

**Progress Report for Stream Monitoring on the
Kisatchie National Forest, 2016 - 2017**



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Table of Contents

2016 - 2017 Summary and Progress	3
Site Selection	3
Field Method Deviations.....	3
Data Summary	4
Data Availability	4
Literature Cited	4
Appendix: Field Methods	7

List of Figures

Figure 1. Sample site locations, Kisatchie National Forest, LA.	5
--	---

List of Tables

Table 1. Sites sampled in 2017.	6
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2016 - 2017 Summary and Progress

The Kisatchie National Forest (KNF) partnered with the USDA Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) and Louisiana State University (LSU) to update and implement an existing Forest-wide stream monitoring program (Byrd 2005). Our primary goals included: 1) develop a field guide detailing sampling methods, 2) provide field teams to sample stream fish and habitat, and 3) organize and analyze existing and new data. The CATT worked with Ted Soileau and David Byrd from KNF and Dr. Mike Kaller from LSU in winter 2016-2017 to document field methods and author a detailed field guide. The CATT and KNF collected stream fish, habitat, water quality, and discharge data from March 21st to April 5th, 2017. Existing data from previous sampling efforts, and the data we collected in 2017, were provided to Dr. Mike Kaller (School of Renewable Natural Resources, LSU) to be organized into a single database for analysis. The data collected will be used to examine for trends in KNF stream condition and to assess impacts for land management practices on stream health.

Site Selection

Sample sites were selected by Ted Soileau (KNF Natural Resource Specialist) from a group of 93 previously sampled sites based on stream flow conditions at the time of sampling. Our intent is to re-sample all 93 sites over a period of 4 years. Annual samples will be spread among ranger districts to reduce inter-annual variation in water quantity and quality across districts.

At each sample site we established a 100 m sample reach with at least 3 fast-water (riffle or run) and 3 slow-water (pool) habitat units, though some sites with low habitat diversity had fewer than 3 fast-water units. We also selected sample reaches that avoid freshwater mussel beds, as well as deep pools inaccessible when using backpack electrofishers. See the appendix for additional details on site selection.

Field Method Deviations

Various deviations to the original methods occurred during the 2017 inventories. As requested by the KNF, the presence of crayfish species (painted and/or creek) were noted for each site. Additionally, we noted whether corbicula and live or relic mussels were present. Although effort was taken to avoid disturbing mussels, following the completion of electrofishing at 2 sites, relic and live mussels were found. Future inventories will record coordinates for currently unmarked mussel locations to assist in the documentation of mussel beds and prevent further disruption. In addition, an Aqua Shock Solutions A-1-L electrofisher and a Marsh McBirney Flo-Mate velocity sensor were used during the inventory and will be used in future sampling. To see all changes made to improve efficiency, safety, and data collection methodology see the 'Changes to Kisatchie Protocol' table in the updated field methods manual (Appendix).

Data Summary

The CATT and KNF completed stream-monitoring inventories on 23 sites over a period of 13 field days in 2017 (Figure 1, Table 1). At these sites, we collected a total of 2,369 fish and 35 different fish species.

Habitat data was collected within 20-26 plots at each site. Water depth averaged 8-58 cm, bank height ranged from 0.2-2.8 m, sand was most frequently the dominant substrate, and canopy coverage fell within the 76-100% category.

Water chemistry parameters were collected at a single location per site. Water temperature ranged from 17.8-22.8 C, pH from 5.1-7.1, and total dissolved solids from 0-112 g/L. Discharge measured at a single location per site ranged from 0.3-21.1 cfs.

Data Availability

The CATT organized spring 2017 fish, stream habitat, water quality, and discharge data into database tables and provided the data to Dr. Mike Kaller at Louisiana State University. Dr. Kaller is combining 2017 data with those from previous inventory and monitoring efforts into a single master database and GIS for the KNF. Dr. Kaller will work with the KNF to develop custom queries and reports for the MS Access database, as needed.

Literature Cited

Byrd, D., 2005, Aquatic Management Indicator Species Population Trends Report, USDA Forest Service, Kisatchie National Forest. 34 pp.

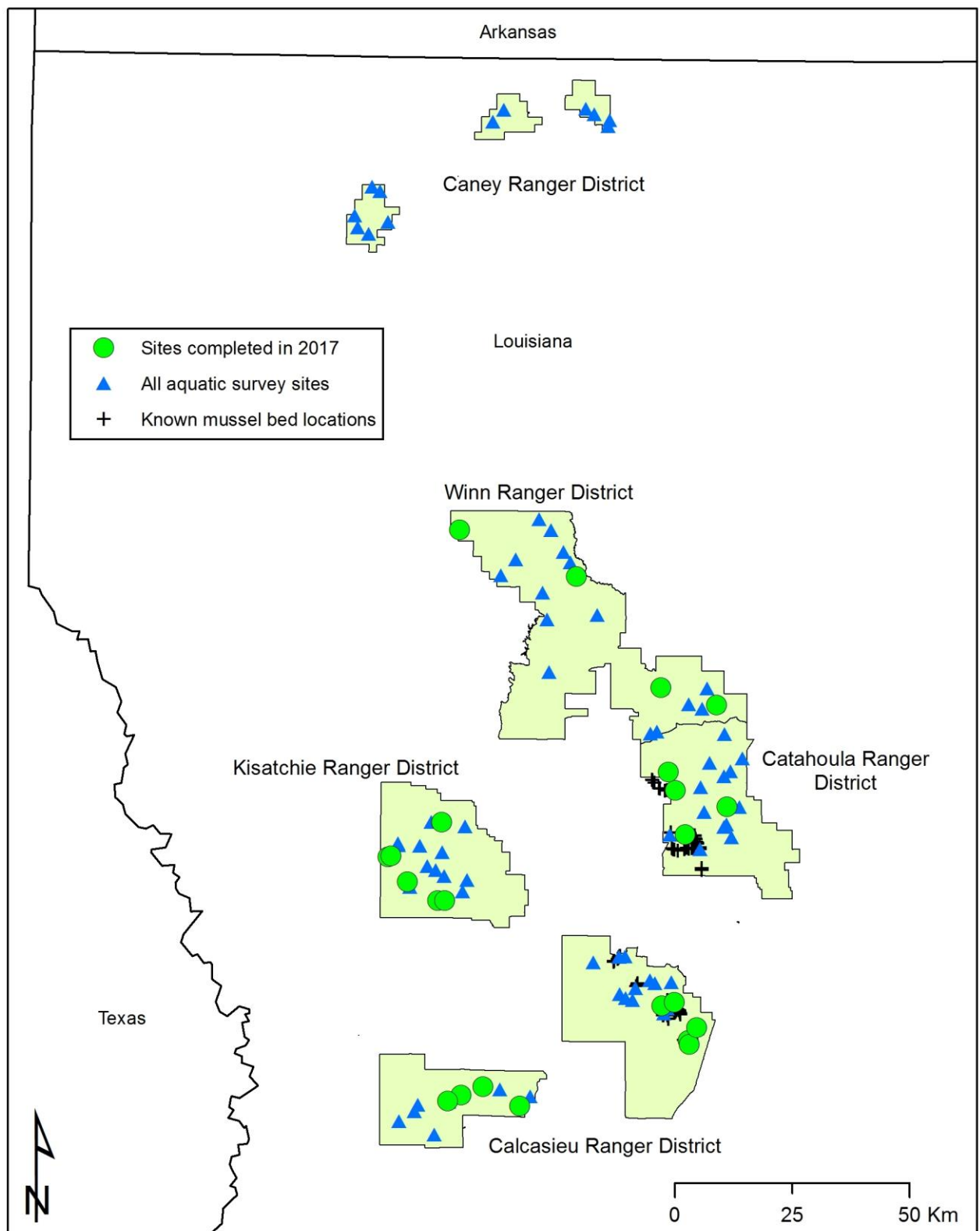


Figure 1. Sample site locations, Kisatchie National Forest.

Table 1. Sites sampled in 2017.

District	Site ID	Stream Name	Site Coordinates
Catahoula	CAT01	Beaver Creek	N31.61099 W92.57629
	CAT02	Black Creek	N31.64615 W92.59120
	CAT03	Chandler Creek	N31.52591 W92.55315
	CAT14	Socia Branch	N31.57911 W92.46012
Calcasieu (Evangeline Unit)	EVA01	Bayou Clear	N31.12960 W92.54685
	EVA04	Castor Creek	N31.19611 W92.60611
	EVA07	Hospital Bayou	N31.12190 W92.54455
	EVA09	Little Bayou Clear	N31.15416 W92.52826
	EVA13	Loving creek	N31.20278 W92.57797
Kisatchie	KIS04	Hyatt Branch	N31.43360 W93.17597
	KIS10	Little Kisatchie Bayou	N31.39722 W93.10756
	KIS12	Rocky Branch	N31.39741 W93.09255
	KIS15	Simmons Creek	N31.48053 W93.22007
	KIS17	Trib to Laird Branch	N31.54853 W93.09968
	KIS18	Wilson Branch	N31.48313 W93.21331
Calcasieu (Vernon Unit)	VER02	Birds Creek	N31.02300 W93.05342
	VER07	Little Brushy Creek	N31.00330 W92.92269
	VER09	West Fork Sixmile	N31.03998 W93.00441
	VER10	Whiskey Chitto	N31.01129 W93.08301
Winn	WIN03	Caney River	N31.80850 W92.60804
	WIN09	Iron Branch	N32.02226 W92.79938
	WIN14	Piney Branch	N32.11036 W93.06304
	WIN18	Trib to Bear Creek	N31.77524 W92.48327

Appendix: Field Methods

Stream Monitoring Methods Manual

Kisatchie National Forest, LA



United States Department of Agriculture Forest Service
Southern Research Station
Center for Aquatic Technology Transfer
1710 Research Center Drive
Blacksburg, VA 24060-6349
<https://www.srs.fs.usda.gov/catt/>

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February 2018



Table of Contents

Introduction.....	2
References.....	2
Changes to Kisatchie Protocol	3
Outline of the Kisatchie Protocol.....	5
Section 1: Contacts & Safety Information.....	6
Internal Contacts.....	6
External Contacts.....	6
Local Hospital Numbers.....	7
Check-out / Check-in.....	8
Tailgate Safety Meetings	8
Regional Safety.....	9
Section 2: Pre-trip Considerations	10
Logistics	10
Fish Methods	10
Section 3: Site Selection	11
Section 4: Fish Inventory.....	16
Fish Sample	16
Seine Hauls	17
Section 5: Habitat Inventory	18
Habitat Inventory Outline	18
Header Information.....	19
Sample Distance (m)	19
Depth (cm).....	20
Dominant Substrate	20
Bank Stability (Stable/Unstable for left and right bank)	20
Bank Angle (<45°, >45°, 90° for left and right bank)	21
Bank Height (cm for left and right bank)	21
Canopy Cover (0-25, 26-50, 51-75, 76-100%).....	23
Instream Cover	24
Section 6: Discharge Measurement	25
Locating a Discharge Transect	25
Measurement Locations.....	25
Using the Top-Setting Rod.....	26
Section 7: Water Chemistry Sampling.....	29
Sample Location	29
Horiba U53 Guide	29
Hanna HI9829 Guide.....	33
Appendix A: SPOT Device Instructions	37
Appendix B: Tailgate Safety Form.....	40
Appendix C: Equipment List.....	41

Introduction

The Kisatchie National Forest (KNF) contains over 5,400 miles of coastal plain streams occupied by at least 87 fish species. Streams typically are very low gradient, dominated by sandy substrates, and prone to drying during the late summer and fall. The KNF identified sedimentation as the primary threat to instream habitat and in its Revised Forest Plan established riparian area and streamside habitat protection zones to minimize the impact of forest management practices on its streams. Impacts from forest management and other anthropogenic and natural stressors are assessed in part through a forest-wide stream monitoring program. The focus of the stream monitoring program is on 4 Management Indicator Species (MIS) and 1 Forest Sensitive Species (FSS) (Table 1).

There is a rich history of stream fish collections on the KNF dating back to the 1950's. Fish were collected for decades from across the Forest by a variety of state, federal, and university entities for research, inventory, and monitoring purposes. In the early 2000's the KNF compiled the various sources into a database and GIS, and reported on trends in MIS relative abundance and reproduction (Byrd, 2005). The 2005 report formed the basis for the current stream fish monitoring program on the KNF, but detailed descriptions of sample locations and field methods were never produced. Here we provide a detailed description of sample site selection and associated field methods to allow for consistent application of the KNF's stream monitoring program.

Table 1. Focal species for the KNF stream monitoring program. Habitat, status, and tolerance from Byrd (2005).

Species	Common name	Habitat	Tolerance	Status
<i>Noturus phaeus</i>	Brown Madtom	Fast-flowing streams with sand and gravel substrate	NA	MIS
<i>Etheostoma artesiae</i>	Redspot Darter	Fast-flowing streams with sand and gravel substrate	Intolerant	MIS
<i>Fundulus olivaceus</i>	Blackspotted Topminnow	Slow-flowing streams with silt and clay substrate	Intermediate	MIS
<i>Aphredoderus sayanus</i>	Pirate Perch	Slow-flowing streams with silt and clay substrate	Intermediate	MIS
<i>Notropis sabinae</i>	Sabine Shiner	Moderate-flowing streams with sand substrate	NA	FSS

References

Byrd, D., 2005, Aquatic Management Indicator Species Population Trends Report, USDA Forest Service, Kisatchie National Forest. 34 pp.

