STAFF GAGE & TRANSDUCER INSTALLATION

Massachusetts Department of Fish and Game
Division of Ecological Restoration
Invested in Nature and Community

Michelle Craddock

MA Department of Fish and Game, Division of Ecological Restoration

Site selection

- Site reconnaissance to identify suitable/best location
  - Range of flow conditions, if possible
  - Talk with others working on river
- Determine what type of installation is most appropriate (streambed, fixed object, other)
- Install transducer/gage in a pool where turbulence is minimal and where equipment will be submerged during low flows
- Pool should have a downstream hydrologic control that allows for a stable stage discharge relationship
  - Natural controls may include a downstream riffle or bedrock outcrop
  - Unnatural controls might include a bridge or culvert that constricts flow
- Avoid sites with extensive aquatic vegetation, beaver activity, or unstable streambeds and banks.

Installation tips - Gage

- Use composite wood for gage board – anything else will eventually rot
- Use stainless steel everything
- When possible, gage should be oriented so that it is parallel to flow
  - If not, water will 'pile up' on gage making it difficult to get an accurate reading
- Installing gage in a pool will result in less turbulence and allow for more accurate gage readings

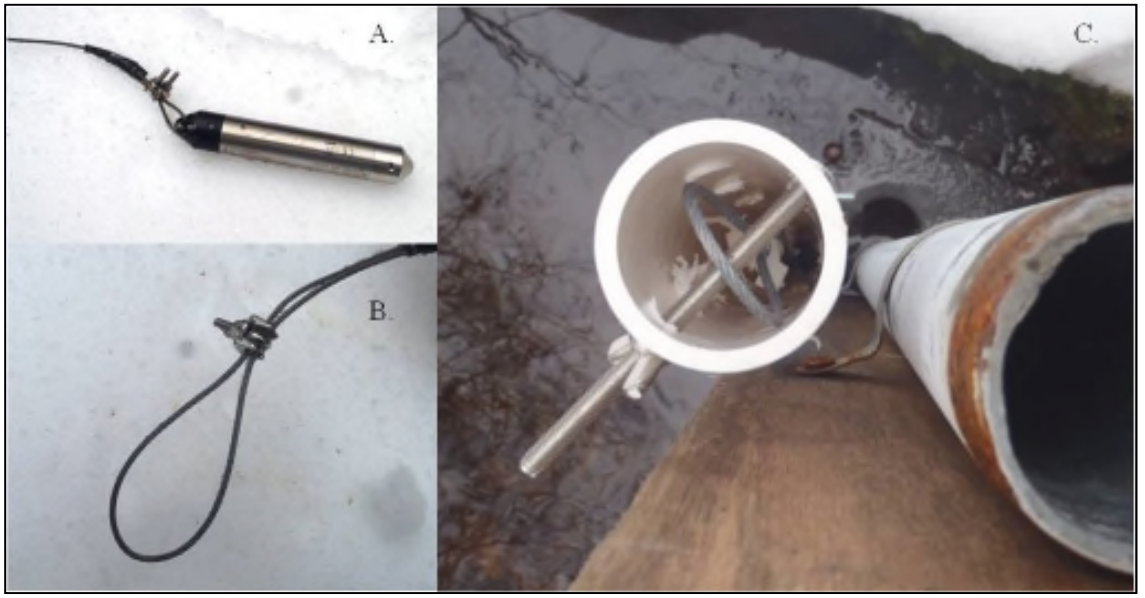
'Pile up' of water on staff gages

Installation tips – Transducers

- Install transducers in a PVC stilling well/protective housing
  - PVC should be installed slightly above streambed to reduce chance of fouling by sediments
  - Drill holes in PVC to allow water to move freely through housing
- Install transducer in calm pool to reduce turbulence and 'noisy' data
- Install transducer in a deep pool – they are less likely to freeze solid/go dry

Installation tips – Non vented transducers

- For non-vented transducers, suspend transducer from top of PVC using a non-stretch cable or rope (e.g., coated stainless steel cable, A) and make a loop at the non-transducer end (B) The cable should be long enough that the transducer will always be under water but not so long that it will come into contact with the streambed.
- Place the looped cable over a long bolt with a wing nut that runs through the top of the PVC (C)
- Use a long section of PVC so that you can access transducer in a variety of lows and not have to fiddle under water



Installation tips – Barometric logger

- Place the device as close as possible to the instream pressure transducer.
- Install in PVC for protection. PVC should be drilled with holes to facilitate air movement
- Drill a hole in bottom of PVC so any water that enters will drain

Installation tips – Vented transducers

- Data logger can be attached to nearby tree in a PVC housing (locking well caps may be available) using stainless steel conduit straps.
- Excess cable can be wound up and secured with zip ties
- If data logger is not supported by pipe, suspend it on a wire or cable so no pressure its put on vented cable

