2014 Evaluation Tool for Barriers to Aquatic Organism Passage (AOP) for NRCS Programs

Background

This tool was developed to evaluate and help prioritize potential AOP or fish passage projects that are identified by natural resource agencies, watershed groups, non-government organizations or private individuals. The tool will help field planners document field conditions, identify target species and to organize the best supporting scientific data. Supporting data would include stream geomorphic assessment data – Bridge and Culvert Assessment, hydraulic modeling, fish population data (VTFWD, USFS, USFWS or consulting biologist data), or other detailed information that assesses current condition. **All potential AOP projects, funded through NRCS, will be evaluated by the Vermont Fish and Wildlife Department or USFWS Aquatic or Fisheries biologists. For projects not identified by a Fisheries Biologist, this worksheet must be completed by August 1st to allow sufficient time for VTFWD Fisheries to evaluate the site prior to program ranking.** This worksheet was a collaborative effort of the NRCS, USFWS, VTFWD, and DEC.

This tool is also intended to determine the level of aquatic habitat fragmentation and serves as the Vermont adaptation of the Stream Visual Assessment Protocol (SVAP) Version 2 Element 11 – Barriers to Aquatic Species Movement. SVAP recommends and Vermont NRCS has implemented State level adjustments to SVAP for our local conditions. Vermont Agency of Natural Resources (ANR) has a wealth of assessment tools and resources available through the River Management Program and Vermont Fish and Wildlife Department. Additional resources are referenced at the end of the document. Much of the following criteria are adapted from The Vermont Culvert Aquatic Organism Passage Screening Tool (2009) and AOP Coarse Screen table (VTFWD). The criteria outlined below should be used to determine how passable the barrier may be to aquatic organisms and to determine a habitat score for planning purposes. **A score of 7 or higher is required to meet the planning criteria to address the aquatic habitat fragmentation resource concern. If the score is less than 7 then a barrier to at least some aquatic organisms or aquatic organism life stages exists.** Evaluation should be completed during low flow conditions. Note that this tool has been specifically developed to evaluate culverts and dams which are the most common and problematic sources of aquatic habitat fragmentation in Vermont. SVAP also includes barriers related to water withdrawals and/or water quality which are uncommon in Vermont and have been removed for this tool. If such conditions are encountered they can still be evaluated through this tool with assistance.

VT NRCS SVAP Adaptation - Barriers to Aquatic Species Movement

Use to determine degree of resource concern related to barriers to movement. If multiple conditions exist at one culvert, document the conditions, but use the lowest score. A score of 6 or less would indicate aquatic habitat fragmentation. A score of 7 or higher would indicate no aquatic habitat fragmentation resource concern.

Physical Structures prohibit movement of aquatic species – Natural barriers could include free fall waterfalls or vertical bedrock faces as part of the stream. Man-made structures, primarily dams and culverts, are the primary fragmentation concern in Vermont. **Score 0-1 if any of the following conditions exist:**

- Culverts with outlet drop height of a foot or more
- Culverts with outlet drop of any height with no plunge pool below culvert outlet,
- Culverts with outlet drop height greater than plunge pool entrance depth (depth of pool directly below culvert)
- Water depth in culvert at outlet is less than 3.5 " (may indicate seasonal problems with movement)

Physical Structures restrict movement of aquatic species through the year or may only allow adult salmonids seasonally. Score 2-3 if any of the following conditions exist:

- Culverts with outlet drop height less than a foot
- Culverts with outlet drop height equal to or less than the plunge pool entrance depth*

*Adult salmonids have strong swimming and leaping abilities further aided by deep plunge pools below culverts

Physical Structures restrict movement for some species or life stages due to limited depth or high velocities in culverts. Culverts could potentially pass strong and moderate swimmers (see page 5 Additional Information) under some flow conditions (culvert outlet is at grade, backwatered, or has a downstream cascade). Note "Cascade" indicates an exit where flow cascades downstream over rocks. Cascades may be passable under some flow conditions, but can also compromise fish passage due to shallow depths and steep ascents. **Score 4-6 if any of the following conditions exist:**

- Culverts with outlets classified as cascade
- Culverts with obstructions
- More than one culvert at a crossing
- Culverts lacking sediment throughout the structure but at grade

Limited or no artificial barriers that prohibit movement of aquatic organisms during any time of the year. These structures function no different than the upstream and downstream channel. **All of the following conditions must exist to score 7-8:**

- Culvert with no outlet drop height and Culvert inlet at grade or backwatered with natural channel bottom sediment throughout the structure.
- Culvert with no obstructions
- Only a single culvert at crossing
- Bridges/arch culverts less than bankfull width

No artificial barriers, bottomless structures at stream bankfull width or wider. These structures function no differently than the upstream and downstream channel. These structures also allow for adjacent stream shoreline habitat readily used by terrestrial wildlife. **Score 9-10 if either of the following conditions exist:**

