YSI Model 550a Dissolved Oxygen (DO) Meter

The YSI 550a Dissolved Oxygen (DO) meter needs to be calibrated before being used in the field each and every time you monitor. Once calibrated, the meter must be left on until you/your team is done with monitoring activities for the day at all monitoring locations.

In order to avoid damaging the meter, do not let sponge inside the probe chamber dry. Maintaining a damp environment in the chamber will help to ensure that your meter has high quality performance throughout the field season. Keep sponge moist by re-wetting it, at least bi-weekly, if not more frequently. If the sensor membrane becomes damaged, you will need to replace it (contact the WAV coordinator for assistance) and then wait at least 1 hour before calibrating and using the meter to monitor at your stream site.

Get to know your YSI 550A DO meter

Instrument display: displays temperature in either °C or °F and dissolved oxygen in either mg/L (milligrams per liter) or % air saturation.

**Power button**: powers the unit on or off.

Backlight button: turns the display backlight on or off. The light will turn off automatically after two minutes of non-use.

Mode button: allows the user to select between % and mg/L during calibration process. When monitoring, pushing 'Mode' switches the instrument display between DO %, DO mg/L, and salinity calibration.

Arrow keys: increases or decreases the value during calibrations.

: enter button

Probe: use to monitor water temp and dissolved oxygen content. Clean the probe with DI water after each monitoring event and store in the calibration chamber when not in use.
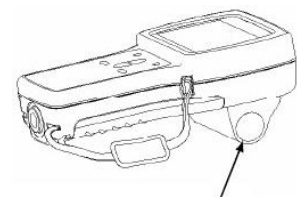
CALIBRATION CHAMBER

Maintaining your YSI 550A DO meter

Verify that the sensor membrane is in good condition by removing the sensor from the storage chamber and check that the sponge is damp, if there are holes or tears in the membrane, and for air bubbles beneath the membrane. If air bubbles or damage to the membrane is evident, replace the membrane housing and solution. Ensure that membrane housing has been filled with KCl solution for at least 1 hour before calibration and first use. Training videos for how to calibrate the YSI 550A meter and monitor with it are available on the WAV website (http://watermonitoring.uwex.edu/wav/monitoring/video.html). Please contact your local coordinator or the WAV coordinator if you have any questions!

YSI 550a DO Meter Calibration Procedure

*Before calibrating your meter at the beginning of the field season, please fill out the top portion of the calibration log with the following information:

- Your name as well as that of any other team members
- Your organization name

Water Action Volunteers Stream Monitoring Program **D.O. METER CALIBRATION LOG**
Team Members: _____
Organization Name: _____

YSI 550A Serial Number: _____

- The serial number for your meter (located on the back of the meter)

**The numbers along the top of the calibration log correspond to the steps in the protocol.

1. Turn on the meter and allow at least 15 minutes of warm up time before calibration.
   - Be sure to note the time that you turned on the meter as this information will be important during the calibration process.
2. Verify that the sensor membrane is in good condition by removing the sensor from the calibration/storage chamber and doing the following:
   - Check that the sponge is damp (rewet if necessary).
   - Shake or blow off excess water on the sensor.
   - Check for holes or tears in the membrane.
   - Check for air bubbles beneath the membrane.
3. Reinsert the sensor into the calibration/storage chamber at the back of the meter.
4. On the calibration log, record the *date, time, name of analyst* (who is calibrating the meter), and the *altitude (in feet)* at which the calibration is taking place.

Step Number:		(4)	
Date	Time	Calibration Analyst's Name	Altitude where calibrated (ft)

   - You can find your local altitude by using a *Wisconsin Atlas and Gazeteer* or a USGS topographic map.
       i. Elevations may appear in meters, but you can convert meters to feet by multiplying the meter value by 3.28.
5. Record the number of minutes of *warm up time* on the DO calibration log.
6. Record the *stabilized probe temperature* (°C) on the DO calibration log (red box).
7. Record the *stabilized pre-calibration D.O.* (mg/L) on the DO calibration log (orange box).
   - Press the MODE button to change from % saturation to mg/L.

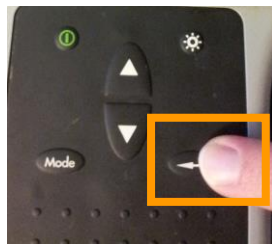| (5)	(6)	(8)
Warm Up Time (min)	Stabilized Probe Temp (°C)	Stabilized Pre-Calibration D.O. (mg/L)

8. Press and release both the UP ARROW and DOWN ARROW keys at the same time to enter the calibration menu.
   - The meter will say CAL on the screen in large letters and CAL in small letters in the lower left corner. This will stay on the screen until the calibration process is done.
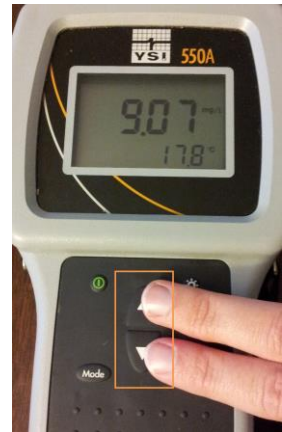
9. Press ENTER on the meter to show a value for altitude (x100) in feet.
   - For example, enter a '9' here indicates 900 ft and a '12' indicates 1200 ft.
10. Adjust the altitude with the up and down arrow buttons for the elevation where the calibration is taking place and press ENTER.
   - The % saturation value is now showing on the meter display.

11. Allow the % saturation value (red box) to stabilize on the screen
   - This may take a minute or two to happen
12. Press ENTER (orange box).
   - The salinity of the water samples is now on the screen.

13. Press ENTER again to accept 0 (the salinity of fresh water).
   - The calibrated % saturation value is now on the screen (red box) and the small CAL is no longer visible in the lower left corner.
14. Press the MODE key (orange box) to switch to mg/L. (This key is used to toggle between mg/L and % saturation.)

