

US EPA ARCHIVE DOCUMENT

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Environmental Protection
Agency

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Development
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Technology Transfer



Environmental Planning for Communities

A Guide to the Environmental
Visioning Process Utilizing a
Geographic Information
System (GIS)

Example Case Studies

- Monroe County, PA, Poconos
- Camp Pendleton area, CA
- Muddy Creek, Benton County, OR
- Willamette basin, OR
- Iowa agricultural watersheds
- Mojave desert CA
- Blackberry Creek, Kane County, IL,
- Chico Creek, Kitsap County, WA

Case Study: Iowa Agricultural Watersheds

- Small watersheds in intensive agricultural areas in Iowa
- Leveraged data from earlier studies
- Project activities at universities in Oregon, Iowa, Michigan, Minnesota

Study Region

- U.S. Cornbelt, nearly all land in private ownership, agricultural land use
- Serious concerns over degradation in water quality, soil erosion, native biodiversity, human quality of life
- Precedent and potential for influence of agricultural policy on land use

Land Use Changes to Reduce Soil Erosion

- Alternative agricultural practices
- Expand use of best management practices
- Conservation Reserve Program

Land Use Changes to Reduce Stream Pollution

- Riparian buffers
- Upland filter strips
- Alternative agricultural practices
- Alternative crops or commodities
- Nutrient detention wetlands, engineered features

Land Use Changes to Maintain Biodiversity

- Set-aside reserves
- Use of native species in plantings (roadsides, farmsteads, etc.)
- Restoration of wetlands
- Habitat connections

Land Use Changes to Keep Families on Land

- Extensive livestock farming (instead of confined feeding operations)
- Diversification of operations
- Non-farm homes, biodiversity farmsteads

Evaluating Land Use Alternatives

- Biodiversity
 - Statistics of change in habitat for all non-fish vertebrate species, plus butterflies
 - Spatially explicit population models for all mammals, plus 4 amphibian species
 - Plant community model for plant biodiversity

Evaluating Land Use Alternatives

- Water quality
 - Spatially-distributed water quality model for nutrients and sediment
- Human dimensions
 - Spatially explicit model of economic impacts (EPIC)
 - Farmer interviews and farm planning

