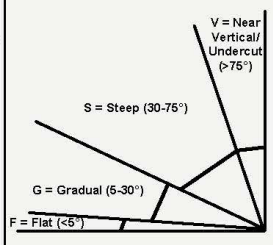
SONAR XX.X	POLE X.X	FLAG

BANK CHARACTERISTICS

		FLAG
Wetted Width XX.XX (m)		
Bar Width X.XX (m)		
Bankfull Width X.XX (m)		
Bankfull Height X.XX (m)		
Incised Height XX.X (m)		

BANK ANGLE CIRCLE ONE

O V
O S
O G
O F



Flag	Comments

Flag Codes: U = suspect or non-standard measurement; F1, F2, etc. = flags assigned by each field crew. Explain all flags in comments section.

02/28/2018 NRSA18 Phab Channel Riparian - Nonwadeable (Front) 2635312080

Reviewed by (initial): _____

NRSA 2018/19 PHAB: CHANNEL/RIPARIAN TRANSECT (Back) - NONWADEABLE ONLY

Site ID: _____ Date: ___ / ___ / _____

TRANSECT: O A O B O C O D O E O F O G O H O I O J O K Chosen bank side: (Facing down stream) O Left O Right

VISUAL RIPARIAN ESTIMATES

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
D = Deciduous C = Coniferous E = Broadleaf Evergreen M = Mixed N = None

RIPARIAN VEGETATION COVER Canopy (>5 m high)	Left Bank	Flag	Right Bank	Flag
Woody Vegetation Type	0 C E M N		0 C E M N	
BIG Trees (Trunk >0.3 m DBH)	0 1 2 3 4		0 1 2 3 4	
SMALL Trees (Trunk <0.3 m DBH)	0 1 2 3 4		0 1 2 3 4	
Understory (0.5 to 5 m high)				
Woody Vegetation Type	0 C E M N		0 C E M N	
Woody Shrubs & Saplings	0 1 2 3 4		0 1 2 3 4	
Non-Woody Herbs, Grasses, & Forbs	0 1 2 3 4		0 1 2 3 4	
Ground Cover (<0.5 m high)				
Woody Shrubs & Saplings	0 1 2 3 4		0 1 2 3 4	
Non-Woody Herbs, Grasses and Forbs	0 1 2 3 4		0 1 2 3 4	
Barren, Bare Dirt or Duff	0 1 2 3 4		0 1 2 3 4	

HUMAN INFLUENCE 0 = Not Present P = >10 m C = Within 10 m plot B = On Bank		Flag		Flag
Wall/Dike/Revetment /Riprap/Dam	0 P C B		0 P C B	
Buildings	0 P C B		0 P C B	
Pavement/Cleared Lot	0 P C B		0 P C B	
Road/Railroad	0 P C B		0 P C B	
Pipes (Inlet/Outlet)	0 P C B		0 P C B	
Landfill/Trash	0 P C B		0 P C B	
Park/Lawn	0 P C B		0 P C B	
Row Crops	0 P C B		0 P C B	
Pasture/Range/Hay Field	0 P C B		0 P C B	
Logging Operations	0 P C B		0 P C B	
Mining Activity	0 P C B		0 P C B	

FISH COVER (10m x 20m Plot)

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

	In-channel Cover	Flag
Filamentous Algae	0 1 2 3 4	
Macrophytes	0 1 2 3 4	
Woody Debris >0.3 m (BIG)	0 1 2 3 4	
Brush/Woody Debris <0.3 m (SMALL)	0 1 2 3 4	
Live Trees in Stream	0 1 2 3 4	
Overhanging Veg. ≤1 m of Surface	0 1 2 3 4	
Undercut Banks	0 1 2 3 4	
Boulders/Ledges	0 1 2 3 4	
Artificial Structures	0 1 2 3 4	

CHANNEL CONSTRAINT

Distance from shore to riparian vegetation (m) XXX _____ Flag _____

Mark only one:
- O Channel is Constrained
- O Channel is in Broad Valley but constrained by incision
- O Channel is in Narrow Valley but NOT very constrained
- O Channel is Unconstrained in Broad Valley

Flag _____

Mark only one:
- O Yes, I could readily see over the bank
- O No, I could not readily see over the bank

Flag _____

CANOPY DENSITY @ BANK

DENSIOMETER (0-17Max)

	Flag		Flag
Up		Left	
Down		Right	

Flag	Comments

Flag Codes: U = suspect or non-standard measurement; F1, F2, etc. = flags assigned by each field crew. Explain all flags in comments section.

02/28/2018 NRSA18 Phab Channel Riparian - Nonwadeable (Back) 9930297177

Reviewed by (initial): _____

NRSA 2018/19 PHAB: THALWEG PROFILE - NONWADEABLE ONLY

Site ID: _____ Date: ____ / ____ / ____

TRANSECT: O A-B O B-C O C-D O D-E O E-F O F-G O G-H O H-I O I-J O J-K

SUBSTRATE CODES	CHANNEL HABITAT CODES	OTHER
BH = BEDROCK/HARDPAN (SMOOTH OR ROUGH) - (LARGER THAN A CAR) BL = BOULDER (250 TO 4000 mm) - BASKETBALL TO CAR) CB = COBBLE (64 TO 250 mm) - (TENNIS BALL TO BASKETBALL) GR = COARSE TO FINE GRAVEL (2 TO 64 mm) - (LADYBUG TO TENNIS BALL) SA = SAND (0.06 TO 2 mm) - (GRITTY - UP TO LADYBUG SIZE) FN = SILT/ CLAY / MUCK - (NOT GRITTY) OT = OTHER (Flag and write comment below)	PO = Pool GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry Channel	Off Channel = Off Channel or Backwater

REMEMBER: A = Upstream end of Reach and K = Downstream end of Reach.

THALWEG PROFILE

STATION	SNAG	DEPTH (Either) UNITS: O ft O m — SONAR XX.X	DEPTH (Either) UNITS: O ft O m — POLE X.X	SUBSTRATE Fill in one Substrate Code for each station	CHANNEL HABITAT Fill in one Channel Habitat Code for each station	OFF CHAN.	FLAG
0	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
1	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
2	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
3	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
4	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
5	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
6	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
7	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
8	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
9	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
10	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	
11	O Y			O BH O BL O CB O GR O SA O FN O OT	O PO O GL O RI O RA O CA O FA O DR	O Y	

Flag	Comments

Flag codes: U = Suspect sample; F1, F2, etc. = flag assigned by field crew. Explain all flags in comment sections.

03/28/2018 NRSA18 Phab Thalweg Profile - Nonwadeable 8425487570

NRSA 2018/19 PHAB: CHANNEL/RIPARIAN CROSS-SECTION - WADEABLE ONLY

Reviewed by (initial): _____

Site ID: _____ Date: ___ / ___ / _____ TRANSECT: ○ A ○ B ○ C ○ D ○ E ○ F ○ G ○ H ○ I ○ J ○ K ○ Extra Side Channel

SUBSTRATE CROSS-SECTIONAL INFORMATION

	Dist LB XX.XX m	Depth XXX cm	Size Class Code	Embed. 0-100%	Flag
Left					
LCtr					
Ctr					
RCtr					
Right					

SUBSTRATE SIZE CLASS CODES — Embed. (%)
- RS = Bedrock (Smooth) - (Larger than a car) — 0
- RR = Bedrock (Rough) - (Larger than a car) — 0
- RC = Concrete/Asphalt
- XB = Large Boulder (1000 to 4000 mm) - (Meterstick to car)
- SB = Small Boulder (250 to 1000 mm) - (Basketball to meterstick)
- CB = Cobble (64 to 250 mm) - (Tennis ball to Basketball)
- GC = Coarse Gravel (16 to 64 mm) - (Marble to Tennis ball)
- GF = Fine Gravel (2 to 16 mm) - (Ladybug to marble)
- SA = Sand (0.06 to 2 mm) - (Gritty - up to Ladybug size) — 100
- FN = Silt / Clay / Muck - (Not Gritty) — 100
- HP = Hardpan - (Firm, Consolidated Fine Substrate) — 0
- WD = Wood - (Any Size)
- OT = Other (Write comment below)

FISH COVER/OTHER

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = VeryHeavy (>75%)

	Cover in Channel	Flag
Filamentous Algae	○0 ○1 ○2 ○3 ○4	
Macrophytes	○0 ○1 ○2 ○3 ○4	
Woody Debris >0.3 m (BIG)	○0 ○1 ○2 ○3 ○4	
Brush/Woody Debris <0.3 m (SMALL)	○0 ○1 ○2 ○3 ○4	
Live Trees or Roots	○0 ○1 ○2 ○3 ○4	
Overhanging Veg. =<1 m of Surface	○0 ○1 ○2 ○3 ○4	
Undercut Banks	○0 ○1 ○2 ○3 ○4	
Boulders	○0 ○1 ○2 ○3 ○4	
Artificial Structures	○0 ○1 ○2 ○3 ○4	

VISUAL RIPARIAN ESTIMATES

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = VeryHeavy (>75%)

D = Deciduous C = Coniferous E = Broadleaf Evergreen M = Mixed N = None

RIPARIAN VEGETATION COVER

Canopy (>5 m high)	Left Bank	Flag:	Right Bank	Flag:
Woody Vegetation Type	○D ○C ○E ○M ○N		○D ○C ○E ○M ○N	
BIG Trees (Trunk >0.3 m DBH)	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
SMALL Trees (Trunk <0.3 m DBH)	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
Understory (0.5 to 5 m high)				
Woody Vegetation Type	○D ○C ○E ○M ○N		○D ○C ○E ○M ○N	
Woody Shrubs & Saplings	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
Non-Woody Herbs, Grasses, & Forbs	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
Ground Cover (<0.5 m high)				
Woody Shrubs & Saplings	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
Non-Woody Herbs, Grasses and Forbs	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	
Barren, Bare Dirt or Duff	○0 ○1 ○2 ○3 ○4		○0 ○1 ○2 ○3 ○4	

BANK MEASUREMENTS

	Bank Angle 0 - 360	Undercut Dist. (m)	Flag
Left			
Right			
Wetted Width XXX.X m			
Bar Width XX.X m			
Bankfull Width XXX.X m			
Bankfull Height XX.X m			
Incised Height XX.X m			

CANOPY COVER MEASUREMENTS

DENSIOMETER (0-17Max)

		Flag			Flag
CenUp			CenR		
CenL			Left		
CenDwn			Right		

HUMAN INFLUENCE

0 = Not Present P = >10 m C = Within 10 m plot B = On Bank

		Flag:		Flag:
Wall/Dike/Revetment /Riprap/Dam	○0 ○P ○C ○B		○0 ○P ○C ○B	
Buildings	○0 ○P ○C ○B		○0 ○P ○C ○B	
Pavement/Cleared Lot	○0 ○P ○C ○B		○0 ○P ○C ○B	
Road/Railroad	○0 ○P ○C ○B		○0 ○P ○C ○B	
Pipes (Inlet/Outlet)	○0 ○P ○C ○B		○0 ○P ○C ○B	
Landfill/Trash	○0 ○P ○C ○B		○0 ○P ○C ○B	
Park/Lawn	○0 ○P ○C ○B		○0 ○P ○C ○B	
Row Crops	○0 ○P ○C ○B		○0 ○P ○C ○B	
Pasture/Range/Hay Field	○0 ○P ○C ○B		○0 ○P ○C ○B	
Logging Operations	○0 ○P ○C ○B		○0 ○P ○C ○B	
Mining Activity	○0 ○P ○C ○B		○0 ○P ○C ○B	

Flag	Comments

Flag codes: K = Sample not collected; U = Suspect sample; F1, F2, etc. = flag assigned by field crew. Explain all flags in comment sections.

4803036914

09/11/2017 NRSA18 Phab Channel Riparian - Wadeable

Do not use in field

NRSA 2018/19 PHAB: THALWEG PROFILE & WOODY DEBRIS - WADEABLE ONLY

Reviewed by (initial): _____

Site ID: _____ Date: ___ / ___ / _____ TRANSECT: O A-B O B-C O C-D O D-E O E-F O F-G O G-H O H-I O I-J O J-K

THALWEG PROFILE

For Transect A-B ONLY: Increment (m) X.X: _____ Total Reach Length (m): _____

STATION	THALWEG DEPTH (cm) (XXX)	WETTED WIDTH (m) (XXX.X)	BAR WIDTH 1 Present	BAR WIDTH 1 XX.X	SOFT /SMALL SEDIMENT	CHANNEL UNIT CODE	SIDE CHANNEL	BACK WATER	THALWEG PROFILE COMMENTS
0			Y		Y		Y	Y	
1			Y		Y		Y	Y	
2			Y		Y		Y	Y	
3			Y		Y		Y	Y	
4			Y		Y		Y	Y	
*5			Y		Y		Y	Y	
6			Y		Y		Y	Y	
*7			Y		Y		Y	Y	
8			Y		Y		Y	Y	
9			Y		Y		Y	Y	
10			Y		Y		Y	Y	
11			Y		Y		Y	Y	
12			Y		Y		Y	Y	
13			Y		Y		Y	Y	
14			Y		Y		Y	Y	

CHANNEL UNIT CODES: PO = Pool GL = Glide RI = Riffle RA = Rapid CA = Cascade FA = Falls DR = Dry

SUBSTRATE

Station (5 or 7) | LFT | LCTR | CTR | RCTR | RGT | FLAG

RS = BEDROCK (SMOOTH) - (LARGER THAN A CAR)
RR = BEDROCK (ROUGH) - (LARGER THAN A CAR)
RC = CONCRETE/ASPHALT
XB = LG. BOULDER (1000 TO 4000 mm) - METERSTICK TO CAR)
SB = SM. BOULDER (250 TO 1000 mm) - BASKETBALL TO METERSTICK)
CB = COBBLE (64 TO 250 mm) - (TENNIS BALL TO BASKETBALL)
GC = COARSE GRAVEL (16 TO 64 mm) - (MARBLE TO TENNIS BALL)
GF = FINE GRAVEL (2 TO 16 mm) - (LADYBUG TO MARBLE)
SA = SAND, (.06 TO 2 mm) (GRITTY - UP TO LADYBUG SIZE)
FN = SILT/ CLAY/ MUCK - (NOT GRITTY)
HP = HARDPAN - (FIRM, CONSOLIDATED FINE SUBSTRATE)
WD = WOOD - (ANY SIZE)
OT = OTHER (FLAG AND EXPLAIN IN COMMENTS)

FLAG	COMMENTS (for SUBSTRATE and LWD)

LARGE WOODY DEBRIS

(10 cm small end diameter; 1.5 m length) FILL IN IF UNMARKED BOXES ARE ZERO ○ FLAG: _____

DIAMETER LARGE END	PIECES ALL/PART IN BANKFULL CHANNEL Length 1.5-5m		5-15m		>15m		PIECES BRIDGE ABOVE BANKFULL CHANNEL Length 1.5-5m		5-15m		>15m	
0.1-<0.3 m												
0.3-0.6 m												
0.6-0.8 m												
>0.8 m												

1 = Measure Bar Width at Station 0 and Mid-Station (5 or 7).

Flag Codes: K = no measurement made; U = suspect measurement; F1, F2, etc. = flags assigned by each field crew. Explain all flags in comments.

10/04/2017 NRSA18 Phab Thalweg Profile - Wadeable

6364573600

Do not use in field

NRSA 2018/19 SEINING INFORMATION

Reviewed by (initial): _____

Site ID: _____ **Date:** ___ / ___ / _____ **Page** ___ **of** ___

Line #	Subreach (e.g., A-B)	Bank	Habitat Sampled (choose one)	If other, describe:	Seine Width (m)	Seine Depth (m)	Approx Haul Distance (m)	Approx Haul Time (sec)	Fish Collected?	Additional Person	Flag
1		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
2		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
3		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
4		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
5		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
6		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
7		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
8		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
9		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
10		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
11		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
12		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
13		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
14		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	
15		O L O R O CH	O PL O GL O RF O BW O ED O SN O Other:						O	O	

BANK: L = Left Bank (facing downstream R = Right Bank (facing downstream) CH = In Channel
HABITAT SAMPLED: PL = Pool, GL = Glide/Run, RF = Riffle, ED = Edge, SN = Snag, BW = Backwater or side channel, OT = Other (describe)
FLAG CODES: K = No measurement made, U = Suspect measurement., F1,F2, etc. = flags assigned by each field crew. Explain all flags in comments.

Flag	Comments

03/28/2018 NRSA18 Seining Information 4803036925

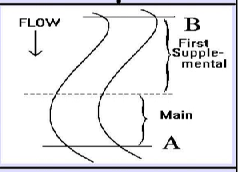
NRSA 2018/19 PHAB: SLOPE AND BEARING - WADEABLE ONLY

Reviewed by (initial):_____

Site ID: _____ Date: ___ / ___ / _____

MAIN (always used)					FIRST SUPPLEMENTAL			SECOND SUPPLEMENTAL			
TRANSECT & METHOD Mark method for every Transect		Slope(%) or Elev. Diff. (cm) Mark Units for every Transect	BEARING 0 - 359	PROPOR-TION %	Slope(%) or Elev. Diff. (cm)	BEARING 0 - 359	PROPOR-TION %	Slope(%) or Elev. Diff. (cm)	BEARING 0 - 359	PROPOR-TION %	FLAG
A < B	O CL O TR O HL O WT O LA O Other	O % O cm									
B < C	O CL O TR O HL O WT O LA O Other	O % O cm									
C < D	O CL O TR O HL O WT O LA O Other	O % O cm									
D < E	O CL O TR O HL O WT O LA O Other	O % O cm									
E < F	O CL O TR O HL O WT O LA O Other	O % O cm									
F < G	O CL O TR O HL O WT O LA O Other	O % O cm									
G < H	O CL O TR O HL O WT O LA O Other	O % O cm									
H < I	O CL O TR O HL O WT O LA O Other	O % O cm									
I < J	O CL O TR O HL O WT O LA O Other	O % O cm									
J < K	O CL O TR O HL O WT O LA O Other	O % O cm									

Flag	Comments



Flag codes: U = Suspect sample; F1, F2, M (M = Method - used for method comment only) = flag assigned by field crew. Explain all flags in comment sections.
CL=Clinometer; HL=Hand Level; LA=Laser rangefinder with electronic clinometer; TR=Transit, surveyors level or total station; WT=Water Tubing.

09/11/2017 NRSA18 Slope and Bearing

0181146753

Do not use in field

NRSA 2018/19 CHANNEL CONSTRAINT

Reviewed by (initial): ____

Site ID: _____ **Date:** ____ / ____ / _____

CHANNEL PATTERN (Fill in one):

- O One Channel
- O Anastomosing (complex) channel - (Relatively long major and minor channels branching and rejoining.)
- O Braided channel - (Multiple short channels branching and rejoining - mainly one channel broken up by numerous mid-channel bars.)

CHANNEL CONSTRAINT(Fill in one):

- O Channel very constrained in V-shaped valley (i.e. it is very unlikely to spread out over valley or erode a new channel during flood)
- O Channel is in Broad Valley but channel movement by erosion during floods is constrained by Incision (Flood flows do not commonly spread over valley floor or into multiple channels.)
- O Channel is in Narrow Valley but is not very constrained, but limited in movement by relatively narrow valley floor (< ~10 x bankfull width)
- O Channel is Unconstrained in Broad Valley (i.e. during flood it can fill off-channel areas and side channels, spread out over flood plain, or easily cut new channels by erosion)

- O Bedrock (i.e. channel is a bedrock-dominated gorge)
- O Hillslope (i.e. channel constrained in narrow V-shaped valley)
- O Terrace (i.e. channel is constrained by its own incision into river/stream gravel/soil deposits)
- O Human Bank Alterations (i.e. constrained by rip-rap, landfill, dike, road, etc.)
- O No constraining features

Percent of channel length with margin in contact with constraining feature: ____ % (0-100%) ------->

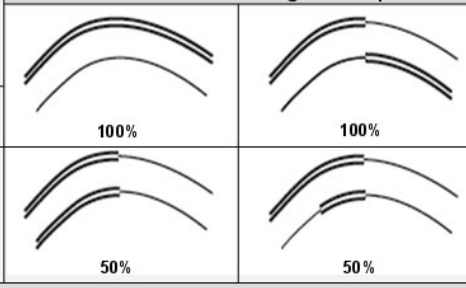
Bankfull width: ____ (m)

Valley width (Visual Estimated Average): _____ (m)

Note: Be sure to include distances between both sides of valley border for valley width.

