Translocation and Monitoring of the Brook Floater Mussel, *Alasmidonta varicosa*, After the 2006 Avulsion in the Suncook River, NH

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Introduction

During extensive flooding in May of 2006, the Suncook River in Epsom, NH breeched a glacial ridge, cut a new channel, and dewatered 3.2 km stretch inhabited by brook floater mussels. Approximately 1200 brook floaters were rescued and held at the National Fish Hatchery, Nashua NH. The mussels were tagged measured and translocated to an upstream section of the Suncook River in North Chichester, NH after up to 60 days in the hatchery.

At the translocation site we discovered one of the largest known brook floater populations range-wide. Resident brook floaters were marked and measured, and both resident and translocated mussels were mapped in 2 experimental plots (Sites 1 and 2). In a control plot (Site 3), only resident mussels were marked and measured.

Objectives: (1) determine whether the recapture rates differed between resident and translocated mussels, (2) determine whether recapture rates differed among sites, (3) evalauate sample size (number of tagged mussels per year) to ensure sufficient power to detect the effect of translocation on survival and sufficient precision for estimation of survival.

Figure 1. Aerial view of the avulsed Suncook River on May 17, 2006. The left photo shows the abandoned channel in red and the new cannel in blue (NH Geological Survey). In the right photo flow is from the parent channel (top left) to the new channel (lower right) (photo by S. Yeaton). The yellow arrows show the nick point of the avulsion.

Figure 2. The abandoned channel (left) formerly habitat for *A. varicosa* and the unstable new channel (right).

Approximately 600 resident mussels were tagged per site in 2006 (Table 1). Although roughly equal numbers of mussels were translocated to Sites 1 and 2, data recording errors prevented some tags from being tracked. As a result, the number of translocated mussels whose tags could be tracked varied by site (Table 1). The recapture rate was highest among resident mussels in the Control site and lowest at Site 2.

Site	Type	Releases	Recaptures	Recapture rate (%)
Control	Resident	591	142	24.0
Site 1	Resident	652	79	12.1
	Translocated	568	39	6.9
Site 2	Resident	571	22	3.9
	Translocated	98	3	3.1

Table 1. Releases, recaptures, and rate of recapture in % for each site and mussel type (resident or translocated) for brook floaters that were tagged in the Suncook River in 2006 and recapture in 2007.

Results

A comparison of length frequencies among relocated and resident mussels reveals that the relocated mussels were somewhat larger than the resident mussels (Figure 1, Table 1; k-s = 0.20, P<0.0001). The median relocated mussel was 47 mm (42 to 52 mm for 25th to 75th percentile; n = 772), and the median resident mussel was 44 mm (40 to 48 mm for 25th to 75th percentile; n = 2929).

Figure 3. Aerial view of translocation sites1-3 showing the extent of riparian vegetation including food plain forest. Upstream view of the plot at site 1.

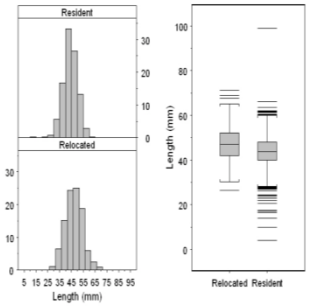

Figure 4. Size (length) distribution for relocated and resident brook floaters (*Alasmidonta varicosa*) from the Suncook River, NH. The relocated mussels tended to be slightly larger than the resident mussels.

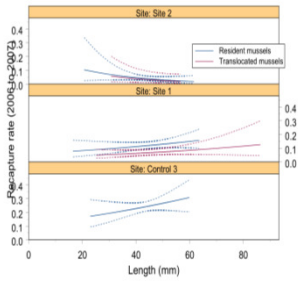

Figure 5. Predicted recapture rate (solid line) and 95% confidence limits (dashed lines) for resident mussels (blue lines) and translocated mussels (red lines) at the 3 sites on the Suncook River. Recapture was of mussels released in 2006 and recovered in 2007.

Resident mussels were more likely to be recaptured than translocated at Site 1. Recapture was nearly twice (1.89 times) as likely among resident mussels (Table 3). At Site 2, recapture rates were not significantly different resident and translocated mussels (Table 3). Recapture rate was highest at the Control site and lowest at Site 2 (Table 4). Recapture was over twice (2.35 times) as likely at the Control site than Site 1 and nearly 8 times (7.94 times) as likely at the Control site than Site 2. Recapture was over 3 times (3.38 times) as likely at Site 1 than Site 2. However, a second 100–year flood in April 2007, washed out many mussels, increasing mortality, and affecting each site differently. Moreover, low water following a prolonged summer drought exposed mussels to intense opportunistic predation at site 3.

Conclusions

Translocated mussels were less likely to be recaptured than resident mussels at Site 1. Assuming that capture probability of resident and translocated mussels were equal then the difference in recapture rate would be due to lower survival or higher emigration for translocated mussels.

Translocated and resident mussels had similar recapture rates at Site 2. However, recapture rate at Site 2 was the lowest among all sites. Recapture rate was highest at the Control site. Between site differences in recapture rate could be due to variation in capture probability rather than survival.

Simulations indicate that between 400 to 600 resident mussels should be tagged per site to ensure adequate precision to estimate survival.

We expect global warming and associated extreme precipitation events and droughts will severely impact brook floater populations.