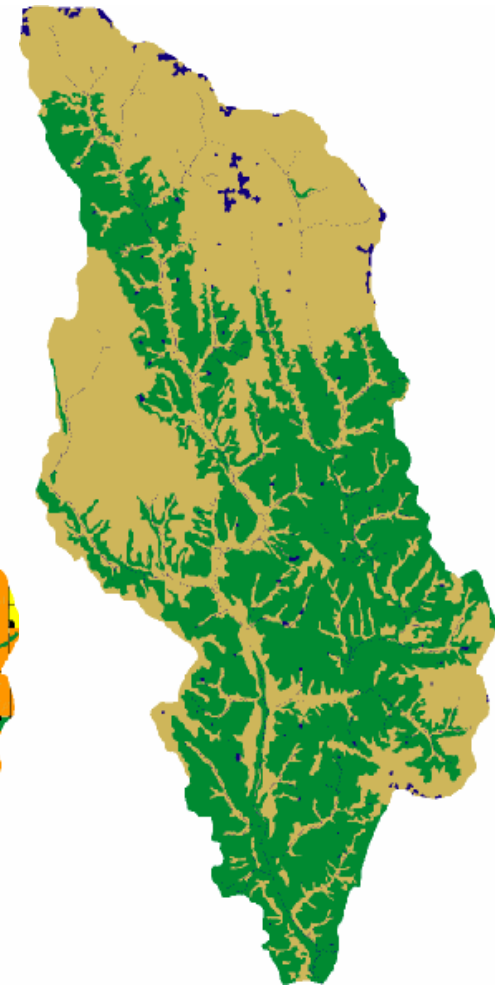
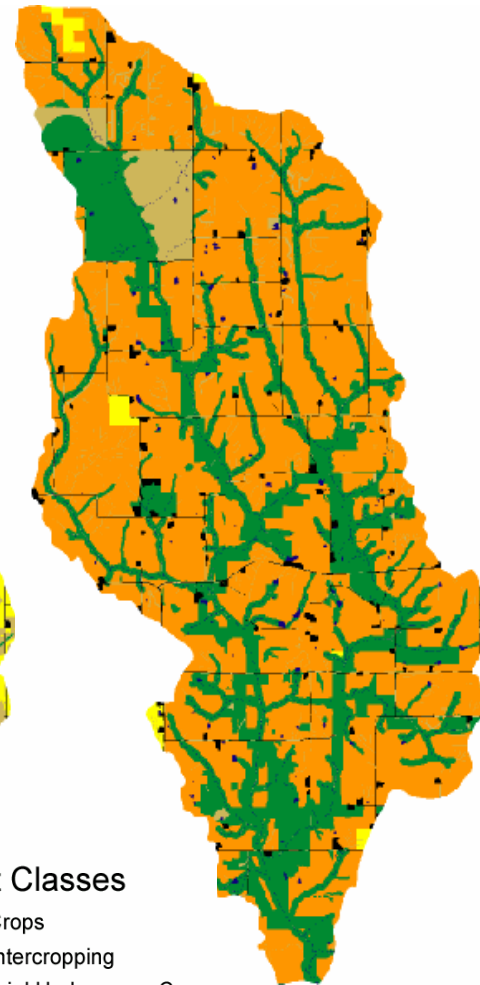
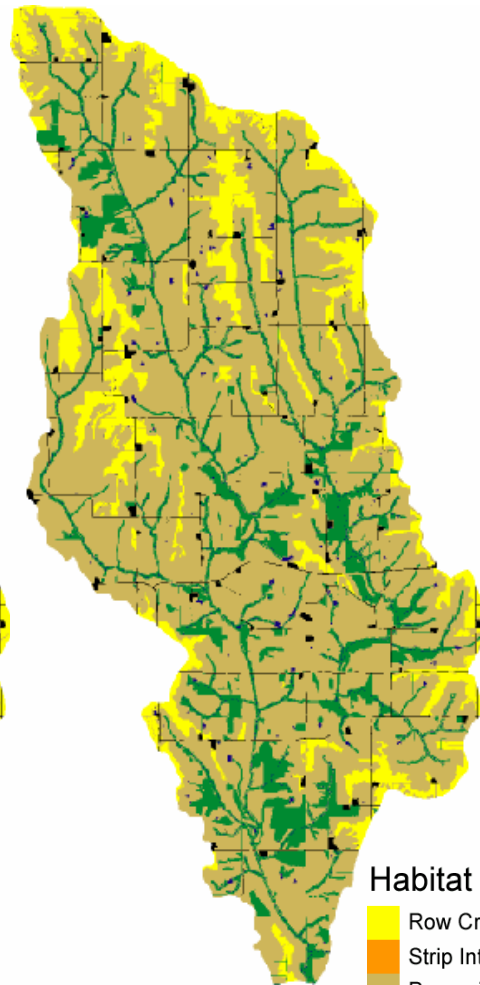
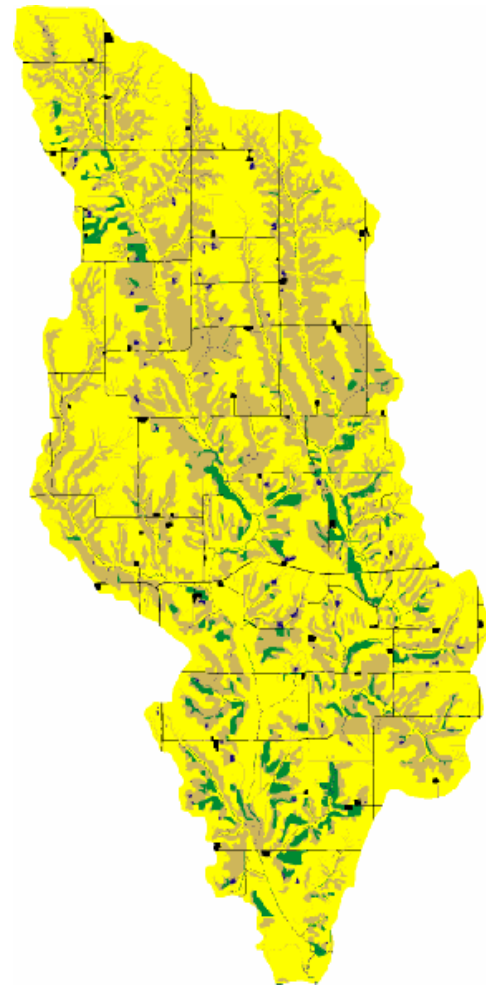
Futures for Buck Creek