Louisiana Department of Health and Hospitals (LDHH), Infectious Disease Epidemiology Section, "Tick Borne Disease." 30 July 2015. Web. 19 Dec. 2017. <
<http://new.dhh.louisiana.gov/assets/oph/Center-PHCH/Center-CH/infectious-epi/EpiManual/TickborneDiseaseManual.pdf>>

Changes to Kisatchie Protocol

All changes or modifications were approved by the KNF in consultation with the CATT and Dr. M. Kaller at Louisiana State University (LSU). No additional changes will be applied without consultation and approval. The following changes to the original 2017 Kisatchie protocols will be applied in 2018:

Item	Change	Reason
Electrofisher Type	In 2017, electrofisher brand was not mentioned. In 2018, eletrofisher will be specified as an Aqua Shock Solutions A-1-L.	Type was not specified before; however, this is the electrofisher CATT owns and uses.
Velocity Sensor Type	In 2017, velocity sensor type was not mentioned. In 2018, velocity sensor will be specified as a Marsh McBirney Flo-Mate.	Type was not specified before; however, this is the sensor CATT owns and uses.
Observations	In 2017, team members were instructed to note in the comments presence and observations relating to mussels, crayfish, beavers, otters, snakes, and ATV. In 2018, presence of corbicula, mussel type (relic and/or live), and crayfish species (painted and/or creek) should be noted. In addition if mussels are found a waypoint should be made.	To assist with sedimentation study Steve Shiley suggested that it would be important to include crayfish species type if found at each reach. We also found while surveying that it would be worth noting corbicula and live or relic mussels. If mussels are found it is important to mark the point to further establish mussel beds and prevent disruption in future surveys.
Pre-trip Considerations	In 2017, this section was not included in the report. In 2018, will include lodging details and fish identification basics	Following the 2017 survey it was noted that to improve help improve efficiency and safety this information should be understood before travelling to Louisiana.
Check-out / Check-in	In 2017, this information was not included in the report. In 2018, the addition of bombing area clearance through contact with Ted Soileau will be included.	Following the 2017 survey, multiple sites required clearance to gain access. Field team leader was in charge of this and should be aware of this in future surveys.
Regional Safety	In 2017, this section was not included in the report. In 2018, will include additional safety information to be aware of and talk about during tailgate safety including animal encounters and weather.	Following the completion of the 2017 survey various safety concerns arose that may occur throughout the entirety of the KNF survey. Team members should be aware of these safety hazards before going into the field.

Item	Change	Reason
Site Selections/Reach Layout	In 2017, this information was not included in the report. In 2018, this section will include that teams should also be aware that streams in the KNF may have unclear and wide terrains. It will also include how to deal with these situations. Ted Soileau will make some sample site selection changes and these will be updated in Table 2 and Table 3 in the 2018 revision of this manual.	Following the 2017 surveys these terrains were common and awareness of this and protocol is beneficial for future teams to complete surveys in the following world.
Outline	In 2017, this information was not included in the report. In 2018, will include inventory steps that improve efficiency.	Following the 2017 survey, efficiency was maximized using the added protocol.
Equipment list	In 2017, blaze orange vest were not included on the equipment list In 2018, blaze orange vest will be added.	Following an encounter with a hunting dog in the 2017 survey. Team should be advised to wear blaze orange while sampling.

Outline of the Kisatchie Protocol

The Kisatchie sampling method is comprised of the following steps:

1. Sample site
 - Navigate to a pre-determined sample site
 - At the site, select a sample reach of 100 m that includes riffle, run, and pool habitat
 - Set block-nets at upstream and downstream end of reach
 - 2 team members walk upstream along streambank (avoid walking in channel as much as possible) using hipchain to measure 100 m
 - Place upstream block-net
 - Meanwhile downstream team unpacks and places the downstream block-net
2. Fish
 - Complete 2 or more passes with backpack electrofisher
 - If more fish (all species individuals combined) are captured in pass 2 than in pass 1, complete a 3rd pass
 - Workup fish after each pass; recording pass number, species, and total length
 - Release fish below lower block-net of sample reach
 - During fish identification of the last pass, a team of 2 may begin habitat inventories
 - Fish identification team, following completion, will then complete 3 seine hauls
 - Workup fish for each seine haul; recording haul length, species, and total length
3. Habitat
 - Visually divide the sample reach longitudinally into 3 equal lanes
 - Visually identify circular plots in each lane (plots spaced every 5 m alternate between lanes)
 - At each circular plot, record physical habitat measurements (depth, substrate, bank stability, bank angle, bank height, canopy closure, and instream cover)
 - Recorder walks thalweg with hipchain during habitat inventory to measure an accurate length of sample reach
4. Discharge
 - Locate a transect within the sample reach having unrestricted flow and a uniform cross-section
 - Stretch a measuring tape perpendicular to flow across the transect and tie off to bank
 - Calculate 10 segment data points along the tape
 - Measure flow and depth at each calculated segment
 - Record 10 velocity measurements; their sum equals discharge
5. Water quality
 - Above the upstream block-net, record water quality measurements (temperature, conductivity, turbidity, total dissolved solids, dissolved oxygen, and pH)

NOTE: To assist with efficiency, the habitat team collects water quality measurements when they are at the upstream block-net and the fish identification team collects discharge. The team that finishes first starts packing equipment, while the water quality team brings down the upstream net. These duties are dependent on water clarity and fish identification ease and may switch between groups; however from experience this is the most effective protocol.

Section 1: Contacts & Safety Information

Internal Contacts

Ted Soileau (Natural Resource Specialist)
318-473-7121 office
985-974-7458 cell (Verizon)
tsoileau@fs.fed.us

Mike Kaller (Louisiana State University)
225-578-0012
mkalle1@lsu.edu

District Law Enforcement Officers:

Caney Ranger District:

R. Burrow
318-401-0618

Winn Ranger District:

B. Bannon
318-446-1759

Catahoula Ranger District:

C. Ledoux
318-407-9775

Kisatchie Ranger District:

J. La Mons
318-471-9701

Calcasieu Ranger District:

C. Gordon
318-465-8596

External Contacts

You may in the course of your assigned duties have the opportunity to interact with individuals interested in learning more about Forest Service management activities. The most direct route for the public to obtain additional information is through their local District office:

Forest	Office	Front Desk
Kisatchie National Forest	Pineville	(318) 473-7160
District	Office	Front Desk
Caney	Homer	(318) 927-2061
Winn	Winnfield	(318) 628-4664
Catahoula	Bentley	(318) 765-3554
Kisatchie	Provencal	(318) 472-1840
Calcasieu	Boyce	(318) 793-9427

The Forest Service also provides these talking points for use at your discretion:

If you encounter a hostile/threatening person(s):

- Apologize and leave immediately, do not argue
- Report to District office and your supervisor
- Alert your team at tailgate safety meeting

If you encounter an irritated person, consider these talking points:

- Explain that our work is helping to ensure the Forest is a source of clean water for drinking and recreation
- The Forest Service manages land for multiple uses and users
- The Forest Service values your input
- Consider contacting your local District office to share your opinion (see numbers above)
- If they become hostile at any point, apologize and leave; do not argue

If you encounter someone that is interested in learning more about what you are doing:

- Share what you are doing
- Explain that our work is helping to ensure the Forest is a source of clean water for drinking and recreation
- Provide a local contact for follow up (see numbers above)

Local Hospital Numbers

Caney Ranger District:

Claiborne Memorial Medical Center
620 E. College
Homer, LA 71040
(318) 927-2024

Reeves Memorial Medical Center
409 1st St.
Bernice, LA 71222
(318) 285-9066

Winn Ranger District:

Winn Parrish Medical Center
301W. Boundary Ave.
Winnfield, LA 71483
(318)-648-3000

Natchitoches Regional Medical Center
501 Keyser Ave.
Natchitoches, LA 71457
(318) 214-4200

Catahoula Ranger District:

Rapides Regional Medical Center
211 4th St.
Alexandria, LA 71301
(318)-769-3000

Kisatchie Ranger District:

Natchitoches Regional Medical Center
501 Keyser Ave.
Natchitoches, LA 71457
(318) 214-4200

Sabine Medical Center
240 Highland Dr.
Many, LA 71449
(318) 256-5691

Calcasieu Ranger District:

Rapides Regional Medical Center
211 4th St.
Alexandria, LA 71301
(318)-769-3000

Check-out / Check-in

Check-out and check-in are an essential part of our safety program. Provide a designated contact with the following information each day before going into the field:

- Names of each person on your team
- SPOT unit number
- Vehicle make/model or number
- Work location(s)

Only go to a new location if you are able to update your plans with your contact. Always work with a partner – never go into the field alone.

Check in with the designated contact at the end of each day. Have a set time of day when you are expected to be back at the duty station. If your team will return after this time, ‘delayed all ok’ messages will be sent every 30 min until the team is back and then a check-in message is sent.

NOTE: If teams are planning to go into the Vernon District (South Calcasieu), special precaution and planning may be necessary, due to a military bombing areas. Ted Soileau is in charge of contact with the base and should be contacted to assure clearance.

Tailgate Safety Meetings

Tailgate safety meetings are performed to remind personnel of potential chemical, physical, and environmental dangers associated with a particular job (see Appendix B for tailgate safety form). The meetings are completed prior to work (as well as weekly thereafter, or after any safety issues arise) so team members are aware of potential hazards. It is important to conduct meetings together as a team typically at the vehicle prior to going into the field. At the completion of the meeting everyone on the team signs the tailgate safety form which is later provided to the team’s supervisor.

Regional Safety

The Kisatchie National Forest location and biodiversity provides additional safety concerns. Team members should be aware of the following before performing fieldwork:

1. Weather

- High temperatures for this region during March and April range from 68-94 F; dehydration is a concern; drink adequate amounts of water
- Storms and tornados are prevalent in the area; watch for tornado and flood warnings; stream sampling may be delayed if there are high flows

2. Terrain

- Tannin stained water, heavily sandy/silty bottoms, and wide streams characterize a large portion of streams encountered
- Streams on the Winn District near Saline Lake may be either too swampy or too wide to survey
- The team leader should be aware of these challenges and discuss with Ted Soileau and CATT leaders when to decide that collection of quality data is compromised; have backup plans for the day, and perform the seining as effectively as possible

3. Animals

- Feral hogs are prevalent and encounters may occur. Keep your distance; if you find yourself in an aggressive situation stand tall, do not run, and look for a retreat such as a tree or an open area to dodge a charge. The hog may bluff-charge to gauge your reaction. Back away in the direction of your retreat. If a charge does occur, jump out of the way at the last moment and prepare for the next charge.
- Water moccasins or cottonmouths may be seen coiled up streambanks, wooded dams, or swimming away as approached. They are not easily visible and could be stepped on if team members are not alert. It is recommended that teams review snakebite protocol.
- Common Snapping turtles and alligator snapping turtles may closely resemble rocks and are easy to step on if caution is not applied. Teams should be well versed in first aid in case of bites.
- Ticks are prevalent in Louisiana and carry the risk of Lyme disease, Human Monocytic Ehrlichiosis, Human Granulocytic Anaplasmosis, Powassan, Babesiosis, Tularemia, and Rocky Mountain spotted fever. It is recommended that team members follow the USFS tick collecting protocol and are aware of proper tick removal and illness identification. Refer to LDHH 2017 for further details of Louisiana tick hazards.
- Leeches may be present. If attached they may not pose a threat further than basic first aid, if they enter your mouth or nose serious injury may occur. The team should test water purification devices before entering the field, be mindful of water before consumption, and use water coolers in the vehicles as the primary water source.

4. Hunters

- Hunting occurs year round for feral hogs. Turkey season usually begins in April. Teams should be aware of specific hunting season dates and where provided blaze orange vests.

Section 2: Pre-trip Considerations

Logistics

The Kistatchie National Forest is approximately a 14-hour drive from Blacksburg, therefore it is necessary to divide the drive into 2 days. Due to the proximity from Blacksburg special precaution when packing the vehicle should also be taken, refer to page 43 for a complete equipment list. The following hotels are the hotels previous teams have stayed in and these hotels or hotels around these locations are recommended:

Drive to KNF:

Comfort INN
5051 Academy Lane
Bessemer, AL, 35022, US
(205) 428-3999

Drive From KNF:

Fairfield Inn & Suites
116 Walker St.
Gadsden, AL 35904
(256) 538-2100

In KNF:

Holiday Inn Express & Suites
2340 North Macarthur Drive
Alexandria, Louisiana 71301
(318) 487-9898

Fairfield Inn & Suites
150 Hayes Avenue
Natchitoches, LA 71457
(318) 354-8007

Fish Methods

With the high biodiversity in Louisiana and the earliness of the trip in the field season, additional preparation for team members is necessary to assist in efficiency. In addition to preparing for this survey by reading this manual, team members should also familiarize themselves with basic fish identification knowledge and review the Kisatchie fish list.

Be able to identify the following before entering the field:

1. Taxa
 - Sunfishes
 - Blackbass (Largemouth, Smallmouth, Spotted)
 - Redhorses
 - Suckers
 - Darters
 - Cyprinds(Shiners)
 - Bullhead Catfish
 - Madtom Catfish
2. Directional Terms
 - Distal
 - Proximal
 - Ventral
 - Dorsal
 - Lateral
 - Anterior
 - Posterior
3. Fin type and location on the body
 - Pectoral
 - Pelvic
 - Anal
 - Dorsal
 - Caudal
 - Adipose

Section 3: Site Selection

In 2005, David Byrd (KNF Forest Fish Biologist at the time) mapped the locations of 198 fish samples that were collected from Forest streams between 1957 and 2004. The sample records were compiled from a variety of sources; including state, federal, and university collaborators (Byrd, 2005). The records and their locations were stored in a shapefile for display in ArcMap software. The resulting maps show samples collected across the KNF.

