



Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

ENDANGERED SPECIES SURVEY GUIDELINES: *Freshwater Mussels (May 2013)*

PURPOSE

The Natural Heritage and Endangered Species Program (NHESP) may request that a project proponent conduct an Endangered Species Survey for state-listed freshwater mussels. This will be used to help the NHESP:

1. determine whether or not a proposed project will adversely affect the actual Resource Area habitat of imperiled wildlife (MA Wetlands Regulations, 310 CMR 10.00);
2. determine whether or not a proposed project will result in a "take" of imperiled state-listed species (MA Endangered Species Regulations, 321 CMR 10.00);
3. evaluate the level of impact to state-listed species habitat during the Conservation and Management Permit application process (321 CMR 10.04(3)(b));
4. identify approaches to avoid or minimize project-related impacts to imperiled state-listed species and their habitats.

IN ADVANCE OF THE SURVEY

- The survey must address all *state- and/or federally listed mussel species identified by the NHESP*.
- *The NHESP MUST pre-approve the candidate mussel biologist who can demonstrate adequate field experience before survey work begins.* The ability to locate and identify state-listed freshwater mussel species and their habitat(s) is required for an adequate freshwater mussel survey. The NHESP may reject surveys that are not conducted by qualified individuals.
- Please forward the resume of the candidate mussel biologist to the NHESP for approval prior to the initiation of any survey work.
- The mussel biologist is required to obtain a *Scientific Collection Permit* from the Division of Fisheries and Wildlife to handle dead or live state-listed mussels. If federally listed mussel species are present, the mussel biologist may also need a permit from the USFWS (e.g., to collect vouchers).
- The mussel biologist shall submit a proposed Scope of Work for the mussel survey (e.g., methods, timing) with their application for a Scientific Collection Permit; the Scope of Work shall follow the *Key Elements* of the *NHESP Endangered Species Survey Guidelines: Freshwater Mussels* (described below) and must be approved in writing by the NHESP. The required *Key Elements* may be modified after consultation with the NHESP due to project scope, current site conditions, habitat availability, and/or existing mussel information.
- The NHESP shall be notified in writing one week prior to the initiation of the mussel survey.

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Natural Heritage & Endangered Species Program

North Drive, Route 135, Westborough, MA 01581 Tel: (508) 389-6360 Fax: (508) 389-7891

REPORTING REQUIREMENTS

1. A narrative report that addresses all the *Key Elements* (described below) of the Freshwater Mussel Survey, including: **Methods, Existing Conditions, Maps, and Impact Analysis.**
2. The report should also include:
 - A description of the study area including location, water body, size (area) of survey area.
 - Description of survey methods used:
 - Snorkel, SCUBA, and/or bucket
 - Number of surveyors
 - Time spent surveying and weather conditions
 - Summary of Results including:
 - List of all species observed, abundance (CPUE) estimates, density estimates per square meter of search area, and shell lengths and general shell condition for state-listed mussels.
 - General habitat description for mussels
 - Micro-habitat for state-listed species
 - Descriptions of subsurface excavation sites and findings
 - Fish species observed
 - Problems encountered or threats observed.
3. Photographs of the study area(s) and representative habitat(s) shall be included in the report.
4. Representative photographs of mussel species observed should be included in the report and spent shells collected should be forwarded to NHESP for documentation and identification purposes.
5. Rare Animal Observation Forms for state-listed species should be completed and forwarded to NHESP within 45 days of observation.
6. Names, qualifications, and contact information of all surveyors.
7. The report should be submitted by December 31 of the same calendar year of survey completion.
8. All other items specifically requested by the NHESP.
9. Number of copies of the Mussel Survey report to be submitted to the NHESP:
 - If you observe a state-listed species: 2 paper + 1 copy on CD
 - If you do not observe a state-listed species: 1 paper + 1 copy on CD

Mail Report To:

Regulatory Review
The Natural Heritage & Endangered Species Program
One Rabbit Hill Road
Westborough, MA 01581

REQUIRED KEY ELEMENTS OF THE ENDANGERED SPECIES SURVEY: *Freshwater Mussels (May 2013)*

