

“In an increasingly complicated management arena, the challenge will be to find alternatives to fixed-width buffers that meet the multiple objectives of providing clean water (minimizing nutrient and sediment inputs), aquatic habitat, habitat for riparian species, connectivity across landscapes, and related responses.”

Richardson, Naiman, & Bisson, 2012

Delineating an Eligibility Area for the McKenzie Voluntary Incentives Program

for Riparian Protection and Restoration



UPPER WILLAMETTE SOIL & WATER CONSERVATION DISTRICT
Your partner for Clean Water, Productive Soil and Wildlife Habitat

Goals for Delineating the Program Area

1. **Credibly science-based: The Nature Conservancy's Active River Area model**
2. Easily explained to a lay audience
3. Repeatable in other watersheds
4. Useful for program analysis and evaluation.

Goals for Delineating the Program Area

1. Credibly science-based
2. **Easily explained to a lay audience: The area of dynamic connection and interaction between the water and land through which it frequently or occasionally flows.**
3. Repeatable in other watersheds
4. Useful for program analysis and evaluation.

Goals for Delineating the Program Area

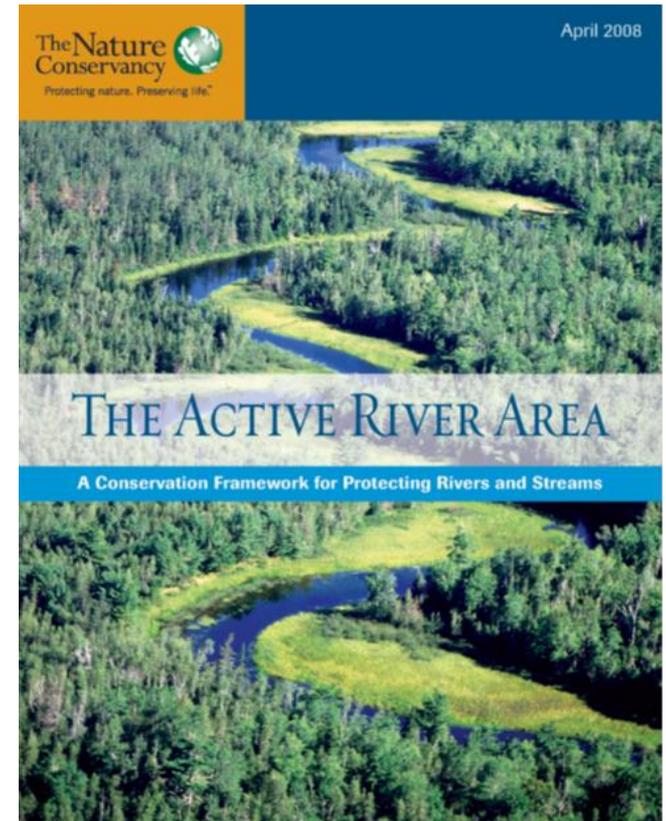
1. Credibly science-based
2. Easily explained to a lay audience
3. **Repeatable in other watersheds: The model depends primarily on nationally-available NHD and USGS DEM datasets.**
4. Useful for program analysis and evaluation.