If you cannot see the valley borders, record the distance you can see and fill this bubble: O

Percent of Channel Margin Examples



COMMENTS

03/28/2018 NRSA18 Channel Constraint

7734623125

NRSA 2018/19 DISCHARGE - WADEABLE ONLY

Reviewed by (initial): _____

Site ID: _____ Date: ___ / ___ / _____

○ Velocity Area

Distance Units ○ ft ○ cm | Depth Units ○ ft ○ cm | Velocity Units ○ ft/s XX.X ○ m/s X.XX

	Dist. from Bank	Depth	Velocity	Flag
1	0			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

○ Timed Filling

Repeat	Volume (L)	Time (s)	Flag
1	.	.	
2	.	.	
3	.	.	
4	.	.	
5	.	.	

○ Neutral Buoyant Object

Measure the stream depth using a wading rod or meter stick at points approximately equal to the following proportions of the total width: 0.1, 0.3, 0.5, 0.7, and 0.9.

	Float 1	Float 2	Float 3
Float Dist. ○ ft ○ m			
Float Time (s)			
Flag			

Cross Sections on Float Reach

	Upper Section	Middle Section	Lower Section
Width ○ ft ○ m	.	.	.
Depth 1 ○ ft ○ cm			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

○ Q Value

If discharge is determined directly in field, record value here: Q = _____ ○ cfs ○ m^3/s Flag [ ]

Flag	Comments

Flag Codes: Z = Last station measured (if not Station 20); F1, F2, etc. = Miscellaneous flags assigned by each field crew. Explain all flags in comments section.

03/28/2018 NRSA18 Discharge 5312491487

NRSA 2018/19 TORRENT EVIDENCE ASSESSMENT

Reviewed by (initial): _____

Site ID: _____ Date: ____ / ____ / ____

Please fill in any of the following that are evident.

EVIDENCE OF TORRENT SCOURING:	
○	01 - Stream channel has a recently devegetated corridor two or more times the width of the low flow channel. This corridor lacks riparian vegetation with possible exception of fireweed, even-aged alder or cottonwood seedlings, grasses, or other herbaceous plants.
○	02 - Stream substrate cobbles or large gravel particles are NOT IMBRICATED. (Imbricated means that they lie with flat sides horizontal and that they are stacked like roof shingles -- imagine the upstream direction as the top of the "roof.") In a torrent scour or deposition channel, the stones are laying in unorganized patterns, lying "every which way." In addition many of the substrate particles are angular (not "water-worn.")
○	03 - Channel has little evidence of pool-riffle structure. (For example, could you ride a mountain bike down the channel?)
○	04 - The stream channel is scoured down to bedrock for substantial portion of reach.
○	05 - There are gravel or cobble berms (little levees) above bankfull level.
○	06 - Downstream of the scoured reach (possibly several miles), there are massive deposits of sediment, logs, and other debris.
○	07 - Riparian trees have fresh bark scars at many points along the stream at seemingly unbelievable heights above the channel bed.
○	08 - Riparian trees have fallen into the channel as a result of scouring near their roots.
EVIDENCE OF TORRENT DEPOSITS:	
○	09 - There are massive deposits of sediment, logs, and other debris in the reach. They may contain wood and boulders that, in your judgement, could not have been moved by the stream at even extreme flood stage.
○	10 - If the stream has begun to erode newly laid deposits, it is evident that these deposits are "MATRIX SUPPORTED." This means that the large particles, like boulders and cobbles, are often not touching each other, but have silt, sand, and other fine particles between them (their weight is supported by these fine particles -- in contrast to a normal stream deposit, where fines, if present, normally "fill-in" the interstices between coarser particles.)
NO EVIDENCE:	
○	11 - No evidence of torrent scouring or torrent deposits.

COMMENTS

10/04/2017 NRSA18 Torrent Evidence **5543621376**

Do not use in field

NRSA 2018/19 ASSESSMENT (Front)

Reviewed by (initial): _____

Site ID: _____ Date: ____ / ____ / ____

Elevation at transect K: _____ ○ ft ○ m

WATERSHED ACTIVITIES AND DISTURBANCES OBSERVED
(Intensity: Blank=Not observed, L=Low, M=Moderate, H=Heavy)

BLANK FIELD INDICATES ABSENCE: ○

Residential	Recreational	Agricultural	Industrial	Stream Management
○ L ○ M ○ H Residences	○ L ○ M ○ H Hiking Trails	○ L ○ M ○ H Cropland	○ L ○ M ○ H Industrial Plants	○ L ○ M ○ H Liming
○ L ○ M ○ H Maintained Lawns	○ L ○ M ○ H Parks, Campgrounds	○ L ○ M ○ H Pasture	○ L ○ M ○ H Mines/Quarries	○ L ○ M ○ H Chemical Treatment
○ L ○ M ○ H Construction	○ L ○ M ○ H Primitive Parks, Camping	○ L ○ M ○ H Livestock Use	○ L ○ M ○ H Oil/Gas Wells	○ L ○ M ○ H Angling Pressure
○ L ○ M ○ H Pipes, Drains	○ L ○ M ○ H Trash/Litter	○ L ○ M ○ H Orchards	○ L ○ M ○ H Power Plants	○ L ○ M ○ H Dredgong
○ L ○ M ○ H Dumping	○ L ○ M ○ H Surface Films, Scums, or Slicks	○ L ○ M ○ H Poultry	○ L ○ M ○ H Logging	○ L ○ M ○ H Channelization
○ L ○ M ○ H Roads		○ L ○ M ○ H Feedlot	○ L ○ M ○ H Evidence of Fir	○ L ○ M ○ H Water Level Fluctuations
○ L ○ M ○ H Bridges/Causeway		○ L ○ M ○ H Water Withdrawal	○ L ○ M ○ H Odors	○ M ○ H Fish Stocking
○ L ○ M ○ H Sewage Treatment			○ L ○ M ○ H Commercial	○ L ○ H Dams

SITE CHARACTERISTICS (200m radius)

WATERBODY CHARACTER

PRISTINE: ○ 5 ○ 4 ○ 3 ○ 2 ○ 1 **Highly Disturbed**

APPEALING: ○ 5 ○ 4 ○ 3 ○ 2 ○ 1 **Unappealing**

BEAVER

Beaver Signs: ○ Absent ○ Rare ○ Common

Beaver Flow Modifications: ○ None ○ Minor ○ Major

DOMINANT LAND USE

Dominant Land Use Around 'X' ○ Forest ○ Agriculture ○ Range ○ Urban ○ Suburban/Town

If Forest, Dominant Age Class ○ 0 - 25 yrs. ○ 26 - 75 yrs. ○ > 75 yrs.

WEATHER

CONDITIONS AND LOCAL CONTACTS

OBSERVATIONS (e.g. accessibility, boating, fishing, swimming, health concerns):

09/13/2017 NRSA18 Assessment

4803036903

Do not use in field

Reviewed by (initial): _____

NRSA 2018/19 ASSESSMENT (Back)

Site ID: _____ **Date:** ____ / ____ / ____

GENERAL ASSESSMENT AND COMMENTS

INVASIVE OR NUISANCE SPECIES OF LOCAL INTEREST

Record species of plants and animals that were observed but are not on the invasive plant form. Examples would be Zebra Mussel or New Zealand Mud Snail, or invasive plants or animals of concern to a particular state. Indicate your level of confidence in your identification, and provide some idea of how prevalent it is in the sampling reach or adjacent riparian area.

Species (Common Name)	Confidence	Prevalence	Comments
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	
	O LOW O HIGH	O DOMINANT O SPARSE O COMMON	

09/13/2017 NRSA18 Assessment

4860036906

Do not use in field

WATER CHEMISTRY (CHEM)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T1
990000

CHLOROPHYLL-a (WCHL)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Volume Filtered: _____mL
T1
990001

WCHL, PCHL, PBIO - OUTER BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
990001, 990003, 990004
T1

PERIPHYTON ASSEMBLAGE ID (PERI)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T3
Composite Volume: _____mL
990002

PERIPHYTON CHLOROPHYLL (PCHL)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T1
Volume Filtered: _____mL
990003

PERIPHYTON BIOMASS (PBIO)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T1
Volume Filtered: _____mL
990004

PERIPHYTON METAGENOMIC (PDNA)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T2
990005

ALGAL TOXIN (MICX)
(PETG Bottle (clear, square bottle)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T2
990006

ALGAL TOXIN (MICZ)
(HDPE Bottle (round Nalgene bottle)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T2
990007

BENTHIC MACROINVERTEBRATES (BERW)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T3
990008

BENTHIC MACROINVERTEBRATES (BETB)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T3
990009

FISH TISSUE PLUG (FPLG)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T2
990011

QA VOUCHER (VERT)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
T3
990012

UNK/RNG VOUCHER (VERT)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2

ENTEROCOCCI (ENTE) - BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Vol. Filt: 1 _____ mL 2 _____ mL
990010

Filter : 1
Vol. Filt: _____ mL
999010

Filter : 2
Vol. Filt: _____ mL
999010

Filter : Blank
Vol. Filt: _____ mL
999010

FISH TISSUE FILLET (FTIS)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____mm
T4
999013.1

FISH TISSUE FILLET (FTIS)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____mm
T4
999013.2

FISH TISSUE FILLET (FTIS)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____mm
T4
999013.3

FISH TISSUE FILLET (FTIS)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____mm
T4
999013.4

FISH TISSUE FILLET (FTIS)
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____mm
T4
999013.5

FISH TISSUE FILLET (FTIS) - BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
999013
T4

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA FISH
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Length: _____ mm
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Bag ___ of ___
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Bag ___ of ___
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Bag ___ of ___
SAMPLE ID: _____

FISH TISSUE FILLET (FTIS) – EXTRA BAG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Bag ___ of ___
SAMPLE ID: _____

QA FISH VOUCHER (VERT) Site ID: NRS18_ _____ ___ / ___ / 201__ **999012**		QA FISH VOUCHER (VERT) Site ID: NRS18_ _____ ___ / ___ / 201__ **999012**	
FISH – BAG TAG: 41 **999012**	FISH – BAG TAG: 42 **999012**	FISH – BAG TAG: 43 **999012**	FISH – BAG TAG: 44 **999012**
FISH – BAG TAG: 37 **999012**	FISH – BAG TAG: 38 **999012**	FISH – BAG TAG: 39 **999012**	FISH – BAG TAG: 40 **999012**
FISH – BAG TAG: 33 **999012**	FISH – BAG TAG: 34 **999012**	FISH – BAG TAG: 35 **999012**	FISH – BAG TAG: 36 **999012**
FISH – BAG TAG: 29 **999012**	FISH – BAG TAG: 30 **999012**	FISH – BAG TAG: 31 **999012**	FISH – BAG TAG: 32 **999012**
FISH – BAG TAG: 25 **999012**	FISH – BAG TAG: 26 **999012**	FISH – BAG TAG: 27 **999012**	FISH – BAG TAG: 28 **999012**
FISH – BAG TAG: 21 **999012**	FISH – BAG TAG: 22 **999012**	FISH – BAG TAG: 23 **999012**	FISH – BAG TAG: 24 **999012**
FISH – BAG TAG: 17 **999012**	FISH – BAG TAG: 18 **999012**	FISH – BAG TAG: 19 **999012**	FISH – BAG TAG: 20 **999012**
FISH – BAG TAG: 13 **999012**	FISH – BAG TAG: 14 **999012**	FISH – BAG TAG: 15 **999012**	FISH – BAG TAG: 16 **999012**
FISH – BAG TAG: 09 **999012**	FISH – BAG TAG: 10 **999012**	FISH – BAG TAG: 11 **999012**	FISH – BAG TAG: 12 **999012**
FISH – BAG TAG: 05 **999012**	FISH – BAG TAG: 06 **999012**	FISH – BAG TAG: 07 **999012**	FISH – BAG TAG: 08 **999012**
FISH – BAG TAG: 01 **999012**	FISH – BAG TAG: 02 **999012**	FISH – BAG TAG: 03 **999012**	FISH – BAG TAG: 04 **999012**

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

VOUCHER – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____
SAMPLE ID _____

FISH VOUCHER – UNK/RNG Site ID: NRS18_ _____ ___ / ___ / 201__		FISH VOUCHER – UNK/RNG Site ID: NRS18_ _____ ___ / ___ / 201__	
FISH – BAG TAG: 41	FISH – BAG TAG: 42	FISH – BAG TAG: 43	FISH – BAG TAG: 44
FISH – BAG TAG: 37	FISH – BAG TAG: 38	FISH – BAG TAG: 39	FISH – BAG TAG: 40
FISH – BAG TAG: 33	FISH – BAG TAG: 34	FISH – BAG TAG: 35	FISH – BAG TAG: 36
FISH – BAG TAG: 29	FISH – BAG TAG: 30	FISH – BAG TAG: 31	FISH – BAG TAG: 32
FISH – BAG TAG: 25	FISH – BAG TAG: 26	FISH – BAG TAG: 27	FISH – BAG TAG: 28
FISH – BAG TAG: 21	FISH – BAG TAG: 22	FISH – BAG TAG: 23	FISH – BAG TAG: 24
FISH – BAG TAG: 17	FISH – BAG TAG: 18	FISH – BAG TAG: 19	FISH – BAG TAG: 20
FISH – BAG TAG: 13	FISH – BAG TAG: 14	FISH – BAG TAG: 15	FISH – BAG TAG: 16
FISH – BAG TAG: 09	FISH – BAG TAG: 10	FISH – BAG TAG: 11	FISH – BAG TAG: 12
FISH – BAG TAG: 05	FISH – BAG TAG: 06	FISH – BAG TAG: 07	FISH – BAG TAG: 08
FISH – BAG TAG: 01	FISH – BAG TAG: 02	FISH – BAG TAG: 03	FISH – BAG TAG: 04

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

FISH VOUCHER – UNK/RNG
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ____ of _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS COMPOSITE SAMPLE

Site ID: NRS18__ _____
Site Name: _____
Date Collected: _____/_____/201__
Sample Type: O BERW O BETB
# of Transects: _____
Collector(s): _____
Jar ___ of ___
SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

BENTHOS – EXTRA JAR
Site ID: NRS18_ _____
Date: _____/_____/201__ Visit #: O1 O2
Jar ___ of ___

SAMPLE ID: _____

Appendix C: Shipping Guidelines

General Shipping Guidelines

Samples will be shipped according to the chart below (Table C.2). The Field Crew Leader will complete the appropriate sample information and tracking form for the samples and will submit tracking information via the NRSA App (alternative methods are listed below). The Field Crew Leader will place the samples and a packing slip (in a waterproof bag or plastic sleeve) in the shipment cooler, and then the Field Crew Leader will attach the appropriate pre-addressed FedEx label for the appropriate lab. The field crew will either drop off the cooler for shipment at a local FedEx location or arrange for a pick up at the hotel or other appropriate facility. If the field crew has chosen a pick up, they must follow up with the facility at which it has been left and/or track the package through FedEx tracking tools to ensure that the shipment cooler has been picked up by FedEx. Once the package is in the possession of FedEx, the IM Team and Field Logistics Coordinator (FLC) will track the package to its destination and take steps necessary to ensure timely delivery.

Tracking information must be submitted electronically to the IM Team and a packing slip or tracking form must accompany each sample shipment. The packing slip or tracking form is to be placed in a resealable plastic bag/pouch secured to the inside of the cooler lid. Seal the shipping container. Submit the sample tracking information to the NARS IM Team to indicate that samples will be in transit to the laboratory. Tracking information must be submitted the same day that the samples are shipped.

Before shipping, it is very important to preserve each sample as directed in the sample collection portion of the appropriate chapter in the NRSA 2018-19 FOM. General directions for sample processing, shipping and tracking are found below:

- Preserve the samples as specified for each indicator before shipping.
- Be aware of the holding times for each type of sample.
- Always line the cooler with a heavy duty plastic bag (cooler liner) when shipping with wet ice or when shipping preserved samples.
- When shipping samples preserved with ethanol, surround the jars with crumpled newspaper or other absorbent material.

<u>When wet ice is used for shipment:</u>

- Ensure that the ice is fresh before shipment, and use adequate amounts of ice to ensure samples will remain cold for up to 36 hours.
- Place samples and ice inside the cooler liner and seal the cooler liner.
- Secure the cooler with packing tape.

When dry ice is used for shipment:

- When shipping frozen batched samples, place the dry ice pad in the bottom of the cooler and then line the cooler with the dry ice liner (silver bubble material).
- Ship frozen batched samples with 20 pounds of dry ice.
- Ship whole fish tissue samples with 50 pounds of dry ice.
- When shipping whole fish tissue or frozen batched samples, place a layer of dry ice in the bottom of the cooler, samples in a middle layer, and a second layer of dry ice on top of the samples.
- Affix a Class 9 Hazardous Goods label (Figure C.1) to the outside of the cooler making sure that it indicates the sender, recipient and amount of dry ice (in kg).

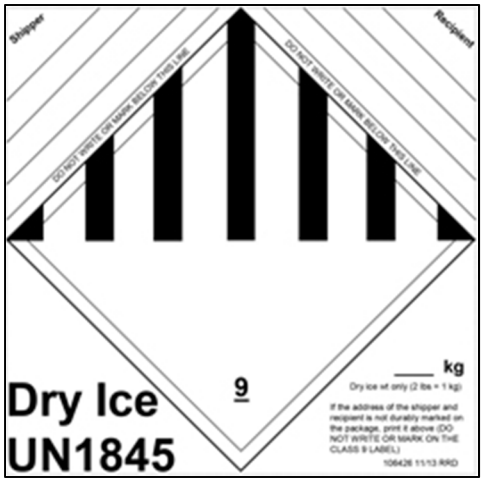


Figure C.1 Class 9 Hazardous Goods label for use with dry ice shipments

NOTE: *Not all FedEx locations will accept shipments containing dry ice. Dry ice shipments can be shipped from "FedEx staffed" locations. You can also arrange for a pick-up from your lab or hotel. Dry ice shipments often cannot be shipped from FedEx Office and Print Centers® or FedEx Authorized ShipCenter® locations. These types of locations are differentiated on FedEX.com in the "Find FedEx Locations" feature. Please be sure to call in advance to ensure your location will accept the package for shipment.*

When shipping samples preserved with ETOH or Formalin (non-chilled batched samples):

- Close the lid of each container tightly and securely with electrical tape
- Line the cooler with the provided cooler liner.
- Place sealed sample containers inside cooler liner
- Surround the jars with crumpled newspaper, pads, or other absorbent material
- Seal the cooler liner securely with zip tie.
- Secure the cooler with packing tape.

***NOTE**: Federal regulations and FedEx rules allow for Ground shipping of certain quantities of flammable liquids WITHOUT the need for special certifications and labeling. Flammable liquids may NOT be shipped via air carrier unless shipper is trained and qualified to do so and specific documentation and labeling requirements are met.*

The Code of Federal Regulations (49 CFR Section 173.150) lists the exceptions which allow shipping of flammable liquids via ground carrier without labeling or special certifications. Ethanol and formalin can be considered to be in either Packaging Group 2 or 3, so we use the more stringent PG 2 as our guideline. The limited quantity exclusion allows ground shipping of PG 2 flammable liquids provided that the individual containers inside the package are not over 1.0 liters each, that the gross weight of the package does not exceed 66 pounds, and that the outer packaging is a sturdy container. Please ensure that your shipment meets these criteria to ensure the legal Ground shipment of these samples.

