**Lone Cabbage Reef Project: Water Quality Sensor Servicing Protocol: Routine Downloads and Maintenance:**

SERVICING TRIPS OCCUR EVERY TWO WEEKS.

LAKEWATCH SAMPLE COLLECTION AND SPAT COLLECTOR EXCHANGE OCCUR MONTHLY (SEPARATE PROTOCOLS).

Optimal Crew: 3 people: Boat Captain, Buoy Handler (dirty hands), Data Retriever (clean hands)

Before trip: Ensure all equipment and cleaning supplies are in servicing box. Charge Toughbook and DiverMate.

Retrieval:

-Approach surface buoy from downcurrent side, locate subsurface float, anchor boat so sensor can be retrieved.

-Use boat hook to bring float to boat. Anchor chain should be long enough to reach into boat.

-Untangling buoys/chains and getting out of the boat to reset screw anchors may be necessary.

Remove Sensor from Buoy Anchor:

-Clean sensor and dry before attempting a download (Data Retriever)

- use tooth brush for star odi sensors and black brush for divers

- clear visible sensor on diver and inside the bottom pointed side (this often gets clogged with mud or spat settles)

-Clean clear/PVC housings (Buoy Handler)

- large screw driver is best to clean the inside of housing

-Record level of fouling/mud on datasheet

**STAR-ODDI DST SENSOR PROTOCOLS (Diver protocols on reverse side):**

Connecting to Sensor:

-Connect communication box to laptop (new USB unit or old serial connection which needs 9V battery)

-Open SeaStar program on desktop

-Click “Yes” to “Run Recorder Connection Wizard”

-Record sensor serial number. Place dry/clean sensor into the chamber in the communication box

-Select Green COM box and click “Next”

Downloading Data:

-Record time of sensor download (UTC)

-Click “Yes” to “Retrieve Recorder Data”

-Record the number of measurements (normal = 700-900 per month)

-Record time of last measurement (UTC)

-Clock symbol should be present under “Mode” in Recorder Wizard Menu (Z’s indicate sensor inactive)

-Record Battery Level (%)

-Within the “Lone Cabbage” Folder on the Desktop, create a folder named with the download date

-Close Recorder Wizard

-Review Data in SeaStar, Locate .DAT file here: C:\Software\Star-Oddi\SeaStar\DST CTD\SerialNumber

-Copy this file to today’s Lone Cabbage desktop folder and save using the following filename format:

YYYYMMDD\_station\_type example: 20171201\_wq2\_star

-Open Recorder Wizard

-Click “Restart Recorder…” from the Recorder Wizard Menu

-Ensure the measurement settings are set to record hourly intervals starting on the next hour.

Example: 0900, not 0932

-Record next measurement time (UTC)

-Click “Ok” and a green “Start New Measurement Sequence” box will appear, followed by a

“Remove Recorder” box. Clicking disconnect sensor will put it to sleep. **Do not do this.**

-Remove sensor, wrap clear housing in press’n’seal, poke holes for circulation, return to pvc housing, redeploy sensor.

-Close SeaStar windows and proceed to next station

(next page: Star-Oddi Initial Programming)

Initial Programming:

-Once sensor is connected to SeaStar program, click “Program and start Recorder” from Recorder Wizard Menu

-From Interval Definitions, select “Single recording interval” and click “Ok”

-Under “Set New Measurement Sequence” select the current date and start time for the next hour

Example: 0900, not 0932. Select hourly measurement intervals and set mode to “Single Mode”

-Click “Ok.” A box will appear summarizing your selections. Review, confirm, click “Ok”

- A green “Start New Measurement Sequence” box will appear, followed by a

“Remove Recorder” box. Remove sensor.

**DIVER CTD PROTOCOLS: MUST CONNECT TO LAPTOP/ONLY USE DIVERMATE AS BACKUP**

Connecting to Sensor:

-Connect Diver communication box to laptop

-Open Diver-Office program on desktop

-Unscrew Diver sensor endcap and insert sensor into communication box

-Click “Diver” Icon

-Record sensor serial number.

-Record time of last measurement (UTC)

-Record next measurement time (UTC)

-Record Battery Level (%)

Downloading Data:

-Record time of sensor download (EST)

-Click “New Data” icon. A QA/QC filter window may appear, review and take any notes, click close. If this is the first time downloading after programming, “New Data” is not an option and click “Data” icon instead. Review graphs/data.

-Find most recent download date range from menu on the left. Right click and select “export”

-In new window, select the Lone Cabbage desktop folder, make sure “Uncompensated” is selected, and click “Ok”

-Rename file using the following filename format:

YYYYMMDD\_station\_type example: 20171201\_wq3\_diver

-Close Diver-Office software and proceed to next station.

-Remove sensor. Wrap sensor in press’n’seal, poke holes for circulation, return to pvc housing and redeploy sensor.

Backup DiverMate instructions: Connecting to Sensor/Downloading Data:

-Record time of sensor download (EST)

-Attach Diver sensor cable to sensor

-Attach Diver sensor cable to Blue DiverMate (it is required to connect in this order)

-On DiverMate, orange light will blink indicating data transfer. Green light indicates successful load.