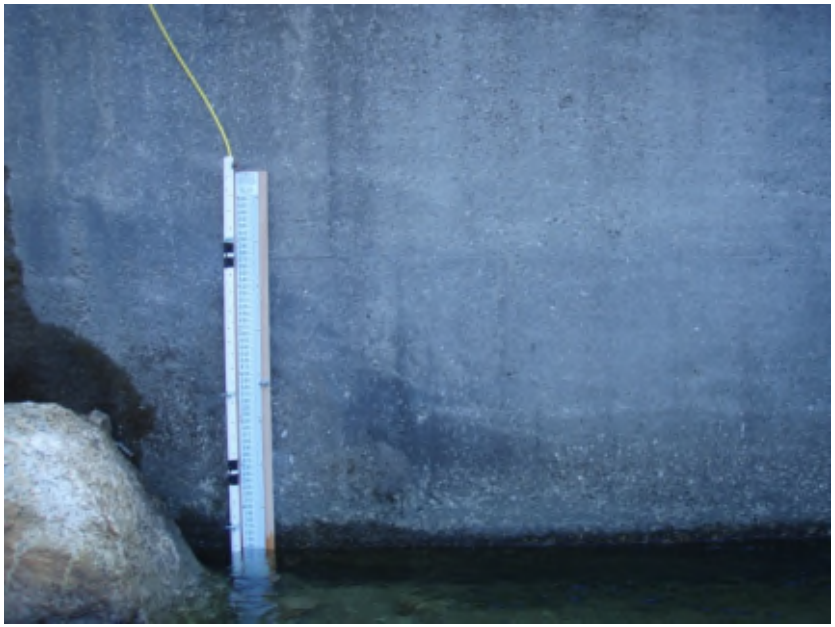
Fixed object (bridge) installation

Preliminary site scouting

Eventual site

Cold River in Florida, MA

Fixed object (bridge) installation

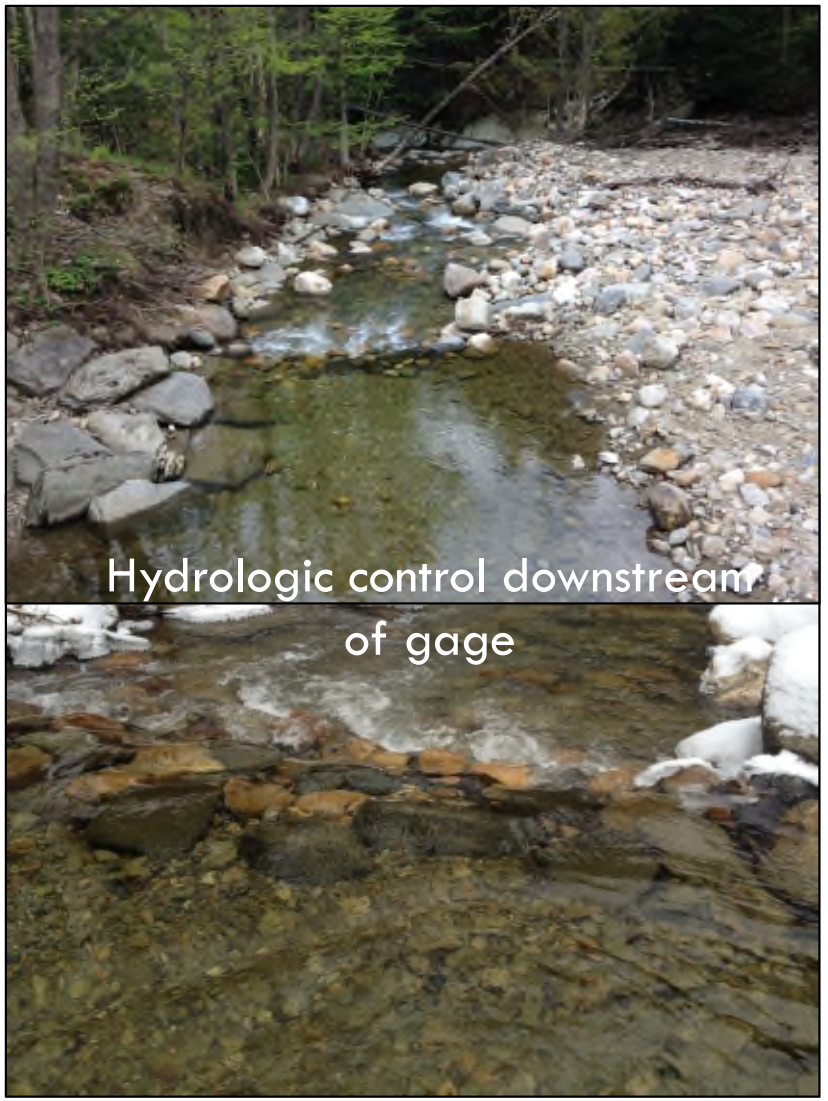


Gage and transducer installed on bridge wing wall

- Calm pool
- Stable attachment point

(Expected stream to be flashy)