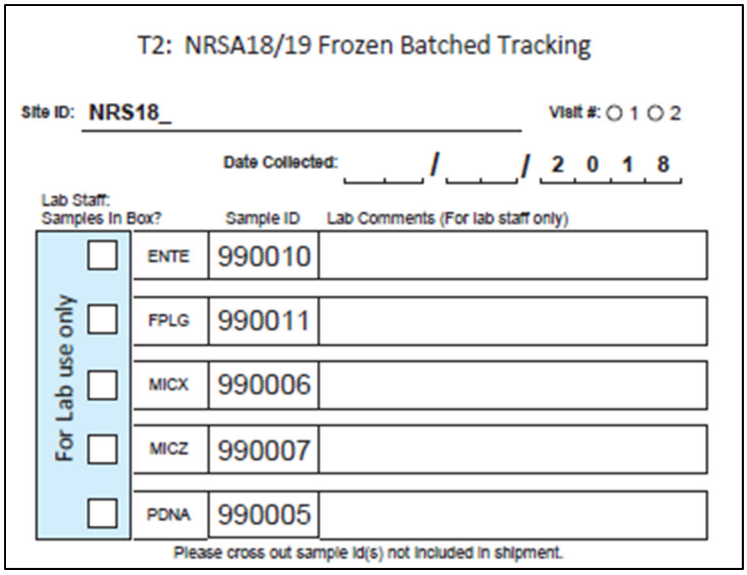
Tracking Forms and Shipment Types

Whenever NRSA samples are shipped, one or more tracking forms are completed to relay important shipping information to the IM Team, FLC and the destination lab. These tracking forms are to be submitted both electronically at the time of shipping (through app submission or by emailing a scan of a paper version of the form) and included as a hard copy (packing slip or tracking form) in the shipping container with the samples.

Packing Slips

Packing slips (Figure C.2) are postcard sized slips that accompany sample labels in the site kits. When crews order site kits (via the Request Form), a set of sample labels and packing slips will accompany each site kit. Sample IDs for the suite of samples collected at a single site will be pre-populated on both the labels and the packing slips. It is important to keep the labels and packing slips organized so the sample IDs will match when shipping occurs. It is a good idea to write the Site ID in the header area of all packing slips when preparing the Site Packet, even if the slip will not be used to ship samples right away. This will help ensure that the sample IDs do not get mis-matched.

When crews submit tracking data via the app, a tracking form will be populated and sent back to them as a PDF document that will look very much like a paper tracking form (see below). Crews DO NOT need to print this form as all tracking information is submitted electronically and the packing slip acts as the chain of custody for the samples in the cooler. The returned PDF is simply a record of the submission for the crew to keep.



T2: NRSA18/19 Frozen Batched Tracking

Site ID: NRS18_ Visit #: ○ 1 ○ 2

Date Collected: ____ / ____ / 2018

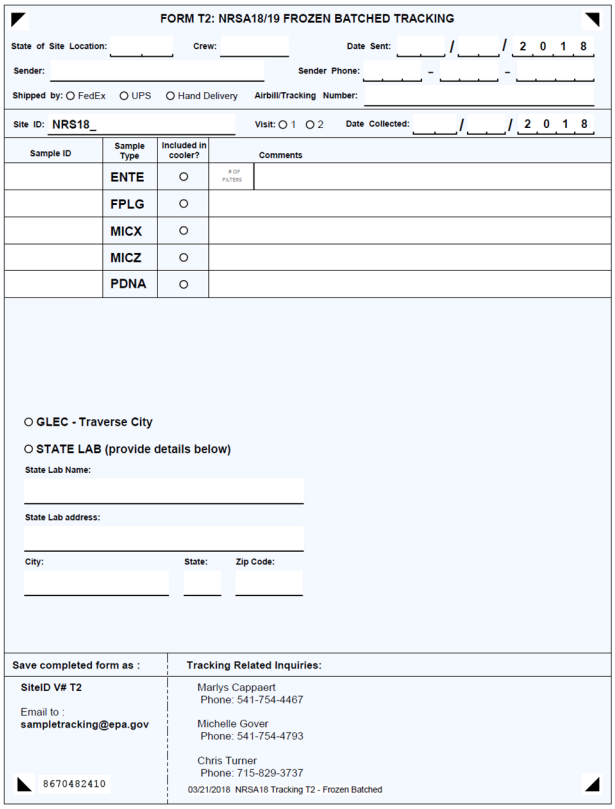
For Lab use only	Lab Staff: Samples In Box?	Sample ID	Lab Comments (For lab staff only)
	☐ ENTE	990010	
	☐ FPLG	990011	
	☐ MICX	990006	
	☐ MICZ	990007	
	☐ PDNA	990005	

Please cross out sample id(s) not included in shipment.

Figure C.2. Example of a T2 Packing Slip

Paper Tracking Forms

Crews who are **NOT** using the NRSA App (E-Forms) for data submission will need to order paper data forms and paper tracking forms (Figure C.3) for each site. Labels will still be sent in the site kits and the crew will need to carefully transfer sample IDs to the paper tracking forms. Crews who are sending a subset of samples to a state lab may also need paper tracking forms or can use a fillable PDF tracking form.



FORM T2: NRSA18/19 FROZEN BATCHED TRACKING

State of Site Location: ____ Crew: ____ Date Sent: ____ / ____ / 2018

Sender: ____ Sender Phone: ____ – ____ – ____

Shipped by: ○ FedEx ○ UPS ○ Hand Delivery Airbill/Tracking Number: ____

Site ID: NRS18_ Visit: ○ 1 ○ 2 Date Collected: ____ / ____ / 2018

Sample ID	Sample Type	Included in cooler?	Comments
	ENTE	○	# OF FILTERS
	FPLG	○	
	MICX	○	
	MICZ	○	
	PDNA	○	

○ GLEC - Traverse City

○ STATE LAB (provide details below)

State Lab Name: ____

State Lab address: ____

City: ____ State: ____ Zip Code: ____

Save completed form as :	Tracking Related Inquiries:
SiteID V# T2 Email to : sampletracking@epa.gov	Marlys Cappaert Phone: 541-754-4467 Michelle Gover Phone: 541-754-4793 Chris Turner Phone: 715-829-3737

8670482410

03/21/2018 NRSA18 Tracking T2 - Frozen Batched

Figure C.3. Example of a T2 Paper Tracking form

Each packing slip and tracking form has been assigned a "T" number to help crews identify the correct slip/form to use when sending samples. This "T" number is located on the top of each slip/form in the title of the form (e.g., T1: NRSA18/19 Daily Water Chemistry Sample Tracking). Crews will also find reference to the same "T" numbers on the individual sample labels and on the top of the pre-printed FedEx return labels provided in the coolers. The FedEx return labels are pre-paid and allow crews to ship samples to any of the nationally contracted laboratories. States using their own labs for certain samples will need to arrange for shipping on their own.

Crews include copies of all packing slips or tracking forms in the coolers (placed in the plastic sleeve affixed to the inside of the cooler lid) when they send samples to the labs, and they also must submit an electronic copy to the IM Team. Crews have several different options for electronically submitting sample and tracking information. If a cooler contains samples from more than one site, then multiple slips/forms must be placed in the cooler and submitted to NARS IM.
In order of preference, the options for submitting sample and tracking information are:

1. Using the NRSA App:
    a. Enter all applicable sample data in the pertinent sections of the NRSA App. For any targeted sample not collected, be sure to indicate a reason why the sample was not collected in the comment bubble adjacent to the "no sample collected" check box.
    b. Fill out the correct tracking form in the app with shipping information (e.g., lab, ship date, airbill number, sender name, and sender phone number).
    c. Submit the tracking form via the app.
    d. On the pre-populated packing slip that accompanied the sample labels, enter the Site ID, Visit number, and Date collected.
    e. For any sample not included in the cooler, line out the sample ID.
    f. Insert the packing slip into the plastic sleeve on the inside of the cooler lid, seal the cooler with packing tape, apply the correct FedEx shipping label, and ship the cooler.
2. Using a paper tracking form:
    a. Hand-enter sample IDs and complete tracking data on a paper tracking form.
    b. Scan the form with a handheld device or office scanner. Attach the file (in PDF version) to an email and address to sampletracking@epa.gov. Be sure that the file scanned is clear and legible. If an office scanner is not available at the time of shipping, consider a free application like CamScanner or AdobeScan which is widely available for mobile devices and has processing tools that will help to ensure that the scan is clear and legible.
        - Please name the PDF files in the following format: "**SiteID V# T#**"**,** where:
            - 'SiteID' is the NRSA18-19 Site ID as listed in the Site Evaluation Spreadsheet (prefix may be omitted);
            - 'V#' is the visit number (e.g., V1 or V2); and
            - 'T#' is the number of the tracking form.
                - Example: AL_10001 V1 T1
            - *The specified naming convention is provided on the bottom of each form as a reminder*.
    c. After scanning, insert the tracking form into the plastic sleeve on the inside of the cooler lid, seal the cooler with packing tape, apply the correct FedEx shipping label, and ship the cooler.
3. Using a fillable PDF tracking form (*may be best for state lab use*):
    a. Using a handheld device or portable computer, enter sample IDs and complete tracking data into a fillable PDF tracking form, save and submit it via email. Fillable PDF tracking

forms do not have pre-populated sample IDs, so care must be taken to enter all sample IDs *exactly* as they are displayed on the sample labels. The fillable PDFs must be saved as an updated copy to the user's computer or device and then attached to an email to sampletracking@epa.gov.

- Please name the PDF files in the following format: "**SiteID V# T#", ** where:
  - 'SiteID' is the NRSA18-19 Site ID as listed in the Site Evaluation Spreadsheet (prefix may be omitted);
  - 'V#' is the visit number (e.g., V1 or V2); and
  - 'T#' is the number of the tracking form.
    - Example: AL_10001 V1 T1
  - *The specified naming convention is provided on the bottom of each form as a reminder*.

b. Print the completed PDF and include the hard copy of the form in the cooler with the samples. *This step may be omitted for coolers shipped to state labs if the lab does not require the receipt of this tracking form.* Insert the tracking form into the plastic sleeve on the inside of the cooler lid, seal the cooler with packing tape, apply the correct FedEx shipping label, and ship the cooler.

Status Reports:
When a crew samples a site, they complete and submit a copy of the **T1 – Site & Sample Status/Water Chemistry Lab Tracking Form**. This will typically be done via the NRSA App but can be accomplished through the use of a paper or fillable PDF version. It is very important to submit this form as soon as possible after every sampling event. Prompt status reports allow the FLC to closely track sampling progress. More importantly, it enables NARS IM to track samples that were collected at each successfully sampled site versus those that were not, and to immediately track the shipment of the time-sensitive samples after each sampling event.

Daily Shipments:

T1 – Site & Sample Status/Water Chemistry Lab Tracking Form

- Complete **Form T1: Site and Sample Status/Water Chemistry Lab Tracking Form** as soon as possible after completing a sampling event.
- Complete the header area to indicate site-specific information (see Figure C.4, Section A). *For App users, this information is contained in the Verification Form*.
- Complete the Site Status section (Figure C.4, Section B) in all cases to indicate whether the site was sampled or not and the method used to sample. *For App users, this information is contained in the Verification Form*.
- Complete the shipment details section (Figure C.4, Section C) to indicate date shipped, airbill number, and sender info. *For App users, this information is completed in the T1 Tracking Form.*
- Complete the immediately shipped sample section (Figure C.4, Section D) to indicate sample IDs, lab, and reasons that targeted samples were not collected. *For App users, this information is contained in the pertinent sample collection forms. Be sure to indicate a reason why a targeted sample was not collected in the comment bubble adjacent to the "no sample collected" check box in the app forms.*

- In cases where a state lab is processing some, but not all of the samples, one copy of the T1 form will be filled out for each lab and submitted separately. The T1 packing slip or tracking form placed in the cooler should only indicate the sample(s) being shipped in that cooler.
    - Packing slips are to be used when samples are sent to national labs. For any sample not included in the cooler, line out the sample ID.
    - Paper or PDF tracking forms are to be used for state labs. Use the 'included in cooler' bubble to indicate which samples are being shipped with the specific form.
    - See Table C.1 for guidance on when to use packing slips versus paper or PDF tracking forms.
- Complete the Batched Sample Status section (Figure C.4, Section E) to indicate whether each type of sample was collected. If any of the samples were targeted but not collected, use the comments section to briefly explain why they were not collected. *For App users, this information is contained in the pertinent sample collection forms. Be sure to indicate a reason why a targeted sample was not collected in the comment bubble adjacent to the "no sample collected" check box in the app forms.*
        - Indicate how many Enterococci filters were collected (typically 2 at normal visits, 3 at Visit 1 to revisit sites).
        - Indicate how many jars of each type were collected (in the case of benthos and fish voucher samples).
- Complete the Field Data Submission section (Figure C.4, Section F) to indicate how field data will be submitted (Electronic App, Fillable PDF, Paper Forms, or Partial App/Paper). *For App users, this information is automatically populated.*
- Send an electronic copy of this form to NARS IM using one of the options listed above. This serves as the "status report" for that sampling event.

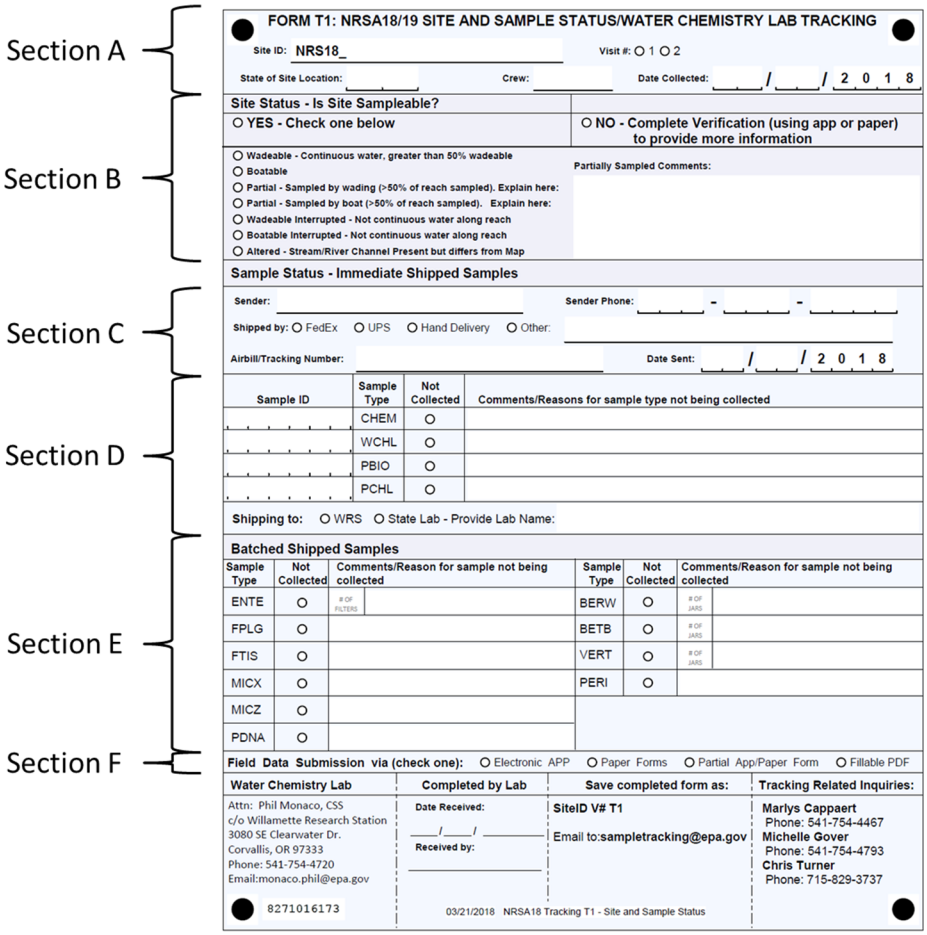


Figure C.4 Example of Tracking Form T1: Site and Sample Status/Water Chemistry Lab Tracking

Batched Sample Shipments:

- Crews may hold batched shipments for the amount of specified in the table below.
- Electronically send the tracking form(s) to NARS IM when the samples are SHIPPED using one of the options listed above.
- Use one packing slip or tracking form for each site's worth of samples in the cooler (i.e. if you have batched samples from four sites in the cooler, there should be four forms completed).
- Include paper copies of the packing slips or tracking forms in the cooler.
- All samples in the cooler should be listed on one of the included tracking forms.

T2 – NRSA 2018-19 Frozen Batched Samples Tracking

- Use this form when shipping frozen batched samples (Enterococci, fish plugs, algal toxins, and periphyton DNA samples). These samples should be shipped within one week of collection.
- For App users, the bulk of the sample information is contained in the pertinent sample collection forms within the app. Shipping information is entered into the T2 Tracking Form.

- Paper form or fillable PDF Form users must transfer sample IDs from the sample labels to the tracking form.
- In cases where a state lab is processing some, but not all of the samples, one copy of the T2 form will be filled out for each lab and submitted separately. The T2 packing slip or tracking form placed in the cooler should only indicate the sample(s) being shipped in that cooler.
    - Packing slips are to be used when samples are sent to national labs. For any sample not included in the cooler, line out the sample ID.
    - Paper or PDF tracking forms are to be used for state labs. Use the 'included in cooler' bubble to indicate which samples are being shipped with the specific form.
    - See Table C.1 for guidance on when to use packing slips versus paper or PDF tracking forms.
- Complete the header area to indicate site-specific information and shipping information.
- Write in or verify the sample IDs for the sample(s) being shipped.
- Indicate to which laboratory the samples are being shipped (i.e., national or state laboratory). If shipping to a state laboratory, provide the laboratory name.
- Send an electronic copy of this form to NARS IM using one of the options listed above.
- Ship the samples to the lab(s) in a cooler with a hard copy of the respective slip/form.

T3 – NRSA 2018-19 Non-Chilled Batched Samples Tracking

- Use this form for shipping batches of non-chilled samples (benthos, periphyton ID samples, and fish voucher samples).
- These samples are shipped together in a cooler (ordered via the Request form) with a heavy duty cooler liner and no ice. Benthos and periphyton ID Samples should be shipped within two weeks of collection. Fish voucher samples may be shipped after fish are fixed, preserved and assembled into the voucher collection with voucher tags.
- The number of samples that will fit in a cooler will depend largely on the number of benthos bottles collected from each site. In most cases, samples from three to five site visits will fit in a cooler together. NEVER split samples from one site into more than one cooler.
- In cases where a state lab is processing some, but not all of the samples, one copy of the T3 form will be filled out for each lab and submitted separately. The T3 packing slip or tracking form placed in the cooler should only indicate the sample(s) being shipped in that cooler.
    - Packing slips are to be used when samples are sent to national labs. For any sample not included in the cooler, line out the sample ID.
    - Paper or PDF tracking forms are to be used for state labs. Use the 'included in cooler' bubble to indicate which samples are being shipped with the specific form.
    - See Table C.1 for guidance on when to use packing slips versus paper or PDF tracking forms.
- Complete the header area to indicate site-specific information and shipping information.
- Write in or verify the sample IDs for the sample(s) being shipped.
- Indicate to which laboratory the samples are being shipped (i.e., national or state laboratory). If shipping to a state laboratory, provide the laboratory name.

- Send an electronic copy of this form to NARS IM using one of the options listed above.
- Ship the samples to the lab(s) in a cooler with a hard copy of the respective slip/form.
- Batched shipped samples need to be shipped with absorbent material and NO ice.
- Place 1-liter bottles upright in the lined cooler and use newspaper or cardboard to fill any empty space between benthos bottles to keep them in an upright position during shipping.

T4 – NRSA 2018-19 Whole Fish Tissue Samples Tracking

- Use this form when shipping frozen whole fish tissue samples. These samples should be shipped within two weeks of collection.
- For App users, the bulk of the sample information is contained in the pertinent sample collection forms within the app. Shipping information is entered into the T4 Tracking Form.
- Paper form or fillable PDF Form users must transfer sample IDs from the sample labels to the tracking form and must also populate the fish common name and lengths of each specimen.
- Complete the header area to indicate site-specific information and shipping information.
- Write in or verify the sample IDs for the sample(s) being shipped.
- Send an electronic copy of this form to NARS IM using one of the options listed above.
- Ship the samples to the lab in a cooler with a hard copy of the respective slip/form.

T5 – NRSA 2018-19 Pack Tracking

- If utilizing paper field forms, review and ship all field forms in the envelope provided in the site kit to NARS IM every two weeks.
- Before shipping, make copies or scans for your records and as a backup in the event the forms are lost during shipping.
- Forms should be sequentially ordered by protocol within the Data Packet to aid in determining that all forms are present and to facilitate data entry once the Data Packet reaches the IM Team.
- The T5 form is the only tracking form which has room for multiple sites to be listed. List the site IDs, dates sampled and visit numbers for all data packets being shipped in the envelope or box.
- You do not need to send multiple scans of the same file.
- You can name the file with a composite name such as “AL_10001 V1, AL_10022 V1, AL_10235 V2, AL_11236 V1 T5”.