Production

Water Quality

Biodiversity

Pre-settlement

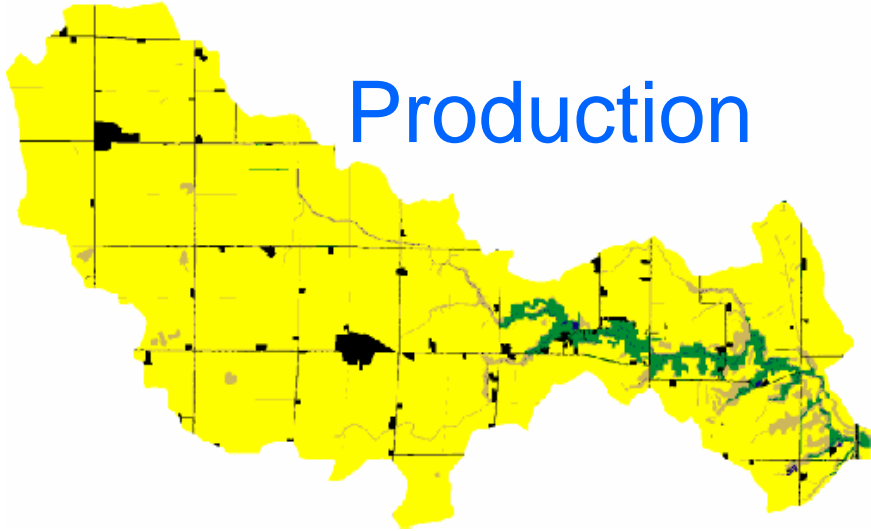


Habitat Classes

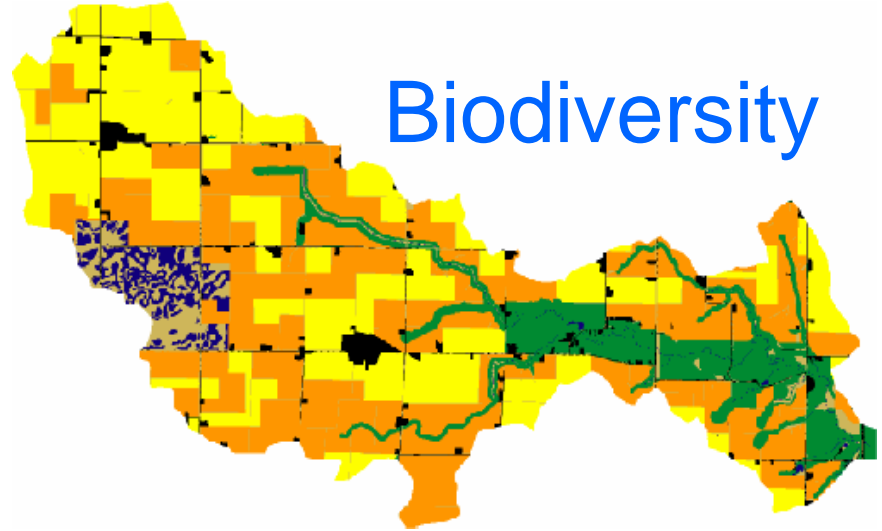
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- Strip Intercropping
- Perennial Herbaceous Cover
- Woodland/Woody Cover
- Water/Wetland
- Urban/Residential/Roads

