

MUSSEL RELOCATION GUIDELINES
Panama City Field Office USFWS
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These guidelines provide recommendations for conducting mussel relocations in Florida. They are intended as a framework for the development of a project specific relocation plan. Certain project specific details, including relocation timing, location of recipient site, impact area, and monitoring schedule will be developed with assistance from staff at the Panama City Field Office of the U.S. Fish and Wildlife Service.

Overview

Mussel relocation success is heavily dependent on the selection of a suitable relocation site and careful handling methods. Specifically, selecting a relocation site near the collection area with stable substrate and similar species, minimizing time out of water, keeping mussels cool and moist, avoiding moving during extreme temperatures, and avoiding overcrowding will reduce stress and improve survival (Dunn and Sietman 1997, Havlik 1997, Cope et al. 2003). Using field personnel familiar with handling mussels is also a factor in successful relocations (Dunn and Sietman 1997).

Relocation Timing

Relocation should occur as close to the project start date as possible to ensure that mussels do not recolonize the work area before construction commences. Ideally, the relocation should occur within 60 days prior to the start date, however, up to 6 months prior is acceptable if this allows for more optimal sampling conditions. In general, the best window for conducting relocations in Florida streams is from May through mid-December. This is when flows are generally lower which can improve mussel detectability, and provides safer diving conditions for work in non-wadeable rivers. It also avoids colder periods when mussels are slow to re-anchor into the substrate. However, specific time frames will depend on the reproductive period of the listed mussels; this varies by species, but generally occurs from late-winter to early summer. When possible, relocation should be avoided during periods of peak gravidity to reduce stress and impacts to reproduction and survival. To minimize thermal stress to the mussels, water temperature should be at least 50° F.

Relocation Personnel

A biologist experienced in unionid collection and monitoring techniques will lead relocation and monitoring efforts. The individual must be familiar with mussel relocation methods, and must possess a current federal Section 10(a)1(a) permit and all state or other permits necessary for handling mussels at the site. The lead biologist is responsible for ensuring that all relocation and monitoring protocols are followed. A sufficient number of personnel must be available during the relocation effort to ensure safety and quality of work and minimize stress to the mussels. All personnel involved in the relocation should have experience in handling mussels.

Personnel with the Panama City Field Office (PCFO) and Florida Fish and Wildlife Conservation Commission (FFWC) will be given the opportunity to be present during the relocation effort.

Recipient Site

Prior to the relocation effort, the lead biologist will select a suitable recipient site or sites. It is

important that the site have stable substrate that meets the habitat requirements of the species being relocated. When necessary, multiple sites should be used to avoid overcrowding. The site(s) should also have a diverse mussel population including species with similar habitat preferences. A survey will be conducted within the site to determine existing mussel community and density, and examine substrate composition before relocating mussels.

To the extent feasible, the recipient site(s) should:

1. Be close to the collection area to minimize stress to the animals.
2. Be upstream of all impacts related to the project.
3. Have similar or better water quality, substrate, and fish fauna to the collection site.
4. Have an existing mussel population with similar species composition.
5. Have sufficient area to accommodate the anticipated number of mussels.

Mussel Collection from the Impact Area

The construction impact area should be clearly marked throughout the relocation effort. Within the project's construction zone, the relocation team should focus on areas that will receive the most severe impacts such as the footprint of structures (bridge piers, coffer dams, concrete pads, etc.) and areas that will be dredged, filled or otherwise disturbed. These collection areas should include a 5-10 meter buffer zone. The PCFO staff will assist in delineating the collection area. The relocation team will conduct visual and tactile surveys using mask and snorkel and/or scuba gear as appropriate. All collection areas will be searched at least twice to ensure that an acceptable percentage of mussels within the impacted area are detected. All mussels encountered will be collected and held in mesh bags in the stream until ready for processing.

Processing and Transport

All mussels will be identified, counted, and relocated. All protected mussels will also be measured, tagged on both valves using plastic numbered tags, and photographed. All mussels will be handled carefully and, except for processing time, will be held in mesh bags in the stream while out of the substrate. During processing, mussels must be protected from temperature extremes (do not place mussels on hot surfaces like boats or sand!). **Protected mussels should be processed and transported to the collection area as soon as possible and within three hours of collection.**

If mussels will be transported to the recipient site by boat or vehicle, they should be placed in clean coolers that have been rinsed with stream water. Depending on air temperature and distance to the recipient site, sealed ice packs should be used to maintain the temperature inside the cooler. Ice packs must not come into direct contact with the mussels. Ice packs should be placed in the bottom of the cooler and a protective layer (e.g. bubble wrap, damp towels) placed over top to keep mussels from directly contacting the ice packs. Mussels will remain in damp mesh bags and placed on top of the protective layer.

All protected mussels will be relocated to an area established at the recipient site for monitoring. They will be carefully embedded into the sediment in the natural (posterior up) position. Optimally, the density following relocation should not exceed 25% of the initial density of the recipient site. The remaining mussels should be distributed evenly over suitable substrate outside of the monitoring site, either from the surface of the water or hand placed in the substrate.

Monitoring

A monitoring program is essential to evaluate the success of any relocation project. At a minimum, the monitoring program should include an assessment of survival and growth of all tagged mussels at least one year following relocation. During yearly monitoring a swim-over survey should be conducted over the entire relocation area being monitored and in areas downstream of the site, and all fresh-dead shells, marked and unmarked, identified and counted. All tagged mussels are to be measured and replaced in the substrate in the same general location from which they were collected.

An effort should be made to minimize disturbance to the bed while searching for tagged mussels. Other mussels encountered will be identified, counted, and replaced in the same general location. Shells of T&E species are to be deposited with the PCFO. After one year of monitoring, the relocation team will coordinate with PCFO staff to determine if monitoring should be continued.

Reports

Following the relocation, a report will be prepared detailing methods, data from tagged mussels, population characteristics in the relocation area, water quality characteristics, a discussion of any problems encountered, and suggestions to improve the relocation process. Reports following each monitoring effort will provide growth and survival results, and any problems encountered. An electronic of the reports will be provided to the Panama City Field Office.

Contact Information

The U.S. Fish and Wildlife Service is responsible for the conservation and management of *federally* listed freshwater mussel species. The Florida Fish and Wildlife Conservation Commission is responsible for the conservation and management of *all* freshwater mussel species throughout Florida.

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