

The *Oncor* Geodatabase for the Columbia Estuary Ecosystem Restoration Program: Handbook of Data Reduction Procedures, Workbooks, and Exchange Templates

NK Sather
AB Borde
HL Diefenderfer
JA Serkowski
AM Coleman
GE Johnson

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Pacific Northwest National Laboratory
Richland, Washington 99352

Appendix E

Depth Sensor Deployment Field Guide

Depth Sensor Deployment Field Data Sheet

Date _____

Location _____

Sensor Serial Number _____

Distance Sensor to Water Level _____

Time _____

Distance Sensor to Top of Post _____

(____) Deployment (____) Retrieval

Distance Sediment to Top of Post _____

Download (____) Yes (____) No

Elevation of post or sensor taken (____) Yes (____) No

Method _____

Notes: _____

Depth Sensor Deployment Field Measurements

A few notes about field measurements:

1. The diagrams below represent some options for sensor deployment. Other options may be used, such as using a line to attach the sensor to PVC rather than another PVC pipe. Whatever the method for deployment, the measurements described below should be made to ensure the sensor is measuring accurately and that the sensor did not move during the deployment period.
2. If at all possible the best way to determine the elevation of the sensor is to take an elevation measurement as close to the sensor location as possible. If this is not possible then an elevation can be taken at an easy to measure point, such as the top of the sensor deployment set up and the difference in locations measured using a measuring tape or stick.
3. The sensor should be deployed as close to the sediment as possible so 1) the likelihood that it will be exposed at low water is minimized, and 2) if the T-post is bent over during deployment, the sensor location will be minimally impacted.

Measurements for T-post deployment and retrieval – post straight

1. Measurement of the water level is critical to determine whether the depth sensor is measuring accurately. This measurement should be taken as close to the time of the sensor measurement as possible. Setting the sensor to take measurements on the hour makes the timing of field measurements easier.
2. The measurement from the sensor to the top of the post is necessary for two reasons:
 - a. to determine if the PVC and sensor shifted during the deployment period
 - b. to be used to determine the elevation of the sensor

When a depth sensor is secured to a T-post, the elevation of the post is sometimes easier to measure than the elevation of the sensor which is inside a PVC pipe and likely underwater. If the direct elevation of the sensor is measurable then this is the desired method. If not, then elevation of the top of the post is measured (4) and an additional measurement from the sensor to the top of post is required (2) in order to determine the elevation of the sensor. A yard or meter stick works best for measuring from the sensor to the top of the post. The hose clamp on the outside at the bottom of the PVC (and approximate location of the sensor) is a findable location underwater to measure from.

3. Measurement from the sediment to the top of the post provides an indication of whether the post moved or if sedimentation occurred. It also provides an elevation of the channel bottom in the unfortunate event that the sensor ends up on the bottom during the deployment period.
4. Measurement of the elevation of the top of the T-post or the sensor elevation can be done with an RTK gps or other survey method, such as an auto-level that can measure the difference between the point and known elevation point.