Table C.1. Guidance on using packing slips and tracking forms

Site data was collected using NRSA APP	Samples in the shipping group (T1, T2, T3) are all going to the **national lab**	Submit tracking via the NRSA App, complete a packing slip, and include the packing slip in the cooler.
	Samples in the shipping group (T1, T2, T3) are all going to a **state lab**	Submit tracking via the NRSA App (indicating name of state lab), complete a packing slip, and include the packing slip in the cooler*.
	Samples in the shipping group (T1, T2, T3) are being **split** between the national lab and state lab(s)	• For samples going to the national lab, submit tracking via the NRSA App (checking ONLY the samples going to the national lab), complete a packing slip (lining out the sample IDs for samples not shipped to the national lab), and include the packing slip in the cooler. • For samples going to state lab(s), complete a PDF tracking form for each lab (indicating only the samples included in each cooler), and email the form to sampletracking@epa.gov. Include the paper form in the cooler*
Site data was collected using paper forms	Samples in the shipping group (T1, T2, T3) are all going to the **national lab**	Complete a paper tracking form, scan and email the form to sampletracking@epa.gov, and include the paper form in the cooler
	Samples in the shipping group (T1, T2, T3) are all going to a **state lab**	Complete a paper or fillable PDF tracking form, scan and email the form to sampletracking@epa.gov, and include the paper form in the cooler*
	Samples in the shipping group (T1, T2, T3) are being **split** between the national lab and state lab(s)	• For samples going to the national lab, complete a paper tracking form (indicating only the samples included in the cooler), scan and email the form to sampletracking@epa.gov, and include the paper form in the cooler • For samples going to state lab(s), complete a PDF tracking form for each lab (indicating only the samples included in each cooler), and email the form to sampletracking@epa.gov. Include the paper form in the cooler*

** If state labs do not request the NRSA packing slip or tracking form be placed in the cooler being shipped to them, that step may be omitted.*

SAMPLE-SPECIFIC SHIPPING GUIDELINES

Before shipping, it is very important to preserve each sample as directed in the sample collection portion of this Field Operations Manual.

- Preserve the samples as specified for each indicator before shipping (Fig. C.5).
- Be aware of the holding times for each type of sample (Table C.2):
  - Water chemistry samples must be shipped within 24 hours of collection (e.g., the same day as sampling or the following day).
  - Chlorophyll-*a* and periphyton biomass samples have longer holding times, but will be sent with the water chemistry samples since they are going to the same laboratory.
  - Enterococci samples must be filtered and frozen on dry ice within 6 hours of collection and must be shipped within one week of collection.
  - Fish tissue samples (plugs and whole fish) must be frozen on dry ice as soon as possible (hold on wet ice until freezing on dry ice if needed).
  - Microcystin samples should be held on wet ice in the field and frozen upon return to lab, office or hotel.
  - Fish voucher specimens can be held on wet ice until being preserved in formalin in the field or laboratory. Preserve samples ASAP.
  - The remaining samples must be preserved immediately upon collection; they may then be sent in batches to the appropriate laboratory.

WATER CHEMISTRY, CHLOROPHYLL-*a (from Water Column)*, Chlorophyll-a (from periphyton) and Periphyton Biomass

- **Water Chemistry**
  Stored in a 4-L cube container
  - Confirm that the cube container is labeled and covered with clear tape.
  - Ensure that air is purged from the container
  - Seal lid with electrical tape
  - Place the cube container inside the cooler liner.

- **Water Column Chlorophyll-*a,* Periphyton Chlorophyll-a and Periphyton Biomass**
  Three filters each stored in a 50-mL centrifuge tube wrapped with aluminum foil
  Filters are initially frozen on dry ice in the field if possible, then shipped on wet ice to WRS lab or approved State lab.
  - Confirm that the labels with sample IDs are completed (including volume of sample filtered) and covered with clear tape.
  - Close lids tightly (turn an additional ¼ turn past the point at which initial resistance is met)
  - Seal lids with electrical tape
  - Cover the two cholorphyll filter tubes with aluminum foil
  - Place the three centrifuge tubes in the provided leak-proof zip top plastic bag.
  - Label the bag with the appropriate outer bag label.
  - Place bagged samples inside cooler liner with water chemistry sample.

PERIPHYTON ID SAMPLES

ID samples preserved with formalin and sealed at the site.

- Confirm that the label with sample ID is completed and covered with clear tape.
- Close lids tightly (turn an additional ¼ turn past the point at which initial resistance is met)
- Seal lids with electrical tape

- Place the sample in the appropriate shipping container with other preserved samples.
- Surround the jars with crumpled newspaper, pads, or other absorbent material.
- Samples can be held for up to two weeks and shipped in batches to the laboratory for analysis.

BENTHIC INVERTEBRATE SAMPLES

Preserved in 95% ethanol and sealed at the site.

- Confirm that the label with sample ID is completed and covered with clear tape.
- Confirm that each jar contains a completed inner label.
- Check to make sure jars are sealed with electrical tape.
- Place3-5 sites worth of jars in each cooler with other preserved samples.
- Surround the jars with crumpled newspaper, pads, or other absorbent material.
- Samples can be held for up to two weeks and shipped in batches to the laboratory for analysis.

WHOLE FISH TISSUE SAMPLES

The samples need to be frozen as soon as possible after collection.

- Pack the provided cooler with 50 lbs of dry ice.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.
- Samples may be stored on dry ice for a maximum of 24 hours. Sampling crews have the option, depending on site logistics, of:
  - shipping the samples packed on dry ice (50 pounds), via priority overnight delivery so that they arrive at the designated laboratory within 24 hours of sample collection (Microbac Laboratories in Baltimore, MD), or
  - freezing the samples within 24 hours of collection at ≤-20°C, and storing the frozen samples until shipment within 2 weeks of sample collection (frozen samples will be packed on dry ice and shipped to Microbac Laboratories via priority overnight delivery service).
  - Microbac does not accept Saturday deliveries, so shipment must take place Monday through Thursday only.

FISH VOUCHER SAMPLES

Fixed in the field with formalin, preserved in a laboratory with ethanol.

- Package each fish species according to fish QA vouchering protocol.
- Confirm that the label with sample ID is completed and covered with clear tape.
- Check to make sure jars are sealed with electrical tape.
- Surround the jars with crumpled newspaper, pads, or other absorbent material.
- Samples can be held and shipped in batches to the laboratory for analysis.

ENTEROCOCCI SAMPLES

The sample needs to be filtered and frozen as soon as possible after collection (within 6 hours).

- Confirm that each microcentrifuge tube is labeled (DO NOT cover labels with tape) and properly sealed (DO NOT seal caps with tape).
- Place microcentrifuge tubes from a single site in a padded bag.
- Confirm that the bag is labeled with the appropriate sample ID (DO NOT cover with clear plastic tape).
- Place the samples in cooler with dry ice liner and pad with other frozen batched samples.
- Pack the box with 20 lbs of dry ice.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.

- Samples can be held frozen and shipped in batches to the laboratory for analysis within one week of collection.

FISH PLUG SAMPLES

The samples need to be frozen as soon as possible after collection.

- Confirm that the label with sample ID is completed and covered with clear tape.
- Check to make sure vial is sealed with electrical tape.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the begining of this Appendix.
- Place the samples in cooler with dry ice liner and pad with other frozen batched samples.
- Pack the box with 20 lbs of dry.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.
- Samples can be held frozen and shipped in batches to the laboratory for analysis within one week of collection.

ALGAL TOXIN SAMPLES

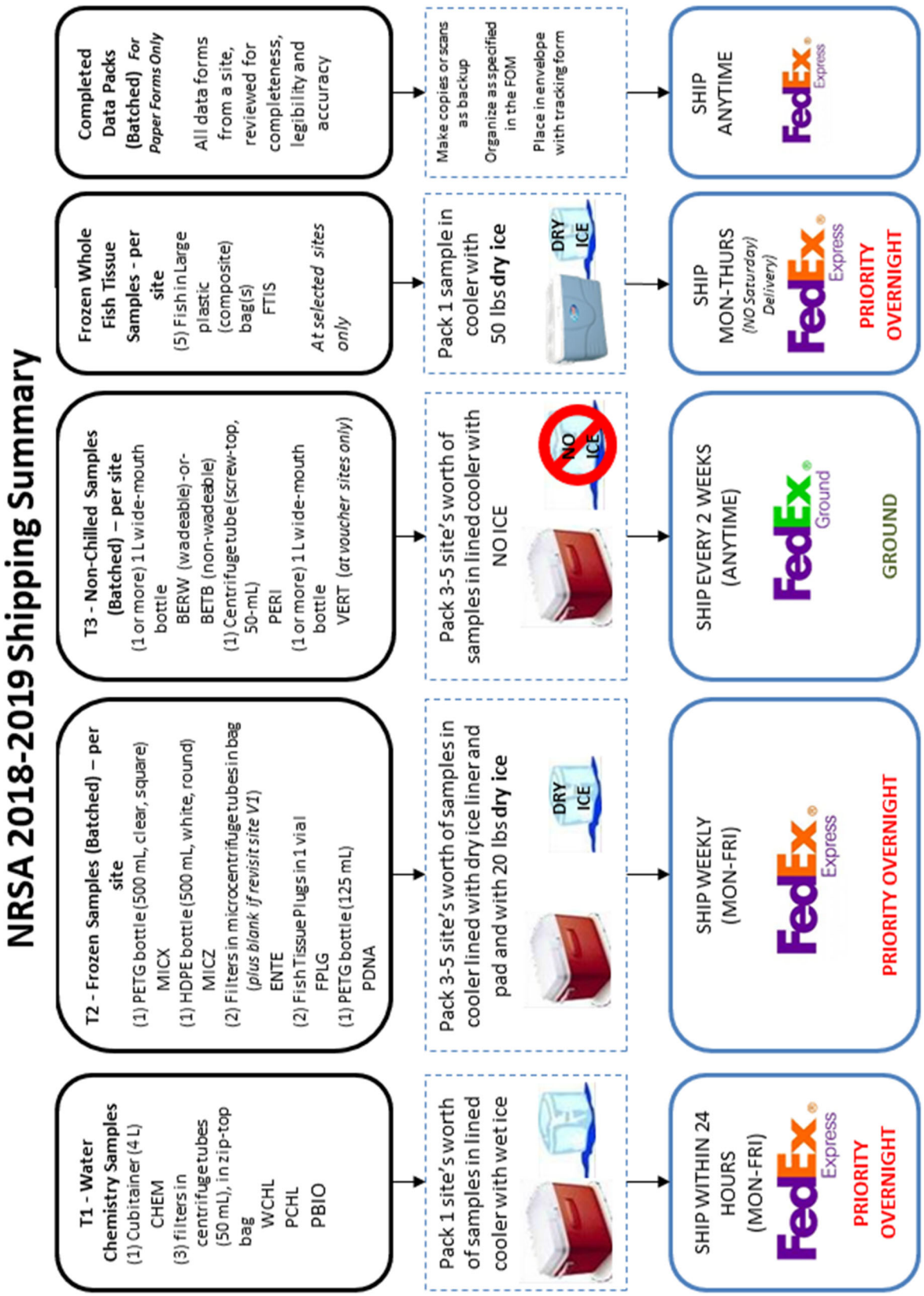
The samples need to be frozen as soon as possible after collection.

- Confirm that the label with sample ID is completed and covered with clear tape.
- Check to make sure bottle is sealed with electrical tape.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.
- Place the samples in cooler with dry ice liner and pad with other frozen batched samples.
- Pack the box with 20 lbs of dry ice.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.
- Samples can be held frozen and shipped in batches to the laboratory for analysis within one week of collection.

PERIPHYTON METAGENOMICS (DNA) SAMPLES

The samples need to be frozen as soon as possible after collection.

- Confirm that the label with sample ID is completed and covered with clear tape.
- Check to make sure bottle is sealed with electrical tape.
- Refer to the DRY ICE SHIPPING PROTOCOLS at the beginning of this Appendix.
- Place the samples in cooler with dry ice liner and pad with other frozen batched samples.
- Pack the box with 20 lbs of dry ice.
- Samples can be held frozen and shipped in batches to the laboratory for analysis within one week of collection.



* Whole fish samples are collected at a subset of pre-selected sites

Figure C.5. Sample packaging and shipping summary

Table C.2 Sample preservation and holding times

SAMPLE		PRESERVATIVE	PACKAGING FOR SHIPMENT	HOLDING TIME
T1 WATER CHEMISTRY SAMPLES	Water Chemistry **CHEM**	Wet ice	Ship in lined cooler with wet ice	24 hours; ship these samples together (WRS lab - Corvallis or State approved lab
	Chlorophyll-*a* **WCHL**	Dry ice in field		
	Periphyton - Chlorophyll-*a* **PCHL**	Dry ice in field		
	Periphyton – Biomass **PBIO**	Dry ice in field		
T2 FROZENBATCHED SAMPLES	Algal Toxins (2) **MICX** **MICZ**	Wet ice in field, Freeze as soon as possible	Ship in cooler with provided dry ice liner and pad with 20 pounds of DRY ICE	Batch; ship weekly to GLEC lab Batch
	Enterococci **ENTE**	Dry ice in field; MUST be filtered & frozen within 6 hours of collection Hold in freezer or on dry ice		
	Fish Tissue Plugs **FPLG**	Dry ice in field; Hold in freezer or on dry ice		
	Periphyton Metagenomics **PDNA**	Wet ice in field, freeze as soon as possible		
T3 NON-CHILLED BATCHED SAMPLES	Periphyton – ID **PERI**	Formalin	Ship in lined cooler	Batch; ship at least every 2 weeks to GLEC
	Benthic macroinvertebrates **BERW** or **BETB**	95% Ethanol		
	Fish Vouchers* **VERT**	95% Ethanol		
T4 WHOLE FISH TISSUE	Whole Fish Tissue* **FTIS**	Dry ice in field; Hold in freezer	Ship in provided cooler with 50 pounds of DRY ICE	If holding in a freezer ship within 2 weeks to Microbac lab

**Fish vouchers and whole fish tissue are collected at selected site only.*

Appendix D: Standard Common and Scientific Names of Fish and Amphibians

APPENDIX D: STANDARD COMMON AND SCIENTIFIC NAMES OF FISH AND AMPHIBIANS

Table D-1. Standard Common and Scientific Names of Fish

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Acipenseriformes	Acipenseridae	*Acipenser oxyrinchus*	atlantic sturgeon
Acipenseriformes	Acipenseridae	*Acipenser medirostris*	green sturgeon
Acipenseriformes	Acipenseridae	*Acipenser fulvescens*	lake sturgeon
Acipenseriformes	Acipenseridae	*Acipenser brevirostrum*	shortnose sturgeon
Acipenseriformes	Acipenseridae	*Acipenser transmontanus*	white sturgeon
Acipenseriformes	Acipenseridae	*Scaphirhynchus suttkusi*	alabama sturgeon
Acipenseriformes	Acipenseridae	*Scaphirhynchus albus*	pallid sturgeon
Acipenseriformes	Acipenseridae	*Scaphirhynchus platorynchus*	shovelnose sturgeon
Acipenseriformes	Polyodontidae	*Polyodon spathula*	paddlefish
Amiiformes	Amiidae	*Amia calva*	bowfin
Anguilliformes	Anguillidae	*Anguilla rostrata*	american eel
Anguilliformes	Congridae	*Conger oceanicus*	conger eel
Anguilliformes	Ophichthidae	*Myrophis punctatus*	speckled worm eel
Atheriniformes	Atherinopsidae	*Labidesthes sicculus*	brook silverside
Atheriniformes	Atherinopsidae	*Membras martinica*	rough silverside
Atheriniformes	Atherinopsidae	*Menidia beryllina*	inland silverside
Atheriniformes	Atherinopsidae	*Menidia audens*	mississippi silverside
Atheriniformes	Atherinopsidae	*Menidia extensa*	waccamaw silverside
Atheriniformes	Atherinopsidae	*Menidia menidia*	atlantic silverside
Beloniformes	Belonidae	*Strongylura marina*	atlantic needlefish
Carcharhiniformes	Carcharhinidae	*Carcharhinus leucas*	bull shark
Characiformes	Characidae	*Astyanax mexicanus*	mexican tetra
Clupeiformes	Clupeidae	*Alosa alabamae*	alabama shad
Clupeiformes	Clupeidae	*Alosa pseudoharengus*	alewife
Clupeiformes	Clupeidae	*Alosa sapidissima*	american shad
Clupeiformes	Clupeidae	*Alosa aestivalis*	blueback herring
Clupeiformes	Clupeidae	*Alosa mediocris*	hickory shad
Clupeiformes	Clupeidae	*Alosa chrysochloris*	skipjack herring
Clupeiformes	Clupeidae	*Dorosoma cepedianum*	gizzard shad
Clupeiformes	Clupeidae	*Dorosoma petenense*	threadfin shad
Clupeiformes	Clupeidae	*Harengula jaguana*	scaled sardine
Clupeiformes	Clupeidae	*Opisthonema oglinum*	atlantic thread herring
Clupeiformes	Clupeidae	*Brevoortia patronus*	gulf menhaden
Clupeiformes	Engraulidae	*Anchoa mitchilli*	bay anchovy
Cypriniformes	Catostomidae	*Carpiodes velifer*	highfin carpsucker
Cypriniformes	Catostomidae	*Carpiodes cyprinus*	quillback
Cypriniformes	Catostomidae	*Carpiodes carpio*	river carpsucker
Cypriniformes	Catostomidae	*Catostomus discobolus*	bluehead sucker
Cypriniformes	Catostomidae	*Catostomus columbianus*	bridgelip sucker
Cypriniformes	Catostomidae	*Catostomus clarkii*	desert sucker

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Catostomidae	*Catostomus latipinnis*	flannelmouth sucker
Cypriniformes	Catostomidae	*Catostomus snyderi*	klamath largescale sucker
Cypriniformes	Catostomidae	*Catostomus rimiculus*	klamath smallscale sucker
Cypriniformes	Catostomidae	*Catostomus macrocheilus*	largescale sucker
Cypriniformes	Catostomidae	*Catostomus catostomus*	longnose sucker
Cypriniformes	Catostomidae	*Catostomus microps*	modoc sucker
Cypriniformes	Catostomidae	*Catostomus platyrhynchus*	mountain sucker
Cypriniformes	Catostomidae	*Catostomus fumeiventris*	owens sucker
Cypriniformes	Catostomidae	*Catostomus plebeius*	rio grande sucker
Cypriniformes	Catostomidae	*Catostomus occidentalis*	sacramento sucker
Cypriniformes	Catostomidae	*Catostomus santaanae*	santa ana sucker
Cypriniformes	Catostomidae	*Catostomus insignis*	sonora sucker
Cypriniformes	Catostomidae	*Catostomus tahoensis*	tahoe sucker
Cypriniformes	Catostomidae	*Catostomus ardens*	utah sucker
Cypriniformes	Catostomidae	*Catostomus warnerensis*	warner sucker
Cypriniformes	Catostomidae	*Catostomus commersonii*	white sucker
Cypriniformes	Catostomidae	*Catostomus bernardini*	yaqui sucker
Cypriniformes	Catostomidae	*Chasmistes cujus*	cui-ui
Cypriniformes	Catostomidae	*Chasmistes liorus*	june sucker
Cypriniformes	Catostomidae	*Chasmistes brevirostris*	shortnose sucker
Cypriniformes	Catostomidae	*Chasmistes muriei*	snake river sucker
Cypriniformes	Catostomidae	*Cycleptus elongatus*	blue sucker
Cypriniformes	Catostomidae	*Cycleptus meridionalis*	southeastern blue sucker
Cypriniformes	Catostomidae	*Deltistes luxatus*	lost river sucker
Cypriniformes	Catostomidae	*Erimyzon oblongus*	creek chubsucker
Cypriniformes	Catostomidae	*Erimyzon sucetta*	lake chubsucker
Cypriniformes	Catostomidae	*Erimyzon tenuis*	sharpfin chubsucker
Cypriniformes	Catostomidae	*Hypentelium etowanum*	alabama hog sucker
Cypriniformes	Catostomidae	*Hypentelium nigricans*	northern hog sucker
Cypriniformes	Catostomidae	*Hypentelium roanokense*	roanoke hog sucker
Cypriniformes	Catostomidae	*Ictiobus cyprinellus*	bigmouth buffalo
Cypriniformes	Catostomidae	*Ictiobus niger*	black buffalo
Cypriniformes	Catostomidae	*Ictiobus bubalus*	smallmouth buffalo
Cypriniformes	Catostomidae	*Minytrema melanops*	spotted sucker
Cypriniformes	Catostomidae	*Moxostoma ariommum*	bigeye jumprock
Cypriniformes	Catostomidae	*Moxostoma duquesnei*	black redhorse
Cypriniformes	Catostomidae	*Moxostoma poecilurum*	blacktail redhorse
Cypriniformes	Catostomidae	*Moxostoma cervinum*	blacktip jumprock
Cypriniformes	Catostomidae	*Moxostoma erythrurum*	golden redhorse
Cypriniformes	Catostomidae	*Moxostoma congestum*	gray redhorse
Cypriniformes	Catostomidae	*Moxostoma lachneri*	greater jumprock
Cypriniformes	Catostomidae	*Moxostoma valenciennesi*	greater redhorse