However, the records in the shapefile represented samples, not sites. Many streams were sampled multiple times in the same vicinity, for example upstream and downstream of the same road-stream crossing. In 2017, Ted Soileau (KNF Natural Resource Specialist) created a new shapefile that merged redundant samples into single sample sites, then removed sites with poor access, water too deep for wading, or no significant amount of Forest Service managed land upstream. The resulting map contained 93 sample sites, which form the basis for the KNF stream monitoring program going forward.

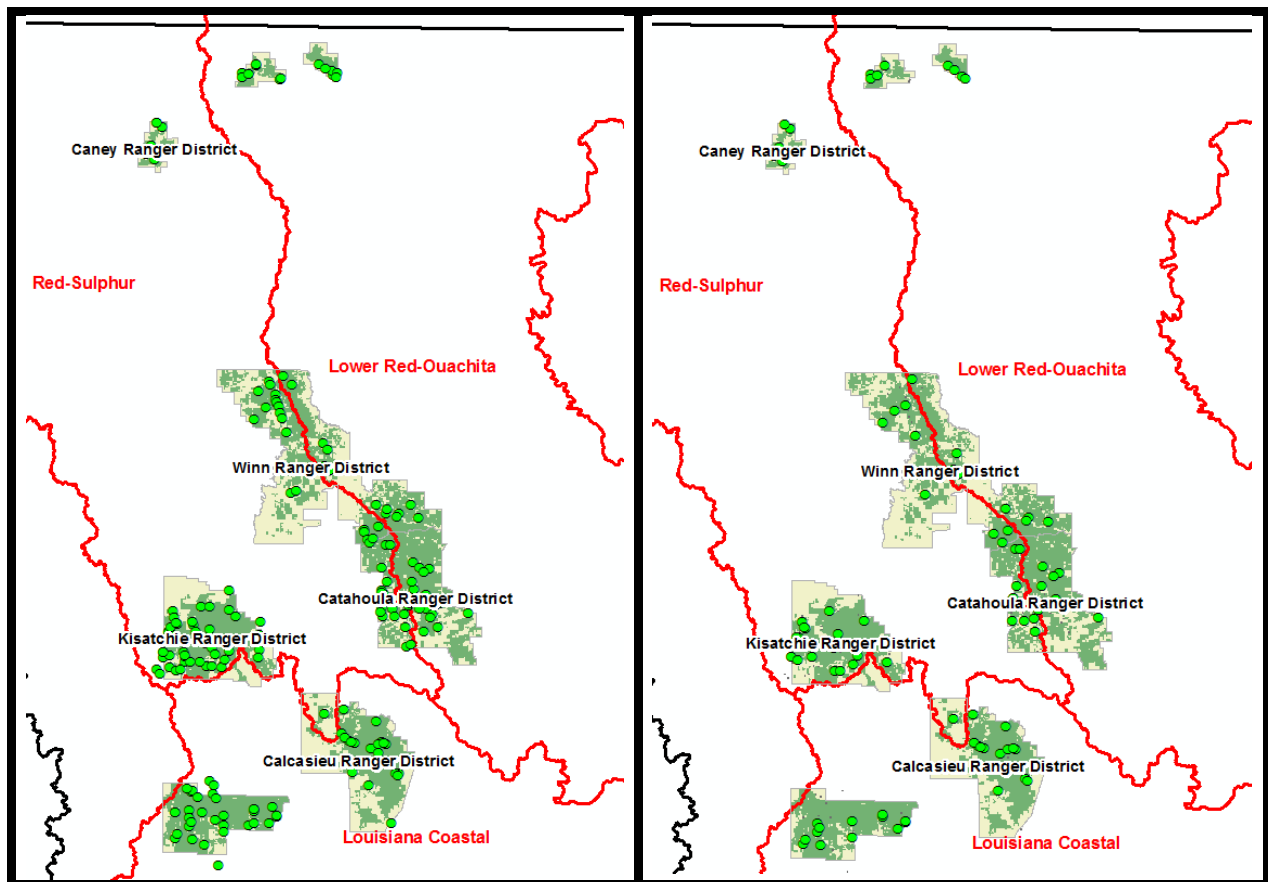


Figure 1. The original 198 sample locations compiled by Byrd in 2005 (left) and the 93 sample sites identified by Soileau in 2017 (right).

Sample effort will be divided among all Ranger Districts each year to reduce the potentially confounding effects of inter-annual variation in water quantity and quality across Districts (Table 2). Sample sites for each year will be selected by the KNF staff based on stream flow conditions near sample time. Sampling in March – April is advised as many streams begin drying by May. Since site conditions can vary by year (drying, beaver dams, etc.) more sites should be identified than can be sampled in a particular year. Once a site is sampled it should not be sampled again until all sites on the District have been completed, though some sites may need to be re-sampled out of order to accommodate for annual variation in sampling conditions. The goal is to complete all 93 sites on a 4 year rotation.

Table 2. Number of established samples sites per Ranger District, number of sites targeted for sampling each year, and anticipated effort per District assuming 2 sample sites are completed per day.

Ranger District/Unit	Established Sample Sites	Target/Year	Effort (days)
Calcasieu (Evangeline Unit)	17	4	2
Calcasieu (Vernon Unit)	10	4	2
Caney	12	4	2
Catahoula	17	4	2
Kisatchie	18	5	2.5
Winn	19	4	2
<i>TOTAL</i>	93	25	12.5

Table 3. Sample site identifier (CATT ID), stream name, previously used identifiers (Aquatic ID & Site Number) and site coordinates per District.

District	CATT ID	Stream Name	<i>Aquatic ID</i>	<i>Site Num</i>	Coordinates (NAD83)
Calcasieu (Evangeline Unit)					
	EVA01	Bayou Clear	36	37	N31.12837 W92.54615
	EVA02	Boggu Bayou	--	--	N31.24140 W92.58488
	EVA03	Browns Creek	30	30	N31.28940 W92.70170
	EVA04	Castor Creek	--	--	N31.19673 W92.60500
	EVA05	Dias Branch	31	31	N31.21061 W92.68709
	EVA06	Dry Prong	40	35	N31.27932 W92.75873
	EVA07	Hospital Bayou	38	39	N31.12175 W92.54395
	EVA08	Lamotte Creek	--	--	N31.23953 W92.62134
	EVA09	Little Bayou Clear	--	--	N31.15286 W92.52691
	EVA10	Little Brushy Creek	62	62	N31.18095 W92.60133
	EVA11	Long Branch	32	32	N31.20636 W92.67093
	EVA12	Long Branch	--	--	N31.19096 W92.59380
	EVA13	Loving Creek	33	33	N31.20357 W92.57838
	EVA14	Mack Branch	--	--	N31.24494 W92.63250
	EVA15	Trib To Muddy Branch	75	75	N31.21819 W92.70050
	EVA16	Valentine Creek	--	--	N31.22994 W92.66492
	EVA17	Whitley Branch	--	--	N31.29048 W92.68755
Calcasieu (Vernon Unit)					
	VER01	Big Brushy Creek	153	154	N31.02105 W92.89966
	VER02	Birds Creek	52	52	N31.02133 W93.05363
	VER03	Bundick Creek	98	98	N30.97251 W93.19102
	VER04	Drakes Creek	93	93	N30.94711 W93.11264
	VER05	Drakes Creek	156	157	N31.00337 W93.14951
	VER06	East Fork Sixmile	155	156	N31.03460 W92.96702
	VER07	Little Brushy Creek	97	97	N31.00278 W92.92187
	VER08	Tighteye Creek	94	94	N30.99134 W93.15736
	VER09	West Fork Sixmile	--	--	N31.03921 W93.00413
	VER10	Whiskey Chitto	49	49	N31.00941 W93.08082

Table 3 continued. Sample site identifier (CATT ID), stream name, previously used identifiers (Aquatic ID & Site Number) and site coordinates per District.

District	CATT ID	Stream Name	<i>Aquatic ID</i>	<i>Site Num</i>	Coordinates (NAD83)
Caney					
	CAN01	Barber Creek	182	182	N32.92078 W92.78093
	CAN02	Butler Creek	116	116	N32.76037 W93.24827
	CAN03	Caney Creek	172	172	N32.67886 W93.27264
	CAN04	Cooley Branch	174	174	N32.70197 W93.22960
	CAN05	Corney Bayou	139	136	N32.89906 W92.72611
	CAN06	Cow Creek	117	117	N32.69041 W93.29831
	CAN07	Fiddler Creek	--	--	N32.71350 W93.30549
	CAN08	Flat Lick Bayou	--	--	N32.76955 W93.26560
	CAN09	Middle Fork Bayou D'Arbonne	88	88	N32.91832 W92.96799
	CAN10	Trib To Corney Lake	183	183	N32.91021 W92.76179
	CAN11	Trib To Hammock Creek	184	184	N32.88808 W92.72951
	CAN12	Trib To M. Fk. Bayou D'Arbonne E.	136	137	N32.89580 W92.99261
Catahoula					
	CAT01	Beaver Creek	99	99	N31.61175 W92.57616
	CAT02	Black Creek	17	17	N31.64727 W92.59012
	CAT03	Chandler Creek	108	108	N31.52494 W92.55424
	CAT04	Cress Creek	4	4	N31.52432 W92.58800
	CAT05	Dry Prong	--	--	N31.61637 W92.51947
	CAT06	Dyson Creek	--	--	N31.54043 W92.46716
	CAT07	Fish Creek	111	111	N31.64662 W92.45186
	CAT08	Flem Branch	--	--	N31.57784 W92.43183
	CAT09	Gray Branch	113	113	N31.63758 W92.46700
	CAT10	Grays Creek	109	109	N31.49697 W92.52065
	CAT11	Indiana Creek	--	--	N31.71842 W92.46554
	CAT12	Little Creek	--	--	N31.67203 W92.42527
	CAT13	Sandy Branch	15	15	N31.66293 W92.49865
	CAT14	Socia Branch	9	9	N31.57899 W92.46007
	CAT15	Trib To Big Creek	11	11	N31.56878 W92.51153
	CAT16	Trib To Dyson Creek	10	10	N31.54490 W92.46099
	CAT17	Trib To Haw Creek	--	--	N31.52003 W92.45052

Table 3 continued. Sample site identifier (CATT ID), stream name, previously used identifiers (Aquatic ID & Site Number) and site coordinates per District.

District	CATT ID	Stream Name	Aquatic ID	Site Num	Coordinates (NAD83)
Kisatchie					
	KIS01	Bayou L'Ivrogne	71	71	N31.43670 W93.04205
	KIS02	Bayou Luce	--	--	N31.54020 W93.04750
	KIS03	Bellwood Creek	67	67	N31.50294 W93.19606
	KIS04	Hyatt Branch	22	22	N31.43336 W93.17599
	KIS05	Kisatchie Bayou	59	59	N31.44449 W93.09351
	KIS06	Kisatchie Bayou	68	68	N31.50234 W93.14807
	KIS07	Kisatchie Bayou	77	77	N31.42260 W93.17078
	KIS08	Laird Branch	41	41	N31.54803 W93.12361
	KIS09	Little Bayou Pierre	66	66	N31.41517 W93.05233
	KIS10	Little Kisatchie Bayou	23	23	N31.39928 W93.10693
	KIS11	Middle Creek	121	121	N31.50638 W93.19742
	KIS12	Rocky Branch	24	24	N31.39841 W93.09241
	KIS13	Sand Branch	42	42	N31.45569 W93.11260
	KIS14	Sheard Branch	21	21	N31.46309 W93.13153
	KIS15	Simmons Creek	27	27	N31.48116 W93.21977
	KIS16	Steep Hill Creek	20	20	N31.49042 W93.09802
	KIS17	Trib To Laird Branch	130	130	N31.54906 W93.09980
	KIS18	Wilson Branch	26	26	N31.48304 W93.21365
Winn					
	WIN01	Bear Creek	145	145	N31.77631 W92.54626
	WIN02	Big Branch	--	--	N32.04881 W92.81273
	WIN03	Caney River	147	147	N31.80749 W92.60703
	WIN04	Couley Creek	103	103	N31.83766 W92.86058
	WIN05	Cypress Creek	102	102	N32.13117 W92.88336
	WIN06	Cypress Creek	137	138	N32.11060 W92.85689
	WIN07	Fourmile Branch	--	--	N31.76680 W92.51573
	WIN08	Iatt Creek	141	141	N31.71963 W92.63141
	WIN09	Iron Branch	--	--	N32.02299 W92.79904
	WIN10	Killan Creek	146	146	N31.80594 W92.50491
	WIN11	Malaudas	132	132	N32.02357 W92.96987
	WIN12	Mendenhause Creek	104	104	N31.94743 W92.75157
	WIN13	Mile Branch	--	--	N32.06883 W92.82856
	WIN14	Piney Branch	--	--	N32.10965 W93.06330
	WIN15	Ragan Creek	105	105	N32.05395 W92.93646
	WIN16	Schoolhouse Creek	148	148	N31.72300 W92.61788
	WIN17	Spring Branch	134	134	N31.98981 W92.87501
	WIN18	Trib To Bear Creek	143	152	N31.77438 W92.48270
	WIN19	White Oak Creek	--	--	N31.93884 W92.86462

Section 4: Fish Inventory

Fish Sample

When laying out the sample reach it should avoid Louisiana Pearlshell mussel beds, which are marked with waypoints on the GPS and streamside with flagging and a tree tag by the KNF. Districts where the team may encounter mussel beds are the Catahoula and Calcasieu. If teams encounter mussels in unmarked locations, a waypoint should be made to further define possible mussel bed locations and prevent disruption in future surveys.

When laying out the sample reach, teams should also be cognizant of turbid and wide streams prevalent in this region, and avoid selecting reaches with sections a backpack electrofisher cannot sample.

