

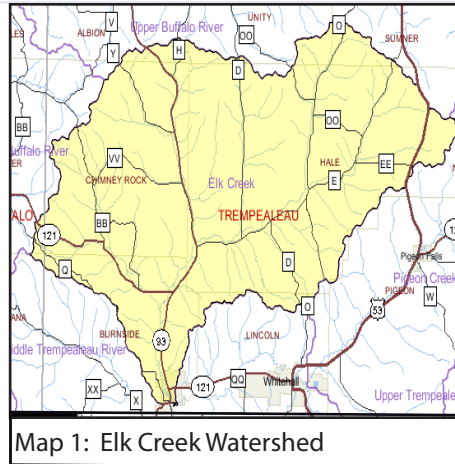
2010 Water Quality Management Plan Update

Buffalo-Trempealeau Basin, Wisconsin

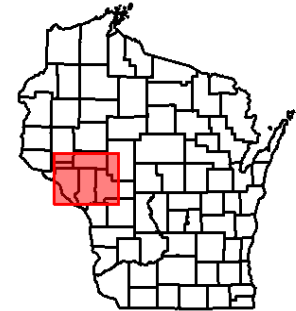
August, 2010

The Elk Creek Watershed lies within two counties, Buffalo and Trempealeau and is part of the larger Black, Buffalo and Trempealeau River Watershed Management Unit in West Central Wisconsin.

Of the 3,852 mi² these basins cover, the Elk Creek Watershed encompasses only 113 mi² (Map 1). There are 285 miles of streams, many of which are only partially meeting their potential use because they are limited by agricultural nonpoint sources of pollution.



Map 1: Elk Creek Watershed



Plan Contents

Watershed Details

Population and Land Use

Figure 1 below shows watershed land use data from the 2001 National Land Cover Inventory dataset, which illustrates the domination of agriculture and forests in the watershed.

Wetlands make up a considerably large component of the water resources in this watershed (3,311 acres), or 4% of the total land area, compared to lakes which cover 47 acres of the landscape. The primary land use in this watershed is agriculture (54% of the land) followed by forest, encompassing roughly 34% of the total acreage of the watershed. The communities of Elk Creek Watershed include the towns of Chimney Rock, Hale, Burnside, Lincoln and Sumner and at the outlet of the watershed is the City of Independence.

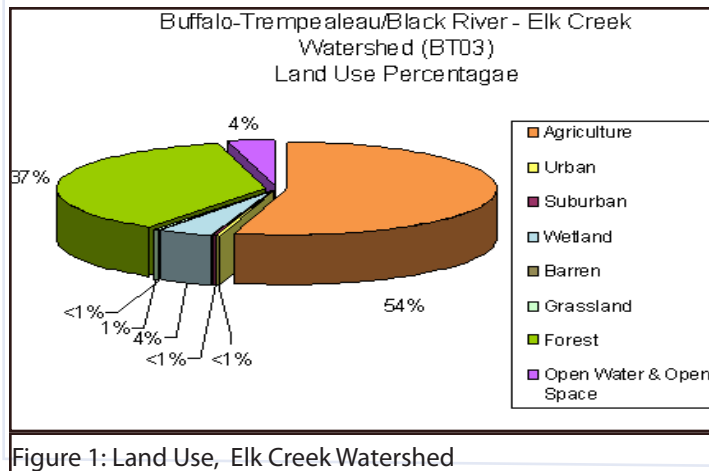


Figure 1: Land Use, Elk Creek Watershed

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Hydrology

Water pollution has complex and profound effects on a water system's stability, both from a water quality and an ecological perspective. For the most part, water quality problems in the Black Buffalo Trempealeau Basin are interrelated and create similar impacts on waterbodies. One impact can lead to another series of impacts and generate further problems for a waterbody.

Sediment deposition may cause the largest impact on waterbodies. Sources of sediment include runoff from croplands, streambank erosion, and streambank pasturing. Studies have shown that in the mid-19th Century, European agricultural practices led to increased runoff and soil erosion (Knox, 1994).