-Red light indicates error. Disconnect, ensure connections are clean and try reconnecting (in proper order).

-Disconnect sensor and replace endcaps.

-Connect DiverMate to Toughbook (pink light = charging, orange light = good connection).

-Open Diver-Office on Toughbook

-Click “Import->Diver Data” from the Menu

-From left menu, select Diver Serial Number, click on “+” sign

-Review Data

-Right click on latest dataset in menu on left and select “export.” Follow export instructions above.

(next page: Initial Diver Programming)

Initial Programming (Deletes all data on unit):

-Once sensor is connected to Diver-Office program and “Diver” window is open.

-Click “Settings” icon. Under “Sample Method” select “Fixed” and “Record Interval” to “1 hour”

-Click “Program” icon.

-Click “Start” icon. Select “Future Start” and select the current date and start time for the next hour

Example: 0900, not 0932.

-Make sure the “Sync Time” is checked and select “Start”

-“CTD Diver” should read “Future Start”

-Click “Close.” Remove sensor.

**REDEPLOYING SENSORS:**

-Place sensor back into housing, wrap with Press n Seal, and place in PVC housing

-Ensure shackles are closed, zip-tie as a backup

-Deploy sensor, pulling chain tight and pointing it towards the mainland

**WHEN TO REMOVE/REPLACE SENSORS:**

-Data review indicates unrealistic or no readings (number of measurements should be similar across stations)

-Downloading Data/Reprogramming is not possible or questionable

-Obvious damage to sensor is observed or spat/barnacle growth is covering sensor

-Record serial numbers of removed/replacement sensors on datasheet

**TRICKS TO DOWNLOAD STAR-ODDI SENSORS:**

These sensors are sometimes glitchy during downloads (won’t connect, odd error boxes pop up)

-If the sensor doesn’t appear in connection wizard, try twisting sensor or holding it down (sometimes you have to hold it down for the whole download/redeployment process).

-Try closing the software and reopening it

-Keep the comm box cool/in the shade. It seems more glitches occur in the summer when sitting in the sun.

-Try switching to the spare comm box. Keep spare comm box cool/in the shade.

-Keep trying. Sometimes it takes ten times to download.

-Make sure latest software is installed on laptop.

**EQUIPMENT LIST:**

-Toughbook laptop (CHARGE! Make sure timezone is set to UTC)

-Star-Oddi and Diver Communication Boxes (plus spare)

-Datasheets and protocols

-GPS with WQ station coordinates

-Channel Lock pliers (opens PVC housing)

-Boat hook (buoy retrieval)

-Cleaning Supplies: Scrub/wire brushes, scrapers, toothbrushes, vinegar, rags, toothpicks

-Press n Seal Wrap

-3 Spare Buoy/Anchor rigs (large buoy, small buoy, rope, chain, shackles, pvc housing, screw anchors)

-Zip-ties

-Screw anchor driver

**Office Protocol**

-Go to the following folder: T:\Oyster Project\project\_task\t7\_data\_management\wq\data

-Move data from previous download from “new\_data” folder to “imported\_data” folder

-Transfer data (.mon or .data files) for each sensor from the laptop to “new\_data” folder

-Scan datasheets, name with YYYYMMDD\_wq\_datasheet format, and place in the following folder:

T:\Oyster Project\project\_task\t7\_data\_management\wq\data\wq\_datasheet

-Update the following tables in MySQL database using the field datasheet:

-lcroyster\_sensordeploy (if sensor removed, then “deployment” time = last measurement plus 1 minute)

-lcroyster\_sensorservice (service log)

-lcroyster\_waterobservation (YSI measurements plus Lakewatch sample results)

-Navigate to User Folder on a computer set up for import (example C:\Users\stevenbeck)

-Right click in empty space and select “Git Bash Here”

-Enter command to import latest data: $ python import\_sensor\_buoy\_data.py

-Click enter. This will update database. Progress should take 10-15 minutes (longer as more data is collected)

-Review log, check for errors

-Run QA/QC programs in MySQL workbench to ensure:

-data is continuous between servicing trips

-sensors are reading in appropriate ranges

-data collected when sensor is out of water are removed (example: during servicing trips)

-data from malfunctioning sensors are removed (flatlines)

-Run additional (graphical) data checks in R.

**RETURNING SENSORS TO STAR-ODDI**

-We try to maintain having 5 spare star-oddi sensors

-Once 3 sensors are in need of repair, Prepare a package to mail back to Star-Oddi:

1) Place sensors in padded box

2) Include a sensor repair request form in package (including sensor serial numbers and issues):

forms here: T:\Oyster Project\oyster\_project2\project\_task\_working\t7\_data\_management\wq\protocol\repair

3) Email the same sensor repair request form to Baldur Sigurgeirsson [baldur@star-oddi.com](mailto:baldur@star-oddi.com), notifying him to expect a package and you are interested if any of the sensors are still under warranty

4) Take package over to WEC HR to arrange international shipment through the WEC FedEx account.

5) Charge to the Lone Cabbage Acct: P0045080: Line Item: Salinity Meters

Address:

Baldur Sigurgiersson

Star-Oddi

Skeidaras 12, 210 Gardabaer, Iceland