Goals for Delineating the Program Area

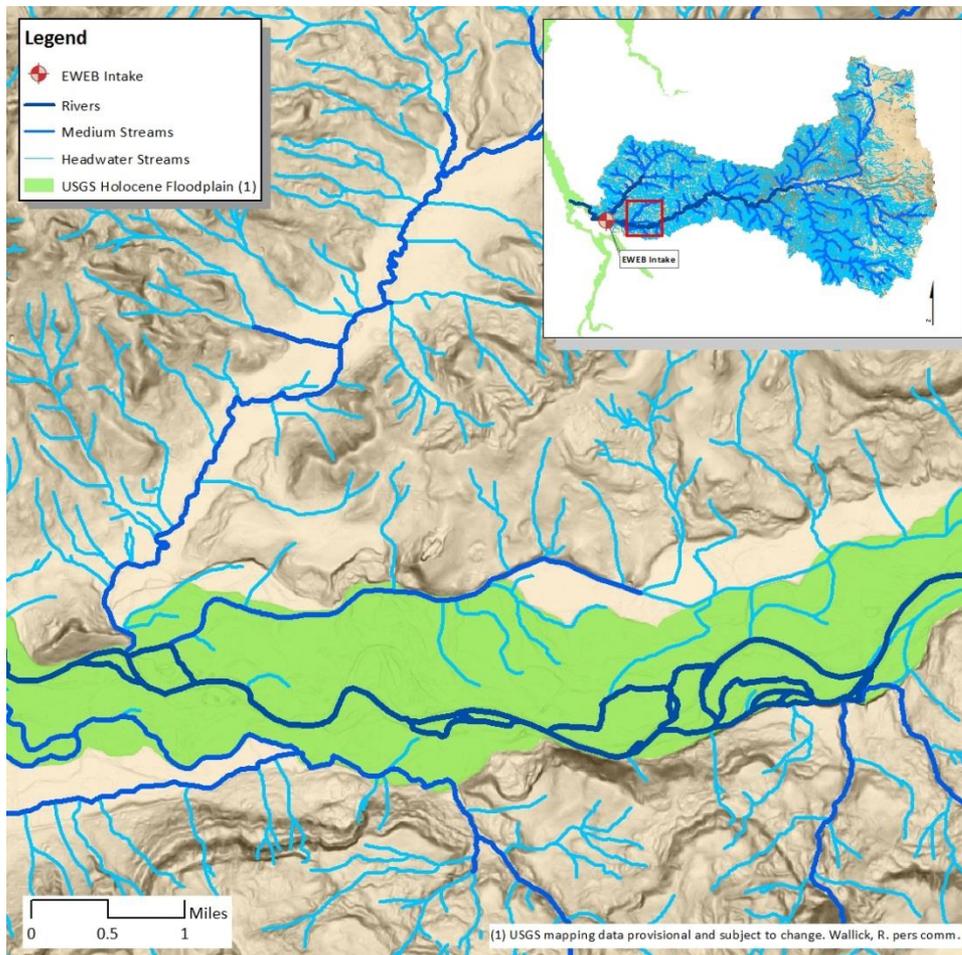
1. Credibly science-based
2. Easily explained to a lay audience
3. Repeatable in other watersheds
4. **Useful for program analysis and evaluation:**
 - a) The model identifies a broad set of landscape elements and functions rather than focusing individual instream processes like sedimentation or vegetated buffer strips.
 - b) The model produces a cost-surface, not a hard boundary, increasing its use.

TNC's Active River Area Model

- * Active River Area (ARA)
 - * Estimates the riparian area, not tied to flood extent specifically
 - * Uses nationally available NHD & USGS DEM data
 - * Relies on NHD Stream Order attribute
 - * Open code, rapid to deploy
 - * Well documented, using known ESRI tools



Conceptual Process Framework



The watershed is divided into three longitudinal sections of

- headwater
- medium
- and river stream segments

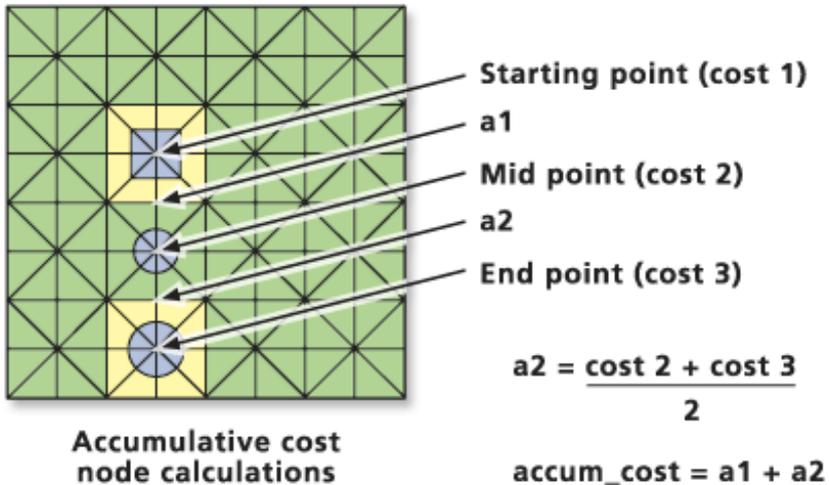
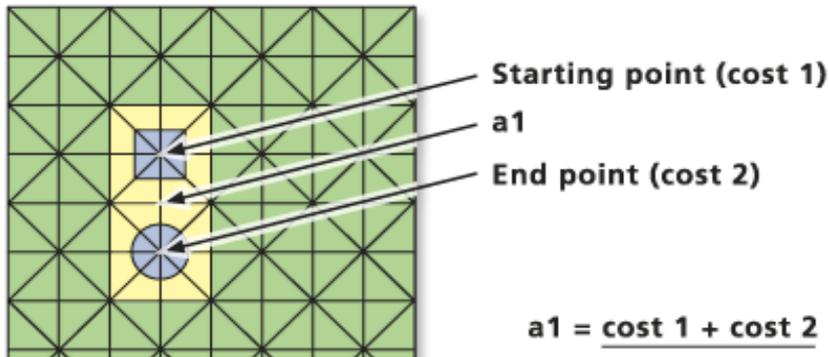
and creates

- Active river areas
- wet-flat areas
- and material contribution areas.