15. Record the *post-calibration D.O.* (mg/L) on the calibration log.
16. Look up the calibration chart D.O. value (mg/L) from the table (available on the next two pages of this manual and as a laminated sheet in the monitoring kit).

(16)	(17)
Post-Calibration D.O. (mg/L)	Calibration Chart D.O. ☺

   - To read the table, find the probe temperature (y-axis) and the altitude (x-axis) and record the corresponding D.O. (mg/L) value as the *calibration chart D.O.* on the calibration log.
   - If the difference between the *post-calibration D.O.* and the *calibration chart D.O.* is greater than 0.3 (mg/L), re-calibrate the meter before using in the field.
17. Record any comments about the calibration process in the *Comments* field on the log.
18. Conduct a post-calibration drift test to verify accuracy of your calibration
   - If unsuccessful, check on the condition of the probe tip and contact the WAV coordinator for further instructions.

***Post Calibration Drift*
This quality control step must be performed to insure the collection of accurate data. After calibration, check the meter for drift. This is a check as to how well the meter is holding the calibration. Leave the meter where you calibrated it (this step is important to insure a stabilized temperature) and walk away for 5 minutes. Upon returning, the DO percent saturation value should be within a couple of percent of the calibrated percent saturation value you recorded. If it has drifted more than a couple of percent, you must remove the cap membrane to check the condition of the probe. If necessary, refurbish the probe tip according to your instrument's manual, and change the solution and membrane (contact the WAV coordinator for further instructions. Once the refurbishment process is completed, wait one hour before repeating the calibration procedures listed above (Steps 1-18).

19. After completing a successful calibration and post-calibration drift test, the <u>DO meter should be left on until the last reading of the day is completed.</u>
20. Once monitoring is complete, moisten the sponge in the calibration chamber and turn the meter off before storing it in the monitoring kit until the next field event.

Note: If you notice your meter is not calibrating properly, please check for bubbles or tears in the membrane and replace if necessary. If replacing the membrane does not work, try cleaning the probe by following instructions in the instrument's manual (located in the pocket of your meter case) or contact the WAV coordinator for further instructions or to inquire about a replacement new meter.

Dissovled Oxygen Saturation (mg/L) Based on Elevation or Ambient Barometric Pressure (Station Pressure)

Elevation Feet Above Sea Level/Equivalent Un-Corrected[1] Barometric Pressure mm Hg

Temp C	Temp F	Elv: -200	0*	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
		Press: 765.1	760	757.1	754.5	751.8	749.1	746.5	743.8	741.1	738.5	735.8	733.1	730.5	727.8	725.1	722.5	719.8	717.1	714.5	711.8	709.1	706.5
0	32.0	14.7	14.62	14.6	14.5	14.5	14.4	14.4	14.3	14.3	14.2	14.2	14.1	14.1	14.0	14.0	13.9	13.8	13.8	13.7	13.7	13.6	13.6
1	33.8	14.3	14.22	14.2	14.1	14.1	14.0	14.0	13.9	13.9	13.8	13.8	13.7	13.7	13.6	13.6	13.5	13.5	13.4	13.4	13.3	13.3	13.2
2	35.6	13.9	13.83	13.8	13.7	13.7	13.6	13.6	13.5	13.5	13.4	13.4	13.3	13.3	13.2	13.2	13.1	13.1	13.0	13.0	13.0	12.9	12.9
3	37.4	13.6	13.46	13.4	13.4	13.3	13.3	13.2	13.2	13.1	13.1	13.0	13.0	12.9	12.9	12.8	12.8	12.7	12.7	12.7	12.6	12.6	12.5
4	39.2	13.2	13.11	13.1	13.0	13.0	12.9	12.9	12.8	12.8	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.4	12.4	12.3	12.3	12.2	12.2
5	41.0	12.9	12.77	12.7	12.7	12.6	12.6	12.5	12.5	12.5	12.4	12.4	12.3	12.3	12.2	12.2	12.1	12.1	12.0	12.0	12.0	11.9	11.9
6	42.8	12.5	12.45	12.4	12.4	12.3	12.3	12.2	12.2	12.1	12.1	12.1	12.0	12.0	11.9	11.9	11.8	11.8	11.7	11.7	11.7	11.6	11.6
7	44.6	12.2	12.14	12.1	12.1	12.0	12.0	11.9	11.9	11.8	11.8	11.8	11.7	11.7	11.6	11.6	11.5	11.5	11.5	11.4	11.4	11.3	11.3
8	46.4	11.9	11.84	11.8	11.8	11.7	11.7	11.6	11.6	11.5	11.5	11.5	11.4	11.4	11.3	11.3	11.3	11.2	11.2	11.1	11.1	11.0	11.0
9	48.2	11.6	11.56	11.5	11.5	11.4	11.4	11.4	11.3	11.3	11.2	11.2	11.2	11.1	11.1	11.0	11.0	10.9	10.9	10.9	10.8	10.8	10.7
10	50.0	11.4	11.29	11.2	11.2	11.2	11.1	11.1	11.0	11.0	11.0	10.9	10.9	10.8	10.8	10.8	10.7	10.7	10.7	10.6	10.6	10.5	10.5
11	51.8	11.1	11.03	11.0	10.9	10.9	10.9	10.8	10.8	10.8	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.4	10.4	10.4	10.3	10.3	10.3
12	53.6	10.8	10.78	10.7	10.7	10.7	10.6	10.6	10.5	10.5	10.5	10.4	10.4	10.4	10.3	10.3	10.2	10.2	10.2	10.1	10.1	10.1	10.0
13	55.4	10.6	10.54	10.5	10.5	10.4	10.4	10.3	10.3	10.3	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.8	9.8
14	57.2	10.4	10.31	10.3	10.2	10.2	10.2	10.1	10.1	10.0	10.0	10	9.9	9.9	9.9	9.8	9.8	9.8	9.7	9.7	9.7	9.6	6.6
15	59.0	10.2	10.08	10.0	10.0	10.0	9.9	9.9	9.9	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.6	9.5	9.5	9.4	9.4	9.4
16	60.8	9.9	9.87	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.6	9.5	9.5	9.5	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2
17	62.6	9.7	9.66	9.6	9.6	9.6	9.5	9.5	9.5	9.4	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.1	9.1	9.1	9.0	9.0
18	64.4	9.5	9.47	9.4	9.4	9.4	9.3	9.3	9.3	9.2	9.2	9.2	9.1	9.1	9.1	9.0	9.0	9.0	8.9	8.9	8.9	8.8	8.8
19	66.2	9.3	9.28	9.2	9.2	9.2	9.1	9.1	9.1	9.0	9.0	9.0	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.7	8.7	8.7	8.6
20	68.0	9.2	9.09	9.1	9.0	9.0	9.0	8.9	8.9	8.9	8.8	8.8	8.8	8.7	8.7	8.7	8.6	8.6	8.6	8.5	8.5	8.5	8.5

