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Bithynia tentaculata is an invasive aquatic snail that has recently spread to the upper Mississippi River from the Great Lakes region. In addition to being a threat to native benthos, the snail harbors two parasite species that kill thousands of migrating waterfowl each year. Unfortunately, little is known about the factors underlying snail and parasite persistence, and what the consequences of continued disease outbreaks might be for this interaction in the future. We have undertaken complimentary theoretical and empirical approaches to address these shortcomings. We have developed a system of differential equations that capture the change in infection states of host organisms. Model parameters were estimated from field and experimental assessments of this system. Results from the theoretical model suggest that 1) parasite success in this system is species dependent, and 2) the persistence of each species will depend on particular transmission points in the life cycle. These outcomes will be used to expand our current empirical and theoretical approaches to better understand interactions between invasive species, native species, and disease transmission in the upper Mississippi River. (Received September 20, 2011)