Collect a fish sample using the following approach:

1. Reach Layout:

- a. A 100 m sample reach encompassing a riffle, run, pool complex is laid out by a team member with a hipchain walking along the bank to avoid disturbing fish and sediment
- b. Block-nets ($\frac{1}{8}$ - $\frac{1}{4}$ inch mesh) are placed at the down and upstream ends
 - Block-nets should be placed between habitat units when available (e.g. between a riffle and pool), or at a place of natural passage restriction (i.e. narrow section of stream)

2. Electrofishing, Pass 1:

- a. Electrofishing should proceed from downstream to upstream using an Aqua Shock Solutions A-1-L
- b. Use 1 backpack electrofisher for streams measuring ≤ 3 m and 2 for streams 3-5 m
- c. Have 2 dip-netters and 1 bucket person
- d. Set Aqua Shock Solutions electro-fishing unit to **DC** (DC electrical current elicits taxis, an involuntary muscular response that causes fish to swim towards the anode); adjust voltage to obtain ~8 amps and adjust accordingly for fish response and water depth (increase voltage if fish escape electrical field; decrease if mortality occurs)
- e. Set electrofisher timer to zero seconds before each pass; at completion of each pass record shock time (sec; combine time per pass for multiple electrofishers), as well as shocker settings (e.g. 400V DC)
- f. Complete pass 1 through the sample reach
- g. Check the downstream block-net for fish after each pass and also clear excess debris

3. Electrofishing, Pass 2:

- a. Repeat steps 2a - 2g
- b. If more fish (all species combined) are captured in pass 2 than in pass 1, complete a 3rd pass

4. Fish Handling:

- a. Fish mortality can be a problem, particularly during warm temperatures
 - Avoid overcrowding buckets with too many fish
 - Separate large predatory species from smaller species
 - Keep fish in buckets with oxygenated water; aerate with pump or regularly change water
 - Keep fish out of direct sun if possible
- b. If large numbers are being collected, fish can be worked up mid-pass and released below lower block-net; flag pause location so the pass can be continued

5. Fish Workup:

- a. Record pass number, fish species, total length (mm), and any vouchered specimens for each individual captured
- b. Voucher fish that cannot be identified in the field
 - Place a completed voucher label and specimen in a voucher bottle with 70% ethanol

- YOY should not be preserved
- Be certain to record vouchers on the datasheet
- Check the species list to be certain no sensitive species are preserved
- c. Observe for and note the presence of Corbicula, live mussels, relic mussels, Painted crayfish, Creek crayfish, Chestnut Lamprey, and Southern Brook Lamprey (lamprey are not included in the fish sample)
 - For lamprey and crayfish; when present catch a couple to identify the species if possible
- d. Release fish below the downstream block-net

Seine Hauls

A 10 m long seine haul is performed at 3 locations within the sample reach; the **first 1/3**, **second 1/3**, and **final 1/3** of the sample reach. Perform seine hauls at all sample sites regardless of water clarity and whether or not channel bottom is all sand; consistent methods are crucial for data analysis. Even if seining is catching no fish, zeros are meaningful and electrofishing was highly effective. Seining will yield more fish in streams with greater turbidity and stained water.

Collect each seine sample using the following approach:

1. Seine Hauls:

- a. Complete three 10 m seine hauls within the first, second, and final 1/3 of the sample reach
- b. Measuring the 10 m can be done by an equivalent number of paces
- c. Each successive seine haul is completed upstream of the previous one
- d. Starting at the downstream end of the 10 m to be seined place each seine handle on the stream substrate and stretch the net perpendicular to the bank
- e. Moving upstream make sure to keep the weighted side of the net brushing the bottom of the stream
- f. End the seine haul on a bank conducive for working up fish or carry to a suitable location
- g. Transfer fish to a bucket with oxygenated water

2. Fish Workup:

- a. Keep seined fish-data separate for each of the 3 seine hauls
- b. Record seine haul number (1st, 2nd, 3rd), fish species, fish total length (mm), and any vouchered specimens for each individual captured
- c. Record sample effort
 - i. Length of each haul measured to the nearest 1 m (make a best effort to complete at least 10 m)
 - ii. Dimensions of seine net used
- d. Release fish

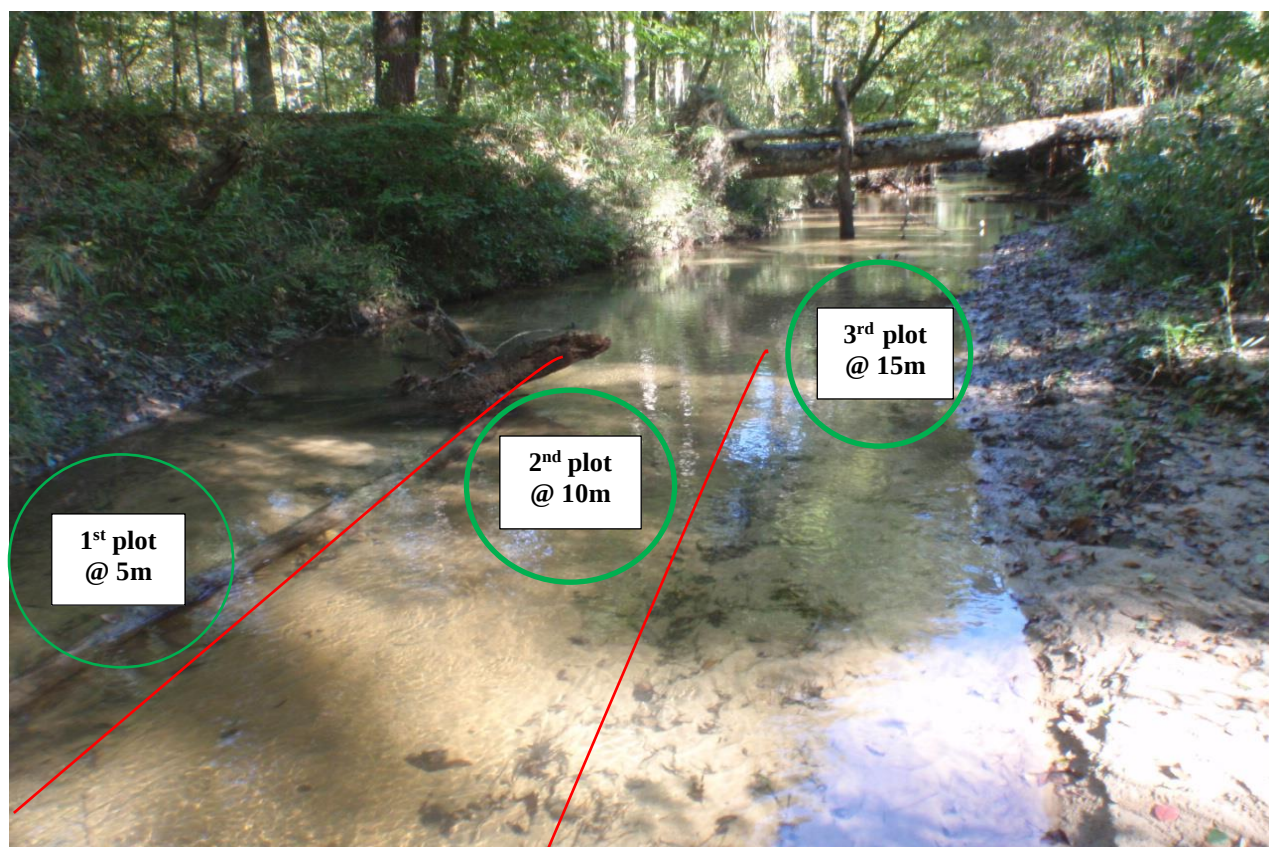
NOTE: Fish species that previous field teams found difficult to differentiate included Longear Sunfish (*Lepomis megalotis*) and Dollar Sunfish (*Lepomis marginatus*) as well as Weed Shiners (*Notropis texanus*) and Ironcolor Shiners (*Notropis chalybaeus*). Sunfish can hybridize, thus it is recommended to identify based on physical structure (body shape and mouth size) before coloration. For the Weed Shiner, the main difference that can be used in the field to differentiate it from Ironcolor Shiners is that the Ironcolor Shiner has black pigment in their mouth, thus if absent identify as Weed Shiner. It is recommended that the team uses various resources such as the Kisatchie fish identifications guide prepared by the CATT and Ted Soileau's fish identification knowledge when he is available in the field.

Section 5: Habitat Inventory

Habitat Inventory Outline

The physical inventory is comprised of the following steps:

1. Fill out header information (date, team, stream, etc.)
2. Create a waypoint on GPS at the upstream block-net
3. Visually divide the sample reach longitudinally into 3 equal lanes
4. Starting in the left lane (looking upstream), at a distance of 5 m or an equivalent number of paces upstream of the lower block-net, establish a visualized circular sample plot having a diameter equal to the lane width
5. Record habitat measurements for the circular plot (depth, substrate, bank stability, bank angle, bank height, canopy closure, and instream cover)
6. While moving upstream also have a hipchain tied off at the location of the downstream block-net so an accurate sample reach distance from downstream to upstream block-net, following the thalweg (location within stream channel having the most depth and flow), is measured and recorded (tie off hipchain string as needed to follow thalweg)
7. Move 5 m upstream and into the center lane to establish a 2nd circular plot
8. Move 5 m upstream and into the right lane to establish a 3rd circular plot
9. Move 5 m upstream and return to the left lane to establish a 4th circular plot
10. Repeat steps until you reach the upstream block-net; record data for a minimum of 20 circular sample plots, record data for more than 20 plots if necessary to reach the upstream block-net



Header Information

Be sure to record all header items completely and accurately. The header includes information for the both the habitat and fish inventories.

1. Site ID	• site identifier from map or GPS (e.g. CAN01)
2. Stream Name	• record full name (no abbreviations)
3. Date	• MM/DD/YY
4. Team	• full name (no abbreviations) of each team member present
5. End Waypoint	• create a waypoint on the GPS when you are positioned at the upstream block-net • record the waypoint label on BOTH the GPS and datasheet • waypoint labeling protocol is 'site identifier + E' (E = end of sample reach), for example Barber Creek's CATT ID is 'CAN01' so the waypoint label would be 'CAN01E'
6. Photo ID (start→up)	• photo ID number for photo taken at the reach start (downstream block-net) looking upstream
7. Photo ID (end→down)	• photo ID number for photo taken at the reach end (upstream block-net) looking downstream
8. Sample Distance (m)	• sample reach distance from downstream to upstream block-net
9. Shock Time Pass 1 (sec)	• shock time (sec) for pass 1; multiple electrofishers combined
10. Shock Time Pass 2 (sec)	• shock time (sec) for pass 2; multiple electrofishers combined
11. Shock Settings	• electrofisher settings (e.g. 400V DC)
12. Block-nets Used	• yes, no, or other (for 'other' be sure to enter a comment)
13. Seine Dimensions (m)	• length and width of the seine used
14. Seine Haul 1 length (m)	• length of seine haul within first 1/3 of sample reach
15. Seine Haul 2 length (m)	• length of seine haul within second 1/3 of sample reach
16. Seine Haul 3 length (m)	• length of seine haul within final 1/3 of sample reach
17. Fish Passage	• impeded or not impeded (by features such as waterfalls, cascades, culverts, etc.)
18. Location	• sample reach location details such as upstream or downstream of a bridge, waterfall, culvert, etc. • also note any site access information (trails, roads, identifying features, etc.) that will be helpful for future teams finding the site
19. Comments	• general site comments • be sure to note the presence or observations relating to mussels and mussel type (relic and/or live), corbicula, crayfish species (painted and/or creek), beaver, otter, snakes, ATVs

Sample Distance (m)

Definition: Number of meters (rounded to the whole meter) from the start of the sample reach (lower block-net) to the upstream end of the sample reach (upper block-net).

How to measure: After the fish sample has been collected, one team member will walk the stream thalweg (section of stream with the most depth and flow) using a hip chain starting at the downstream block-net and ending when at the upstream block-net. Tie off the hipchain string as needed to follow the thalweg

Where to measure: Once per sample reach from downstream to upstream block-net.

Equipment used: Hipchain.

Depth (cm)

Definition: Vertical distance to the nearest 5 cm from the channel bottom (i.e. top of substrate) to the water surface.

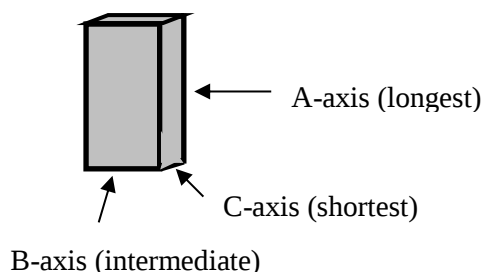
How to measure: Water depth is measured at the center of each circular plot; for consistency water depth can be measured in front of the team member's foot after 3 even paces in the center of the circular plot within the correct longitudinal lane.

Where to measure: At the center of all circular plots within a sample reach.

Equipment used: Wading rod.

Dominant Substrate

Definition: Substrate is the inorganic material making up the bed of the wetted stream channel. Individual substrate particles are measured on their intermediate, or b-axis. The b-axis determines the minimum size sieve hole through which a particle can be pass through.



How to measure: Visually determine the dominant substrate present with the circular plot; choose from the following substrate categories:

Type	Size (mm)	Description
Silt & Clay	<0.059	Silt is slippery, clay is sticky and hold together when in a ball
Sand	0.06 – 1	grainy, does not hold form when rolled into ball
Small Gravel	2-15	sand to thumbnail
Large Gravel	16-63	thumbnail to fist
Cobble	64-256	fist to head

Where to measure: Within each circular plot within a sample reach.

Equipment used: Visual estimate.

