Invasive aquatic species can result in harm to ecosystems into which they have been introduced, and current invasive species control technologies are not always successful. Modern biotechnology has enabled the development of genetic biocontrol (GBC) approaches that could control or eradicate unwanted invasive aquatic species through the release of a genetically modified (GM) version of an invasive fish species to a targeted aquatic environment. Effective deployment and long term use of GBC technologies will depend on our ability to identify and manage possible unintended effects to the natural environment. Environmental risk analysis (ERA) provides an existing framework for identifying the likelihood and consequences of unintended impacts, and for developing risk management strategies. However, traditional ERAs have not yet confronted GBC applications, which would involve the purposeful release of a GM animal to achieve environmental goals, and would require society and scientists to consider biosafety from a new angle. For the unique situation of genetically modified biocontrol organisms (GMBOs), we use a composite environmental risk analysis (cERA) process to tackle some special considerations with which a cERA of a GMBO will have to contend: new potential hazards; uncertainty introduced by extrapolating from domestic systems to natural ecosystems; challenges in identifying risk management options; and challenges of stakeholder engagement related to new technologies. The cERA that we propose draws from ERAs of traditional, non-GM biocontrol organisms and of GM fish, and includes stakeholder engagement at key points, particularly in the problem formulation stage that defines the scope of the analysis, building conceptual models of the social-ecological system, identifying hazards, and defining assessment and measurement endpoints.

Keywords: environmental risk assessment, genetic biocontrol, aquatic species, fish