Extreme flows contribute largely to sediment deposition and floods generally result in erosion and pollution from materials in the floodplain. The major result of both extreme flows and sediment deposition is an increase in nutrient loading. Nutrient loading in a lake or stream will alter its chemical structure, which in turn creates other physical and biological problems. The sources of excess nutrients are mainly barnyard and cropland runoff, industrial discharges, and streambank pasturing. The most harmful nutrients to stream health are nitrogen and phosphorus.

Temperature fluctuations are increased due to extreme flows and sedimentation. These fluctuations are detrimental to fish species that cannot tolerate extremes in temperature. If sediment levels continue to increase in a lake or stream and the habitat is altered significantly, temperatures have the potential to change. As temperatures rise and organic materials in the water increase, dissolved oxygen (DO) levels tend to decrease. Aquatic species are stressed when DO levels get too low and may not survive. The whole aquatic habitat can be drastically affected.

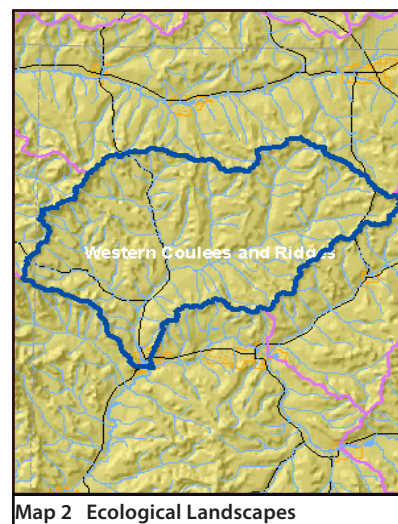
The accumulation of these impacts can cause loss of habitat. Typically, by this time, streambank vegetation is limited, sediment build up has covered spawning beds and temperature and dissolved oxygen fluctuations have made the environment unlivable for cold water and some warm water fish. For the public's health and safety, recreation, and wildlife needs, it is vital to protect water quality in the waterbodies of the Black-Buffalo-Trempealeau River Basin and across the state.

Ecological Landscapes

This watershed is located in the Western Coulee and Ridges Ecological Landscape in southwestern and west central Wisconsin and is characterized by its highly eroded, driftless topography and relatively extensive forested landscape (Map 2). Soils are silt loams (loess) and sandy loams over sandstone residuum over dolomite. Several large rivers including the Wisconsin, Mississippi, Chippewa, Kickapoo and Black flow through or border the Ecological Landscape.

Historical vegetation consisted of southern hardwood forests, oak savanna, scattered prairies, and floodplain forests and marshes along the major rivers. With Euro-American settlement, most of the land on ridgetops and valley bottoms was cleared of oak savanna, prairie, and level forest for agriculture. The steep slopes between valley bottom and ridgetop, unsuitable for raising crops, grew into oak-dominated forests after the ubiquitous presettlement wildfires were suppressed.

Current vegetation is a mix of forest, agriculture, and grassland with some wetlands in the river valleys. The primary forest cover is oak-hickory (51%) dominated by oak species and shagbark hickory. Maple-basswood forests (28%), dominated by sugar maple, basswood and red maple, are common in areas that were not subjected to repeated presettlement wildfires. Bottomland hardwoods (10%) are common in the valley bottoms of major rivers and are dominated by silver maple, ashes, elms, cottonwood, and red maple. Relict conifer forests including white pine, hemlock and yellow birch are a rarer natural community in the cooler, steep, north slope microclimates.



Historical Note

Independence is in the Town of Burnside, which corresponds with one of the townships created under the Land Ordinance of 1785. Shortly after the naming of Burnside in 1863, settlers from Europe and the eastern U.S. began arriving in significant numbers. Many of these immigrants were of Polish descent and they brought with them their cultural heritage which included their devotion to the Roman Catholic Church. It was primarily economic reasons which brought the first settlers to Independence, Wisconsin, and led to the formation of Saints Peter and Paul Catholic Parish.

The State of Wisconsin along with other Midwestern states, was interested in populating its vast territories. Wisconsin offered the availability of farmlands which attracted the early peasant immigrants. The large city of Milwaukee had jobs in industry and presented an opportunity for the unskilled workers. Small agricultural communities attracted the early Polish settlers.