Bank Stability (Stable/Unstable for left and right bank)

Definition: Percent of streambank from bankfull elevation to top of bank for incised channels or water's edge to top of bank for stable channels that is covered by vegetation, leaf litter, or protected by materials that do not allow bank erosion (e.g. rooted vegetation or armored by rock or large wood).

How to estimate: Banks are rated as stable or unstable; **stable** if rooted vegetation, leaf litter, or armoring by rock or large wood cover $\geq 50\%$ of the bank (adjacent to the circular plot from bankfull up to top of bank); **unstable** if exposed soil covers $\geq 50\%$ of the bank.

Where to estimate: Left and right bank adjacent to all circular plots from bankfull to top of bank.

Equipment used: Visual estimate.

Bank Angle (<45°, >45°, 90° for left and right bank)

Definition: Slope of stream bank from bankfull elevation to top of bank for incised channels or water's edge to top of bank for stable channels (recorded as slope category <45°, >45°, or 90°)

How to measure: Visually estimate, however if uncertain use the following method. Place the bottom of the wading rod at bankfull (or water's edge for stable channel) then lay the top of the wading rod against the bank. Place the clinometer on the wading rod and read the degree slope of the rod. Flat (i.e. level) banks (0°) are recorded as <45° and vertical banks are recorded as 90°

If bank is undercut, push bottom of wading rod as far beneath bank as possible, then pull up on other end of rod until it contacts the underside of the undercut bank. Place the clinometer on the wading rod to measure the undercut bank angle. Record the bank angle as a negative number to indicate undercut, for example if clinometer reading is 32, record as -<45°

Where to measure: Left and right bank adjacent to all circular plots as either <45°, >45°, or 90° (if bank is undercut, record as negative: -<45°, ->45°).

Equipment used: Visual estimate, and/or clinometer and wading rod.

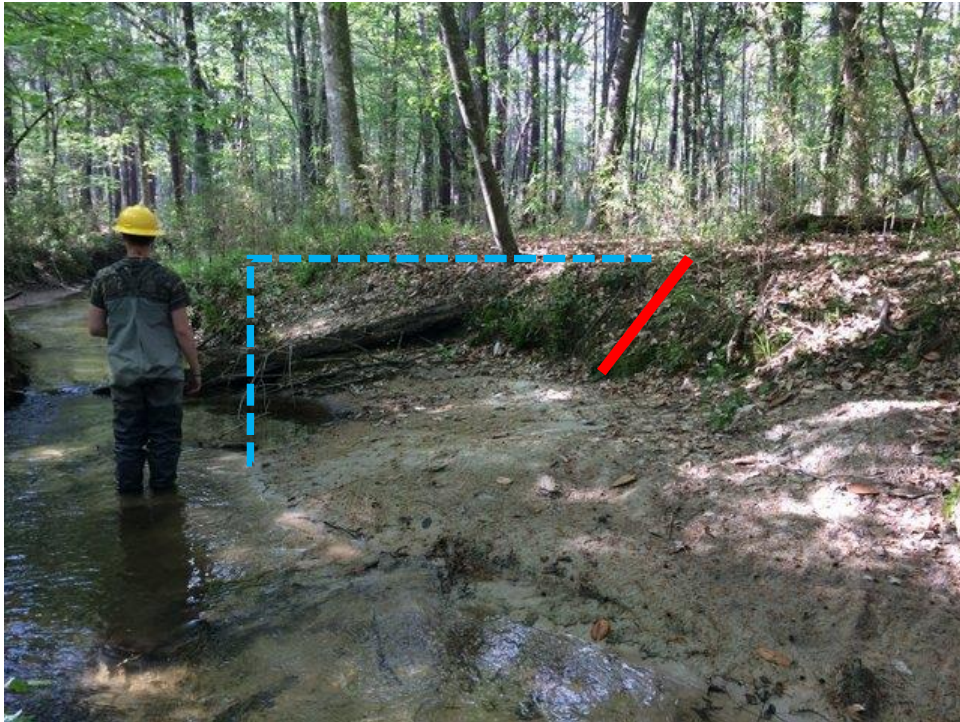
Bank Height (cm for left and right bank)

Definition: Measure the distance vertically from water's edge to top of bank as determined by physical features (i.e. a lip) or to established grasses and sedge.

How to measure: For small bank heights, place the wading rod vertically at water's edge and hold the clinometer against the side of the wading rod. While using the clinometer to sight horizontally, slide the clinometer up or down the wading rod until you are sighting the top of the bank. Record the height (i.e. where the clinometer is on the wading rod). For large bank heights, hold the wading rod horizontal to water's surface with the end of the rod at the top of the bank (place clinometer on top of rod to level), measure the height from the rod to water's edge or surface.

Where to measure: Left and right bank adjacent to all circular plots.

Equipment Used: Wading rod, clinometer, and meter tape.



Incised channel with stable banks: Measure bank stability and bank angle from bankfull elevation to top of bank (red line indicates location of measurement). Measure bank height from water's edge to top of bank (blue dashed line indicates location of measurement).



Incised channel with unstable banks: Measure bank stability and bank angle from bankfull elevation to top of bank (red line indicates location of measurement). Measure bank height from water's edge to top of bank (blue dashed line indicates location of measurement).

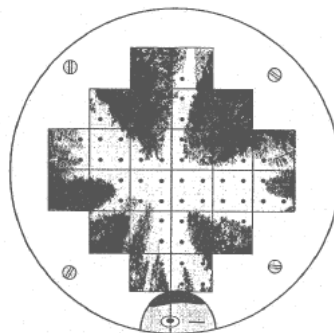


Stable channel with stable banks: Measure bank stability and bank angle from water's edge to top of bank (red line indicates location of measurement). Measure bank height from water's edge to top of bank.

Canopy Cover (0-25, 26-50, 51-75, 76-100%)

Definition: Percent of vegetation cover from tree canopy over the stream channel.

How to measure: Hold the spherical densiometer flat in your palm at chest height while standing in the center of each circular plot, facing upstream. The grid etched on the surface of the mirror has 24 quarter-inch squares. When in areas of heavy overhead cover it is easier and faster to estimate the relative amount of over-story coverage by assuming the presence of four equi-spaced dots in each square, then counting dots representing openings in the canopy. The percentage of canopy cover is then assumed to be the complement of this number. For example, if 18 dots are not covered by canopy the percent canopy cover is $100 - 18 = 82\%$. This value will be slightly different than the value calculated using the instructions on the inside of the lid, but the difference is negligible.



Where to measure: At the center of all circular plots within a sample reach; record as 0-25, 26-50, 51-75, or 76-100%

Equipment used: Spherical densiometer.

Instream Cover

Definition: Natural features either on or below the water surface, or within 30 cm of the water surface if above the water surface, that obscure overhead viewing.

How to estimate: Visually determine the dominant cover type present with the circular plot; choose from the following cover categories:

Cover Type	Definition
No Cover	
Algae	Filamentous algae or moss attached to rocks or streambed
Plants	Living terrestrial or aquatic vegetation
Roots	Roots from terrestrial or aquatic plants
Branches	Small wood habitat
Logs	Large wood habitat
Undercut bank	Bank overhangs the water surface
Leaves	Fallen leaves from terrestrial trees/plants
Other	

Where to estimate: Within each circular plot within a sample reach.

Equipment used: Visual estimate.

Section 6: Discharge Measurement

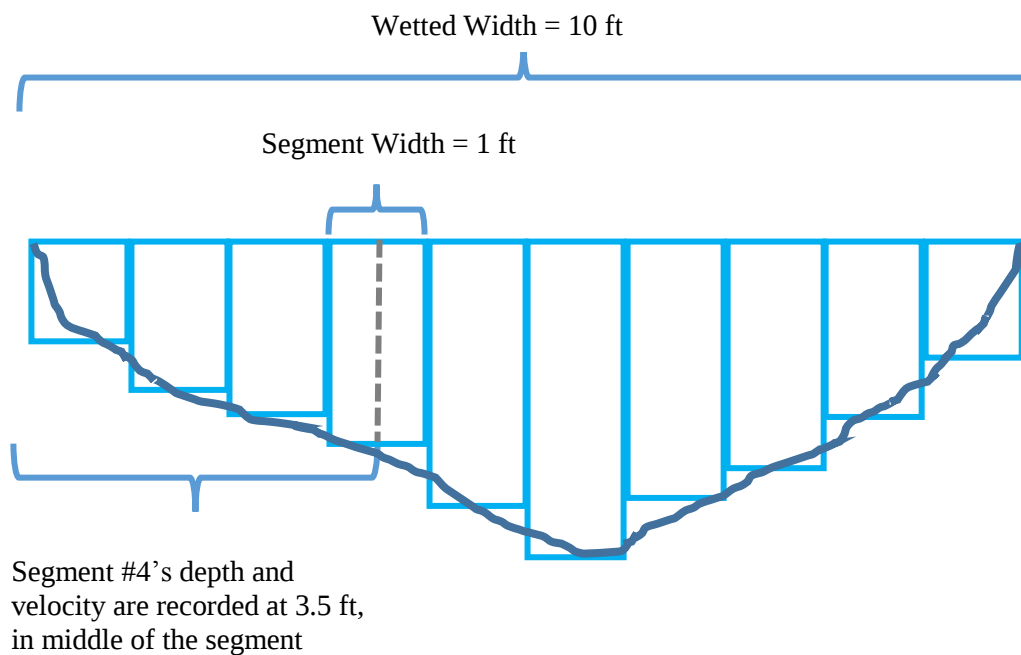
Locating a Discharge Transect

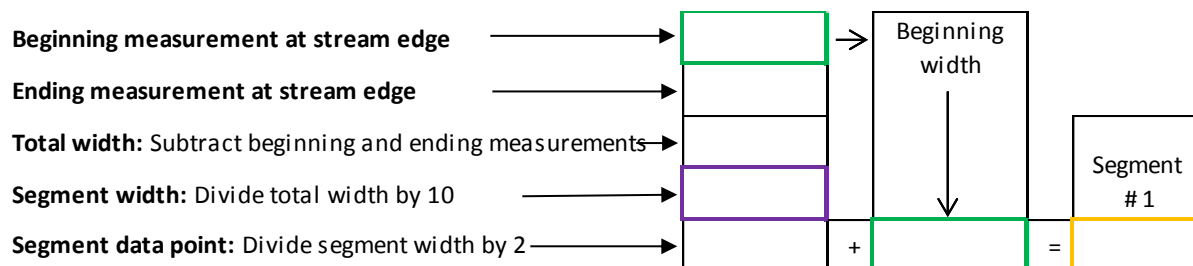
Stream discharge is calculated at 1 transect per sample reach and the transect placement should meet as many of the criteria below as possible. Meeting all of these selection criteria is often not possible. The team should choose the best available cross section based on these characteristics.

- A relatively straight channel with parallel edges upstream and downstream of the cross section
- Defined edges on both sides of the cross section
- Uniform shape; roughly parabolic, trapezoidal, or rectangular in shape
- Free of vegetative growth, large cobbles, and boulders
- Free of eddies, slack water, and turbulence
- Flow distributed evenly across the channel
- Depths greater than 15 cm (0.5 ft), 6 cm (0.2 ft) is the minimum we can measure
- Depth no greater than 75 cm (2.5 ft)
- Sites should not be immediately downstream of sharp bends or vertical drops

Measurement Locations

Stretch a tape across the transect perpendicular to flow. Pull the tape as tight as possible and secure it on both the left and right banks. Using a Marsh McBirney Flo-Mate velocity sensor record lengths to the nearest 0.01 ft. Round to 2 decimal places. Divide the wetted stream width by 10 to create 10 evenly spaced segments across the stream. Record water velocity reading(s) at the mid-point of each segment. For example, if the stream is 10 ft wide, take velocity reading(s) at 0.5, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5, 7.5, 8.5, and 9.5 feet.





Segment data point: This is the middle of each segment. Add the "Segment Data Point" to the "Beginning measurement at stream edge" to obtain segment #1. Add segment #1 to "Segment width" to obtain segment #2. Add segment #2 to the "Segment width" to obtain segment #3. Repeat until you have obtained 10 locations to be sample along the tape.

Depth and Flow: Measure the depth and velocity at each segment # along tape. Measure the velocity at 60% of the depth. To set the sensor at 60% of the depth, line up the foot scale on the sliding rod with the tenth scale on the top of the depth gauge rod.