- Good downstream control



Fixed object installation

Streambed installation

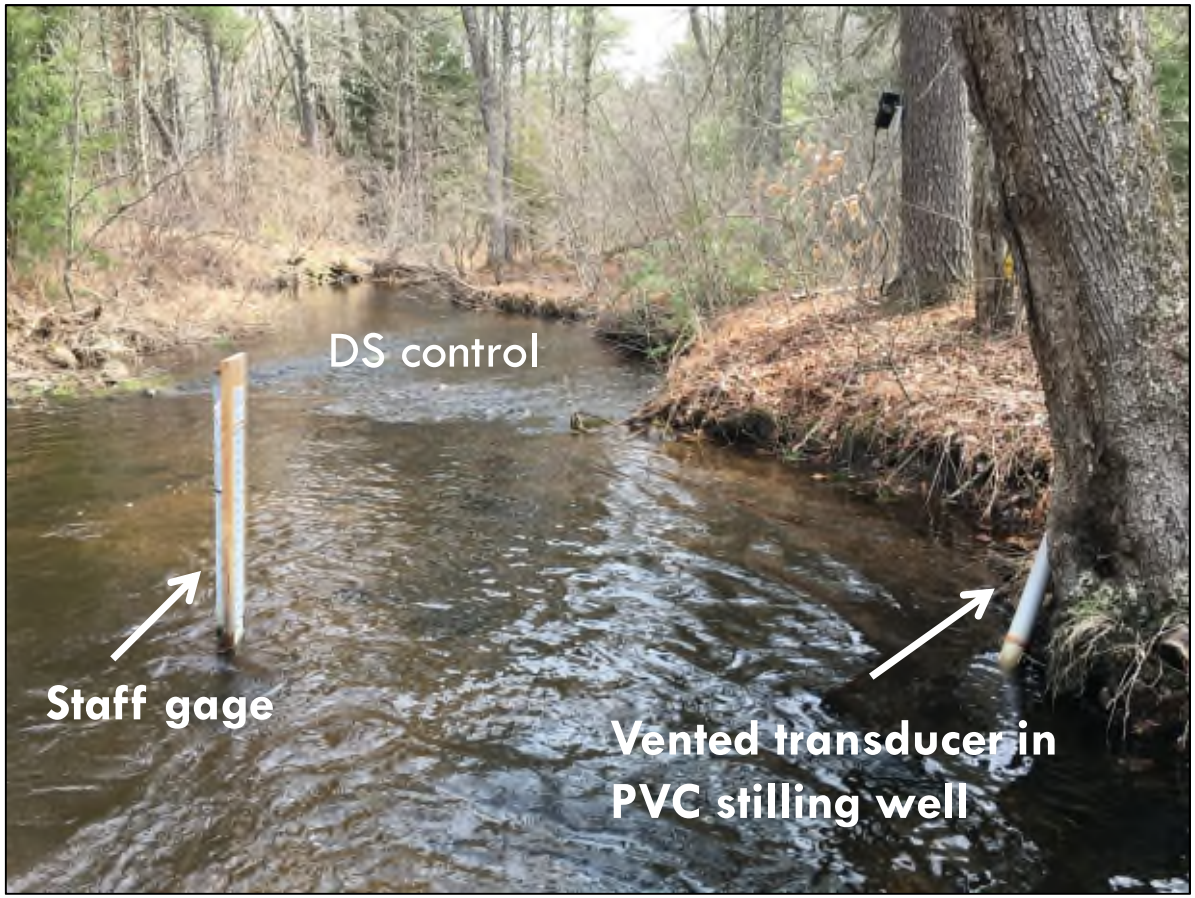
- Pros : Accessible via conservation land, calm pool, upstream of stable hydrologic control, easily accessible, close to biological monitoring sites

Gage pool upstream of hydrologic control (rock riffle)

Even in high flow, gage pool is calm

Parkers Brook in Barre, MA

Streambed and tree installation



Gage and transducer are in different locations but are in the same gage pool and have the same hydrologic control

Vented transducer is near stream bank so cable is not in stream. Transducer is in calm, deep pool

Gulf Brook in Pepperell, MA

Bad installation sites

Channel is sandy and looks unstable, banks are undercut, no obvious hydrologic control

Channel is sandy and is not clearly defined, no obvious hydrologic control

Good news is that better installation sites were found downstream!

Bad installation sites

Gage installed at low flow in rock riffle – not in pool – washed out during high spring flows and was reinstalled in better location