These area are delineated using a slope-based cost surface.

How Cost is Calculated

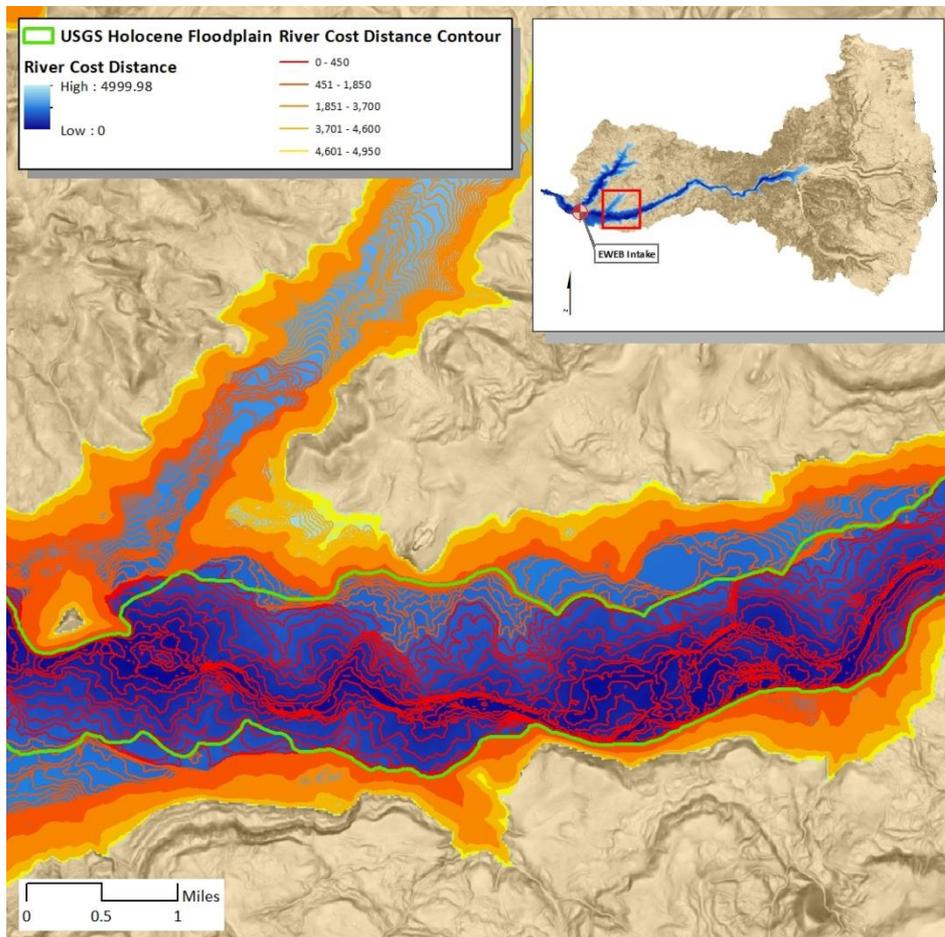
(ESRI documentation)



