9 Research, Inventory, and Monitoring Needs

A variety of watershed research projects are conducted on Division properties by outside agencies and institutions. The Division supports these projects through access to its properties and, occasionally, limited support in the form of funding and/or Division staff time. This research has informed Division managers and has improved or supported watershed management practices.

Listed below is a variety of current research, inventory, or monitoring needs on Division properties on the Ware River, in the general areas of forestry, wildlife, and cultural resources. These are listed in part to direct the Division's own research and monitoring efforts in the coming decade, but also as a specific reference for potential researchers who are looking for a project that would address a real need of the Division.

9.1 Forest Research Needs

9.1.1 Monitoring of Forest Management Activities

The DCR/DWSP policy to allow no measurable impact upon stream water quality from forest management activities creates a need to establish a standard approach to measuring compliance. Streams should be monitored to correlate short-term water quality changes and active logging conducted on Division lands within DCR/DWSP standards. Monitoring should involve upstream and downstream and/or paired watershed sampling before planned operations, during active logging, and following the completion of the operations. The study should include storm event testing. Parameters should include pH, temperature, dissolved oxygen, turbidity, suspended solids, total particulates, total and fecal coliform, and nutrients. Based on this fieldwork, specific recommendations could be made outlining a low cost, statistically valid method of monitoring logging operations on a more wide-scale basis. Recommendations for adjustments in current Division Conservation Management Practices would be made, if necessary, based on this research.

9.1.2 Invasive Plant Species

A wide variety of invasive plant species is currently established on and adjacent to Division properties on the Ware River watershed. Control of these species is important to the establishment of tree regeneration and the maintenance of native plant diversity. To begin to address this issue, a survey of invasive plant species on the watershed and the extent of their spread should be conducted and added to the Division GIS, in part to establish an historical reference point for future distribution of these species. Once priorities have been established for control, further research needs to be conducted on the feasibility of mechanical controls and/or the relative benefits and threats associated with chemical or biological controls.

9.1.3 Evaluation of Ware River Access Roads

This project would include a watershed-wide mapping of road conditions to be used as a management tool in maintaining and improving the current road network. Part of this project would involve locating the most appropriate model for sizing culverts, and utilizing GIS to routinely size culverts and design drainage characteristics to withstand 50-year storms. The results of this study would also be useful in planning road repair, maintenance, or construction on newly acquired property.

9.1.4 GIS Projects

There is great potential for increased use of GIS technologies in the management of the natural resources of the Ware River watershed. Essentially every component of the Division's management efforts could utilize the analytical and mapping capabilities of this technology. There is a need to either establish contracts to generate GIS data, or to increase the capabilities of the current DWSP in-house GIS capability. Examples of potential GIS projects include mapping stone walls and cultural resource locations on Division property, and incorporating rare plant and animal locations in review maps for proposed timber harvesting.

9.1.5 Hemlock Woolly Adelgid Impact Monitoring

The invasion of the hemlock woolly adelgid into Division watershed forests at Wachusett and Quabbin Reservoirs has generated wide-ranging discussion regarding the future of Eastern Hemlock throughout the region, and the potential impacts to water quality and the forest ecosystem resulting from its decline. A long-term study is needed to track the extent of the invasion and infestation and monitor the impacts with an emphasis on water quality. This study could also monitor the effects of the salvaging of dead and dying hemlock and therefore help inform future management decisions.

9.2 Wildlife Research Needs

Although limited wildlife research or monitoring has been conducted on the Ware River watershed in recent years, some monitoring of high priority species has occurred. More work is needed. The following projects represent a few areas where technical data would assist in managing Ware River wildlife resources more effectively.

9.2.1 Dynamics of Ware River Beaver Populations Where Trapping is Restricted

Beaver are considered a high priority species. Division regulations allow trapping at the Ware River, and trapping occurred regularly in the past. However, since the passing in 1996 of a referendum limiting trapping, there has effectively been no trapping mortality on beaver in the Ware River watershed. Even if the law were modified, there are very few trappers left in the state to resume the activity. As a result, beaver populations in the Ware River have expanded. By determining the population dynamics and dispersal of beaver in the watershed, we can gain better understanding of habitat use, natural mortality, and the importance of marginal habitat.

9.2.2 Biological Surveys and Inventories

In order to minimize or avoid negative impacts of land management activities on wildlife and critical habitats, all proposed activities are reviewed by Division wildlife biologists. However, current staffing is limited, and it would be impossible to carefully inspect each of the hundreds of acres affected by proposed management activities. The Division must rely on foresters and others working in the field to add their observations to existing records of known occurrences of critical habitat or species. Although new information is added as it becomes available, the database is far from complete. Biological surveys conducted by qualified persons can provide critical additional information that will aid Division efforts to protect these resources during land management activities. Information should also be incorporated into GIS datalayers.

9.2.3 Vernal Pool Surveys

The Division recently completed a contract that mapped potential vernal pools on the watersheds using color infrared photos. Over 300 potential pools were identified. These pools are gradually being surveyed by Division staff to determine their importance as habitat and to try to locate other unmapped pools. To improve protection for this resource, the survey and mapping effort should be increased. The mapping will be incorporated into GIS to facilitate land management planning.

9.2.4 Dynamics of the Expanding Ware River Moose Population

Moose populations continue to expand at the Ware River. Division land within the watershed appear to serve as a corridor and core habitat for the species within the state. Little research has focused on moose populations in the southern extent of their range. Research would focus on the habitat use and population dynamics of moose and the potential impact of an increasing moose population on forest growth and regeneration.

9.3 Cultural Resources Research Needs

The principal research need for the continued protection of cultural resources within Division properties on the Ware River watershed is to inventory, accurately map, and digitize all known historic cultural sites. This inventory would be modeled after the multi-phased historic site inventory that was completed for the Quabbin Reservoir watershed in 1995-96. The Quabbin inventory was completed by graduate students and faculty of the Boston University Department of Archaeology in collaboration with the DCR/DWSP staff archaeologist. The process involved integration of location and descriptive information from a variety of cartographic and historical resources, including MDC Real Estate Plans and a series of maps dating as far back as 1794. Information from these sources was used to complete a database and map record for several hundred sites. Many of these sites were subsequently field checked for current condition. Spatial information is entered in the Division's GIS database so that important sites can be identified when management activities are proposed for areas within Division properties. This process greatly enhances the ability of managers to protect historic cultural resources.