Futures for Walnut Creek

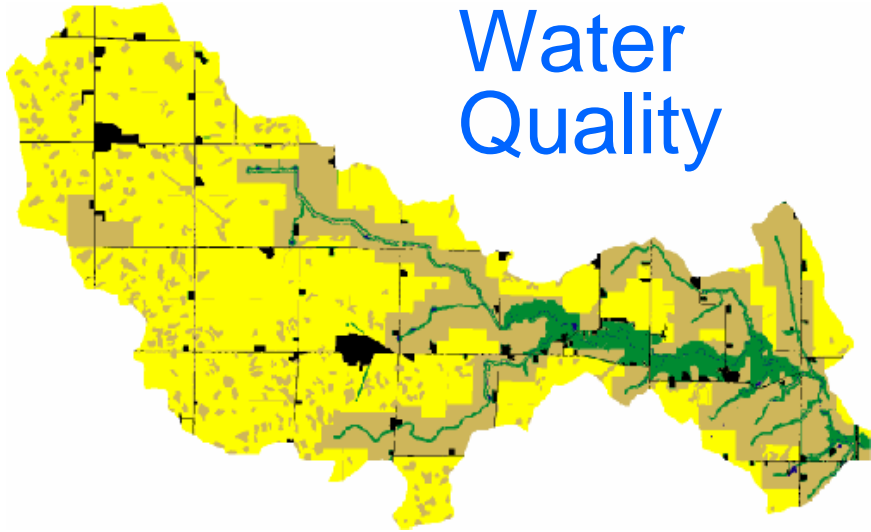
Production



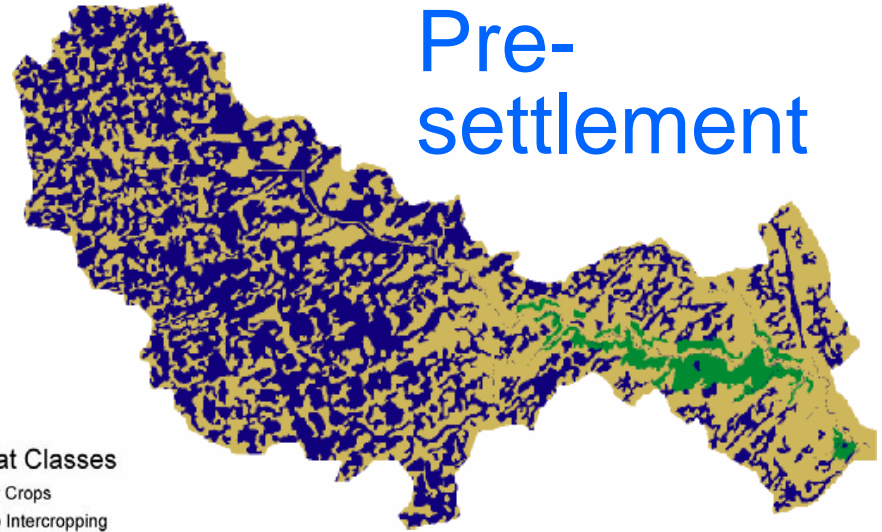
Biodiversity



Water Quality



Pre-settlement

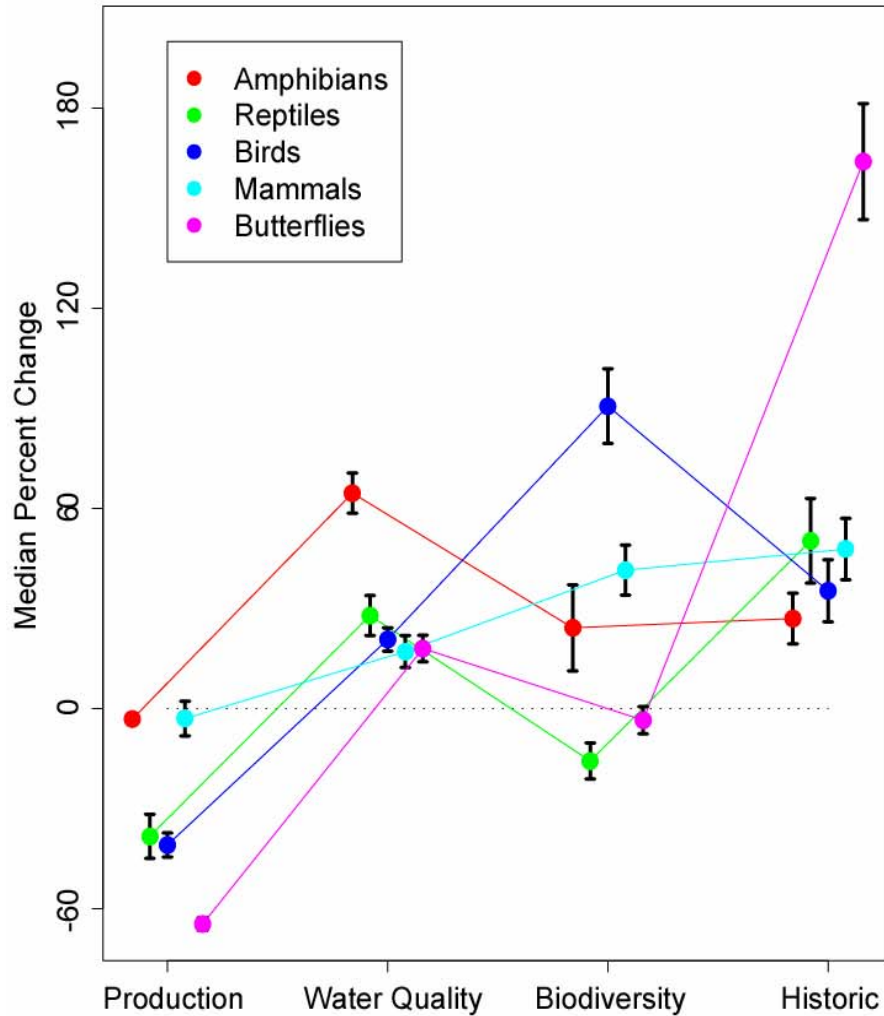