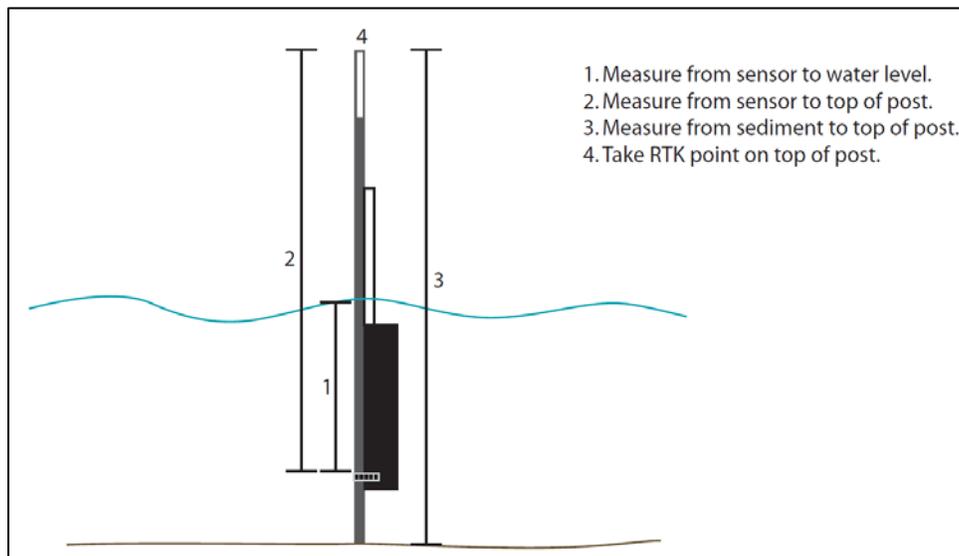


Figure 1. Measurements to be taken when a sensor is inside PVC and attached to a t-post.

Measurements for T-post deployment – post leaning

Sometimes the T-post will have been compromised sometime during the deployment period and may be leaning at an angle (Figure 4). In this situation additional measurements are necessary to determine the resulting elevation of the sensor and to collect the verification measurements.

1. If direct measurement of sensor elevation (4) is not possible but elevation of the top of the post is measured then the vertical distance (as opposed to the distance along the post) from the top of the post to the sensor can be calculated using the following equation:

$$\text{Vertical distance from top of post} = \text{Measurement 3} * (\text{Measurement 2} / \text{Measurement 1}).$$

The vertical distance is then subtracted from the elevation at the top of the post (5) to get the sensor elevation.

2. Besides being used in the equation above, the vertical measurement from the sensor to the water level allows for the verification that the sensor is measuring accurately. This measurement should be taken as close to time the sensor is recording a measurement as possible.
3. This measurement is used in the equation above and the measurement along the post from sensor to the top determines whether the sensor moved along the post during deployment.
4. The RTK (or other survey method) measurement of sensor elevation should be taken, if possible.

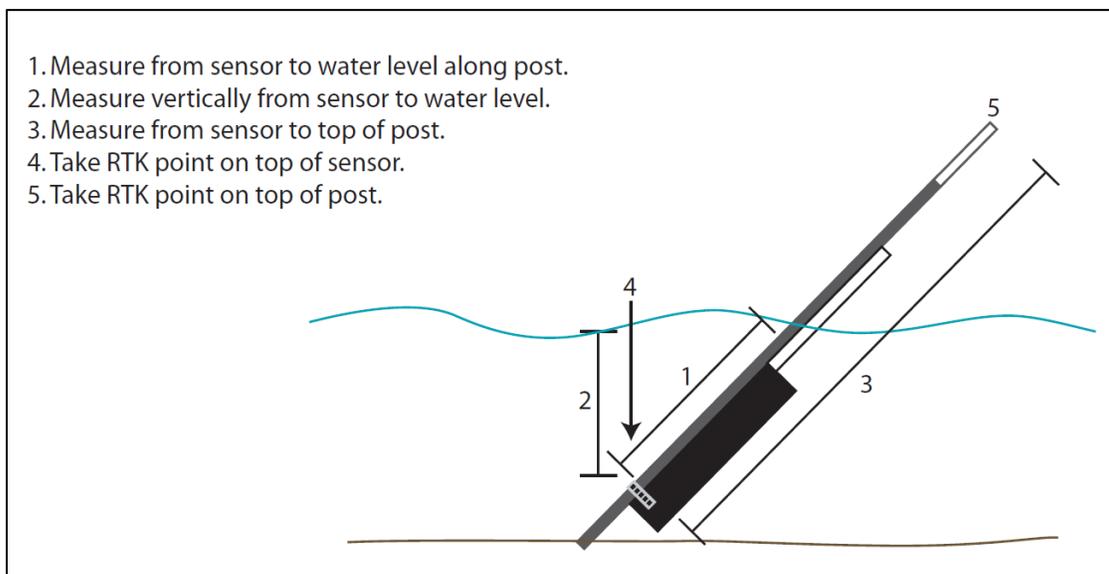


Figure 2. Measurements to be taken when a sensor is inside PVC and attached to a t-post that is leaning.