Dissovled Oxygen Saturation (mg/L) Based on Elevation or Ambient Barometric Pressure (Station Pressure)

Elevation Feet Above Sea Level/Equivalent Un-Corrected[1] Barometric Pressure mm Hg

Temp C	Temp F	2000	1900	1800	1700	1600	1500	1400	1300	1200	1100	1000	900	800	700	600	500	400	300	200	100	0*	-200
Elv: Press:		706.5	709.1	711.8	714.5	717.1	719.8	722.5	725.1	727.8	730.5	733.1	735.8	738.5	741.1	743.8	746.5	749.1	751.8	754.5	757.1	760	765.1
20	**68.0**	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.9	8.9	8.9	9.0	9.0	9.0	9.1	9.09	9.2
21	**69.8**	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.9	8.91	9.0
22	**71.6**	8.1	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.7	8.7	8.74	8.8
23	**73.4**	8.0	8.0	8.0	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.58	8.6
24	**75.2**	7.8	7.9	7.9	7.9	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.3	8.3	8.3	8.4	8.4	8.42	8.5
25	**77.0**	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.26	8.3
26	**78.8**	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	8.0	8.0	8.0	8.1	8.1	8.11	8.2
27	**80.6**	7.4	7.4	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.97	8.0
28	**82.4**	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.83	7.9
29	**84.2**	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.7	7.69	7.7
30	**86.0**	7.0	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.56	7.6
31	**87.8**	6.9	6.9	7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.43	7.5
32	**89.6**	6.8	6.8	6.8	6.9	6.9	6.9	6.9	7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.3	7.3	7.30	7.4
33	**91.4**	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.2	7.18	7.2
34	**93.2**	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	7.0	7.0	7.0	7.0	7.06	7.1
35	**95.0**	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.95	7.0

*Dissolved oxygen saturation at 760 mm Hg derived from the tables of Benson & Kuause (1980), from C.M. Mortimer 1981. The oxygen content of air-saturated fresh waters over ranges of temperature and atmospheric pressure of limnological interest. Mitt. Int. Ver. Limnol. No. 22. Stuttgart, Germany.

[1]Dissolved oxygen saturation values based on elevation due not account for TRUE station pressure. For more accurate dissolved oxygen saturation values use un-corrected pressure measurements.
Uncorrected barometric pressure values = National Weather Service Barometric Pressure in mm Hg x (Equivalent elevation pressure/760)

Source: J. Sullivan, WDNR-LaCrosse, March 2006

YSI 550a DO Meter Monitoring Procedure

Before going out to your stream site to monitor dissolved oxygen (or any parameter), please remember to fill out the top portion of the monitoring datasheet with your name (s), the station name, and the station ID #, as well as the date and time of the monitoring event.

Station Info	WAV Station Number*: _____ Date*: ____/____/20___ Time*: _____ AM or PM
	WAV Station Name*: _____
	Team Member Name(s)*: _____

*Denotes required field

It is also important that you indicate what type of equipment was used to monitor for dissolved oxygen. In this case, you will circle the YSI 550A Meter option on your datasheet.

Dissolved Oxygen (D.O.) Sampling Method	Circle one:	Hach Kit	LaMotte Kit YSI 550A Meter Other: _____	-
D.O. mg/L	No. of Titration Drops: _____		No. of Plastic Measuring Tubes: _____	Dissolved Oxygen Content: _____ mg/L

To measure dissolved oxygen (DO) in the stream:

1. With the DO meter in hand, enter the stream downstream from your monitoring location (as to not disturb the bottom sediment as you move towards the site).
    a. You can also monitor dissolved oxygen from a bridge overpass as to not disturb the bottom sediment.
2. Remove the probe from its chamber and insert it into the water to be measured.
    a. Continuously stir or move the probe through the water (especially when monitoring in very still water) while taking the measurement.
3. Allow the temperature and dissolved oxygen readings to stabilize.
    a. This should take anywhere from 2 to 5 minutes.
4. Observe and record the water temp and the DO values on the monitoring datasheet.

Water Temperature					°C
Dissolved Oxygen (D.O.) Sampling Method	Circle one:	Hach Kit	LaMotte Kit YSI 550A Meter Other: _____		-
D.O. mg/L	No. of Titration Drops: _____		No. of Plastic Measuring Tubes: _____	Dissolved Oxygen Content: _____	mg/L
D.O. % Saturation					%

5. Press the MODE button to change the instrument display.
6. Observe and record the % saturation value on the monitoring datasheet.

D.O. mg/L	No. of Titration Drops: _____		No. of Plastic Measuring Tubes: _____	Dissolved Oxygen Content: _____	mg/L
D.O. % Saturation					%

7. Rinse the probe with distilled water after each use, and return it to the storage chamber.
8. Before storing the meter in the carrying case, moisten the probe sponge by soaking with distilled water.
9. Press the green button on the meter to turn if off at the conclusion of the day's monitoring effort.

Oakton Acorn pH 5 and 5+ Meter

WAV volunteers currently use one of three different pH meters:

1. pH 5 (original software and original outside casing)
2. pH 5 (updated software, but original outside casing)
3. pH 5+ (updated software and updated outside casing)

pH 5 meter   **pH 5+ meter**

Which pH meter do I have?