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Catostomidae	*Moxostoma lacerum*	harelip sucker
Cypriniformes	Catostomidae	*Moxostoma austrinum*	mexican redhorse
Cypriniformes	Catostomidae	*Moxostoma collapsum*	notchlip redhorse
Cypriniformes	Catostomidae	*Moxostoma pisolabrum*	pealip redhorse
Cypriniformes	Catostomidae	*Moxostoma carinatum*	river redhorse
Cypriniformes	Catostomidae	*Moxostoma robustum*	robust redhorse
Cypriniformes	Catostomidae	*Moxostoma macrolepidotum*	shorthead redhorse
Cypriniformes	Catostomidae	*Moxostoma anisurum*	silver redhorse
Cypriniformes	Catostomidae	*Moxostoma breviceps*	smallmouth redhorse
Cypriniformes	Catostomidae	*Moxostoma rupiscartes*	striped jumprock
Cypriniformes	Catostomidae	*Moxostoma pappillosum*	v-lip redhorse
Cypriniformes	Catostomidae	*Moxostoma cf. poecilurum*	apalachicola redhorse
Cypriniformes	Catostomidae	*Moxostoma cf. lachneri*	brassy jumprock
Cypriniformes	Catostomidae	*Pantosteus lahontan*	lahontan sucker
Cypriniformes	Catostomidae	*Thoburnia atripinnis*	blackfin sucker
Cypriniformes	Catostomidae	*Thoburnia hamiltoni*	rustyside sucker
Cypriniformes	Catostomidae	*Thoburnia rhothoeca*	torrent sucker
Cypriniformes	Catostomidae	*Xyrauchen texanus*	razorback sucker
Cypriniformes	Cobitidae	*Misgurnus anguillicaudatus*	oriental weatherfish
Cypriniformes	Cyprinidae	*Acrocheilus alutaceus*	chiselmouth
Cypriniformes	Cyprinidae	*Agosia chrysogaster*	longfin dace
Cypriniformes	Cyprinidae	*Campostoma pauciradii*	bluefin stoneroller
Cypriniformes	Cyprinidae	*Campostoma anomalum*	central stoneroller
Cypriniformes	Cyprinidae	*Campostoma oligolepis*	largescale stoneroller
Cypriniformes	Cyprinidae	*Campostoma ornatum*	mexican stoneroller
Cypriniformes	Cyprinidae	*Carassius auratus*	goldfish
Cypriniformes	Cyprinidae	*Clinostomus elongatus*	redside dace
Cypriniformes	Cyprinidae	*Clinostomus funduloides*	rosyside dace
Cypriniformes	Cyprinidae	*Couesius plumbeus*	lake chub
Cypriniformes	Cyprinidae	*Ctenopharyngodon idella*	grass carp
Cypriniformes	Cyprinidae	*Cyprinella callistia*	alabama shiner
Cypriniformes	Cyprinidae	*Cyprinella xaenura*	altamaha shiner
Cypriniformes	Cyprinidae	*Cyprinella leedsi*	bannerfin shiner
Cypriniformes	Cyprinidae	*Cyprinella formosa*	beautiful shiner
Cypriniformes	Cyprinidae	*Cyprinella venusta*	blacktail shiner
Cypriniformes	Cyprinidae	*Cyprinella caerulea*	blue shiner
Cypriniformes	Cyprinidae	*Cyprinella callitaenia*	bluestripe shiner
Cypriniformes	Cyprinidae	*Cyprinella camura*	bluntface shiner
Cypriniformes	Cyprinidae	*Cyprinella pyrrhomelas*	fieryblack shiner
Cypriniformes	Cyprinidae	*Cyprinella chloristia*	greenfin shiner
Cypriniformes	Cyprinidae	*Cyprinella callisema*	ocmulgee shiner
Cypriniformes	Cyprinidae	*Cyprinella lepida*	plateau shiner

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Cyprinidae	*Cyprinella proserpina*	proserpine shiner
Cypriniformes	Cyprinidae	*Cyprinella lutrensis*	red shiner
Cypriniformes	Cyprinidae	*Cyprinella zanema*	santee chub
Cypriniformes	Cyprinidae	*Cyprinella analostana*	satinfin shiner
Cypriniformes	Cyprinidae	*Cyprinella spiloptera*	spotfin shiner
Cypriniformes	Cyprinidae	*Cyprinella whipplei*	steelcolor shiner
Cypriniformes	Cyprinidae	*Cyprinella gibbsi*	tallapoosa shiner
Cypriniformes	Cyprinidae	*Cyprinella labrosa*	thicklip chub
Cypriniformes	Cyprinidae	*Cyprinella trichroistia*	tricolor shiner
Cypriniformes	Cyprinidae	*Cyprinella nivea*	whitefin shiner
Cypriniformes	Cyprinidae	*Cyprinella galactura*	whitetail shiner
Cypriniformes	Cyprinidae	*Cyprinus carpio*	common carp
Cypriniformes	Cyprinidae	*Dionda diaboli*	devils river minnow
Cypriniformes	Cyprinidae	*Dionda nigrotaeniata*	guadalupe roundnose minnow
Cypriniformes	Cyprinidae	*Dionda argentosa*	manantial roundnose minnow
Cypriniformes	Cyprinidae	*Dionda serena*	nueces roundnose minnow
Cypriniformes	Cyprinidae	*Dionda episcopa*	roundnose minnow
Cypriniformes	Cyprinidae	*Eremichthys acros*	desert dace
Cypriniformes	Cyprinidae	*Erimonax monachus*	spotfin chub
Cypriniformes	Cyprinidae	*Erimystax insignis*	blotched chub
Cypriniformes	Cyprinidae	*Erimystax x-punctatus*	gravel chub
Cypriniformes	Cyprinidae	*Erimystax harryi*	ozark chub
Cypriniformes	Cyprinidae	*Erimystax cahni*	slender chub
Cypriniformes	Cyprinidae	*Erimystax dissimilis*	streamline chub
Cypriniformes	Cyprinidae	*Exoglossum maxillingua*	cutlip minnow
Cypriniformes	Cyprinidae	*Exoglossum laurae*	tonguetied minnow
Cypriniformes	Cyprinidae	*Gila alvordensis*	alvord chub
Cypriniformes	Cyprinidae	*Gila orcuttii*	arroyo chub
Cypriniformes	Cyprinidae	*Gila coerulea*	blue chub
Cypriniformes	Cyprinidae	*Gila elegans*	bonytail
Cypriniformes	Cyprinidae	*Gila boraxobius*	borax lake chub
Cypriniformes	Cyprinidae	*Gila nigrescens*	chihuahua chub
Cypriniformes	Cyprinidae	*Gila intermedia*	gila chub
Cypriniformes	Cyprinidae	*Gila nigra*	headwater chub
Cypriniformes	Cyprinidae	*Gila cypha*	humpback chub
Cypriniformes	Cyprinidae	*Gila pandora*	rio grande chub
Cypriniformes	Cyprinidae	*Gila robusta*	roundtail chub
Cypriniformes	Cyprinidae	*Gila ditaenia*	sonora chub
Cypriniformes	Cyprinidae	*Gila crassicauda*	thicktail chub
Cypriniformes	Cyprinidae	*Gila bicolor*	tui chub
Cypriniformes	Cyprinidae	*Gila atraria*	utah chub

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Cyprinidae	*Gila seminuda*	virgin chub
Cypriniformes	Cyprinidae	*Gila purpurea*	yaqui chub
Cypriniformes	Cyprinidae	*Hemitremia flammea*	flame chub
Cypriniformes	Cyprinidae	*Hesperoleucus symmetricus*	california roach
Cypriniformes	Cyprinidae	*Hybognathus hankinsoni*	brassy minnow
Cypriniformes	Cyprinidae	*Hybognathus hayi*	cypress minnow
Cypriniformes	Cyprinidae	*Hybognathus regius*	eastern silvery minnow
Cypriniformes	Cyprinidae	*Hybognathus nuchalis*	mississippi silvery minnow
Cypriniformes	Cyprinidae	*Hybognathus placitus*	plains minnow
Cypriniformes	Cyprinidae	*Hybognathus amarus*	rio grande silvery minnow
Cypriniformes	Cyprinidae	*Hybognathus argyritis*	western silvery minnow
Cypriniformes	Cyprinidae	*Hybopsis amblops*	bigeye chub
Cypriniformes	Cyprinidae	*Hybopsis winchelli*	clear chub
Cypriniformes	Cyprinidae	*Hybopsis hypsinotus*	highback chub
Cypriniformes	Cyprinidae	*Hybopsis lineapunctata*	lined chub
Cypriniformes	Cyprinidae	*Hybopsis amnis*	pallid shiner
Cypriniformes	Cyprinidae	*Hybopsis rubrifrons*	rosyface chub
Cypriniformes	Cyprinidae	*Hypophthalmichthys nobilis*	bighead carp
Cypriniformes	Cyprinidae	*Hypophthalmichthys molitrix*	silver carp
Cypriniformes	Cyprinidae	*Iotichthys phlegethontis*	least chub
Cypriniformes	Cyprinidae	*Lavinia exilicauda*	hitch
Cypriniformes	Cyprinidae	*Lepidomeda vittata*	little colorado spinedace
Cypriniformes	Cyprinidae	*Lepidomeda altivelis*	pahranagat spinedace
Cypriniformes	Cyprinidae	*Lepidomeda mollispinis*	virgin spinedace
Cypriniformes	Cyprinidae	*Lepidomeda albivallis*	white river spinedace
Cypriniformes	Cyprinidae	*Leuciscus idus*	ide
Cypriniformes	Cyprinidae	*Luxilus zonistius*	bandfin shiner
Cypriniformes	Cyprinidae	*Luxilus zonatus*	bleeding shiner
Cypriniformes	Cyprinidae	*Luxilus cardinalis*	cardinal shiner
Cypriniformes	Cyprinidae	*Luxilus cornutus*	common shiner
Cypriniformes	Cyprinidae	*Luxilus cerasinus*	crescent shiner
Cypriniformes	Cyprinidae	*Luxilus pilsbryi*	duskystripe shiner
Cypriniformes	Cyprinidae	*Luxilus chrysocephalus*	striped shiner
Cypriniformes	Cyprinidae	*Luxilus coccogenis*	warpaint shiner
Cypriniformes	Cyprinidae	*Luxilus albeolus*	white shiner
Cypriniformes	Cyprinidae	*Lythrurus atrapiculus*	blacktip shiner
Cypriniformes	Cyprinidae	*Lythrurus roseipinnis*	cherryfin shiner
Cypriniformes	Cyprinidae	*Lythrurus lirus*	mountain shiner
Cypriniformes	Cyprinidae	*Lythrurus snelsoni*	ouachita shiner
Cypriniformes	Cyprinidae	*Lythrurus matutinus*	pinewoods shiner
Cypriniformes	Cyprinidae	*Lythrurus bellus*	pretty shiner
Cypriniformes	Cyprinidae	*Lythrurus umbratilis*	redfin shiner

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Cyprinidae	*Lythrurus fumeus*	ribbon shiner
Cypriniformes	Cyprinidae	*Lythrurus ardens*	rosefin shiner
Cypriniformes	Cyprinidae	*Lythrurus fasciolaris*	scarlet shiner
Cypriniformes	Cyprinidae	*Lythrurus alegnotus*	warrior shiner
Cypriniformes	Cyprinidae	*Macrhybopsis marconis*	burrhead chub
Cypriniformes	Cyprinidae	*Macrhybopsis tetranema*	peppered chub
Cypriniformes	Cyprinidae	*Macrhybopsis australis*	prairie chub
Cypriniformes	Cyprinidae	*Macrhybopsis hyostoma*	shoal chub
Cypriniformes	Cyprinidae	*Macrhybopsis meeki*	sicklefin chub
Cypriniformes	Cyprinidae	*Macrhybopsis storeriana*	silver chub
Cypriniformes	Cyprinidae	*Macrhybopsis aestivalis*	speckled chub
Cypriniformes	Cyprinidae	*Macrhybopsis gelida*	sturgeon chub
Cypriniformes	Cyprinidae	*Margariscus margarita*	pearl dace
Cypriniformes	Cyprinidae	*Meda fulgida*	spikedace
Cypriniformes	Cyprinidae	*Moapa coriacea*	moapa dace
Cypriniformes	Cyprinidae	*Mylocheilus caurinus*	peamouth
Cypriniformes	Cyprinidae	*Mylopharodon conocephalus*	hardhead
Cypriniformes	Cyprinidae	*Mylopharyngodon piceus*	black carp
Cypriniformes	Cyprinidae	*Nocomis platyrhynchus*	bigmouth chub
Cypriniformes	Cyprinidae	*Nocomis leptocephalus*	bluehead chub
Cypriniformes	Cyprinidae	*Nocomis raneyi*	bull chub
Cypriniformes	Cyprinidae	*Nocomis biguttatus*	hornyhead chub
Cypriniformes	Cyprinidae	*Nocomis asper*	redspot chub
Cypriniformes	Cyprinidae	*Nocomis effusus*	redtail chub
Cypriniformes	Cyprinidae	*Nocomis micropogon*	river chub
Cypriniformes	Cyprinidae	*Notemigonus crysoleucas*	golden shiner
Cypriniformes	Cyprinidae	*Notropis girardi*	arkansas river shiner
Cypriniformes	Cyprinidae	*Notropis rupestris*	bedrock shiner
Cypriniformes	Cyprinidae	*Notropis boops*	bigeye shiner
Cypriniformes	Cyprinidae	*Notropis dorsalis*	bigmouth shiner
Cypriniformes	Cyprinidae	*Notropis heterodon*	blackchin shiner
Cypriniformes	Cyprinidae	*Notropis melanostomus*	blackmouth shiner
Cypriniformes	Cyprinidae	*Notropis heterolepis*	blacknose shiner
Cypriniformes	Cyprinidae	*Notropis atrocaudalis*	blackspot shiner
Cypriniformes	Cyprinidae	*Notropis simus*	bluntnose shiner
Cypriniformes	Cyprinidae	*Notropis bifrenatus*	bridle shiner
Cypriniformes	Cyprinidae	*Notropis asperifrons*	burrhead shiner
Cypriniformes	Cyprinidae	*Notropis cahabae*	cahaba shiner
Cypriniformes	Cyprinidae	*Notropis mekistocholas*	cape fear shiner
Cypriniformes	Cyprinidae	*Notropis percobromus*	carmine shiner
Cypriniformes	Cyprinidae	*Notropis wickliffi*	channel shiner
Cypriniformes	Cyprinidae	*Notropis chihuahua*	chihuahua shiner

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Cypriniformes	Cyprinidae	*Notropis potteri*	chub shiner
Cypriniformes	Cyprinidae	*Notropis petersoni*	coastal shiner
Cypriniformes	Cyprinidae	*Notropis amoenus*	comely shiner
Cypriniformes	Cyprinidae	*Notropis xaenocephalus*	coosa shiner
Cypriniformes	Cyprinidae	*Notropis cummingsae*	dusky shiner
Cypriniformes	Cyprinidae	*Notropis atherinoides*	emerald shiner
Cypriniformes	Cyprinidae	*Notropis edwardraneyi*	fluvial shiner
Cypriniformes	Cyprinidae	*Notropis buchanani*	ghost shiner
Cypriniformes	Cyprinidae	*Notropis chlorocephalus*	greenhead shiner
Cypriniformes	Cyprinidae	*Notropis altipinnis*	highfin shiner
Cypriniformes	Cyprinidae	*Notropis micropteryx*	highland shiner
Cypriniformes	Cyprinidae	*Notropis hypsilepis*	highscale shiner
Cypriniformes	Cyprinidae	*Notropis chalybaeus*	ironcolor shiner
Cypriniformes	Cyprinidae	*Notropis ortenburgeri*	kiamichi shiner
Cypriniformes	Cyprinidae	*Notropis longirostris*	longnose shiner
Cypriniformes	Cyprinidae	*Notropis volucellus*	mimic shiner
Cypriniformes	Cyprinidae	*Notropis spectrunculus*	mirror shiner
Cypriniformes	Cyprinidae	*Notropis scabriceps*	new river shiner
Cypriniformes	Cyprinidae	*Notropis ammophilus*	orangefin shiner
Cypriniformes	Cyprinidae	*Notropis nubilus*	ozark minnow
Cypriniformes	Cyprinidae	*Notropis ozarcanus*	ozark shiner
Cypriniformes	Cyprinidae	*Notropis albizonatus*	palezone shiner
Cypriniformes	Cyprinidae	*Notropis perpallidus*	peppered shiner
Cypriniformes	Cyprinidae	*Notropis orca*	phantom shiner
Cypriniformes	Cyprinidae	*Notropis ariommus*	popeye shiner
Cypriniformes	Cyprinidae	*Notropis anogenus*	pugnose shiner
Cypriniformes	Cyprinidae	*Notropis chrosomus*	rainbow shiner
Cypriniformes	Cyprinidae	*Notropis bairdi*	red river shiner
Cypriniformes	Cyprinidae	*Notropis harperi*	redeye chub
Cypriniformes	Cyprinidae	*Notropis chiliticus*	redlip shiner
Cypriniformes	Cyprinidae	*Notropis jemezanus*	rio grande shiner
Cypriniformes	Cyprinidae	*Notropis blennius*	river shiner
Cypriniformes	Cyprinidae	*Notropis suttkusi*	rocky shiner
Cypriniformes	Cyprinidae	*Notropis rubellus*	rosyface shiner
Cypriniformes	Cyprinidae	*Notropis baileyi*	rough shiner
Cypriniformes	Cyprinidae	*Notropis semperasper*	roughhead shiner
Cypriniformes	Cyprinidae	*Notropis sabinae*	sabine shiner
Cypriniformes	Cyprinidae	*Notropis rubricroceus*	saffron shiner
Cypriniformes	Cyprinidae	*Notropis stramineus*	sand shiner
Cypriniformes	Cyprinidae	*Notropis scepticus*	sandbar shiner
Cypriniformes	Cyprinidae	*Notropis oxyrhynchus*	sharpnose shiner
Cypriniformes	Cyprinidae	*Notropis photogenis*	silver shiner