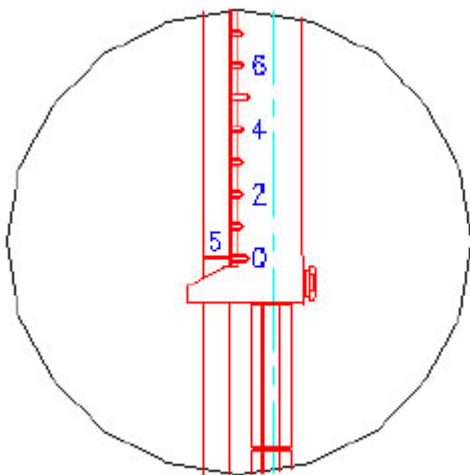
Using the Top-Setting Rod

For depths measuring 6 cm to 75 cm (0.2 ft to 2.5 ft) record one velocity reading with probe set to 0.6 of the total depth from the water surface (0.4 of the total depth from the bottom). Examples of how to set the probe to 0.6 depth are shown below:

Example 1:

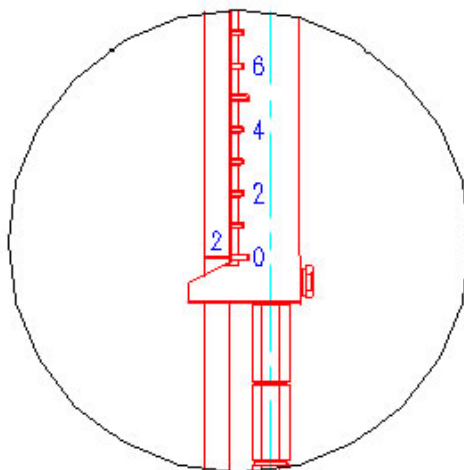
Metric Rod

- Water depth 50 cm
- Record 1 velocity reading
- Set to 0.6 from surface (20 cm from streambed)
- Line up 5 on sliding rod with 0 on handle



English Rod

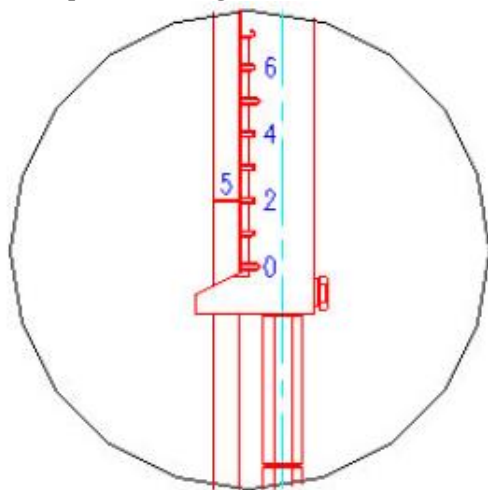
- Water depth 2.0 ft.
- Record 1 velocity reading
- Set to 0.6 from surface (0.8 ft from streambed)
- Line up 2 on sliding rod with 0 on handle



Example 2:

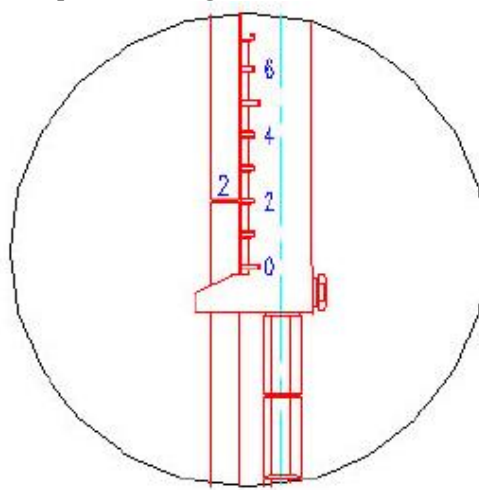
Metric Rod

- Water depth 52 cm
- Record 1 velocity reading
- Set to 0.6 from surface (21 cm from streambed)
- Line up 5 on sliding rod with 2 on handle



English Rod

- Water depth 2.2 ft.
- Record 1 velocity reading
- Set to 0.6 from surface (0.88 ft from streambed)
- Line up 2 on sliding rod with 2 on handle

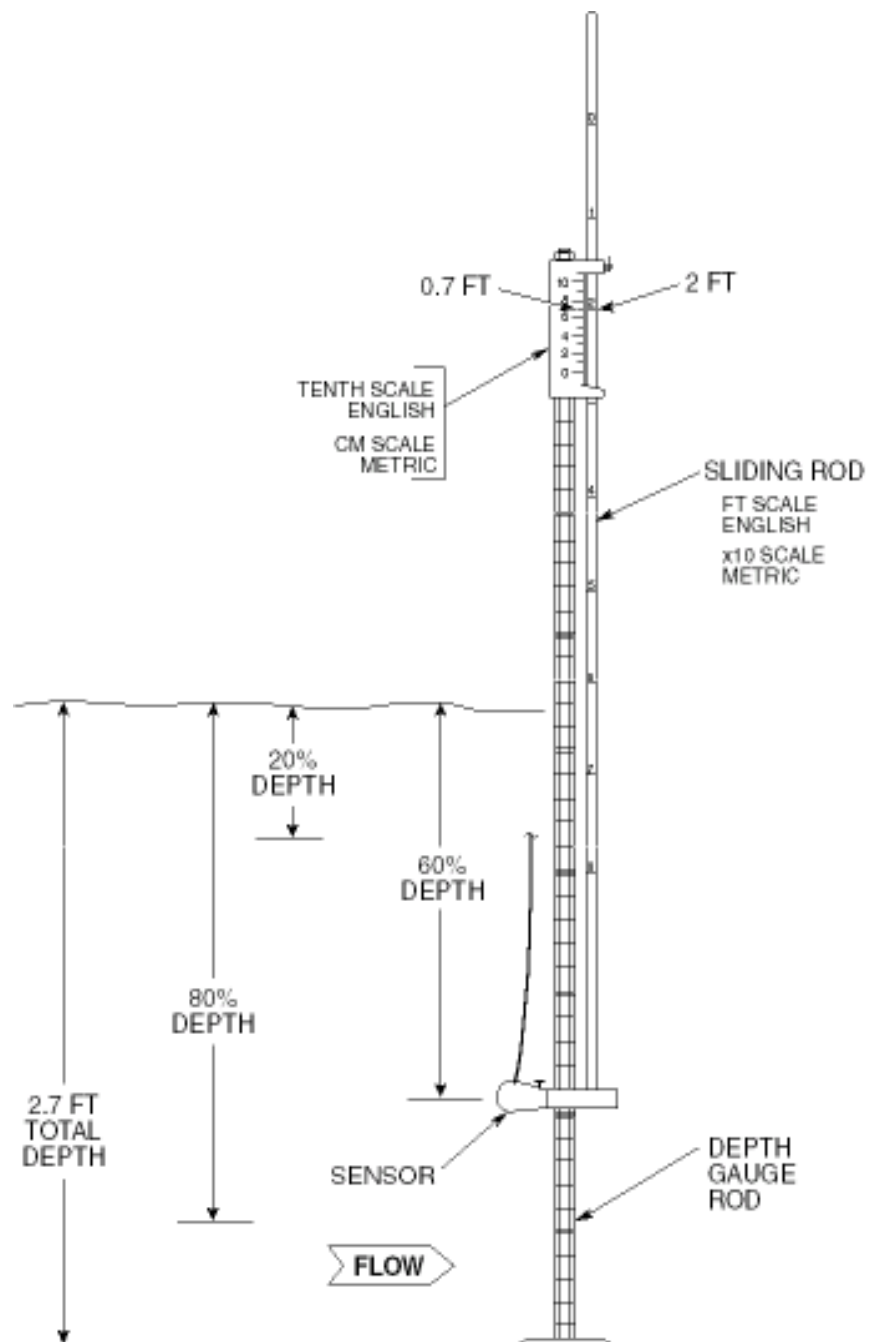


NOTE: Our equipment cannot obtain velocity readings where water depth is less than 6 cm (0.2 ft.). If water depth is less than 6 cm in a segment, record the depth on the datasheet and record the water velocity as 0 cfs. If the flow meter reads a negative value, record the flow as 0 cfs.

Record Depth and Velocity at each Segment Data Point. *Indicates specified decimal place.

Segment #	Segment Data Point (ft)	Depth (ft)	Velocity (ft/sec)	Segment width (ft)	Discharge (cf/sec)
	*2	*1	*2	*2	*2
# 1			X	X	=
# 2			X	X	=
# 3			X	X	=
# 4			X	X	=
# 5			X	X	=
# 6			X	X	=
# 7			X	X	=
# 8			X	X	=
# 9			X	X	=
# 10			X	X	=
Sum					

The black flow sensor on the top-setting rod must be facing upstream into flow as shown below.



Section 7: Water Chemistry Sampling

Sample Location

All water chemistry measurements will be made just upstream of the upstream block-net using a Horiba U53 meter (or the backup Hanna HI9829 meter). Place probe of water chemistry meter in a shaded location with moderate flow

Parameters Measured

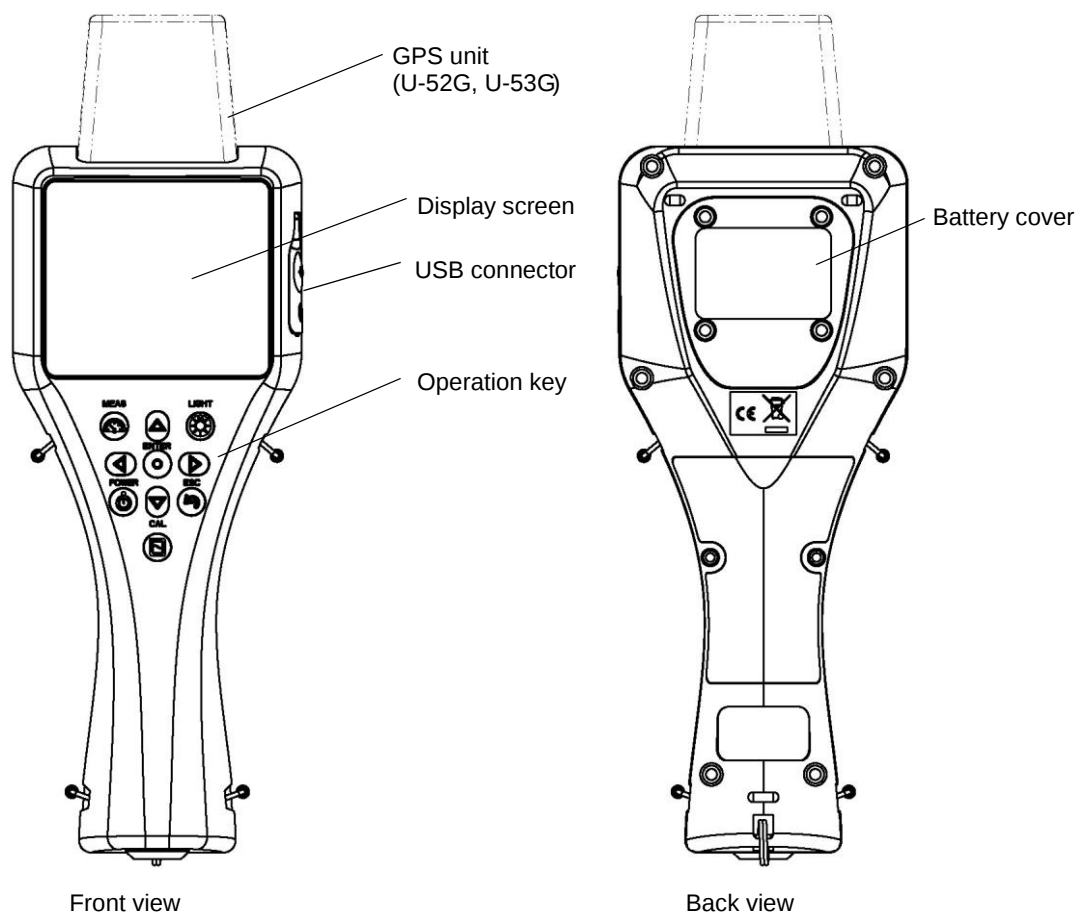
1. Temperature (°C)
2. Conductivity (mS/cm)
 - a. Note that the Horiba U53 meter records millisiemens (mS/cm); once data is collected and maintained in the database, convert to microsiemens ($\mu\text{S/cm}$) where $1 \text{ mS/cm} = 1,000 \mu\text{S/cm}$
3. Turbidity (NTU)
4. Total Dissolved Solids (g/L)
5. Dissolved Oxygen (mg/L)
6. pH

Horiba U53 Guide

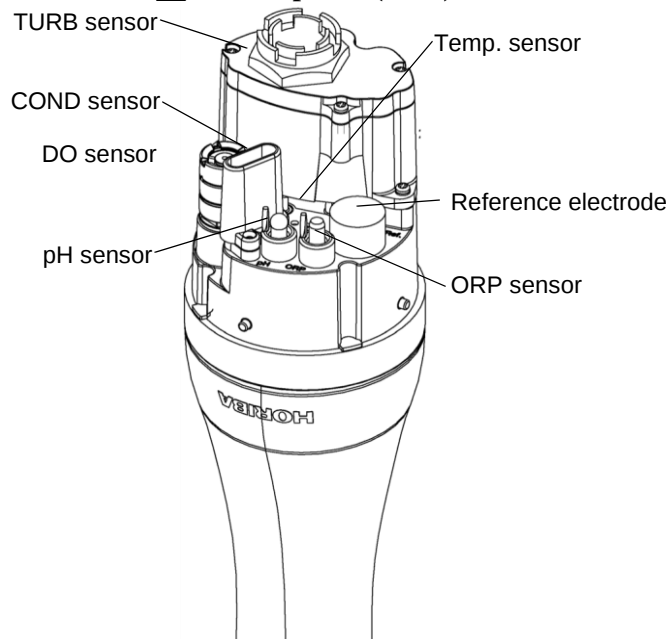
A full user's manual for this meter will be provided separately from this field manual and should be reviewed before measurements are taken. Team should calibrate the device before taking into the field.