Before calibrating your pH meter, you will first need to ascertain which meter version you are using. This information is important to know because the calibration protocol is varies slightly between the different software versions.

The only way to tell if you have meter version #1 or #2 is by going through the calibration process and seeing what happens between the calibration with the pH 7 buffer solution calibration and the calibration with the pH 10 buffer solution. The original software tells the meter to exit calibration mode and return to measurement mode upon completion of the first calibration point. This means that you will complete two 'one point' calibrations as you have to re-enter calibration mode in order to complete the pH 10 calibration. The software update on the newer meters keeps the meter in calibration mode throughout the calibration process (the values on the screen will continue to blink). This means that you will complete a 'two point' calibration when calibrating the meter.

For all meters used by WAV volunteers…

Both the Oakton Acorn pH 5 and the 5+ meters need to be calibrated before being used in the field each and every time you monitor throughout the field season. Once calibrated, the pH meter can be turned on and off between monitoring events if you monitor at multiple locations in one day (unlike the DO meter).

When calibrating your meter, please use both the pH 7 and pH 10 buffer solutions (NIST) provided in order to calibrate the meter. Do not reuse the buffer solutions following the calibration as contaminants in the solution can impact the accuracy of the calibration and the field measurements.

In order to avoid damaging the meter, be sure to keep the pH electrode (specifically the bulb at the end of the probe) wet when not in use. Store the electrode in the electrode soaker bottle and keep it filled with electrode storage solution. Refresher storage solution can be found in your monitoring kit. Contact the WAV coordinator if you need more solution.

If you notice your meter is not calibrating properly, try cleaning the probe by following the instructions in the instrument's manual (located in the pocket of your meter case) or contact the WAV coordinator for directions.

*Before calibrating your meter at the beginning of the field season, please fill out the top portion of the calibration log with the following information:
- Your name, as well as that of any other team members
- The name of your organization
- The serial number for your meter (located on the back of the meter)
- The type of meter that you are using
    - This can be recorded after the first calibration is completed

Water Action Volunteers Stream Monitoring Program   **pH METER CALIBRATION LOG**
Team Members: _____
Organization Name: _____

Oakton Acorn pH Meter Serial Number: _____   Meter Type: ❑ ph 5   ❑ ph 5+

Cal. procedure - pH 5 meter with original software and original outside casing

This calibration process will be completed by conducting two one-point calibrations. This means that the meter will complete a single point calibration and then exit calibration mode each time. You will have to restart the calibration process when using the pH 10 buffer solution by pressing the CAL button.

1. Connect pH and temperature probes to meter.
    a. Ensure that the pH probe connecter snaps into place.
2. Turn the meter on by pushing the On/Off button on the face of the meter.

3. Record the *date*, *time*, and the *name of analyst* performing the calibration on the calibration log.

Date	Time	Calibration Analyst's Name

4. Remove the pH electrode from the electrode soaker bottle.
5. Rinse the pH electrode with distilled water and shake the excess water off of the electrode.

6. Click the MODE button to find the *temperature* reading and record value on the calibration log.

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

7. Click the MODE button again to return to the pH screen on the meter.
8. Press the CAL button on the meter in order to start the calibration process (blinking).
9. Place the electrode and temperature sensors into the pH buffer solution and submerge the glass bulb completely in the solution.

10. Wait for the reading to stabilize and record the *Stabilized pH* value on the calibration log.

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

11. Press the ENTER key once and record the *Calibrated pH* value (the meter is now out the calibration mode and in measuring mode).

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

12. Check that the *Calibrated pH* value is within 0.2 of the pH buffer standard (7 or 10).
    a. If the value is more than 0.2 higher or lower than its pH buffer value (compare values in the grey columns, outlined in blue), recalibrate the meter (new line).
    b. Record the new results on the next line of the pH meter calibration log.
13. Remove the electrode from the buffer solution (refill if necessary), rinse with distilled water and shake off the excess water from the electrode.
14. **To finish the calibration, repeat steps 6 through 12 for the pH 10 buffer solution.**
15. Replace the pH probe in the electrode soaker bottle (refill if necessary), turn the meter off, and head out to the field to complete your monitoring activities.

Cal. procedure - pH 5 meter with updated software, but original outside casing

The updated software version in the pH 5 allows for you to complete a two-point calibration without ever leaving the calibration mode. After you press ENTER following the first calibration, the value on the screen will continue to blink, indicating that it is still in calibration mode (unlike the old version that stopped blinking after you hit ENTER and went into measuring mode).

1. Connect the pH and temperature probes to meter.
   a. Ensure that the pH probe connecter snaps into place.
2. Turn the meter on by pushing the On/Off button on the face of the meter.

3. Record the *date*, *time*, and the *name of analyst* performing the calibration on the calibration log.

Date	Time	Calibration Analyst's Name

4. Remove the pH electrode from the electrode soaker bottle.
5. Rinse the pH electrode with distilled water and shake the excess water off of the electrode.

6. Click the MODE button to find the *temperature* reading and record value on the calibration log.

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

7. Click the MODE button again to return to the pH screen on the meter.
8. Press the CAL button on the meter in order to start the calibration process.
9. Place the electrode and temperature sensors into the pH 7 buffer solution and submerge the glass bulb completely in the solution.

