Appendix F. Input Data Layers used for Index of Ecological Integrity

The following appendix is from the report "Conservation Assessment and Prioritization System (CAPS) Preliminary Statewide Massachusetts Assessment", June 2, 2009. Kevin McGarigal, Bradley W. Compton, Scott D. Jackson, and Kasey Rolih. Landscape Ecology Program, Department of Natural Resources Conservation, University of Massachusetts, Amherst.

Nonforested Uplands – Three of these communities came from the MassGIS 2005 Land Use: pasture, powerlines, and open land (formerly called old fields in CAPS).

Wetlands – We used Massachusetts DEP Wetlands. DEP wetlands were photo-interpreted, and are generally of high quality, although beaver pond disturbance/succession has introduced many "errors," most commonly current shrub swamps mapped as forested wetland. Note that many new coastal wetlands have been added for this run.

Lakes and Ponds – We used MassGIS 1:25k hydrography to represent lakes and ponds. Ponds were defined as being waterbodies smaller than 5 ha, lakes as those larger than 5 ha. This is based on a logistic regression of sizes of lakes and ponds in areas where NWI falls within the Highlands, because NWI distinguishes between lakes and ponds, whereas DEP wetlands depict all open water as one class.

Vernal Pools – We used Potential Vernal Pools from MassWildlife's Natural Heritage and Endangered Species Program. Potential vernal pools that fell within a terrestrial type were treated as a single pixel pool (30 m × 30 m). When a potential vernal pool fell within a wetland mapped by DEP, we retained DEP's classification.

Streams and Rivers – Streams and rivers are based on our work for Natural Heritage and Endangered Species Program's Living Waters project. MassGIS 1:25k stream centerlines were used to define streams. Streams are classified by order and gradient. Order is calculated from the stream centerline data; and gradient is based on the digital elevation model. We identified rivers that flow into the state to correct the order of these stream networks. For rivers wider than 30 m, the open water class from Land Use was used to represent the entire river basin, and the class based on order and gradient was applied to the entire width.

Developed Land – Developed land comes directly from the MassGIS 2005 Land Use.

Dams – Dams (in four size classes) were developed in collaboration with DEP and Mass Riverways as part of Natural Heritage's Living Waters project. Dams were derived from a MassDEP point shapefile and digitized as lines over stream centerlines overlaid on the MassGIS 1 meter, 1:5000 black and white orthophotos. Dams are treated as a developed type.

Roads and Railroads – Roads are railroads are from MassGIS's 1:25k EOT roads and trains layers. Roads were reclassified into five types based on original road classes as well as surface type (for unpaved roads). We also used interpolated traffic rates from the EOT roads layer. Railroads were mapped in three classes: railroad, abandoned railbed, and rail trail.

Elevation – A digital elevation model (DEM) was created by David Goodwin of the UMass Resource Mapping Unit from MassGIS digital terrain model (DTM) elevation contours, elevation points, and topographic breaklines as part of the Living Waters project.

Flow – A flow grid (giving the direction of expected water flow for each cell) based on a digital elevation model was created for all of mainland Massachusetts by our lab as part of the Living Waters project. This flow grid conforms to MassGIS centerline data. We used this flow grid directly.

Aquatic Resistance – We modified the approach of Randhir *et al*. 2001. (*Forest Ecology and Management* 143:47-56) to build a time-of-travel grid for each cell in the project area, based on land cover, slope, flow, and stream gradient. This grid was used to define the influence area within the watershed of each point for our watershed metrics.

Point-source Pollution – Point-source pollution was defined by Massachusetts Natural Heritage and Endangered Species Program as part of their Living Waters project. These data are based on an assessment of pollution risk compiled from six DEP and EPA data layers: TRI (Toxic Release Inventory), RCRIS (Resource Conservation and Recovery Information), PCS (Permit Compliance System), MINES (Mineral Industry Locations), IFD (Industrial Facility Discharge Sites), and CERCLIS (Superfund National Priority List Sites) from the EPA Basins 3.0 website (http://www.epa.gov/waterscience/basins/metadata.htm). UST (Underground Storage Tank Locations), GRWTR (Ground Water Discharge Permits), and DEP Solid Waste Facilities point sources are available from MassGIS. See Natural Heritage's Living Waters Technical Report for details.

Imperviousness – Impervious surfaces are from MassGIS. This layer is at 1 m resolution, based on the 2005 orthophotos. Imperviousness is summarized as percent impervious in 30 m cells.