Habitat Classes

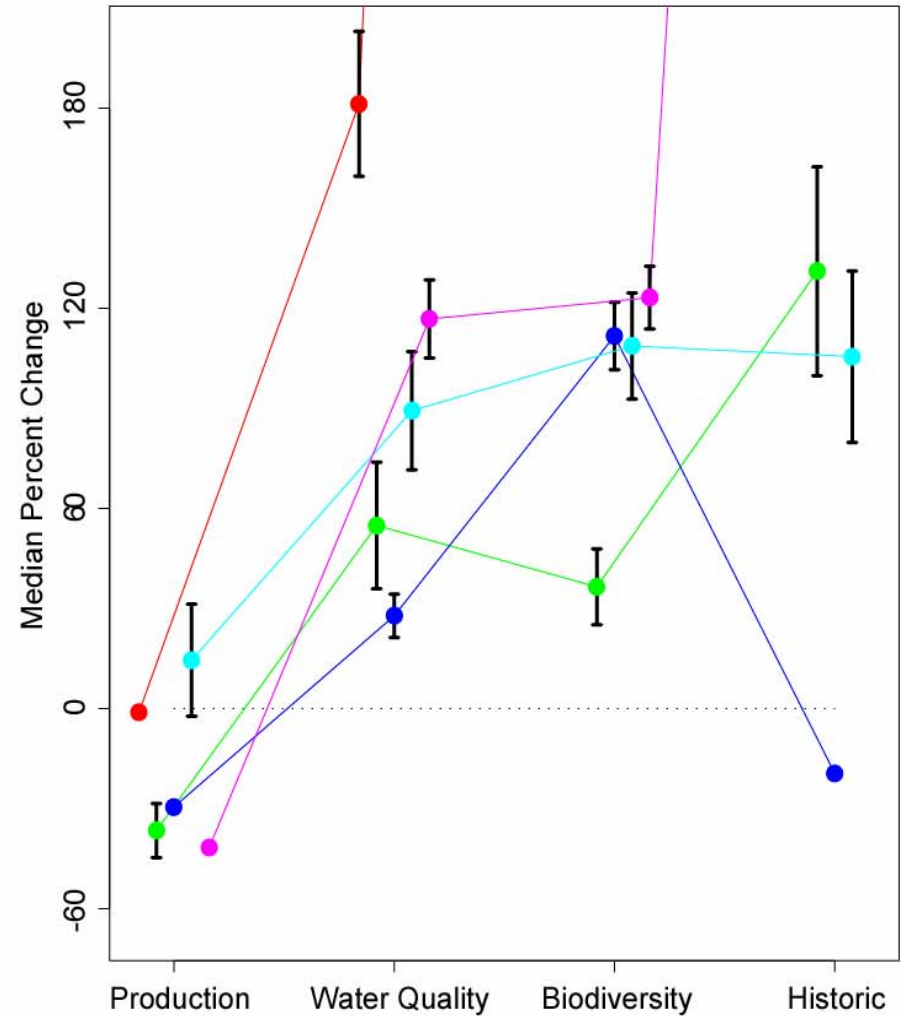
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- Perennial Herbaceous Cover
- Woodland/Woody Cover
- Water/Wetland
- Urban/Residential/Roads