10. Wait for the reading to stabilize and record the *Stabilized pH* value on the calibration log.

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

11. Press the ENTER key once and record the *Calibrated pH* value

pH 7 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH ☺
		7	

12. Check that the *Calibrated pH* value is within 0.2 of the pH 7 buffer standard.
    a. If the value is more than 0.2 higher or lower than its pH buffer value (compare values in the grey columns, outlined in blue), recalibrate the meter.
    b. Record the new results on the next line of the pH meter calibration log.
13. Remove the electrode from the pH 7 buffer solution, rinse with distilled water and shake off the excess water from the electrode.
14. Place the electrode and temperature sensors directly into the pH 10 buffer solution and submerge the glass bulb completely in the solution

**With the software update, the meter stays in calibration mode between buffer solutions in order to complete the two-point calibration. This means that you will not be able to record the temperature for the <u>pH 10 buffer solution</u>– either leave the space blank or scribble out the column (⊗) so that you remember that you can't fill in this column.

pH 7 standard				pH 10 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH☺	Temp. (C)	Stabilized pH	pH Std	Calibrated pH☺
		7		⊗		10	

15. Wait for the reading to stabilize and record the *Stabilized pH* value on the calibration log.

pH 10 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH☺
		10	

16. Press the ENTER key once and record the *Calibrated pH* value
    a. The pH reading on the screen will stop blinking as the meter should have exited calibration mode and entered measurement mode.

pH 10 standard			
Temp. (C)	Stabilized pH	pH Std	Calibrated pH☺
		10	

17. Check that the *Calibrated pH* value is within 0.2 of the <u>pH 7 buffer standard</u>.
    a. If the value is more than 0.2 higher or lower than its pH buffer value (compare values in the grey columns, outlined in blue), recalibrate the meter.
    b. Record the new results on the next line of the pH meter calibration log.
18. (the value on the screen will stop blinking as the meter should have exited calibration mode and entered measurement mode).
19. Remove the electrode from the pH 10 buffer solution, rinse with distilled water and shake off the excess water from the electrode.
20. Replace the pH probe in the electrode soaker bottle (refill if necessary), turn the meter off, and head out to the field to complete your monitoring activities.

Cal. procedure - pH 5+ meter with updated software and updated outside casing

For the pH 5+ meter, the updated software version from the pH 5 is all wrapped up in a brand new package! The updated version allows for you to complete a two-point calibration without ever leaving the calibration mode. After you press ENTER following the first calibration, the value on the screen will continue to blink, indicating that it is still in calibration mode (unlike the old version that stopped blinking after you hit ENTER and went into measuring mode).

Follow the calibration procedure list above (page 19) for the **pH 5 meter with the updated software, but original outside casing** in order to properly calibrate your pH 5+ meter. Please contact your local coordinator or the WAV coordinator if you have any questions about how to properly calibrate any of the meters!

Oakton Acorn pH Meter Monitoring Procedure

Before going out to your stream site to monitor pH (or any parameter), please remember to fill out the top portion of the monitoring datasheet with your name (s), the station name, and the station ID #, as well as the date and time of the monitoring event.

Station Info	WAV Station Number*: _____	Date*: ____/____/20___	Time*: _____ AM or PM
	WAV Station Name*: _____		
	Team Member Name(s)*: _____		

*Denotes required field

To measure pH in the stream:
1. Connect any electrodes to the pH meter and turn the meter on by pushing the On/Off button on the face of the meter.
    a. The meter does not have to be left on following the calibration process.
2. Remove the electrode from the electrode soaker bottle.
    a. Place the electrode soaker bottle to the side.
3. Rinse off the electrode with distilled water and shake off any excess water.
4. Wade into the middle of the stream from a safe access location
    a. Walk upstream from the access point (downstream of monitoring location) as to not disturb the bottom substrate.
5. Place pH and temperature probes into the stream and gently stir the probes.
6. Wait 2-3 minutes for pH reading to stabilize.
7. Record the pH reading on the monitoring datasheet.

D.O. % Saturation		%
pH		-

8. Rinse the electrode with distilled water and shake off the excess water.
9. Place the electrode back in the electrode soaker bottle.
    a. Refresh storage solution if necessary.
10. Turn the meter off using the On/Off button on the face of the meter.
11. Disconnect the electrodes from the meter and store the meter and electrodes in the carrying case until the next monitoring event.

A refresher video for how to monitor pH with the Oakton Acorn pH meter is available on the WAV website (http://watermonitoring.uwex.edu/wav/monitoring/video.html). Please contact your local coordinator or the WAV coordinator if you have any questions!

Transparency Tube

Sample Collection

Collect the sample away from the stream bank in the main flow (well-mixed) area. Be careful not to disturb the stream bottom when you collect the water sample. If you get sediment from bottom disturbances, dump out the sample, move upstream (away from the disturbed area) and try again. For the observer, consistency is the key. If you initially wear your eyeglasses when you take the reading, then always wear your eyeglasses to take this measurement. However, you should never wear sunglasses when you take this reading.

Before going out to your stream site to monitor transparency (or any parameter), please remember to fill out the top portion of the monitoring datasheet with your name (s), the station name, and the station ID #, as well as the date and time of the monitoring event.

Station Info	**WAV Station Number*:** _____ **Date*:** ____/____/20___ **Time*:** _____ AM or PM **WAV Station Name*:** _____ **Team Member Name(s)*:** _____

*Denotes required field

It is also important that the length of the transparency tube is recorded on the monitoring datasheet for each monitoring event as this information will be used when the data is evaluated as part of the quality assurance process.

Transparency	Tube Length (circle one)	Trial #1	Trial #2	Average	-
	60 cm 100 cm 120 cm				cm

In Stream

1. Make sure that the clamp on the drain tube is closed
2. Walk into the water at an access point downstream from the sampling location.
   a. Be careful not to stir up the bottom sediment upstream of your sampling location.
3. Face upstream (into the current) in the middle of the stream or in a well-mixed area off-shore.
4. Collect your water sample by plunging your bucket or transparency tube 8-12 inches beneath the surface or halfway down from the surface.
   a. If using a bucket, scoop away from your body and into the current.
5. Cover the top of the transparency tube after you have filled it with water and return to shore to take the reading.

From Shore

To collect a sample while standing on the shore, use a bucket or sample bottle attached to a pole so that you can reach the water from your on shore location. Scoop from below the surface in the upstream direction and be careful not to stir up the sediment upstream of your sample. Pour the water into the transparency tube in order to take the transparency measurement. Collect additional samples if more water is needed to fill the transparency tube all the way to the top.