MUSSEL SURVEY METHODS

1. Surveys must be conducted during June through September, during periods of low flows, and only during periods lacking significant rainfall.
2. The survey must *consider the landscape context* of the project site, and identify and map any on-site and off-site habitat features that may be of importance to the focus species.
3. The freshwater mussel Survey must systematically cover the entire portion of river, stream, lake, or pond associated with a proposed project and its potential direct and indirect impacts (e.g., from bank clearing, downstream sedimentation, equipment staging, access, etc.).
 - In lakes and ponds, surveys should include, at a minimum, the limit of work and the 50 feet beyond the limit of work in all directions.
 - In rivers and streams, assessments should include, at a minimum, the limit of work and extend 300 feet downstream and 150 feet upstream beyond the limit of work
 - The NHESP may modify standard survey distances based on the project type, existing site conditions, habitat availability, and mussel information. For example, if the survey area does not encompass all direct/indirect project impacts, the NHESP may expand the survey area as necessary.
4. If state-listed mussels are encountered, subsurface exploration should be conducted in one per cent (1%) of the survey area or in areas where juveniles are encountered or juvenile habitat exists (e.g., depositional areas behind rocks, along streambanks, sandbars, etc.) (Yeager et al. 1994). Substrate sediments shall be excavated using 0.25 m² quadrats to a depth of a minimum of 10 cm and sieved through a mesh screen with openings of 4-6 mm to detect juvenile mussels.
5. SCUBA is required in depths over 3 feet and snorkeling required in depths less than 3 feet. Mucket buckets may be used in water too shallow to snorkel. Hand surveys may be necessary when visibility is poor.
6. The Catch per Unit Effort (CPUE) method must be used to qualitatively assess mussel species abundance; CPUE is the number of mussels found per person hour of searching ($\# \text{ individuals per species found} \div \# \text{ minutes searching} \times 60 \div \# \text{ surveyors}$).
7. Density shall also be estimated at each site using number of mussels found per species per square meter of survey area.
8. All state-listed mussels should be counted and identified to species. Length (millimeters) of the first 100 state-listed individuals per species should be recorded; to help assess recruitment length of all state-listed specimens less than 40 millimeters should be recorded. The first 50 specimens of all common species should be counted and identified; overall common species abundance (e.g., abundant, scattered, infrequent) should be estimated.
9. Photographs of representatives of each state-listed mussel *species* per site is required for documentation and identification purposes; photos should show a lateral view. If underwater cameras are available, photos of mussels while siphoning can help confirm identification.
10. A representative sample of spent shells (per species) shall be forwarded to NHESP for documentation and identification purposes.
11. Any mussels removed from the substrate will be returned to the same area and *carefully* rebedded into the sediment in their original orientation; anteriorly into the substrate, posterior end up.
12. Rare Animal Observation Forms shall be filled out for state-listed mussels and forwarded to NHESP within 45 days of the observation; GPS points are recommended for these locations but not required.

EXISTING CONDITIONS	<ol style="list-style-type: none"> 1. Habitat Description and Analysis - Describe the habitat at the study area (e.g., substrate composition, flow (runs, riffles, pools), water quality, water clarity, stream depth and width, aquatic vegetation, bank and riparian areas, adjacent landuse etc...) and evaluate its quality and variation in regards to its suitability for state-listed mussels. 2. Host Fish - List any fish species observed. 3. Other important site features - Both natural and human-induced features of the study area, such as existing disturbance or development (e.g., paved roads, bridges, pipes, culverts, docks, impoundments, dams, eroding banks, scouring, recreational use, predation, areas of recent forest clearing) should be described as well as any <i>off-site habitat features</i> that may be important to rare mussels. 4. Representative Photographs - Photos of the study area, including pictures representative of the habitats encountered, must be provided; indicate the photograph date, location (e.g., site #), and cardinal direction of view (e.g., photo #1; looking northeast) or a symbol on the site map which indicates where the photo was taken.
MAPS	<ol style="list-style-type: none"> 1. Habitat Map: <ul style="list-style-type: none"> • All portions of the project site should be classified and mapped based upon its ability to provide habitat for the relevant species (e.g., substrate composition, flow (pools, runs, riffles), depth, aquatic vegetation, bank and riparian areas, adjacent landuse etc...) • The habitat map should be overlaid on an ortho-photo of the project site (e.g., 2005 MassGIS color orthos) with an indication of scale. 2. Mussel Distribution Map: <ul style="list-style-type: none"> • The survey area(s), location(s) of state-listed specimen(s) or concentrations, and subsurface excavation sites should be mapped. • The Mussel Distribution Map should be overlaid on an ortho-photo of the project site (e.g. 2005 MassGIS color orthos) with an indication of the scale.
IMPACT ANALYSIS	<ul style="list-style-type: none"> • If state-listed mussels are present, then this section should include quantification of the impacts of the proposed project to the mussel's habitat. For example, what proportion of the mussel bed observed will be altered by the proposed project or will the project result in alterations to the substrate, hydrology, river morphometry, and/or water quality within state-listed species habitat? • Potential impacts should be thoroughly evaluated and discussed. In addition, recommendations should be provided for protective measures and design changes that avoid and/or minimize project impacts to state-listed species and their habitats, and mitigate such impacts. • If any species is also listed pursuant to the U.S. Endangered Species Act (16 U.S.C.A. §§ 1531-1544), this section must reference and include guidance from the Recovery Plan.
<p>IF ANY STATE-LISTED SPECIES ARE OBSERVED, RARE ANIMAL OR PLANT OBSERVATION FORM(S) MUST BE SUBMITTED TO THE NHESP WITHIN 45 DAYS OF THE OBSERVATION.</p>	

Yeager, M.M., Cherry, D.S., and R.J. Neves. 1994. Feeding and Burrowing of Juvenile Rainbow Mussels, *Villosa iris* (Bivalvia: Unionidae). Journal of the North American Benthological Society, Vol. 13, No. 2. pp. 217-222.