Elk Creek at Swede Valley Road, Photo Credit: M. Hazuga 2010

They immediately organized themselves into a parish. Although 1875 is the generally accepted date of origin of Saints Peter and Paul Parish, some historians would argue for the earlier date when the people began to gather at irregular intervals for services in private homes. The smallness of their numbers and the economic hardships involved required that meetings be held in private homes until a church could be built. When they had increased to about sixty families, a ten acre site for a church was acquired from the Markham family for the sale price of fifteen dollars. The first white frame church was completed and dedicated by Bishop Michael Heiss, Diocese of La Crosse, on October 7, 1875. From these early days as a mission parish of some sixty families, Saints Peter and Paul has grown to be one of the largest congregations in the diocese.

Watershed Condition

Priority Issues

Priority issues for this watershed include the quantity and quality of stormwater reaching surface waters, and the impacts on surface water temperature from stormwater runoff. A related but distinct priority is identifying and reducing urban and agricultural nonpoint source pollution in addition to stormwater runoff.

Water Quality Goals

- Conduct comprehensive stream surveys on impaired or potentially impaired streams;
- Installation of in-stream habitat where habitat is a limiting factor for biological condition, and
- Continue continuous water temperature monitoring on key streams where temperature may be a limiting factor for biological response.

Overall Condition

Trout habitat and populations have not significantly improved in the watershed since 1979, according to fish survey findings. However, recent drought conditions may have had considerable impact on trout survival in the watershed streams. Macroinvertebrate sample results indicate a significant improvement in water quality at four sites, poorer water quality at five sites and no detectable change at eight sites. The original project objective



Sand Hill Cranes in Wetlands

of improving stream biological condition to the excellent category was only achieved at one site in the watershed.

Point and Nonpoint Sources

The Elk Creek Watershed was one of the five initial priority watershed projects selected under the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1979. Implementation of best management practices in the watershed was administered by the DNR and the Trempealeau County Land Conservation Department from 1980 -1988. The water quality objectives of the priority watershed project were: 1) Decrease sediment loading to Bugle Lake; 2) Improve Hilsenhoff Biotic Index values to excellent category for aquatic insects; 3) Reduce fecal bacterial levels; 4) Upgrade the aesthetics of streams (improve smell and appearance)

The Elk Creek Priority Watershed Project was partially successful in meeting the established water resource objectives based on evaluation monitoring results. The most significant measured change was a considerable reduction in fecal coliform and fecal streptococcus bacterial levels in several of the watershed streams.

Based on discussions with individuals who are familiar with the history of the Elk Creek watershed, the streams smell less offensive and look cleaner than before the project began. Although these changes may not be readily quantified, it appears the objective of cleaner and better smelling streams has been achieved to a degree.



Trout Unlimited restoration work on Elk Creek involved enhancing brook trout habitat. From the TU website.

River and Stream Condition

Elk Creek is a 22-mile tributary of the Trempealeau River and is designated as a Class III trout stream for its entire length. Land use in the Elk Creek Watershed is dominated by agriculture and, in 1979, it was one of five watersheds initially selected under the Nonpoint Source Abatement Program. The project was successful in reducing bacteria levels and organic pollution in some streams but trout habitat and populations did not significantly improve immediately following the completion of the project (Source: 2002 WQM Plan).

Monthly water chemistry samples were collected in 2007 from Elk Creek as part of the Statewide Watershed Rotation stream monitoring network. Water chemistry sites are generally selected near the mouth of main-stem streams to document nutrient concentrations in surface water leaving the watershed. Elk Creek has the highest median total phosphorus concentration of 55 sites surveyed to date in the West Central Region. The growing season median total phosphorus concentration was over 5 times higher than the proposed water quality standard.