Transparency Tube Monitoring Procedure

1. Remove large objects from the water sample.
   a. If necessary, filter through a nylon stocking.
2. If the sample has settled, use a stirring stick to stir the sample, or pour the sample into a clean bucket and back into the transparency tube to suspend all materials.
3. Stand out of direct sunlight and remove sunglasses if you are wearing them.
   a. If you cannot get to a shady place, use your body to cast a shadow on the tube.
4. Looking into the transparency tube for the target (black and white) disc on the bottom of tube.
   a. If disc <u>is visible</u>, record the length of the tube (e.g., 60, 100, or 120 cm) on the datasheet.

Transparency	Tube Length (circle one)			Trial #1	Trial #2	Average	-
	60 cm	100 cm	120 cm				cm

5. If target disc <u>is not visible</u>, have your partner let water out a little at a time using the valve at the bottom until disc is just visible.
   a. Have them stop letting water out immediately when you can just see the contrast between black and white on the disc at the bottom of the tube.
6. Read the level of water in the tube using the measuring tape on the side of the tube.
   a. Measurement will be in centimeters.
7. Record the measurement on your monitoring datasheet in the appropriate column.

Transparency	Tube Length (circle one)			Trial #1	Trial #2	Average	-
	60 cm	100 cm	120 cm				cm

8. Dump contents of tube on ground.
9. Collect a new sample and repeat steps 1 through 8 in order to complete a second trial.
10. Record the second measurement in cm on your monitoring datasheet.

Transparency	Tube Length (circle one)			Trial #1	Trial #2	Average	-
	60 cm	100 cm	120 cm				cm

A refresher video for how to monitor water clarity with a transparency tube is available on the WAV website (http://watermonitoring.uwex.edu/wav/monitoring/video.html). Please contact your local coordinator or the WAV coordinator if you have any questions!

Entering Monitoring Data into SWIMS

NOTE: Your web browser should be Microsoft Internet Explorer version 5.5 or higher.

1. Use Internet Explorer and navigate to https://dnrx.wisconsin.gov/swims.
2. Enter your WAMS User ID and Password and click Sign In

Wisconsin Department of Natural Resources

Surface Water Integrated Monitoring System (SWIMS)

Enter your User ID and Password to sign in
User ID
Password
Sign In

DNR Staff:
Log in with your Oracle ID and Password

Volunteers and Others:
Our log-in screen has changed. Log in with your Wisconsin User ID and Password above.
Forgot your password?
Get a Wisconsin User ID and Password

3. Click the Submit Data tab along the menu bar at the top of the screen.

My Projects | Submit Data | Reports, Maps, and Documents
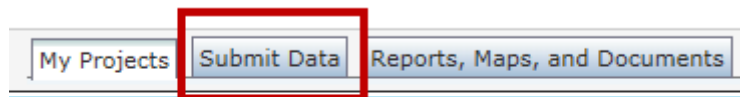
My Projects

4. Click the Add New button on the left side of the screen
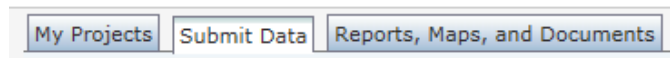
My Projects | Submit Data | Reports, Maps, and Documents

Submit Data

Monitoring Data

View List   View what yo
an option to

Add New   Add new mo

Submit Biological Data   Add new mad

5. Select your monitoring site from the Project dropdown list

   a. Selecting the project SHOULD automatically select the monitoring station.
      i. Please double check that the project and the station match when entering your monitoring data.
   b. If your monitoring location is not listed in the drop down Project list, please do not enter your data at this time.
      i. Contact local coordinator or the program coordinator to get your SWIMS account assigned to the correct station(s).
6. Select your group of Data Collectors (single individual or multiple people) using the down arrow to the right of the name field.

   If the correct list of data collectors is not in the list, create a new group by following the instructions below:
   a. [If necessary] Create a new data collector group:
      **This step is only necessary once for each group of collectors. After the group has been created, it will be available via the dropdown box.
      i. Click the 🔍 binoculars icon (to the right of the Data Collectors field)

      ii. To create a New Collector Group from the volunteers already attached to the project, click Add (to the left of the names) for each volunteer

iii. To add a new person to the collector group, search their name in the 'Search People/Groups' field at the top of the window

iv. Once complete, select Create and use this collector group to return to the main data entry screen

7. Confirm that the monitoring Station is same as Project

a. If there is more than one station listed or the correct station is not listed, please do not enter your data at this time. DO NOT USE THE BINOCULARS TO SELECT A STATION THAT DOES NOT MATCH THE PROJECT FIELD.

i. Report missing or incorrect station information to the WAV Data Manager and wait until the correct project and station information are available before entering your monitoring data.

8. Click the Show Map button to confirm the location of your monitoring site. Notify the data manager if the location is incorrect.

9. Enter the Start Date (mm/dd/yyyy) that you did your data collection work

a. A calendar window will pop up as well that you can use

10. Enter the Time that you started your data collection work

a. We require the start time information for all monitoring data. Be sure to enter AM or PM, also. Note: 12 noon is 12:00 PM.

11. Select the WAV Stream Monitoring 2015 form

    a. The WAV Stream Monitoring 2015 form should be selected automatically. If it is not, select it from the drop down list.

    b. If it is not available, you will need to contact the program coordinator to correct this before you will be able to enter your monitoring data.

12. DO NOT ENTER the Latitude and Longitude

    a. The location of your monitoring site is already established in SWIMS. If you wish to check the location of your monitoring site, click the Show Map button as described in Step 8.

13. Enter the End Date and Time for when you completed your monitoring work.

    a. These fields will autofill so you will need to update it accordingly.

14. Enter additional data in Comments
   a. Please, record any information that might help characterize your data. For instance, include information on any activity occurring upstream that may be affecting water quality, as well as observations you made regarding current weather, wildlife at the site, upcoming storms, etc.

Comments

Fill in the weather here, lake or streamside observations, wildlife spotted, names of additional helpers etc..