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cypriniformes	Cyprinidae	*Notropis shumardi*	silverband shiner
Cypriniformes	Cyprinidae	*Notropis buccatus*	silverjaw minnow
Cypriniformes	Cyprinidae	*Notropis candidus*	silverside shiner
Cypriniformes	Cyprinidae	*Notropis stilbius*	silverstripe shiner
Cypriniformes	Cyprinidae	*Notropis uranoscopus*	skygazer shiner
Cypriniformes	Cyprinidae	*Notropis buccula*	smalleye shiner
Cypriniformes	Cyprinidae	*Notropis hudsonius*	spottail shiner
Cypriniformes	Cyprinidae	*Notropis procne*	swallowtail shiner
Cypriniformes	Cyprinidae	*Notropis maculatus*	taillight shiner
Cypriniformes	Cyprinidae	*Notropis braytoni*	tamaulipas shiner
Cypriniformes	Cyprinidae	*Notropis telescopus*	telescope shiner
Cypriniformes	Cyprinidae	*Notropis leuciodus*	tennessee shiner
Cypriniformes	Cyprinidae	*Notropis amabilis*	texas shiner
Cypriniformes	Cyprinidae	*Notropis topeka*	topeka shiner
Cypriniformes	Cyprinidae	*Notropis greenei*	wedgespot shiner
Cypriniformes	Cyprinidae	*Notropis texanus*	weed shiner
Cypriniformes	Cyprinidae	*Notropis alborus*	whitemouth shiner
Cypriniformes	Cyprinidae	*Notropis rafinesquei*	yazoo shiner
Cypriniformes	Cyprinidae	*Notropis lutipinnis*	yellowfin shiner
Cypriniformes	Cyprinidae	*Opsopoeodus emiliae*	pugnose minnow
Cypriniformes	Cyprinidae	*Oregonichthys crameri*	oregon chub
Cypriniformes	Cyprinidae	*Oregonichthys kalawatseti*	umpqua chub
Cypriniformes	Cyprinidae	*Orthodon microlepidotus*	sacramento blackfish
Cypriniformes	Cyprinidae	*Phenacobius crassilabrum*	fatlips minnow
Cypriniformes	Cyprinidae	*Phenacobius teretulus*	kanawha minnow
Cypriniformes	Cyprinidae	*Phenacobius catostomus*	riffle minnow
Cypriniformes	Cyprinidae	*Phenacobius uranops*	stargazing minnow
Cypriniformes	Cyprinidae	*Phenacobius mirabilis*	suckermouth minnow
Cypriniformes	Cyprinidae	*Phoxinus cumberlandensis*	blackside dace
Cypriniformes	Cyprinidae	*Phoxinus neogaeus*	finescale dace
Cypriniformes	Cyprinidae	*Phoxinus saylori*	laurel dace
Cypriniformes	Cyprinidae	*Phoxinus oreas*	mountain redbelly dace
Cypriniformes	Cyprinidae	*Phoxinus eos*	northern redbelly dace
Cypriniformes	Cyprinidae	*Phoxinus erythrogaster*	southern redbelly dace
Cypriniformes	Cyprinidae	*Phoxinus tennesseensis*	tennessee dace
Cypriniformes	Cyprinidae	*Pimephales notatus*	bluntnose minnow
Cypriniformes	Cyprinidae	*Pimephales vigilax*	bullhead minnow
Cypriniformes	Cyprinidae	*Pimephales promelas*	fathead minnow
Cypriniformes	Cyprinidae	*Pimephales tenellus*	slim minnow
Cypriniformes	Cyprinidae	*Plagopterus argentissimus*	woundfin
Cypriniformes	Cyprinidae	*Platygobio gracilis*	flathead chub
Cypriniformes	Cyprinidae	*Pogonichthys ciscoides*	clear lake splittail

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Cypriniformes	Cyprinidae	*Pogonichthys macrolepidotus*	splittail
Cypriniformes	Cyprinidae	*Pteronotropis grandipinnis*	apalachee shiner
Cypriniformes	Cyprinidae	*Pteronotropis hubbsi*	bluehead shiner
Cypriniformes	Cyprinidae	*Pteronotropis welaka*	bluenose shiner
Cypriniformes	Cyprinidae	*Pteronotropis euryzonus*	broadstripe shiner
Cypriniformes	Cyprinidae	*Pteronotropis signipinnis*	flagfin shiner
Cypriniformes	Cyprinidae	*Pteronotropis merlini*	orangetail shiner
Cypriniformes	Cyprinidae	*Pteronotropis hypselopterus*	sailfin shiner
Cypriniformes	Cyprinidae	*Ptychocheilus lucius*	colorado pikeminnow
Cypriniformes	Cyprinidae	*Ptychocheilus oregonensis*	northern pikeminnow
Cypriniformes	Cyprinidae	*Ptychocheilus grandis*	sacramento pikeminnow
Cypriniformes	Cyprinidae	*Ptychocheilus umpquae*	umpqua pikeminnow
Cypriniformes	Cyprinidae	*Relictus solitarius*	relict dace
Cypriniformes	Cyprinidae	*Rhinichthys atratulus*	eastern blacknose dace
Cypriniformes	Cyprinidae	*Rhinichthys deaconi*	las vegas dace
Cypriniformes	Cyprinidae	*Rhinichthys falcatus*	leopard dace
Cypriniformes	Cyprinidae	*Rhinichthys cobitis*	loach minnow
Cypriniformes	Cyprinidae	*Rhinichthys cataractae*	longnose dace
Cypriniformes	Cyprinidae	*Rhinichthys osculus*	speckled dace
Cypriniformes	Cyprinidae	*Rhinichthys umatilla*	umatilla dace
Cypriniformes	Cyprinidae	*Rhinichthys evermanni*	umpqua dace
Cypriniformes	Cyprinidae	*Rhinichthys obtusus*	western blacknose dace
Cypriniformes	Cyprinidae	*Rhodeus sericeus*	bitterling
Cypriniformes	Cyprinidae	*Richardsonius egregius*	lahontan redside
Cypriniformes	Cyprinidae	*Richardsonius balteatus*	redside shiner
Cypriniformes	Cyprinidae	*Richardsonius X Rhinichthys balteatus x osculus*	redside shiner x speckled dace
Cypriniformes	Cyprinidae	*Scardinius erythrophthalmus*	rudd
Cypriniformes	Cyprinidae	*Semotilus atromaculatus*	creek chub
Cypriniformes	Cyprinidae	*Semotilus thoreauianus*	dixie chub
Cypriniformes	Cyprinidae	*Semotilus corporalis*	fallfish
Cypriniformes	Cyprinidae	*Semotilus lumbee*	sandhills chub
Cypriniformes	Cyprinidae	*Snyderichthys copei*	leatherside chub
Cypriniformes	Cyprinidae	*Tinca tinca*	tench
Cypriniformes	Cyprinidae	*Cyprinella cf. zanema*	thinlip chub
Cypriniformes	Cyprinidae	*Hypophthalmichthys molitrix*	silver carp
Cypriniformes	Catostomidae	*Catostomus cf. latipinnis*	little colorado river sucker
Cypriniformes	Catostomidae	*Moxostoma robustum*	smallfin redhorse
Cypriniformes	Cyprinidae	*Macrhybopsis cf. aestivalis*	coosa chub
Cypriniformes	Cyprinidae	*Semotilus X Luxilus atromaculatus x chrysocephalus*	creek chub x striped shiner

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Cypriniformes	Cyprinidae	*Cyprinus carpio*	mirror carp
Cypriniformes	Cyprinidae	*Hypophthalmichthys nobilis*	bighead carp
Cypriniformes	Cyprinidae	*Notropis amplamala*	longjaw minnow
Cypriniformes	Cyprinidae	*Notropis cf. spectrunculus*	sawfin shiner
Cypriniformes	Cyprinidae	*Pteronotropis stonei*	lowland shiner
Cyprinodontiformes	Aplocheilidae	*Rivulus hartii*	giant rivulus
Cyprinodontiformes	Aplocheilidae	*Rivulus marmoratus*	mangrove rivulus
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon nevadensis*	amargosa pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon elegans*	comanche springs pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon eximius*	conchos pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon macularius*	desert pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon diabolis*	devils hole pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon bovinus*	leon springs pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon radiosus*	owens pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon pecosensis*	pecos pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon rubrofluviatilis*	red river pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon salinus*	salt creek pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon arcuatus*	santa cruz pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon variegatus*	sheepshead minnow
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon eremus*	sonoyta pupfish
Cyprinodontiformes	Cyprinodontidae	*Cyprinodon tularosa*	white sands pupfish
Cyprinodontiformes	Cyprinodontidae	*Jordanella floridae*	flagfish
Cyprinodontiformes	Fundulidae	*Fundulus diaphanus*	banded killifish
Cyprinodontiformes	Fundulidae	*Fundulus cingulatus*	banded topminnow
Cyprinodontiformes	Fundulidae	*Fundulus julisia*	barrens topminnow
Cyprinodontiformes	Fundulidae	*Fundulus pulvereus*	bayou killifish
Cyprinodontiformes	Fundulidae	*Fundulus nottii*	bayou topminnow
Cyprinodontiformes	Fundulidae	*Fundulus olivaceus*	blackspotted topminnow
Cyprinodontiformes	Fundulidae	*Fundulus notatus*	blackstripe topminnow
Cyprinodontiformes	Fundulidae	*Fundulus euryzonus*	broadstripe topminnow
Cyprinodontiformes	Fundulidae	*Fundulus chrysotus*	golden topminnow
Cyprinodontiformes	Fundulidae	*Fundulus parvipinnis*	guadalupe cardinalfish
Cyprinodontiformes	Fundulidae	*Fundulus grandis*	gulf killifish
Cyprinodontiformes	Fundulidae	*Fundulus lineolatus*	lined topminnow
Cyprinodontiformes	Fundulidae	*Fundulus confluentus*	marsh killifish
Cyprinodontiformes	Fundulidae	*Fundulus heteroclitus*	mummichog
Cyprinodontiformes	Fundulidae	*Fundulus kansae*	northern plains killifish
Cyprinodontiformes	Fundulidae	*Fundulus catenatus*	northern studfish
Cyprinodontiformes	Fundulidae	*Fundulus zebrinus*	plains killifish
Cyprinodontiformes	Fundulidae	*Fundulus sciadicus*	plains topminnow
Cyprinodontiformes	Fundulidae	*Fundulus rubrifrons*	redface topminnow
Cyprinodontiformes	Fundulidae	*Fundulus escambiae*	russetfin topminnow

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Cyprinodontiformes	Fundulidae	*Fundulus jenkinsi*	saltmarsh topminnow
Cyprinodontiformes	Fundulidae	*Fundulus seminolis*	seminole killifish
Cyprinodontiformes	Fundulidae	*Fundulus stellifer*	southern studfish
Cyprinodontiformes	Fundulidae	*Fundulus rathbuni*	speckled killifish
Cyprinodontiformes	Fundulidae	*Fundulus luciae*	spotfin killifish
Cyprinodontiformes	Fundulidae	*Fundulus dispar*	starhead topminnow
Cyprinodontiformes	Fundulidae	*Fundulus bifax*	stippled studfish
Cyprinodontiformes	Fundulidae	*Fundulus waccamensis*	waccamaw killifish
Cyprinodontiformes	Fundulidae	*Fundulus blairae*	western starhead topminnow
Cyprinodontiformes	Fundulidae	*Fundulus albolineatus*	whiteline topminnow
Cyprinodontiformes	Fundulidae	*Leptolucania ommata*	pygmy killifish
Cyprinodontiformes	Fundulidae	*Lucania goodei*	bluefin killifish
Cyprinodontiformes	Fundulidae	*Lucania parva*	rainwater killifish
Cyprinodontiformes	Goodeidae	*Crenichthys nevadae*	railroad valley springfish
Cyprinodontiformes	Goodeidae	*Crenichthys baileyi*	white river springfish
Cyprinodontiformes	Goodeidae	*Empetrichthys merriami*	ash meadows poolfish
Cyprinodontiformes	Goodeidae	*Empetrichthys latos*	pahrump poolfish
Cyprinodontiformes	Poeciliidae	*Belonesox belizanus*	pike killifish
Cyprinodontiformes	Poeciliidae	*Gambusia amistadensis*	amistad gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia gaigei*	big bend gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia senilis*	blotched gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia heterochir*	clear creek gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia holbrooki*	eastern mosquitofish
Cyprinodontiformes	Poeciliidae	*Gambusia geiseri*	largespring gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia rhizophorae*	mangrove gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia nobilis*	pecos gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia georgei*	san marcos gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia speciosa*	tex-mex gambusia
Cyprinodontiformes	Poeciliidae	*Gambusia affinis*	western mosquitofish
Cyprinodontiformes	Poeciliidae	*Heterandria formosa*	least killifish
Cyprinodontiformes	Poeciliidae	*Poecilia formosa*	amazon molly
Cyprinodontiformes	Poeciliidae	*Poecilia reticulata*	guppy
Cyprinodontiformes	Poeciliidae	*Poecilia sphenops*	mexican molly
Cyprinodontiformes	Poeciliidae	*Poecilia latipinna*	sailfin molly
Cyprinodontiformes	Poeciliidae	*Poecilia mexicana*	shortfin molly
Cyprinodontiformes	Poeciliidae	*Poeciliopsis occidentalis*	gila topminnow
Cyprinodontiformes	Poeciliidae	*Poeciliopsis gracilis*	porthole livebearer
Cyprinodontiformes	Poeciliidae	*Xiphophorus hellerii*	green swordtail
Cyprinodontiformes	Poeciliidae	*Xiphophorus maculatus*	southern platyfish
Cyprinodontiformes	Poeciliidae	*Xiphophorus variatus*	variable platyfish
Elopiformes	Elopidae	*Elops saurus*	ladyfish
Elopiformes	Elopidae	*Elops affinis*	machete

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Elopiformes	Megalopidae	*Megalops atlanticus*	tarpon
Esociformes	Esocidae	*Esox niger*	chain pickerel
Esociformes	Esocidae	*Esox masquinongy*	muskellunge
Esociformes	Esocidae	*Esox lucius*	northern pike
Esociformes	Esocidae	*Esox americanus*	redfin pickerel
Esociformes	Esocidae	*Esox americanus vermiculatus*	grass pickerel
Esociformes	Esocidae	*Esox lucius x masquinongy*	tiger muskellunge
Esociformes	Umbridae	*Dallia pectoralis*	alaska blackfish
Esociformes	Umbridae	*Novumbra hubbsi*	olympic mudminnow
Esociformes	Umbridae	*Umbra limi*	central mudminnow
Esociformes	Umbridae	*Umbra pygmaea*	eastern mudminnow
Gadiformes	Gadidae	*Lota lota*	burbot
Gadiformes	Gadidae	*Microgadus tomcod*	atlantic tomcod
Gasterosteiformes	Gasterosteidae	*Apeltes quadracus*	fourspine stickleback
Gasterosteiformes	Gasterosteidae	*Culaea inconstans*	brook stickleback
Gasterosteiformes	Gasterosteidae	*Gasterosteus aculeatus*	espinocho
Gasterosteiformes	Gasterosteidae	*Pungitius pungitius*	ninespine stickleback
Gasterosteiformes	Syngnathidae	*Microphis brachyurus*	opossum pipefish
Gasterosteiformes	Syngnathidae	*Syngnathus scovelli*	gulf pipefish
Gasterosteiformes	Gasterosteidae	*Gasterosteus aculeatus*	threespine stickleback
Hiodontiformes	Hiodontidae	*Hiodon alosoides*	goldeye
Hiodontiformes	Hiodontidae	*Hiodon tergisus*	mooneye
Lepisosteiformes	Lepisosteidae	*Atractosteus spatula*	alligator gar
Lepisosteiformes	Lepisosteidae	*Lepisosteus platyrhincus*	florida gar
Lepisosteiformes	Lepisosteidae	*Lepisosteus osseus*	longnose gar
Lepisosteiformes	Lepisosteidae	*Lepisosteus platostomus*	shortnose gar
Lepisosteiformes	Lepisosteidae	*Lepisosteus oculatus*	spotted gar
Mugiliformes	Mugilidae	*Agonostomus monticola*	mountain mullet
Mugiliformes	Mugilidae	*Mugil cephalus*	striped mullet
Mugiliformes	Mugilidae	*Mugil curema*	white mullet
Myliobatiformes	Dasyatidae	*Dasyatis sabina*	atlantic stingray
Osteoglossiformes	Notopteridae	*Chitala ornata*	clown knifefish
Perciformes	Belontiidae	*Trichopsis vittata*	croaking gourami
Perciformes	Centrarchidae	*Acantharchus pomotis*	mud sunfish
Perciformes	Centrarchidae	*Ambloplites constellatus*	ozark bass
Perciformes	Centrarchidae	*Ambloplites cavifrons*	roanoke bass
Perciformes	Centrarchidae	*Ambloplites rupestris*	rock bass
Perciformes	Centrarchidae	*Ambloplites ariommus*	shadow bass
Perciformes	Centrarchidae	*Archoplites interruptus*	sacramento perch
Perciformes	Centrarchidae	*Centrarchus macropterus*	flier
Perciformes	Centrarchidae	*Enneacanthus obesus*	banded sunfish
Perciformes	Centrarchidae	*Enneacanthus chaetodon*	blackbanded sunfish

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Centrarchidae	*Enneacanthus gloriosus*	bluespotted sunfish
Perciformes	Centrarchidae	*Lepomis symmetricus*	bantam sunfish
Perciformes	Centrarchidae	*Lepomis macrochirus*	bluegill
Perciformes	Centrarchidae	*Lepomis marginatus*	dollar sunfish
Perciformes	Centrarchidae	*Lepomis cyanellus*	green sunfish
Perciformes	Centrarchidae	*Lepomis megalotis*	longear sunfish
Perciformes	Centrarchidae	*Lepomis humilis*	orangespotted sunfish
Perciformes	Centrarchidae	*Lepomis gibbosus*	pumpkinseed
Perciformes	Centrarchidae	*Lepomis auritus*	redbreast sunfish
Perciformes	Centrarchidae	*Lepomis microlophus*	redear sunfish
Perciformes	Centrarchidae	*Lepomis miniatus*	redspotted sunfish
Perciformes	Centrarchidae	*Lepomis punctatus*	spotted sunfish
Perciformes	Centrarchidae	*Lepomis gulosus*	warmouth
Perciformes	Centrarchidae	*Micropterus treculii*	guadalupe bass
Perciformes	Centrarchidae	*Micropterus salmoides*	largemouth bass
Perciformes	Centrarchidae	*Micropterus coosae*	redeye bass
Perciformes	Centrarchidae	*Micropterus cataractae*	shoal bass
Perciformes	Centrarchidae	*Micropterus dolomieu*	smallmouth bass
Perciformes	Centrarchidae	*Micropterus punctulatus*	spotted bass
Perciformes	Centrarchidae	*Micropterus notius*	suwannee bass
Perciformes	Centrarchidae	*Pomoxis nigromaculatus*	black crappie
Perciformes	Centrarchidae	*Pomoxis annularis*	white crappie
Perciformes	Centropomidae	*Centropomus undecimalis*	common snook
Perciformes	Centropomidae	*Centropomus parallelus*	smallscale fat snook
Perciformes	Centropomidae	*Centropomus ensiferus*	swordspine snook
Perciformes	Centropomidae	*Centropomus pectinatus*	tarpon snook
Perciformes	Channidae	*Channa marulius*	bullseye snakehead
Perciformes	Channidae	*Channa argus*	snakehead
Perciformes	Cichlidae	*Astronotus ocellatus*	oscar
Perciformes	Cichlidae	*Cichla ocellaris*	butterfly peacock bass
Perciformes	Cichlidae	*Cichlasoma bimaculatum*	black acara
Perciformes	Cichlidae	*Cichlasoma nigrofasciatum*	convict cichlid
Perciformes	Cichlidae	*Cichlasoma meeki*	firemouth cichlid
Perciformes	Cichlidae	*Cichlasoma octofasciatum*	jack dempsey
Perciformes	Cichlidae	*Cichlasoma managuense*	jaguar guapote
Perciformes	Cichlidae	*Cichlasoma urophthalmus*	mayan cichlid
Perciformes	Cichlidae	*Cichlasoma citrinellum*	midas cichlid
Perciformes	Cichlidae	*Cichlasoma cyanoguttatum*	rio grande cichlid
Perciformes	Cichlidae	*Cichlasoma salvini*	yellowbelly cichlid
Perciformes	Cichlidae	*Geophagus surinamensis*	redstriped eartheater
Perciformes	Cichlidae	*Hemichromis letourneuxi*	african jewelfish
Perciformes	Cichlidae	*Heros severus*	banded cichlid