Measurements for T-post deployment – post laying on the bottom

Sometimes the deployment setup will have been compromised sometime during the deployment period and the sensor and/or T-post may be lying on the bottom (Figure 5). In this situation additional measurements are necessary to determine the resulting elevation of the sensor and to collect the verification measurements.

1. The vertical measurement from the sensor to the water level allows for the verification that the sensor is measuring accurately. This measurement should be taken as close to time the sensor is recording a measurement as possible.
2. The measurement along the post from sensor to the top determines whether the sensor moved along the post during deployment.
3. If possible, an elevation measurement should be taken at the location of the sensor. If this is not possible then the elevation can be estimated from the measurement of the top of the post to the sediment surface taken at deployment (3).
4. If the T-post is still standing then take an elevation measurement at the top of the post to determine whether the post moved at all during the deployment period.

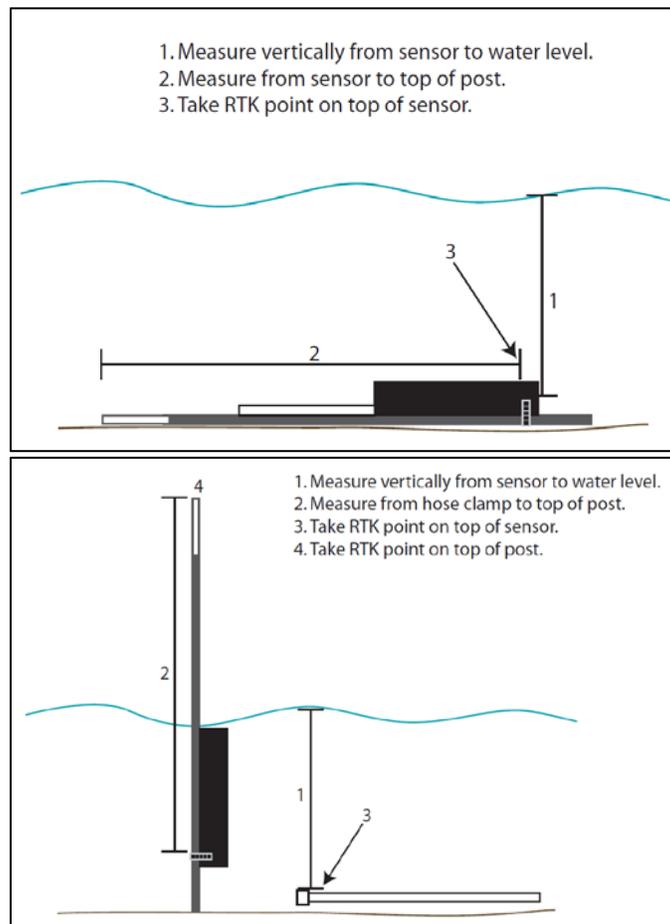


Figure 3. Measurements to be taken when a sensor is laying on the bottom.

Measurements for sensor attached to piling

Sensors can be attached to a piling or other existing structure (Figure 6). This is a very good alternative because it does not require the placement of a post in the water.

1. Measurement of the water level is critical to determine whether the depth sensor is measuring accurately. This measurement should be taken as close to the time of the sensor measurement as possible. Setting the sensor to take measurements on the hour makes the timing of field measurements easier.
2. Measurement from the sediment to the water level allows for the calculation of the 1) distance of the sensor to the sediment and 2) the calculation of the elevation of the channel bottom. This provides an indication of whether sedimentation occurred during the deployment period. It also provides an elevation of the channel bottom in the unfortunate event that the sensor ends up on the bottom during the deployment period.
3. An elevation measurement should be taken at the location of the sensor at deployment.
4. Marking the piling at the location of the sensor or the PVC at deployment provides a means of determining if the sensor moved during the deployment period.

