Memorandum

To: Daniel Keefe, EPA RPM
Cc: Nyanza OU IV Site File

From: Bart Hoskins, EPA Ecological Risk Assessor

RE: Fish movement between reaches

One consideration in selecting river reaches for study, and sampling fish within those reaches, was whether fish would exhibit high site fidelity such that fish sampled within a given reach could be assumed to represent conditions within that reach on a consistent basis. A number of the reaches (e.g., Reaches 3 and 4) are defined by man-made barriers that would almost entirely preclude movement to other reaches. Other reaches (e.g., 2 and 7) are constrained by substantial changes in habitat that would discourage movement of fish.

Of principal interest is the largemouth bass, which was a driver in human health risk because, as the top predator fish in the Sudbury River, the Largemouth Bass consistently exhibited the highest mercury concentrations. Numerous studies have found that this species is more likely to remain within a well-defined “home range”. The following studies define the relevant home range for largemouth bass as 5.11 acres (Fish and Savitz, 1983), 12.75 acres (Messing and Wicker, 1986), and 22 acres (Sammons, S.M., et al., 2003).

Moreover, most studies regarding home range were measurement in open water bodies (i.e. lakes). Open water likely contributes to an increase in home range as compared to a river which provides less opportunity for migration (i.e. more restricted in terms of depth and direction). Not withstanding this, based on the preceding home range for open water species, the perimeter of a 22-acre square is 975 feet (or approximately 0.2 miles). This value is substantial less than the average distance of the Sudbury River reaches (i.e, 3 miles), and more so when one considers the length of reaches in downstream section that are not impounded are more often greater in length than the average river reach.

Finally, these fish are not known to migrate seasonally to any significant degree, although they may move seasonally within their home range. In conclusion, the home range of largemouth bass would strongly suggest that few fish would move from one reach of the Sudbury River to another.
References