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Cichlidae	*Oreochromis aureus*	blue tilapia
Perciformes	Cichlidae	*Oreochromis mossambicus*	mozambique tilapia
Perciformes	Cichlidae	*Oreochromis niloticus*	nile tilapia
Perciformes	Cichlidae	*Oreochromis urolepis*	wami tilapia
Perciformes	Cichlidae	*Sarotherodon melanotheron*	blackchin tilapia
Perciformes	Cichlidae	*Tilapia zillii*	redbelly tilapia
Perciformes	Cichlidae	*Tilapia mariae*	spotted tilapia
Perciformes	Elassomatidae	*Elassoma zonatum*	banded pygmy sunfish
Perciformes	Elassomatidae	*Elassoma okatie*	bluebarred pygmy sunfish
Perciformes	Elassomatidae	*Elassoma boehlkei*	carolina pygmy sunfish
Perciformes	Elassomatidae	*Elassoma evergladei*	everglades pygmy sunfish
Perciformes	Elassomatidae	*Elassoma okefenokee*	okefenokee pygmy sunfish
Perciformes	Elassomatidae	*Elassoma alabamae*	spring pygmy sunfish
Perciformes	Eleotridae	*Dormitator maculatus*	fat sleeper
Perciformes	Eleotridae	*Eleotris amblyopsis*	largescaled spinycheek
Perciformes	Eleotridae	*Eleotris perniger*	smallscaled spinycheek
Perciformes	Eleotridae	*Eleotris picta*	spotted sleeper
Perciformes	Eleotridae	*Gobiomorus dormitor*	bigmouth sleeper
Perciformes	Eleotridae	*Guavina guavina*	guavina
Perciformes	Eleotridae	*Eleotris amblyopsis*	largescaled spinycheek sleeper
Perciformes	Embiotocidae	*Cymatogaster aggregata*	shiner perch
Perciformes	Embiotocidae	*Hysterocarpus traskii*	tule perch
Perciformes	Gerreidae	*Diapterus auratus*	irish pompano
Perciformes	Gerreidae	*Eucinostomus harengulus*	tidewater mojarra
Perciformes	Gerreidae	*Eugerres plumieri*	striped mojarra
Perciformes	Gerreidae	*Gerres cinereus*	yellowfin mojarra
Perciformes	Gobiidae	*Acanthogobius flavimanus*	yellowfin goby
Perciformes	Gobiidae	*Awaous banana*	river goby
Perciformes	Gobiidae	*Clevelandia ios*	arrow goby
Perciformes	Gobiidae	*Ctenogobius fasciatus*	blotchcheek goby
Perciformes	Gobiidae	*Ctenogobius boleosoma*	darter goby
Perciformes	Gobiidae	*Ctenogobius shufeldti*	freshwater goby
Perciformes	Gobiidae	*Ctenogobius claytonii*	mexican goby
Perciformes	Gobiidae	*Ctenogobius pseudofasciatus*	slashcheek goby
Perciformes	Gobiidae	*Eucyclogobius newberryi*	tidewater goby
Perciformes	Gobiidae	*Gillichthys mirabilis*	longjaw mudsucker
Perciformes	Gobiidae	*Gobioides broussonetii*	violet goby
Perciformes	Gobiidae	*Gobiosoma bosc*	naked goby
Perciformes	Gobiidae	*Lophogobius cyprinoides*	crested goby
Perciformes	Gobiidae	*Microgobius gulosus*	clown goby
Perciformes	Gobiidae	*Neogobius melanostomus*	round goby

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Gobiidae	*Proterorhinus marmoratus*	tubenose goby
Perciformes	Gobiidae	*Tridentiger bifasciatus*	shimofuri goby
Perciformes	Gobiidae	*Tridentiger barbatus*	shokihaze goby
Perciformes	Haemulidae	*Orthopristis chrysoptera*	pigfish
Perciformes	Lutjanidae	*Lutjanus griseus*	gray snapper
Perciformes	Moronidae	*Morone saxatilis*	striped bass
Perciformes	Moronidae	*Morone chrysops*	white bass
Perciformes	Moronidae	*Morone americana*	white perch
Perciformes	Moronidae	*Morone mississippiensis*	yellow bass
Perciformes	Moronidae	*Morone na*	wiper
Perciformes	Percidae	*Ammocrypta pellucida*	eastern sand darter
Perciformes	Percidae	*Ammocrypta bifascia*	florida sand darter
Perciformes	Percidae	*Ammocrypta beanii*	naked sand darter
Perciformes	Percidae	*Ammocrypta vivax*	scaly sand darter
Perciformes	Percidae	*Ammocrypta meridiana*	southern sand darter
Perciformes	Percidae	*Ammocrypta clara*	western sand darter
Perciformes	Percidae	*Crystallaria asprella*	crystal darter
Perciformes	Percidae	*Etheostoma ramseyi*	alabama darter
Perciformes	Percidae	*Etheostoma cragini*	arkansas darter
Perciformes	Percidae	*Etheostoma euzonum*	arkansas saddled darter
Perciformes	Percidae	*Etheostoma sagitta*	arrow darter
Perciformes	Percidae	*Etheostoma cinereum*	ashy darter
Perciformes	Percidae	*Etheostoma zonifer*	backwater darter
Perciformes	Percidae	*Etheostoma zonale*	banded darter
Perciformes	Percidae	*Etheostoma zonistium*	bandfin darter
Perciformes	Percidae	*Etheostoma obeyense*	barcheek darter
Perciformes	Percidae	*Etheostoma forbesi*	barrens darter
Perciformes	Percidae	*Etheostoma rubrum*	bayou darter
Perciformes	Percidae	*Etheostoma nigripinne*	blackfin darter
Perciformes	Percidae	*Etheostoma duryi*	blackside snubnose darter
Perciformes	Percidae	*Etheostoma blennius*	blenny darter
Perciformes	Percidae	*Etheostoma sanguifluum*	bloodfin darter
Perciformes	Percidae	*Etheostoma camurum*	bluebreast darter
Perciformes	Percidae	*Etheostoma jessiae*	blueside darter
Perciformes	Percidae	*Etheostoma chlorosoma*	bluntnose darter
Perciformes	Percidae	*Etheostoma wapiti*	boulder darter
Perciformes	Percidae	*Etheostoma lynceum*	brighteye darter
Perciformes	Percidae	*Etheostoma burri*	brook darter
Perciformes	Percidae	*Etheostoma edwini*	brown darter
Perciformes	Percidae	*Etheostoma bison*	buffalo darter
Perciformes	Percidae	*Etheostoma osburni*	candy darter
Perciformes	Percidae	*Etheostoma collis*	carolina darter

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Percidae	*Etheostoma scotti*	cherokee darter
Perciformes	Percidae	*Etheostoma etnieri*	cherry darter
Perciformes	Percidae	*Etheostoma cervus*	chickasaw darter
Perciformes	Percidae	*Etheostoma davisoni*	choctawhatchee darter
Perciformes	Percidae	*Etheostoma hopkinsi*	christmas darter
Perciformes	Percidae	*Etheostoma colorosum*	coastal darter
Perciformes	Percidae	*Etheostoma ditrema*	coldwater darter
Perciformes	Percidae	*Etheostoma coosae*	coosa darter
Perciformes	Percidae	*Etheostoma aquali*	coppercheek darter
Perciformes	Percidae	*Etheostoma basilare*	corrugated darter
Perciformes	Percidae	*Etheostoma collettei*	creole darter
Perciformes	Percidae	*Etheostoma corona*	crown darter
Perciformes	Percidae	*Etheostoma susanae*	cumberland darter
Perciformes	Percidae	*Etheostoma uniporum*	current darter
Perciformes	Percidae	*Etheostoma proeliare*	cypress darter
Perciformes	Percidae	*Etheostoma percnurum*	duskytail darter
Perciformes	Percidae	*Etheostoma pseudovulatum*	egg-mimic darter
Perciformes	Percidae	*Etheostoma baileyi*	emerald darter
Perciformes	Percidae	*Etheostoma etowahae*	etowah darter
Perciformes	Percidae	*Etheostoma flabellare*	fantail darter
Perciformes	Percidae	*Etheostoma pyrrhogaster*	firebelly darter
Perciformes	Percidae	*Etheostoma fonticola*	fountain darter
Perciformes	Percidae	*Etheostoma crossopterum*	fringed darter
Perciformes	Percidae	*Etheostoma vitreum*	glassy darter
Perciformes	Percidae	*Etheostoma denoncourti*	golden darter
Perciformes	Percidae	*Etheostoma parvipinne*	goldstripe darter
Perciformes	Percidae	*Etheostoma jordani*	greenbreast darter
Perciformes	Percidae	*Etheostoma chlorobranchium*	greenfin darter
Perciformes	Percidae	*Etheostoma blennioides*	greenside darter
Perciformes	Percidae	*Etheostoma lepidum*	greenthroat darter
Perciformes	Percidae	*Etheostoma oophylax*	guardian darter
Perciformes	Percidae	*Etheostoma swaini*	gulf darter
Perciformes	Percidae	*Etheostoma histrio*	harlequin darter
Perciformes	Percidae	*Etheostoma lawrencei*	headwater darter
Perciformes	Percidae	*Etheostoma kantuckeense*	highland rim darter
Perciformes	Percidae	*Etheostoma brevirostrum*	holiday darter
Perciformes	Percidae	*Etheostoma exile*	iowa darter
Perciformes	Percidae	*Etheostoma nigrum*	johnny darter
Perciformes	Percidae	*Etheostoma kanawhae*	kanawha darter
Perciformes	Percidae	*Etheostoma rafinesquei*	kentucky darter
Perciformes	Percidae	*Etheostoma microperca*	least darter
Perciformes	Percidae	*Etheostoma chuckwachatte*	lipstick darter

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Percidae	*Etheostoma neopterum*	lollypop darter
Perciformes	Percidae	*Etheostoma longimanum*	longfin darter
Perciformes	Percidae	*Etheostoma sellare*	maryland darter
Perciformes	Percidae	*Etheostoma tetrazonum*	missouri saddled darter
Perciformes	Percidae	*Etheostoma asprigene*	mud darter
Perciformes	Percidae	*Etheostoma nianguae*	niangua darter
Perciformes	Percidae	*Etheostoma okaloosae*	okaloosa darter
Perciformes	Percidae	*Etheostoma radiosum*	orangebelly darter
Perciformes	Percidae	*Etheostoma bellum*	orangefin darter
Perciformes	Percidae	*Etheostoma spectabile*	orangethroat darter
Perciformes	Percidae	*Etheostoma pallididorsum*	paleback darter
Perciformes	Percidae	*Etheostoma mariae*	pinewoods darter
Perciformes	Percidae	*Etheostoma caeruleum*	rainbow darter
Perciformes	Percidae	*Etheostoma luteovinctum*	redband darter
Perciformes	Percidae	*Etheostoma whipplei*	redfin darter
Perciformes	Percidae	*Etheostoma rufilineatum*	redline darter
Perciformes	Percidae	*Etheostoma artesiae*	redspot darter
Perciformes	Percidae	*Etheostoma chienense*	relict darter
Perciformes	Percidae	*Etheostoma grahami*	rio grande darter
Perciformes	Percidae	*Etheostoma podostemone*	riverweed darter
Perciformes	Percidae	*Etheostoma rupestre*	rock darter
Perciformes	Percidae	*Etheostoma phytophilum*	rush darter
Perciformes	Percidae	*Etheostoma flavum*	saffron darter
Perciformes	Percidae	*Etheostoma fricksium*	savannah darter
Perciformes	Percidae	*Etheostoma serrifer*	sawcheek darter
Perciformes	Percidae	*Etheostoma thalassinum*	seagreen darter
Perciformes	Percidae	*Etheostoma acuticeps*	sharphead darter
Perciformes	Percidae	*Etheostoma tecumsehi*	shawnee darter
Perciformes	Percidae	*Etheostoma smithi*	slabrock darter
Perciformes	Percidae	*Etheostoma boschungi*	slackwater darter
Perciformes	Percidae	*Etheostoma gracile*	slough darter
Perciformes	Percidae	*Etheostoma microlepidum*	smallscale darter
Perciformes	Percidae	*Etheostoma simoterum*	snubnose darter
Perciformes	Percidae	*Etheostoma olivaceum*	sooty darter
Perciformes	Percidae	*Etheostoma stigmaeum*	speckled darter
Perciformes	Percidae	*Etheostoma barrenense*	splendid darter
Perciformes	Percidae	*Etheostoma squamiceps*	spottail darter
Perciformes	Percidae	*Etheostoma maculatum*	spotted darter
Perciformes	Percidae	*Etheostoma punctulatum*	stippled darter
Perciformes	Percidae	*Etheostoma derivativum*	stone darter
Perciformes	Percidae	*Etheostoma fragi*	strawberry darter
Perciformes	Percidae	*Etheostoma striatulum*	striated darter

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Percidae	*Etheostoma virgatum*	striped darter
Perciformes	Percidae	*Etheostoma kennicotti*	stripetail darter
Perciformes	Percidae	*Etheostoma fusiforme*	swamp darter
Perciformes	Percidae	*Etheostoma swannanoa*	swannanoa darter
Perciformes	Percidae	*Etheostoma tallapoosae*	tallapoosa darter
Perciformes	Percidae	*Etheostoma barbouri*	teardrop darter
Perciformes	Percidae	*Etheostoma olmstedi*	tessellated darter
Perciformes	Percidae	*Etheostoma tippecanoe*	tippecanoe darter
Perciformes	Percidae	*Etheostoma lachneri*	tombigbee darter
Perciformes	Percidae	*Etheostoma trisella*	trispot darter
Perciformes	Percidae	*Etheostoma gutselli*	tuckasegee darter
Perciformes	Percidae	*Etheostoma inscriptum*	turquoise darter
Perciformes	Percidae	*Etheostoma tuscumbia*	tuscumbia darter
Perciformes	Percidae	*Etheostoma douglasi*	tuskaloosa darter
Perciformes	Percidae	*Etheostoma variatum*	variegate darter
Perciformes	Percidae	*Etheostoma chermocki*	vermilion darter
Perciformes	Percidae	*Etheostoma perlongum*	waccamaw darter
Perciformes	Percidae	*Etheostoma bellator*	warrior darter
Perciformes	Percidae	*Etheostoma nuchale*	watercress darter
Perciformes	Percidae	*Etheostoma vulneratum*	wounded darter
Perciformes	Percidae	*Etheostoma raneyi*	yazoo darter
Perciformes	Percidae	*Etheostoma moorei*	yellowcheek darter
Perciformes	Percidae	*Etheostoma juliae*	yoke darter
Perciformes	Percidae	*Etheostoma meadiae*	bluespar darter
Perciformes	Percidae	*Etheostoma planasaxatile*	duck darter
Perciformes	Percidae	*Etheostoma orientale*	eastrim darter
Perciformes	Percidae	*Etheostoma occidentale*	westrim darter
Perciformes	Percidae	*Gymnocephalus cernuus*	ruffe
Perciformes	Percidae	*Perca flavescens*	yellow perch
Perciformes	Percidae	*Percina antesella*	amber darter
Perciformes	Percidae	*Percina gymnocephala*	appalachia darter
Perciformes	Percidae	*Percina macrolepida*	bigscale logperch
Perciformes	Percidae	*Percina nigrofasciata*	blackbanded darter
Perciformes	Percidae	*Percina maculata*	blackside darter
Perciformes	Percidae	*Percina burtoni*	blotchside logperch
Perciformes	Percidae	*Percina cymatotaenia*	bluestripe darter
Perciformes	Percidae	*Percina palmaris*	bronze darter
Perciformes	Percidae	*Percina nevisense*	chainback darter
Perciformes	Percidae	*Percina copelandi*	channel darter
Perciformes	Percidae	*Percina brevicauda*	coal darter
Perciformes	Percidae	*Percina jenkinsi*	conasauga logperch
Perciformes	Percidae	*Percina sciera*	dusky darter

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Percidae	*Percina stictogaster*	frecklebelly darter
Perciformes	Percidae	*Percina lenticula*	freckled darter
Perciformes	Percidae	*Percina evides*	gilt darter
Perciformes	Percidae	*Percina aurolineata*	goldline darter
Perciformes	Percidae	*Percina suttkusi*	gulf logperch
Perciformes	Percidae	*Percina pantherina*	leopard darter
Perciformes	Percidae	*Percina caprodes*	logperch
Perciformes	Percidae	*Percina macrocephala*	longhead darter
Perciformes	Percidae	*Percina nasuta*	longnose darter
Perciformes	Percidae	*Percina kathae*	mobile logperch
Perciformes	Percidae	*Percina squamata*	olive darter
Perciformes	Percidae	*Percina fulvitaenia*	ozark logperch
Perciformes	Percidae	*Percina aurora*	pearl darter
Perciformes	Percidae	*Percina crassa*	piedmont darter
Perciformes	Percidae	*Percina shumardi*	river darter
Perciformes	Percidae	*Percina roanoka*	roanoke darter
Perciformes	Percidae	*Percina rex*	roanoke logperch
Perciformes	Percidae	*Percina vigil*	saddleback darter
Perciformes	Percidae	*Percina oxyrhynchus*	sharpnose darter
Perciformes	Percidae	*Percina peltata*	shield darter
Perciformes	Percidae	*Percina phoxocephala*	slenderhead darter
Perciformes	Percidae	*Percina tanasi*	snail darter
Perciformes	Percidae	*Percina austroperca*	southern logperch
Perciformes	Percidae	*Percina uranidea*	stargazing darter
Perciformes	Percidae	*Percina notogramma*	stripeback darter
Perciformes	Percidae	*Percina aurantiaca*	tangerine darter
Perciformes	Percidae	*Percina carbonaria*	texas logperch
Perciformes	Percidae	*Percina burtoni*	blotchside darter
Perciformes	Percidae	*Sander canadensis*	sauger
Perciformes	Percidae	*Sander vitreus*	walleye
Perciformes	Percidae	*Sander lucioperca*	zander
Perciformes	Percidae	*Sander canadensis x vitreus*	saugeye
Perciformes	Pomatomidae	*Pomatomus saltatrix*	bluefish
Perciformes	Sciaenidae	*Aplodinotus grunniens*	freshwater drum
Perciformes	Sciaenidae	*Bairdiella icistia*	bairdiella
Perciformes	Sciaenidae	*Bairdiella chrysoura*	silver perch
Perciformes	Sciaenidae	*Cynoscion xanthulus*	orangemouth corvina
Perciformes	Sciaenidae	*Cynoscion nebulosus*	spotted seatrout
Perciformes	Sciaenidae	*Leiostomus xanthurus*	spot
Perciformes	Sciaenidae	*Micropogonias undulatus*	atlantic croaker
Perciformes	Sciaenidae	*Sciaenops ocellatus*	red drum
Perciformes	Sparidae	*Archosargus probatocephalus*	sheepshead

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Perciformes	Sparidae	*Lagodon rhomboides*	pinfish
Perciformes	Centrarchidae	*Micropterus salmoides*	largemouth bass (yoy)
Perciformes	Centropomidae	*Centropomus parallelus*	fat snook
Perciformes	Percidae	*Etheostoma tennesseense*	tennessee darter
Percopsiformes	Amblyopsidae	*Amblyopsis spelaea*	northern cavefish
Percopsiformes	Amblyopsidae	*Amblyopsis rosae*	ozark cavefish
Percopsiformes	Amblyopsidae	*Chologaster cornuta*	swampfish
Percopsiformes	Amblyopsidae	*Forbesichthys agassizii*	spring cavefish
Percopsiformes	Amblyopsidae	*Speoplatyrhinus poulsoni*	alabama cavefish
Percopsiformes	Amblyopsidae	*Typhlichthys subterraneus*	southern cavefish
Percopsiformes	Aphredoderidae	*Aphredoderus sayanus*	pirate perch
Percopsiformes	Percopsidae	*Percopsis transmontana*	sand roller
Percopsiformes	Percopsidae	*Percopsis omiscomaycus*	trout-perch
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon castaneus*	chestnut lamprey
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon greeleyi*	mountain brook lamprey
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon fossor*	northern brook lamprey
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon bdellium*	ohio lamprey
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon unicuspis*	silver lamprey
Petromyzontiformes	Petromyzontidae	*Ichthyomyzon gagei*	southern brook lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra appendix*	american brook lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra camtschatica*	arctic lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra hubbsi*	kern brook lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra similis*	klamath lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra aepyptera*	least brook lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra minima*	miller lake lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra tridentata*	pacific lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra lethophaga*	pit-klamath brook lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra ayresii*	river lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra richardsoni*	western brook lamprey
Petromyzontiformes	Petromyzontidae	*Petromyzon marinus*	sea lamprey
Petromyzontiformes	Petromyzontidae	*Lampetra similis*	klamath river lamprey
Pleuronectiformes	Achiridae	*Trinectes maculatus*	hogchoker
Pleuronectiformes	Paralichthyidae	*Citharichthys spilopterus*	bay whiff
Pleuronectiformes	Paralichthyidae	*Paralichthys lethostigma*	southern flounder
Pleuronectiformes	Pleuronectidae	*Platichthys stellatus*	starry flounder
Pristiformes	Pristidae	*Pristis pectinata*	smalltooth sawfish
Salmoniformes	Osmeridae	*Hypomesus transpacificus*	delta smelt
Salmoniformes	Osmeridae	*Hypomesus olidus*	pond smelt
Salmoniformes	Osmeridae	*Hypomesus pretiosus*	surf smelt
Salmoniformes	Osmeridae	*Hypomesus nipponensis*	wakasagi
Salmoniformes	Osmeridae	*Osmerus mordax*	rainbow smelt
Salmoniformes	Osmeridae	*Spirinchus thaleichthys*	longfin smelt