Accumulative cost
node calculations

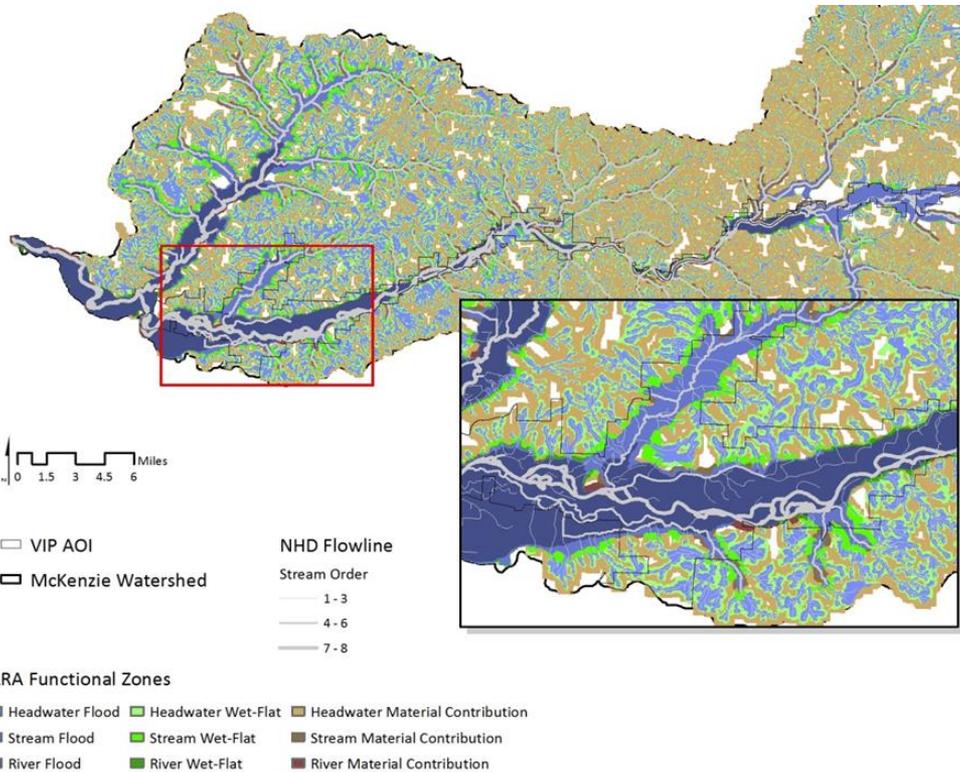
The cost assigned to each cell represents the cost per unit distance for moving through the cell. **The final value per cell is the cell size multiplied by the cost value.** For example, if the cost raster has a cell size of 30, and a particular cell has a cost value of 10, the final cost of that cell is 300 units.

Model Calibration

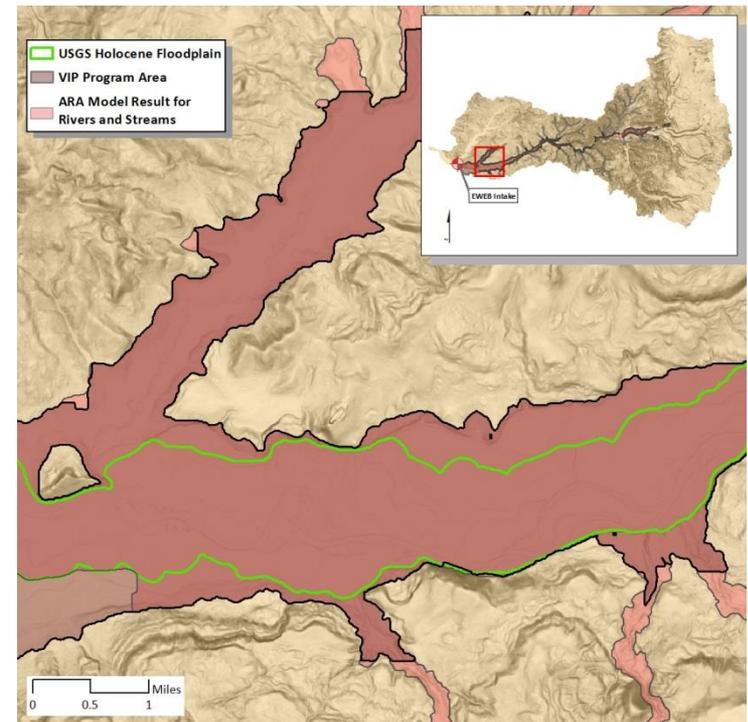


- * ARA cost-surface thresholds are set for
 - * Headwater
 - * Stream
 - * Riverareas in response to different landscape conditions.
- * Resultant areas merged together to generate ARA.
- * Other landscape types use similar calibration process against reference datasets.
- * We focused on the riverine and stream sections for program implementation.

Model Results & Use



ARA Functional Landscape Types



VIP Program Boundary

Project Partners

- * **Eugene Water & Electric Board**
- * McKenzie Watershed Council (MWC)
- * Upper Willamette Soil & Water Conservation District (SWCD)
- * Cascade Pacific Resource Conservation and Development
- * *Lane Council of Governments*
- * McKenzie River Trust
- * University of Oregon
- * Oregon State University
- * US Forest Service
- * The Freshwater Trust
- * Metropolitan Wastewater Management Commission (MWMC)
- * Others