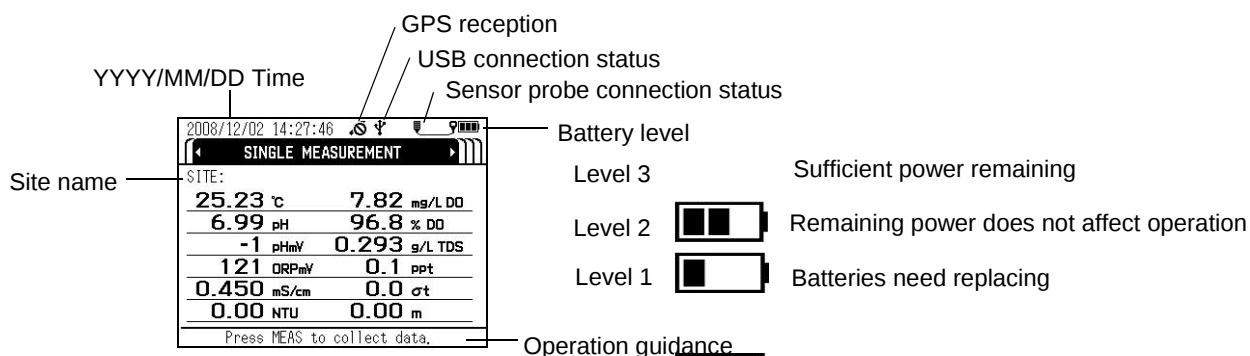
Display



Sensor probe (U-53)



Display screen



Labels for the display screen:

- YYYY/MM/DD Time
- GPS reception
- USB connection status
- Sensor probe connection status
- Battery level
- Level 3: Sufficient power remaining
- Level 2: Remaining power does not affect operation
- Level 1: Batteries need replacing
- Operation guidance

Site name: SITE:

Measurement data:

25.23 °C	7.82 mg/L DO
6.99 pH	96.8 % DO
-1 pHmV	0.293 g/L TDS
121 ORPmV	0.1 ppt
0.450 mS/cm	0.0 σt
0.00 NTU	0.00 m

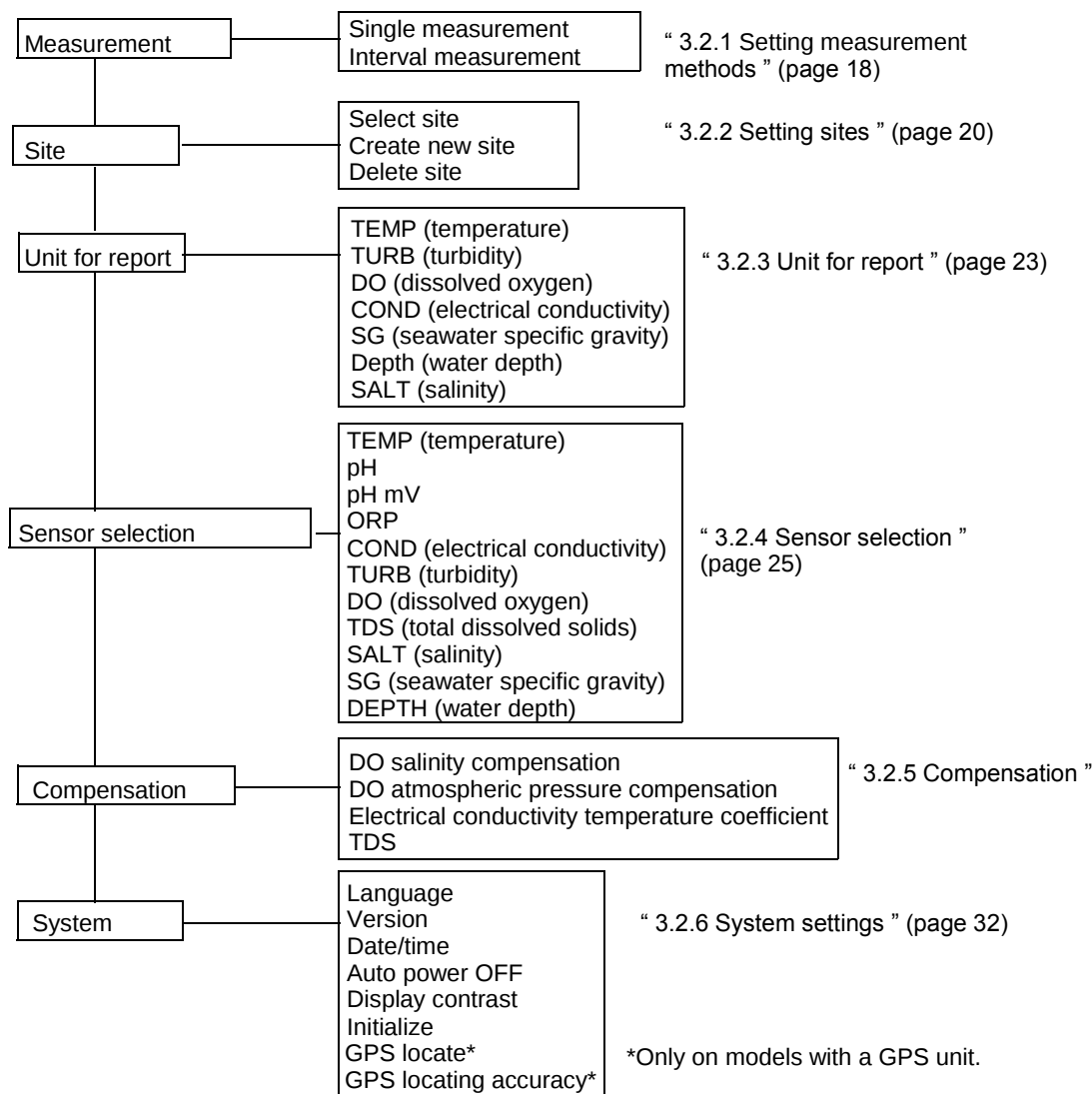
Press MEAS to collect data.

Operation key

Key name	description
 POWER key	Turns the system's power ON/OFF. The initial screen appears immediately after turning the power ON. Press and hold down the POWER key for about 3 seconds to turn the power ON and OFF.
 MEAS key	When pressed in the measurement screen, used to set the measurement values of all the measurement parameters. Measurement values flash until the data stabilizes. When pressed in the setting, calibration or data operation screen, returns to the measurement screen.
 ENTER key	Used to execute functions, set entered values or store data in memory.

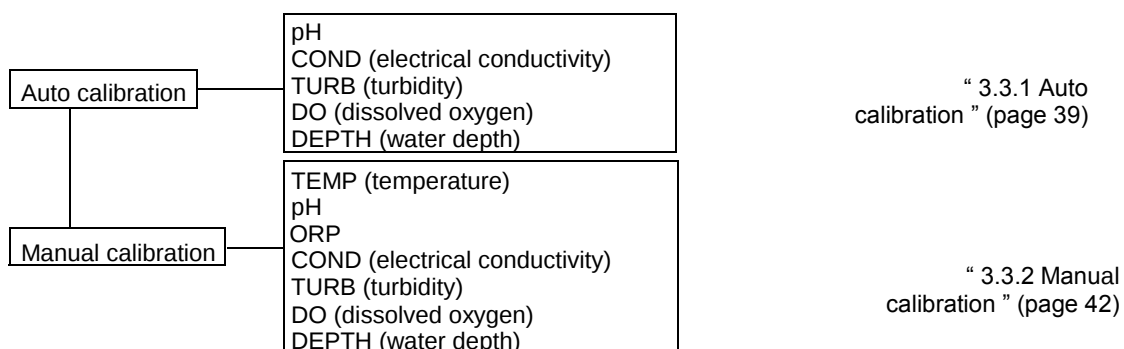
CAL 	CAL key	Switches to the calibration screen.
ESC 	ESC key	Returns to the immediately preceding operation.
LIGHT 	LIGHT key	Turns the backlight ON/OFF. ⌘ Using the backlight shortens battery life. ⌘ The backlight does not light for about 3 seconds after power ON. ⌘ When the sensor probe is connected while the display's backlight is lit, the backlight goes out for about 3 seconds.
	Left key	Moves the cursor to the left.
	Right key	Moves the cursor to the right.
	Up key	Moves the cursor up.
	Down key	Moves the cursor down.

2.4 Setting menu items

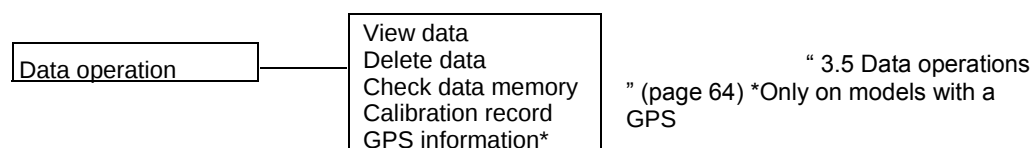


(page 26)

2.5 Calibration menu items



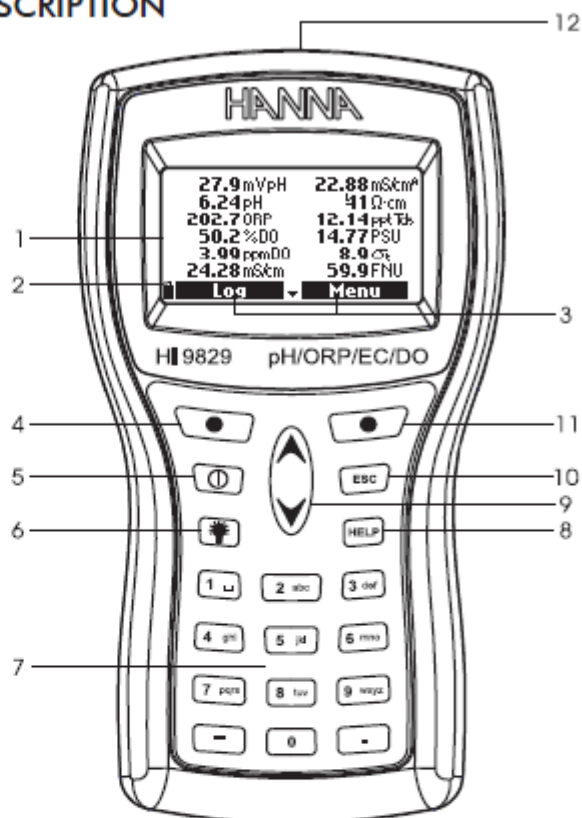
2.6 Data operation menu items



Hanna HI9829 Guide

A full user's manual for this back-up meter will be provided separately from this field manual and should be reviewed before measurements are taken. Team should calibrate the device before taking into the field.

1.4 DISPLAY & KEYBOARD DESCRIPTION

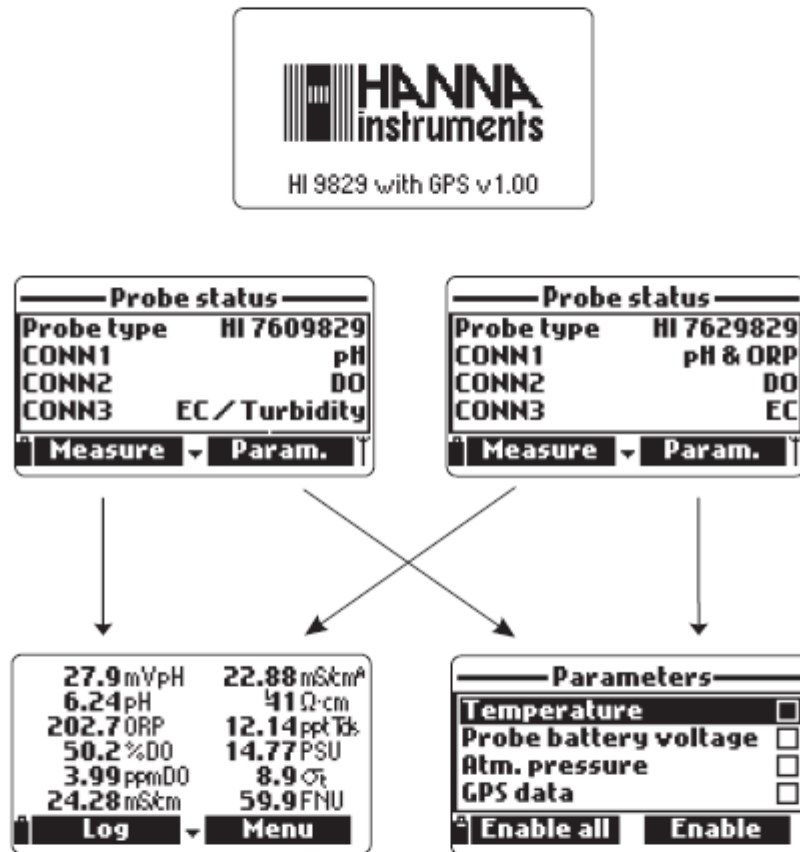


1. Graphic LCD
2. Battery level indicator
3. Softkey functions
4. Left softkey: function defined on display
5. On/Off key: turn the meter on and off
6. Lamp key: turn the backlight on and off
7. Alphanumeric keyboard: insert alphanumeric codes
8. HELP key: obtain information about the displayed screen
9. Arrow keys: scroll the displayed options/message
10. ESC key: return to the previous screen
11. Right softkey: function defined on display
12. GPS signal strength indicator (optional)
13. Tag reader

5.2 METER INITIALIZATION

After connecting the desired sensors to the probe and connecting the probe to the meter (see previous chapter), turn the meter on by pressing ON/OFF.

After the initialization has been completed, the meter displays the PROBE STATUS SCREEN.



The probe status screen identifies the probe and attached sensors. Non-logging probes are identified as **HI 7609829** and logging probes are identified as **HI 7629829**.

Two active soft keys are found at the bottom of the status screen.

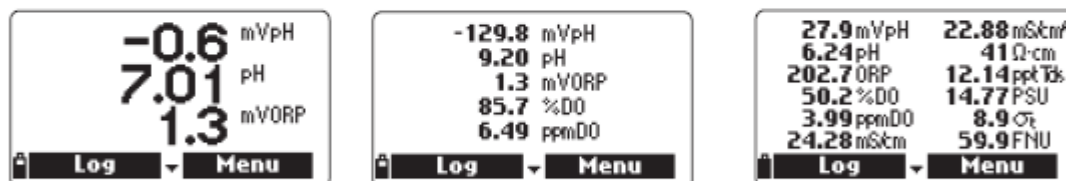
- Press <Measure> to access the measurement mode.
- Press <Param> to access the "Select Parameter" menu. (This screen can also be accessed from the main menu, see Chapter 6 for a detailed description.).
- Press the DOWN arrow to view additional information about the probe.