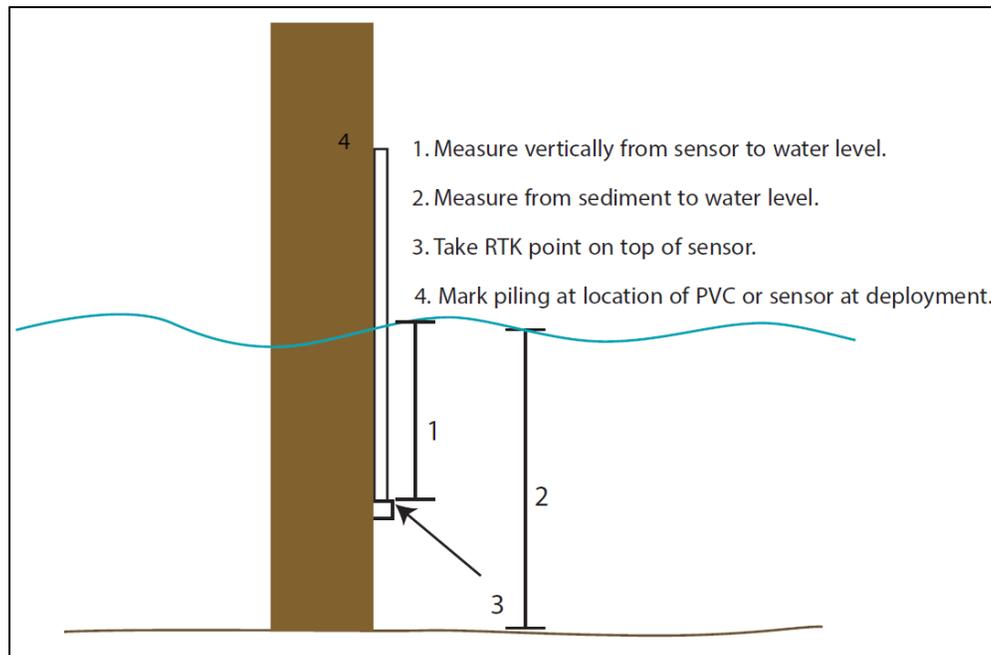


Figure 4. Measurements to be taken when a sensor is attached to a piling.

Measurements for sensor attached to block

Sensors can be deployed on blocks or other weighted objects (Figure 7). The disadvantage of this method is that it is very difficult to determine whether the elevation of the sensor changed during the deployment period.

1. The vertical measurement from the sensor to the water level allows for the verification that the sensor is measuring accurately. This measurement should be taken as close to time the sensor is recording a measurement as possible.
2. The RTK (or other survey method) measurement of sensor elevation should be taken.

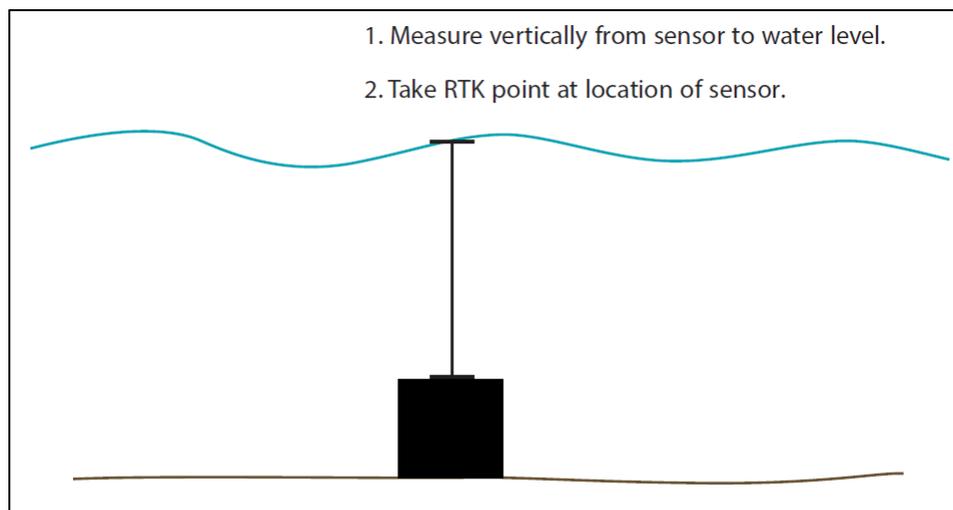


Figure 5. Measurements to be taken when a sensor is attached to a block.