Brian,

Your memo is a very thorough and accurate summary of last week's discussions. I have no suggested edits; however, I will summarize my impressions regarding those ecological issues discussed at the workshop as they affect BO coordination.

1) I am a little concerned because we focused most of our discussions on issues affecting only *Amblema neislerii*, although RPM5 poses the same 2 questions for all 3 species. If RPM5 is to be fully addressed, there must be substantial consideration of population size and effect of low-water events for all three listed species.

2) As with most Coastal Plain streams, the middle section of the Apalachicola River is highly dynamic. Native organisms, at both individual and population levels, typically are well-adapted to dynamic flow and channel migration. Mortality associated with life in this dynamic environment affects all such populations and should not be perceived as particularly unusual or threatening to *A. neislerii*.

3) The mussel populations in the Apalachicola typify those in such dynamic environments. The population depends on many patches of suitable habitat (e.g., eddy habitats) to persist even if portions of the population suffer high mortality from major physical changes at one or a few locations. Habitat suitability probably improves in some locations and declines in others during any particularly forceful hydrologic event. For populations to persist over a long period, habitat losses must be balanced by habitat gains at some biologically significant temporal scale (i.e., "dynamic equilibrium"). Dr. Harvey referred to distributary dynamics as well as the implications of stranding during low water in precisely this sense.

   Aerial photos indicated that the geomorphic phenomenon associated with stranding events has occurred many times in the past. Therefore it is reasonable to assume that stranding events are natural and probably not detrimental to the longterm survival of mussel populations in the Apalachicola.

   Both geomorphic experts were skeptical of the idea that the river is widening. If a detrimental widening process has been occurring since 1940, it is not likely that so many mussels would remain in the middle reach.

4) It seems that the Apalachicola "stranding" or "vulnerable habitat" or "other concern" issues were used to infer that "take" is occurring, thereby requiring actions by the Corps. However, it could be (should be) argued that mortality, stress, harassment, etc…resulting from natural phenomena does not constitute "take." Mortality due to stranding is no different from any other natural selective force on a population. The RPM states that you must estimate population size and estimate effect of stranding on populations. However, the question that most directly addresses to what degree the Corps should be held responsible should be:

> Have actions of the Corps caused natural hydrogeomorphological events to occur at an accelerated or altered rate so that mussel mortality occurs in an unnatural manner?

"Take" is really only justified if the above question is answered in the affirmative.

RPM5, as currently written, seems to concede such and requires **monthly** monitoring of "take." It implies that the Corps is responsible for "take," that "take" might be detectable each month, and therefore intense mussel monitoring studies must be conducted. However, preliminary results and discussions at the workshop support the argument that "take" does not occur (i.e., is the result of natural processes, not Corps actions).

I appreciate the opportunity to attend the workshop. Section 7 coordination is difficult enough without pending litigation. We have been assisting the St. Paul and Rock Island Districts with Biological Opinion actions for *Lampsilis higginsii* (Higgin's eye pearly mussel) for several years and are about to initiate a risk-informed decision analysis project to help them design a conservation management plan for another Endangered species, *Quadrula fragosa* (winged mapleleaf).

Please feel free to contact us if you want to discuss such issues in the future. Take care, and good luck with the Apalachicola project.

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