15. Click Next to go to the field work data entry screen

Save and Return | Save | Next

16. Enter your monitoring data from the red and purple boxes in the Result column

WAV Stream Monitoring 2015
Form for entering WAV parameters data.

	Parameter	Result
Weather	Weather	⌄
	Sampling Date:	⌄
	Weather over past two days	
	Current Stream Condition	⌄
	Current Streamside Observations	
WAV Monitoring Parameters	Air Temperature	
	Water Temperature	
	Dissolved Oxygen (D.O.) Sampling Method	⌄
	Dissolved Oxygen	
	Dissolved Oxygen % Saturation	
	pH	
	Transparency Tube Length	⌄
	Transparency Trial 1	
	Transparency Trial 2	
	Transparency Average(Calculates when saved)	
	Specific Conductance	
	Chloride Sample Collected?	⌄
	Point/Outfall Number-Chloride	
	Total Phosphorus Sample Collected?	⌄
	Point/Outfall Number-TP	

Next Date | Next Station | Save | Save and Return to List | Save and Next

   a. Enter the values recorded for each <u>measured</u> parameter. If you did not monitor the parameter, LEAVE IT BLANK! Entering a '0' into SWIMS does not indicate that you did not monitor it; it indicates that you got a result of '0'!
   b. Use the dropdown menus when available to record your response.
17. Click Save to save data.
   a. You will now see the result for the transparency average (grey line).
18. To continue entering your monitoring results:
   a. Click Next Date and Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date
   b. Click Save and Return to List to view your recently updated monitoring data
   c. Click Save and Next to move to the next data entry screen.

| Next Date | Next Station | Save | Save and Return to List | Save and Next |

19. This page is for entering streamflow data (green box) and monitoring equipment calibration information (orange box).

WAV Streamflow			
Form for entering WAV streamflow data and equipment calibration information.			
	Parameter	Result	Units
	Was streamflow monitored?	⌄	
	Streamflow method used?	⌄	
Flow Meter Method	Streamflow if using flow meter (cfs):		CFS
	Additional Comments		
Stream Flow Float Method	Length Assessed		Feet
	Stream Width		10ths Feet (eg 12.6)
	Stream Measurement Point 1 (ALWAYS 0)		10ths Feet
	Stream Measurement Point 2		10ths Feet
	Stream Measurement Point 3		10ths Feet
	Stream Measurement Point 4		10ths Feet
	Stream Measurement Point 5		10ths Feet
	Stream Measurement Point 6		10ths Feet
	Stream Measurement Point 7		10ths Feet
	Stream Measurement Point 8		10ths Feet
	Stream Measurement Point 9		10ths Feet
	Stream Measurement Point 10		10ths Feet
	Stream Measurement Point 11		10ths Feet
	Stream Measurement Point 12		10ths Feet
	Stream Measurement Point 13		10ths Feet
	Stream Measurement Point 14		10ths Feet
	Stream Measurement Point 15		10ths Feet
	Stream Measurement Point 16		10ths Feet
	Stream Measurement Point 17		10ths Feet
	Stream Measurement Point 18		10ths Feet
	Stream Measurement Point 19		10ths Feet
	Stream Measurement Point 20		10ths Feet
	Total Sum of Depths	0.0	Feet
	# of Intervals	0	
	Ave. Depth		Feet
	Cross Sectional Area	0.0	Square Feet
	Velocity Float Trial 1		Seconds
	Velocity Float Trial 2		Seconds
	Velocity Float Trial 3		Seconds
	Velocity Float Trial 4		Seconds
	Sum of Float Trials	0.0	Seconds
	Number of Trials	0	
	Float Time Average		Seconds
	Average Surface Velocity		Ft per Second
	Velocity Correction Factor	⌄	
	Corrected Surface Velocity		Ft per Second
	Calculated Streamflow	0.0	CFS
	Corrected Streamflow (Calculated):	0.0	
Monitoring Equipment Calibration	Dissolved Oxygen Meter Calibrated?	⌄	
	pH Meter Calibrated?	⌄	
	ECTestr Calibrated?	⌄	

| Next Date | Next Station | Save | Save and Return to List | Save and Next |

a. If you did not monitor the streamflow, answer 'No' to the 'Was streamflow monitored?' question at the top of the page and LEAVE THE REST BLANK!
b. Use the dropdown menus to indicate if you meters were calibrated or not.
   i. If you did not monitor for road salt, leave the ECTestr line blank.

20. If you entered streamflow data, click Save to save the data.
   a. You will now see the calculated results for streamflow (grey lines).
   b. If not, skip this step and continue to Step 21.

21. To continue entering your monitoring results:
   a. Click Next Date and Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date
   b. Click Save and Return to List to view your recently updated monitoring data
   c. Click Save and Next to move to the next data entry screen.

22. This page is for entering thermistor (continuous temperature monitoring device) data (blue box) on the back of the datasheet.

a. Use the dropdown menus (when available) to record your responses
b. Please remember to enter the time of deployment or retrieval of the thermistor (be sure to enter AM or PM using the dropdown menu to the right).
   i. If you are doing the monthly check, LEAVE THOSE BLANK!

23. To continue entering your monitoring results:
a. Click Next Date and Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date.
b. Click Save to save data.
c. Click Save and Return to List to view your recently updated monitoring data.
d. Click Save and Next to move to the next data entry screen.

24. This page is for entering biotic index data (red box) from the back of the datasheet.

a. Enter the values recorded for each _measured_ parameter. If you did not monitor the parameter, LEAVE IT BLANK!

b. Use the dropdown menus when available to record your response.

25. If you entered biotic index data, click Save to save the data.

    a. You will now see the results for the calculated fields (grey lines).

    b. If not, skip this step and continue to Step 26.

26. To continue entering your monitoring results:

    a. Click Next Date or Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date

    b. Click Save and Return to List to view your recently updated monitoring data

    c. Click Save and Next to move to the next data entry screen.