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Salmoniformes	Osmeridae	*Thaleichthys pacificus*	eulachon
Salmoniformes	Salmonidae	*Coregonus autumnalis*	arctic cisco
Salmoniformes	Salmonidae	*Coregonus laurettae*	bering cisco
Salmoniformes	Salmonidae	*Coregonus nigripinnis*	blackfin cisco
Salmoniformes	Salmonidae	*Coregonus hoyi*	bloater
Salmoniformes	Salmonidae	*Coregonus nasus*	broad whitefish
Salmoniformes	Salmonidae	*Coregonus artedi*	cisco
Salmoniformes	Salmonidae	*Coregonus johannae*	deepwater cisco
Salmoniformes	Salmonidae	*Coregonus pidschian*	humpback whitefish
Salmoniformes	Salmonidae	*Coregonus kiyi*	kiyi
Salmoniformes	Salmonidae	*Coregonus clupeaformis*	lake whitefish
Salmoniformes	Salmonidae	*Coregonus sardinella*	least cisco
Salmoniformes	Salmonidae	*Coregonus zenithicus*	shortjaw cisco
Salmoniformes	Salmonidae	*Coregonus reighardi*	shortnose cisco
Salmoniformes	Salmonidae	*Oncorhynchus tshawytscha*	chinook salmon
Salmoniformes	Salmonidae	*Oncorhynchus keta*	chum salmon
Salmoniformes	Salmonidae	*Oncorhynchus kisutch*	coho salmon
Salmoniformes	Salmonidae	*Oncorhynchus clarkii*	cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus gilae*	gila trout
Salmoniformes	Salmonidae	*Oncorhynchus gorbuscha*	pink salmon
Salmoniformes	Salmonidae	*Oncorhynchus mykiss*	rainbow trout
Salmoniformes	Salmonidae	*Oncorhynchus nerka*	sockeye salmon
Salmoniformes	Salmonidae	*Oncorhynchus clarkii utah*	bonneville cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus clarkii lewisi*	westslope cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus apache x mykiss*	apache x rainbow trout
Salmoniformes	Salmonidae	*Oncorhynchus mykiss x aguabonita*	rainbow x golden trout
Salmoniformes	Salmonidae	*Prosopium abyssicola*	bear lake whitefish
Salmoniformes	Salmonidae	*Prosopium gemmifer*	bonneville cisco
Salmoniformes	Salmonidae	*Prosopium spilonotus*	bonneville whitefish
Salmoniformes	Salmonidae	*Prosopium williamsoni*	mountain whitefish
Salmoniformes	Salmonidae	*Prosopium coulterii*	pygmy whitefish
Salmoniformes	Salmonidae	*Prosopium cylindraceum*	round whitefish
Salmoniformes	Salmonidae	*Salmo salar*	atlantic salmon
Salmoniformes	Salmonidae	*Salmo trutta*	brown trout
Salmoniformes	Salmonidae	*Salmo X Salvelinus trutta x fontinalis*	tiger trout
Salmoniformes	Salmonidae	*Salvelinus alpinus*	arctic char
Salmoniformes	Salmonidae	*Salvelinus fontinalis*	brook trout
Salmoniformes	Salmonidae	*Salvelinus confluentus*	bull trout
Salmoniformes	Salmonidae	*Salvelinus malma*	dolly varden

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Salmoniformes	Salmonidae	*Salvelinus namaycush*	lake trout
Salmoniformes	Salmonidae	*Stenodus leucichthys*	inconnu
Salmoniformes	Salmonidae	*Thymallus arcticus*	arctic grayling
Salmoniformes	Salmonidae	*Oncorhynchus tshawytscha*	chinook salmon (yoy)
Salmoniformes	Salmonidae	*Oncorhynchus clarkii clarkii*	coastal cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus clarkii pleuriticus*	colorado river cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus clarkii x mykiss*	cutbow
Salmoniformes	Salmonidae	*Oncorhynchus clarkii henshawi*	lahontan cutthroat trout
Salmoniformes	Salmonidae	*Oncorhynchus mykiss*	rainbow trout (steelhead)
Salmoniformes	Salmonidae	*Oncorhynchus mykiss gairdneri*	redband rainbow trout
Salmoniformes	Salmonidae	*Oncorhynchus aguabonita*	golden trout
Salmoniformes	Salmonidae	*Salmo salar*	atlantic salmon juvenile
Scorpaeniformes	Cottidae	*Clinocottus acuticeps*	sharpnose sculpin
Scorpaeniformes	Cottidae	*Cottus carolinae*	banded sculpin
Scorpaeniformes	Cottidae	*Cottus extensus*	bear lake sculpin
Scorpaeniformes	Cottidae	*Cottus baileyi*	black sculpin
Scorpaeniformes	Cottidae	*Cottus caeruleomentum*	blue ridge sculpin
Scorpaeniformes	Cottidae	*Cottus aleuticus*	coastrange sculpin
Scorpaeniformes	Cottidae	*Cottus hubbsi*	columbia sculpin
Scorpaeniformes	Cottidae	*Cottus princeps*	klamath lake sculpin
Scorpaeniformes	Cottidae	*Cottus bendirei*	malheur sculpin
Scorpaeniformes	Cottidae	*Cottus klamathensis*	marbled sculpin
Scorpaeniformes	Cottidae	*Cottus marginatus*	margined sculpin
Scorpaeniformes	Cottidae	*Cottus bairdii*	mottled sculpin
Scorpaeniformes	Cottidae	*Cottus hypselurus*	ozark sculpin
Scorpaeniformes	Cottidae	*Cottus beldingii*	paiute sculpin
Scorpaeniformes	Cottidae	*Cottus pitensis*	pit sculpin
Scorpaeniformes	Cottidae	*Cottus girardi*	potomac sculpin
Scorpaeniformes	Cottidae	*Cottus asper*	prickly sculpin
Scorpaeniformes	Cottidae	*Cottus paulus*	pygmy sculpin
Scorpaeniformes	Cottidae	*Cottus perplexus*	reticulate sculpin
Scorpaeniformes	Cottidae	*Cottus gulosus*	riffle sculpin
Scorpaeniformes	Cottidae	*Cottus asperrimus*	rough sculpin
Scorpaeniformes	Cottidae	*Cottus confusus*	shorthead sculpin
Scorpaeniformes	Cottidae	*Cottus greenei*	shoshone sculpin
Scorpaeniformes	Cottidae	*Cottus tenuis*	slender sculpin
Scorpaeniformes	Cottidae	*Cottus cognatus*	slimy sculpin
Scorpaeniformes	Cottidae	*Cottus ricei*	spoonhead sculpin
Scorpaeniformes	Cottidae	*Cottus rhotheus*	torrent sculpin

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Scorpaeniformes	Cottidae	*Cottus echinatus*	utah lake sculpin
Scorpaeniformes	Cottidae	*Cottus leiopomus*	wood river sculpin
Scorpaeniformes	Cottidae	*Cottus chattahoochee*	chattahoochee sculpin
Scorpaeniformes	Cottidae	*Cottus cf. broadband sculpin*	clinch sculpin
Scorpaeniformes	Cottidae	*Cottus tallapoosae*	tallapoosa sculpin
Scorpaeniformes	Cottidae	*Leptocottus armatus*	pacific staghorn sculpin
Scorpaeniformes	Cottidae	*Myoxocephalus thompsonii*	deepwater sculpin
Scorpaeniformes	Cottidae	*Myoxocephalus quadricornis*	fourhorn sculpin
Scorpaeniformes	Cottidae	*Cottus kanawhae*	kanawha sculpin
Siluriformes	Ariidae	*Ariopsis felis*	hardhead catfish
Siluriformes	Callichthyidae	*Hoplosternum littorale*	brown hoplo
Siluriformes	Clariidae	*Clarias batrachus*	walking catfish
Siluriformes	Doradidae	*Platydoras armatulus*	southern striped raphael
Siluriformes	Ictaluridae	*Ameiurus melas*	black bullhead
Siluriformes	Ictaluridae	*Ameiurus nebulosus*	brown bullhead
Siluriformes	Ictaluridae	*Ameiurus platycephalus*	flat bullhead
Siluriformes	Ictaluridae	*Ameiurus brunneus*	snail bullhead
Siluriformes	Ictaluridae	*Ameiurus serracanthus*	spotted bullhead
Siluriformes	Ictaluridae	*Ameiurus catus*	white catfish
Siluriformes	Ictaluridae	*Ameiurus natalis*	yellow bullhead
Siluriformes	Ictaluridae	*Ictalurus furcatus*	blue catfish
Siluriformes	Ictaluridae	*Ictalurus punctatus*	channel catfish
Siluriformes	Ictaluridae	*Ictalurus lupus*	headwater catfish
Siluriformes	Ictaluridae	*Ictalurus pricei*	yaqui catfish
Siluriformes	Ictaluridae	*Noturus funebris*	black madtom
Siluriformes	Ictaluridae	*Noturus miurus*	brindled madtom
Siluriformes	Ictaluridae	*Noturus phaeus*	brown madtom
Siluriformes	Ictaluridae	*Noturus taylori*	caddo madtom
Siluriformes	Ictaluridae	*Noturus furiosus*	carolina madtom
Siluriformes	Ictaluridae	*Noturus flavater*	checkered madtom
Siluriformes	Ictaluridae	*Noturus elegans*	elegant madtom
Siluriformes	Ictaluridae	*Noturus munitus*	frecklebelly madtom
Siluriformes	Ictaluridae	*Noturus nocturnus*	freckled madtom
Siluriformes	Ictaluridae	*Noturus hildebrandi*	least madtom
Siluriformes	Ictaluridae	*Noturus insignis*	margined madtom
Siluriformes	Ictaluridae	*Noturus eleutherus*	mountain madtom
Siluriformes	Ictaluridae	*Noturus placidus*	neosho madtom
Siluriformes	Ictaluridae	*Noturus stigmosus*	northern madtom
Siluriformes	Ictaluridae	*Noturus gilberti*	orangefin madtom
Siluriformes	Ictaluridae	*Noturus lachneri*	ouachita madtom
Siluriformes	Ictaluridae	*Noturus albater*	ozark madtom
Siluriformes	Ictaluridae	*Noturus stanauli*	pygmy madtom

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Siluriformes	Ictaluridae	*Noturus trautmani*	scioto madtom
Siluriformes	Ictaluridae	*Noturus exilis*	slender madtom
Siluriformes	Ictaluridae	*Noturus baileyi*	smoky madtom
Siluriformes	Ictaluridae	*Noturus leptacanthus*	speckled madtom
Siluriformes	Ictaluridae	*Noturus flavus*	stonecat
Siluriformes	Ictaluridae	*Noturus gyrinus*	tadpole madtom
Siluriformes	Ictaluridae	*Noturus flavipinnis*	yellowfin madtom
Siluriformes	Ictaluridae	*Pylodictis olivaris*	flathead catfish
Siluriformes	Ictaluridae	*Satan eurystomus*	widemouth blindcat
Siluriformes	Ictaluridae	*Trogloglanis pattersoni*	toothless blindcat
Siluriformes	Loricariidae	*Hypostomus plecostomus*	suckermouth catfish
Siluriformes	Loricariidae	*Pterygoplichthys pardalis*	amazon sailfin catfish
Siluriformes	Loricariidae	*Pterygoplichthys multiradiatus*	orinoco sailfin catfish
Siluriformes	Loricariidae	*Pterygoplichthys anisitsi*	southern sailfin catfish
Siluriformes	Loricariidae	*Pterygoplichthys disjunctivus*	vermiculated sailfin catfish
Siluriformes	Ictaluridae	*Noturus fasciatus*	saddled madtom
Synbranchiformes	Synbranchidae	*Monopterus albus*	asian swamp eel

Table D-2. Standard Common and Scientific Names of Amphibians[1]

ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
Anura	Ascaphidae	*Ascaphus truei*	tailed frog
Anura	Ascaphidae	*Ascaphus truei*	tailed frog (tadpole)
Anura	Bufonidae	*Bufo boreas*	western toad
Anura	Bufonidae	*Bufo microscaphus*	arizona toad
Anura	Bufonidae	*Bufo hemiophrys*	canadian toad
Anura	Bufonidae	*Bufo punctatus*	red-spotted toad
Anura	Bufonidae	*Bufo woodhousii*	woodhouse's toad
Anura	Hylidae	*Hyla arenicolor*	canyon treefrog
Anura	Hylidae	*Pseudacris maculata*	boreal chorus frog
Anura	Hylidae	*Pseudacris cadaverina*	california treefrog
Anura	Hylidae	*Pseudacris regilla*	pacific tree frog
Anura	Pipidae	*Xenopus laevis*	african clawed frog
Anura	Ranidae	*Lithobates pipiens*	leopard frog
Anura	Ranidae	*Lithobates blairi*	plains leopard frog
Anura	Ranidae	*Lithobates chiricahuensis*	chiricahua leopard frog
Anura	Ranidae	*Rana catesbeiana*	bullfrog
Anura	Ranidae	*Rana catesbeiana*	bullfrog tadpole
Anura	Ranidae	*Rana aurora*	red-legged frog
Anura	Ranidae	*Rana cascadae*	cascade frog
Anura	Ranidae	*Rana luteiventris*	columbia spotted frog
Anura	Ranidae	*Rana boylii*	foothill yellow-legged frog
Anura	Ranidae	*Rana clamitans*	green frog
Anura	Ranidae	*Rana yavapaiensis*	lowland leopard frog
Anura	Ranidae	*Rana muscosa*	mountain yellow-legged frog
Anura	Ranidae	*Rana pretiosa*	spotted frog
Anura	Ranidae	*Rana sylvatica*	wood frog
Caudata	Ambystomatidae	*Ambystoma macrodactylum*	longtoed salamander
Caudata	Ambystomatidae	*Dicamptodon tenebrosus*	pacific giant salamander
Caudata	Ambystomatidae	*Dicamptodon ensatus*	california giant salamander
Caudata	Ambystomatidae	*Dicamptodon aterrimus*	idaho giant salamander
Caudata	Rhyacotritonidae	*Rhyacotriton kezeri*	columbia torrent salamander
Caudata	Salamandridae	*Taricha granulosa*	rough-skinned newt
Caudata	Salamandridae	*Taricha torosa*	california newt

[1] Although not required, you may note amphibians and reptiles captured on the fish collection form.

Appendix E: Example Electrofishing Settings

Example Backpack Output Goals

Waveform: PDC (fish catching settings, e.g., 60 pps, 25% duty cycle)
Electrodes: Ring anode, rattail cathode
R100: 275 Ohms
Fish Cond.: 115 µS/cm

Water Conductivity (Ambient)	Applied Voltage Goal (Peak)	Applied Amperage Goal (Peak)
25	669	**0.61**
50	394	**0.72**
60	349	**0.76**
80	291	**0.85**
100	257	**0.93**
150	211	**1.15**
200	188	**1.37**
250	174	**1.59**
300	165	**1.80**
400	154	**2.24**
500	147	**2.67**
600	142	**3.11**
700	139	**3.54**
800	137	**3.98**
900	135	**4.41**
1000	133	**4.85**
1500	129	**7.02**
2000	126	**9.20**
2500	125	**11.37**
3000	124	**13.54**

Adapted from:
http://electrofishing.net/2018/01/11/output-goal-tables-for-backpacks-towbarges-and-boats/

If your conductivity meter cannot measure **ambient** conductivity, you can "uncorrect" specific conductance at 25 °C to ambient conductivity using the following equation:

- Ambient conductivity=Specific conductance x (1+([water temp-25 °C] x 0.02))

Example Towed-barge Output Goal Table (1 anode)

Waveform: 80 pps, 40% duty cycle
Anode: One Ring 14" diameter (35.56 cm)
Cathode: Plate 66" x 45" (167.6 cm x 114 cm)
R100: 147 Ohms with one anode
Fish Cond.: 115 µS/cm

Water Conductivity (Ambient)	Applied Voltage Goal (Peak)	Applied Amperage Goal (Peak)
25	921	**1.58**
50	543	**1.87**
60	480	**1.98**
80	401	**2.20**
100	354	**2.43**
150	291	**3.00**
200	259	**3.56**
250	240	**4.13**
300	228	**4.69**
400	212	**5.82**
500	202	**6.95**
600	196	**8.08**
700	192	**9.21**
800	188	**10.34**
900	186	**11.47**
1000	183	**12.60**
1500	177	**18.26**
2000	174	**23.91**
2500	172	**29.56**
3000	171	**35.21**

Adapted from:
http://electrofishing.net/2018/01/11/output-goal-tables-for-backpacks-towbarges-and-boats/

If your conductivity meter cannot measure **ambient** conductivity, you can "uncorrect" specific conductance at 25 °C to ambient conductivity using the following equation:

- Ambient conductivity=Specific conductance x (1+([water temp-25 °C] x 0.02))

Example 2-boom Boat Output Goal Table

Waveform: PDC (fish catching settings, e.g., 60 pps, 25% duty cycle)
Anode: Two booms Wisconsin rings 4 – 6 droppers
Cathode: Boat hull (16 – 18' length)
R100: 35 Ohms
Fish Cond.: 115 µS/cm

Water Conductivity (Ambient)	Applied Voltage Goal (Peak)	Applied Amperage Goal (Peak)
25	851	**6.09**
50	502	**7.17**
60	443	**7.61**
80	371	**8.48**
100	327	**9.35**
150	269	**11.52**
200	239	**13.70**
250	222	**15.87**
300	210	**18.04**
400	196	**22.39**
500	187	**26.74**
600	181	**31.09**
700	177	**35.43**
800	174	**39.78**
900	171	**44.13**
1000	169	**48.48**
1500	164	**70.22**
2000	161	**91.96**
2500	159	**113.70**
3000	158	**135.43**

Adapted from:
http://electrofishing.net/2018/01/11/output-goal-tables-for-backpacks-towbarges-and-boats/

If your conductivity meter cannot measure **ambient** conductivity, you can "uncorrect" specific conductance at 25 °C to ambient conductivity using the following equation:

- Ambient conductivity=Specific conductance x (1+([water temp-25 °C] x 0.02))

Rationale for boats:
We are seeing from several sources that 10 – 12 amps are the required minimum for successful fishing at 115 µS/cm with a 2-boom electrofishing boat using rectangular-wave pulsed DC. Rounded wave PDC, as produced from GPP units, appear to require higher amperages (12 – 14 amp range at 115 µS/cm). The above table uses a 35 Ohm boat electrode system (2 booms with 4 – 6 droppers each, unpainted boat hull) and the low end of the rectangular wave requirements (10 amps at 115 µS/cm).
The best output to standardize by is current. However, in low conductivity water, or when using low power units as backpacks, voltage may be a better choice to use instead of current.
Here's the big catch. If you plan to use these as starting guides, then the electrode arrangement should be similar to that described for each table. For example, spherical boat electrodes are not similar enough to Wisconsin Rings for this purpose. We all know that electrode arrangements will differ (different length hulls, 4 droppers instead of 6, etc. The cool thing is that current targets will be more consistent while voltage targets will vary more.
For a good blog with data on this concept, see:
http://electrofishing.net/2016/05/21/boat-fleet-fishing-thresholds/
For information on different boat and raft electrode arrangements, next look at this:
http://electrofishing.net/2017/03/20/estimating-electrofishing-thresholdswithout-fish/