5.3 MEASUREMENT MODE

Measurement mode is one of the three main operating modes of **HI 9829** (along with logging mode and setup mode).

During measurement mode **HI 9829** will simultaneously measure data for all enabled parameters.

- Use the numbers on the keyboard to select the number of parameters that are shown on the screen at one time. The display will automatically resize the font.

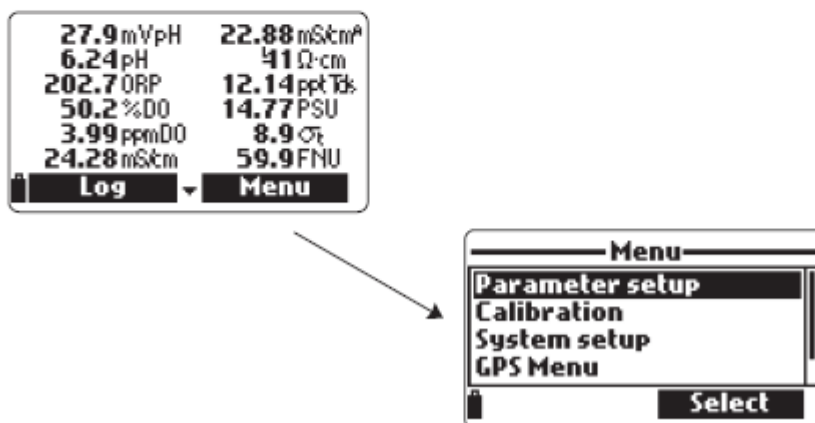


- Press the [up] and [down] arrows to scroll through the enabled parameters if they do not fit on one screen.

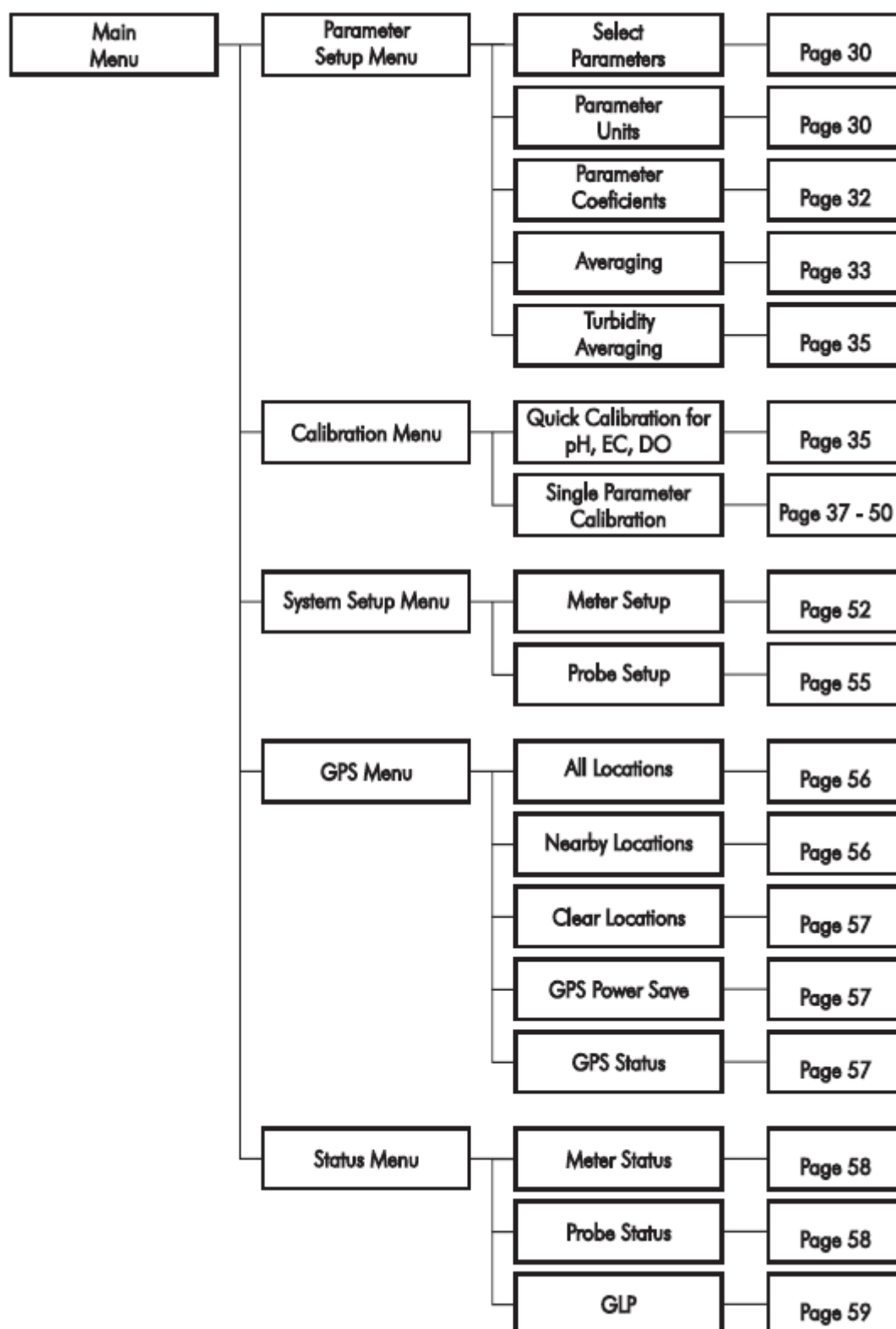
Note A flashing measurement value indicates that the measurement is out of range.

A flashing measurement unit indicates that the user calibration has not been done and is needed for accurate readings.

- Press <Log> to enter the log menu. See Chapter 11 for details.
- Press <Menu> to enter the main setup menu. The main menu accesses the parameter setup, calibration, system setup, GPS and status options. See the following chapters for details.



5.4 SETUP MENU STRUCTURE



Appendix A: SPOT Device Instructions

SPOT Device Safety Plan

Before Going into Field

Turn on SPOT device



1. Press and hold On/Off button until it blinks green
 - On/Off button will blink green every 3 seconds when on
2. Check battery life
 - If battery life is less than 30%, On/Off button will flash red, change batteries

Check Out



1. Press and hold OK button until it blinks green
2. GPS light will blink green when SPOT sees satellites and continues while obtaining GPS location
3. Once GPS location is obtained the message **“Check-in, all OK”** is sent to field team leader(s) and supervisor(s)
4. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink for 1 hr)
5. If no GPS signal is found the GPS light will blink red; move to a location with clearer view of sky; SPOT will keep looking for up to 15 min; if no GPS location is found in 15 min your message will not be sent

Using SPOT in Field

Delayed



1. If everything is okay and you are fine, but you are delayed and will not return to the duty station (or hotel) by the specified return time, press and hold the Custom Message button until it blinks green
2. Once GPS location is obtained the message **“Delayed, all OK”** is sent to field team leader(s) and supervisor(s)
3. Resend the “Delayed, all OK” message every hour until you return to the duty station (or hotel)
4. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink for 1 hr)
5. If no GPS signal is found the GPS light will blink red; move to a location with clearer view of sky; SPOT will keep looking for up to 15 min; if no GPS location is found in 15 min your message will not be sent



Help (Non-Life Threatening Situation)



1. Press and hold Help button until it blinks green
2. Once GPS location is obtained the message **“Help needed (non-life threatening) Please send assistance to my location”** is sent to field team leader(s) and supervisor(s)
3. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink for 1 hr)
4. If no GPS signal is found the GPS light will blink red; move to a location with clearer view of sky; SPOT will keep looking for up to 4 min
5. If no GPS location is found in 4 min your message will be sent, but without GPS location; in this case the GPS light blinks red and Message Sending light blinks green for 15 sec (Message Sending light will then continue to blink for 1 hr)
6. To CANCEL, press and hold the Help button until it blinks red; then let SPOT work until Help button stops blinking; the Message Sending light will then blink green indicating it has sent the cancel message

SOS/911 (Life Threatening Emergency ONLY)

SOS

1. Press and hold SOS button until it blinks green
2. Once GPS location is obtained the International Emergency Rescue Coordination Center is alerted and they notify emergency responders in your area
3. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink)
4. If no GPS signal is found the GPS light will blink red; move to a location with clearer view of sky
5. The first message will be sent within 1 min of activation with or without your GPS location
6. If no GPS location is found in 4 min your message will be sent, but without GPS location; in this case the GPS light blinks red and Message Sending light blinks green for 15 sec (Message Sending light will then continue to blink)
7. To CANCEL, press and hold the SOS button until it blinks red; then let SPOT work until Help button stops blinking; the Message Sending light will then blink green indicating it has sent the cancel message

Track Progress



1. Do not use unless instructed to do so by your team leader
2. Press and hold Track Progress button until it blinks green
3. GPS light will blink green when SPOT sees satellites and continues while obtaining GPS location
4. Once GPS location is obtained a waypoint is sent to an online map every 10 min
5. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink for 1 hr)
6. If no GPS signal is found the GPS light will blink red; if no GPS location is found in 4 min SPOT will not send this particular waypoint
7. To CANCEL, press and hold the Track Progress button until the light turns off

After Returning from Field

Check In



1. Press and hold OK button until fit blinks green
2. GPS light will blink green when SPOT sees satellites and continues while obtaining GPS location
3. Once GPS location is obtained the message “**Check-in, all OK**” is sent to field team leader(s) and supervisor(s)
4. If successful the GPS light and Message Sending light will both blink green for 15 sec (Message Sending light will then continue to blink for 1 hr)
5. If no GPS signal is found the GPS light will blink red; move to a location with clearer view of sky; SPOT will keep looking for up to 15 min; if no GPS location is found in 15 min your message will not be sent

Turn off SPOT device



1. Press and hold On/Off button until it stops blinking green

Additional Notes

To maximize the chances of your message going through:

- Turn SPOT on 5 min before sending a message (this allows SPOT to know its current location)
- Ensure SPOT has a clear view of the sky
- Leave SPOT in the same place for at least 20 min after sending a message.

Check-In, Non-Emergency Help, and Custom Message

- Press and hold the appropriate button for at least 2 sec (non-emergency help messages can be cancelled by pressing and holding the button again for at least 3 sec)
- Pre-programmed messages are sent to the contact list with a GPS location
- SPOT attempts to send check-in messages every 5 min for 20 min
- SPOT attempts to send non-emergency help messages every 5 min for 1 hr

SOS Button (for use if you have a life threatening emergency and need immediate help)

- Press and hold for at least 2 sec (to cancel: press again and hold for at least 3 sec)
- Emergency signal and location is sent to SPOT's Emergency Response Center
- SPOT will contact the appropriate emergency responders as well as the primary and secondary contacts listed on the account for that unit

Appendix B: Tailgate Safety Form

Tailgate Safety Sheet

Forest/District : SRS RWU 4353

Briefing Project: _____

Briefing Administrator: _____

Date: _____

Topics Covered:

- | | | |
|---|---|---|
| ☐ Cuts/lacerations | ☐ Heat Exhaustion | ☐ Sunburn |
| ☐ Dehydration | ☐ Hypothermia | ☐ Swift-water |
| ☐ Drowning | ☐ Insect sting, snake bite | ☐ Traffic on roadway |
| ☐ Electrocution | ☐ JHA for fieldwork | ☐ Vehicle Backing |
| ☐ Falling debris | ☐ Lightning | ☐ Vehicle Speeding |
| ☐ Falls/Twists/Sprains | ☐ Poisonous plants | ☐ Vehicle Stuck |
| ☐ Flashflood | ☐ PPE | ☐ Vehicle visibility |

Other: _____

Attendees: *name*

signature

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Appendix C: Equipment List

		Qty	✓
Electronics	Field GPS w/ camera		
	Vehicle GPS		
	AA Battery charger		
	GPS/Camera charger		
	Ipad chargers		
	Ipads		
	Laptop		
	Powerstrip		
	Rechargeable Batteries		
	SPOT units & lithium batteries		
	Vehicle power inverter		
Efish	Backpack electrofishing unit		
	Block nets		
	Buckets		
	Dipnets		
	Efish batteries		
	Efish battery chargers		
	Efish probes		
	Mesh zip bags		
	Pelican case for efish batteries		
	Seine		
	Shocker rain cover		
Fish Workup	Aquarium nets		
	Ethyl Alcohol		
	Measuring board		
	Viewing Container		
	Voucher labels		
	Voucher/Sample bottles		
Stream Habitat	Clinometer		
	Hipchain		
	Ruler		
	Spherical Densiometer		
	Tape measure, 50 m		
	Topofil		
	Wading rod		
H2O	Flow Meter		
	Stakes		
	Thermometer		
	Topsetting Rod		
	Water Quality Meter		

		Qty	✓
PPE	Efish gloves		
	Hardhats		
	Waders		
	Wading boots		
	Wading socks		
	Blaze orange vests		
Packs	Backpack		
	Clipboard		
	Field Manual		
	First aid kit		
	Fish ID book/guide		
	Flagging		
	Framepack		
	Maps		
	Paper datasheets		
	Pencils		
	Radio/cell phone		
	RITR paper/notebook		
	Sharpie/Markers		
	Tecnu		
	Toilet paper		
	Topographic maps		
	Water filter		
Misc	Bee killer spray		
	Bow saws		
	Chains		
	Directions		
	Duct tape		
	Emergency phone numbers		
	Extra truck keys		
	Gate keys		
	Insect repellent		
	Permits & JHA		
	RITR Paper		
	Sunscreen		
	Tailgate Safety Forms		
	Tools/fix-it kits		
	Vehicle USE log sheets		
	Water jug for trucks		
	Ziplock bags		