Next Date	Next Station	Save	Save and Return to List	Save and Next

27. This page is for entering habitat data for streams <10m wide (separate data sheet).

Qualit Fish Habitat Less Than 10 M	
Parameter	**Result**
Riparian Buffer Width Score:	∨
Bank Erosion Score:	∨
Pool Area Score:	∨
Width:Depth Ratio Score:	∨
Riffle:Riffle or Bend:Bend Ratio Score:	∨
Fine Sediments Score:	∨
Cover for Fish Score:	∨
Qualitative Fish Habitat Total Score (Calculated):	0.0

Next Date	Next Station	Save	Save and Return to List	Save and Next

a. Enter the values recorded for each _measured_ parameter. If you did not monitor the parameter, LEAVE IT BLANK!

b. Use the dropdown menus when available to record your response.

28. If you entered habitat data for streams <10m wide, click Save to save the data.

    a. You will now see the results for the calculated fields (grey lines).

    b. If not, skip this step and continue to Step 29.

29. To continue entering your monitoring results:

    a. Click Next Date or Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date

    b. Click Save and Return to List to view your recently updated monitoring data

    c. Click Save and Next to move to the next data entry screen.

Next Date	Next Station	Save	Save and Return to List	Save and Next

30. This page is for entering habitat data for streams >10m wide (separate data sheet).

Qualit Fish Habitat More Than 10 M	
Parameter	**Result**
Bank Stability Score:	∨
Maximum Thalweg Score:	∨
Riffle:Riffle or Bend:Bend Ratio Score:	∨
Rocky Substrate Score:	∨
Cover for Fish Score:	∨
Qualitative Fish Habitat Total Score (Calculated):	0.0

Next Date	Next Station	Save	Save and Return to List

a. Enter the values recorded for each _measured_ parameter. If you did not monitor the parameter, LEAVE IT BLANK!

b. Use the dropdown menus when available to record your response.

31. If you entered habitat data for streams >10m wide, click Save to save the data.
   a. You will now see the results for the calculated fields (grey lines).
   b. If not, skip this step and continue to Step 32.
32. To continue entering your monitoring results:
   a. Click Next Date or Next Station to return to the initial 'Create Monitoring Data' screen to begin entering data for a different station or for a different date
   b. Click Save and Return to List to view your recently updated monitoring data
   c. Click Save and Next to move to the next data entry screen.

| Next Date | Next Station | Save | Save and Return to List | Save and Next |

33. Congratulations! You're done entering data for this monitoring event!!!

Wisconsin Department of Natural Resources

Surface Water Integrated Monitoring System (SWIMS)   Welcome Keen, Bill | SWDV | Help | Log Off

| My Projects | Submit Data | Reports, Maps, and Documents |

Show 10 ⌄ entries
Monitoring Data you recently updated, or helped collect:

	Fieldwork Start	Project	Data Collectors	Status	Station ID	Station Name	Last Updated
🔍 ✏ ☀ 🗑	09/17/2015 07:00 AM	Badger Mill Creek at 69 Upstream to Fenceline	Bill Keen	COMPLETE	10011966	Badger Mill Creek - Sth. 69 Upstream To Fenceline In Pasture	09/17/2015
🔍 ✏ ☀ 🗑	07/22/2015 04:30 PM	Sugar River upstream of Valley Rd	Lisa Keen, Bill Keen	COMPLETE	10009476	Sugar River Upstream Of Valley Rd	09/16/2015
🔍 ✏ ☀ 🗑	07/22/2015 04:00 PM	Sugar River at Riverside Rd	Lisa Keen, Bill Keen	COMPLETE	133548	Sugar River at Riverside Rd	09/16/2015

Viewing or Editing your Monitoring Data in SWIMS

NOTE: Your web browser should be Microsoft Internet Explorer version 5.5 or higher.
   1. Use Internet Explorer and navigate to https://dnrx.wisconsin.gov/swims.
   2. Enter your WAMS User ID and Password and then click Sign In.
   3. Click the Submit Data tab along the menu bar at the top of the screen.
   4. Click the View List button on the left side of the screen.
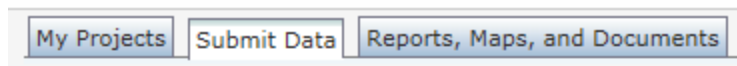
| My Projects | Submit Data | Reports, Maps, and Documents |

Submit Data

Monitoring Data

View List   View what yo
an option to

Add New   Add new mo

5. On this screen, you will be able to view all of the monitoring data that you recently updated or helped to collect (you were listed as a Data Collector)

6. Click the magnifying glass 🔍 to view previously entered data or click on the pencil ✏️ to edit previously entered monitoring data.
7. Once you've edited your entries on the 'Edit Monitoring Data' screen (station, data collectors, start date/time or end date/time, comments), click Save and Return to save your changes and view other fieldwork event.

8. To edit previously entered monitoring data (streamflow, weather, biotic index, etc), you will need to select the correct data entry form before moving to the next screen.
**When you enter the data initially, all of the forms are linked, but when editing they are separated so you have to select them one at a time.

   a. Qualit Fish Habitat Less than 10 M – separate habitat form (Step 27)
   b. Qualit Fish Habitat More than 10 M – separate habitat form (Step 30)
   c. WAV Stream Monitoring 2015 – red and purple boxes on the front page of the monitoring datasheet (Step 16)

d. WAV Citizen Monitoring Biotic Index - red box on the back page of the monitoring datasheet (Step 24)
    e. WAV Streamflow - green and orange boxes on the front page of the monitoring datasheet (Step 19)
    f. WAV_Thermistors - blue box on the back page of the monitoring datasheet (Step 22)
9. Click Next to edit the results on the next screen.
    a. Clicking Save will save your changes, but the screen will not change.
10. Once you have made the necessary changes to the data form, click Save and Return to view your recently updated monitoring data.
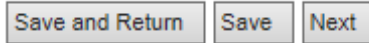
Please contact the WAV program coordinator if you have any questions or concerns about entering or viewing you monitoring data in SWIMS!