- Arch type culvert with natural sediments, boulder/woody complexity throughout
- Bridge greater than bankfull width allows for streamside habitat (shoreline) below structure

VT NRCS Evaluation Data Form - Barriers to Aquatic Organisms

Form Completed by: **Date:**

Phone Number:

Applicant Name: **Town, County:**

VT NRCS Scoring (see criteria and point levels above):

Barrier Description and Rationale for Scoring (see criteria/categories above):

Barrier age (if known) and structural condition:

Site Description and Summary – Be very specific of location (e.g. road and stream names, watershed, town, etc) and Provide USGS topographic map with site clearly marked (recommend use a GPS location):

AO Species Target (e.g. brook trout):

Other species which would potentially benefit from the project:

Screening Questions **Select One:**

1. Is the barrier (culvert) slated for replacement in the near future?
   If 'Yes' then estimate date:

2. Was this project identified and recommended by a Fisheries biologist?
   Name of Biologist:

3. Has the ANR Phase 2, Rapid Geomorphic and Habitat Assessments been completed? If 'Yes' attach Reports from DEC.
   See Vermont Natural Resource Atlas (River Management Themes)
   http://anrmaps.vermont.gov/websites/anra/

Screening Questions (continued) **Select One:**

4. Has the ANR Phase 2, Bridge and Culvert Assessment been completed?
   If 'Yes' attach Aquatic Organism and Wildlife Passage Report.
   See The Stream Geomorphic Assessment Data Management System (SGA-DMS).
   Click on *Datasets* tab and then *Select Reports*
   https://anrnode.anr.state.vt.us/SGA/

Assistance is available from River Scientists for your area or the State Biologist
Contact DEC: http://www.anr.state.vt.us/dec/waterq/rivers/htm/rv_geoassess-contact.htm

5. Has a more detailed hydraulic survey (e.g, FishXing) been completed?
   (Speak with local District Fisheries Biologist) If 'Yes' attach form.

6. Has VTFWD evaluated the site or is there historic fish population data?
   (Speak with local District Fisheries Biologist) If 'Yes' attach data.

7. Have permits been secured by the applicant? This is a requirement for any dam removal project.

8. What is the total length of perennial stream (use topo quad-solid line) above the obstruction?
   Distance (feet):

9. Are there barriers* upstream or downstream of this site (distance to nearest barriers)?

Upstream distance (feet): **Barrier Type:**

Downstream distance (feet): **Barrier Type:**

** In general, culverts can be considered barriers unless all of the following conditions exist: there is no drop at the outlet, natural streambed substrate is present throughout the culvert, there is no blockage at the inlet, and the structure width is at least 75% of the stream bankfull width. Natural barriers, such as a high and steep waterfall, are also included. See also criteria above for more detail.*

10. List any State or Federal rare, threatened or endangered aquatic species within the river system:

Send completed form, maps and pictures to:
Toby Alexander
USDA NRCS
356 Mountain View Drive, Suite 105
Colchester, VT 05446
Or email toby.alexander@vt.usda.gov

Additional Information

Expected periods of movement for selected fish species in Vermont. Solid represents spawning movements, shaded represents general (e.g. foraging, refugia) movements). VTFWD

Species	Lifestage	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brook trout	All									
Rainbow trout	All									
Brown trout	All									
Atlantic salmon	Adult									
	Juvenile									
Rainbow smelt	Adult									
American eel	Juvenile "Yellow" eel									
White sucker	Adult									
Other resident fishes	All									

Broad Characterization of Swimming Ability

Weak Swimmers
- Small benthic species (e.g., sculpins, darters, burbot)
- Early life stages (age-0 and juvenile) of larger benthic and pelagic species

Weak-Marginal Swimmers
- Small pelagic species (e.g., sunfish, dace, shiners)
- Medium benthic species (e.g., creek chubsucker, bullhead)
- Juveniles of large benthic and pelagic species

Marginal-Strong Swimmers
- Large pelagic and benthic species (e.g., fallfish, creek chub, suckers, perch, bass, pickerel)

Strong Swimmers
- Large pelagic species (e.g., salmon, trout, shad, alewife)

Note: For Point Category 4-6 on page 2, 'Strong and Moderate Swimmers' would include *Marginal-Strong Swimmers* and *Strong Swimmers* listed at left (VTFWD).

Additional Resources

The following documents are all excellent resources available on the Vermont Fish and Wildlife Department webpage - http://www.vtfishandwildlife.com/library.cfm?libbase_=Reports_and_Documents

- Vermont Stream Crossing Handbook
- The Vermont Culvert Aquatic Organism Passage Screening Tool (2009)
- Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in VT

There are also multiple excellent resources available from Vermont ANR DEC River Management

- Stream Geomorphic Assessment Appendix G – Bridge & Culvert Assessment - http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_SGAB&CProtocols.pdf