Changes in Habitat

Buck Creek

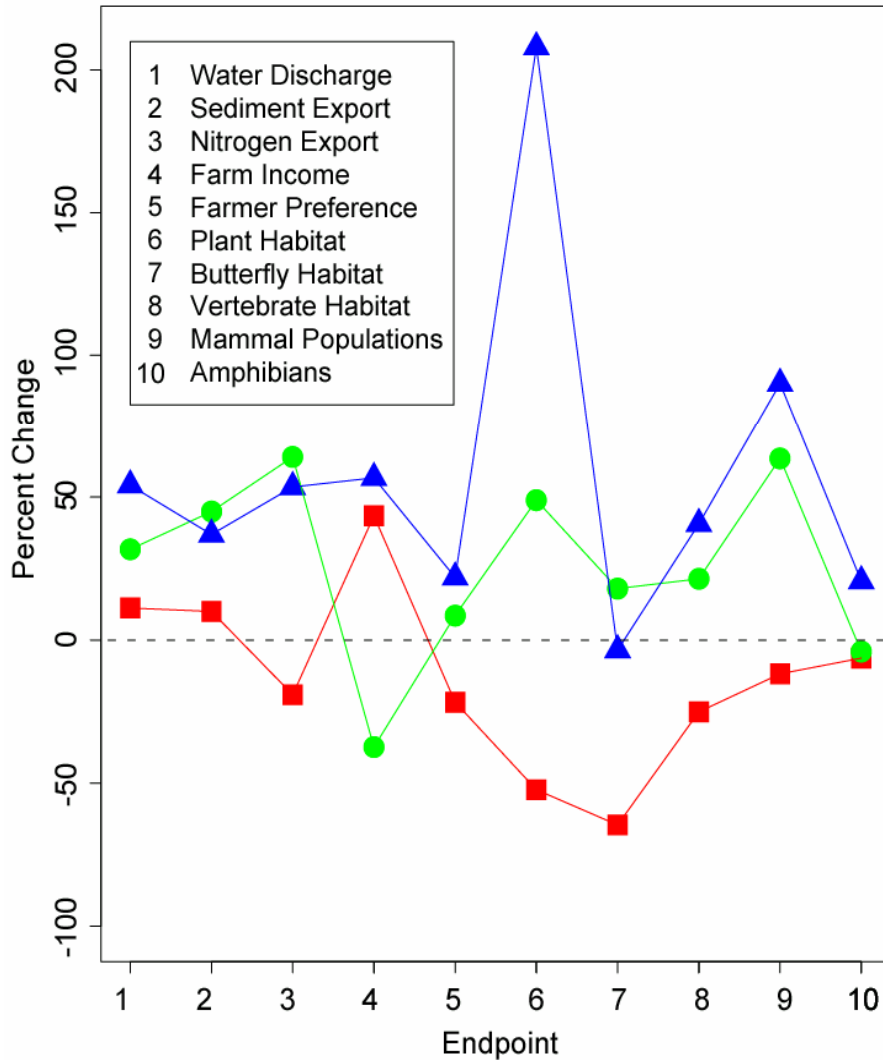


Walnut Creek

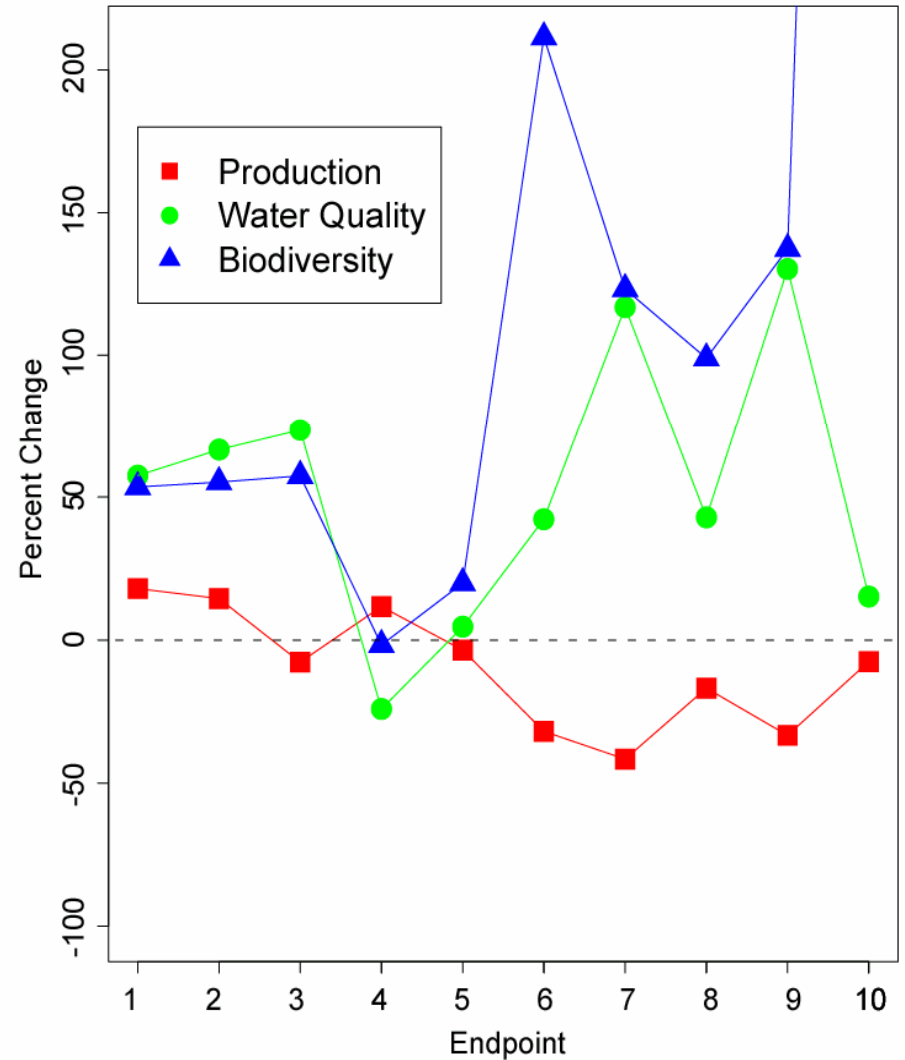


Changes in All Endpoints

Buck Creek



Walnut Creek



Bibliography: web sites

Monroe County, Pennsylvania:

<http://www.gsd.harvard.edu/depts/larchdep/research/monroe/>

Camp Pendleton, Southern California:

<http://www.gsd.harvard.edu/studios/brc/brc.html>

Muddy Creek, Oregon:

http://ise.uoregon.edu/Muddy/Muddy_abstract.html

Willamette Basin, Oregon:

<http://oregonstate.edu/dept/pnw-erc/>

Agricultural Watersheds, Iowa:

<http://bufo.geo.orst.edu/tc/firma/ip/>

Kane County, Illinois:

<http://www.co.kane.il.us/kcstorm/blackberry/>

Bibliography: selected articles

- Baker JP, Hulse DW, Gregory SV, White D, Van Sickle J, Berger PA, Dole D, Schumaker NH. 2004. Alternative futures for the Willamette River Basin, Oregon. *Ecological Applications* 14(2):313-324.
- Hulse D, Eilers D, Freemark K, Hummon C, White D. 2000. Planning alternative future landscapes in Oregon: evaluating effects on water quality and biodiversity. *Landscape Journal* 19(2):1-19.
- Santelmann MV, White D, Freemark K, Nassauer JI, Eilers JM, Vache KB, Danielson BJ, Corry RC, Clark ME, Polasky S, Cruse RM, Sifneos J, Rustigian H, Coiner C, Wu J, Debinski D. 2004. Assessing alternative futures for agriculture in Iowa, USA. *Landscape Ecology* 19(4):357-374.
- Steinitz C, McDowell S. 2001. Alternative futures for Monroe County, Pennsylvania: a case study in applying ecological principles. *Applying ecological principles to land management*. Dale VH, Haeuber RA, editors. Springer, New York. pp. 165-193.
- White D, Preston EM, Freemark KE, Kiester AR. 1999. A hierarchical framework for conserving biodiversity. *Landscape Ecological Analysis: Issues and Applications*. Klopatek JM, Gardner RH, editors. Springer, New York. pp. 127-153.