Total phosphorus concentration collected from Elk Creek at Swede Valley Road are very high compared to statewide averages (Figure 2). The solid line is the 2010 proposed phosphorus standard for wadeable streams (0.075 mg/l). Additional monitoring is required to

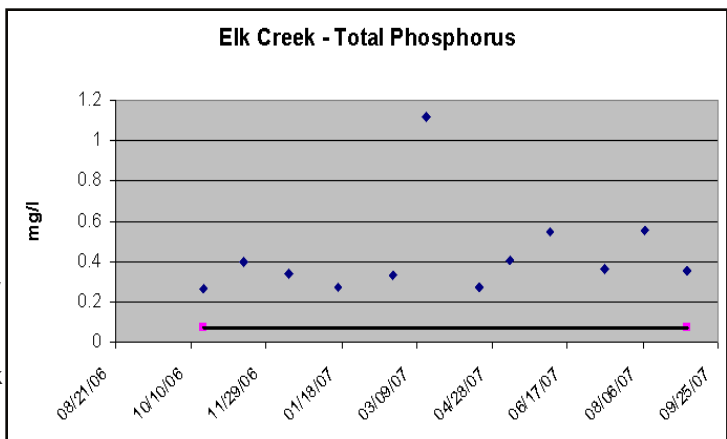


Figure 2: Elk Creek Total Phosphorus at Swede Valley Road

Coldwater Fisheries: Habitat is an Essential Ingredient

With sustainable cold water temperatures documented in a majority of Elk Creek tributaries, the limiting factor for excellent cold water fisheries appears to be habitat. Many of these streams are highly entrenched as improved farming practices have reduced the sediment load to the stream, and the stream cuts through the historically deposited sediments. With high and steep banks, the streams are not well connected to their historical floodplain, which results in increased scour and bank erosion. In-stream habitat projects along State-owned portions of **Borst Valley Creek** and **Bruce Valley Creek** have reduced and stabilized some bank erosion. The habitat work coupled with the stocking of feral (native) trout strains have improved the trout fisheries in these two streams over the last decade.

determine if background or ambient groundwater phosphorus concentrations are naturally high or if the elevated phosphorus concentrations observed in Elk Creek are a result of the agriculturally dominated watershed.

Borst Valley Creek is an eight mile tributary of Elk Creek and is designated as a Class III trout stream for its entire length. Baseflow water chemistry samples collected from the stream within the state wildlife area found total phosphorus concentrations nearly 2.5 times higher than the proposed water quality standard. Land use above the sampling site is mostly undisturbed with the wildlife area comprising nearly 45% of the watershed. Causes of elevated phosphorus concentrations are not known since current watershed land use is mostly protected. High stream concentrations may be the result of historic sediment deposition from poor land use activities, drainage of wetland soils or inputs from groundwater.

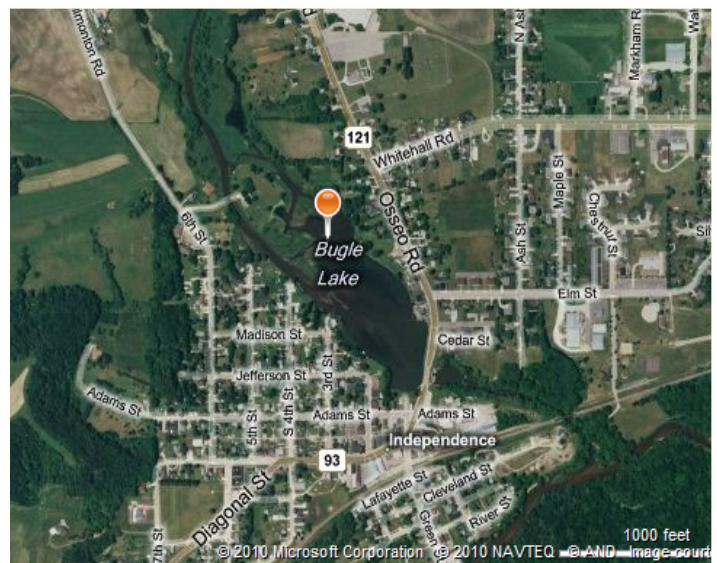
Hawkinson Valley Creek is a four mile tributary to Chimney Rock. The stream has a current use of warm water forage fish. Recent fishery surveys found a few stocked trout in lower reaches and a limited number of warm water species in upper stream locations. Baseflow water chemistry samples collected from the stream just below a state wildlife area found total phosphorus concentrations three times higher than the proposed water quality standard. Land use above the sampling site is mostly protected, with the wildfire area representing 30% of the watershed. Similar to Borst Valley Creek, causes of elevated phosphorus concentrations are not known since most current watershed land use is protected.

Borst Valley and Hawkinson Valley Creeks are two streams in the watershed that have relatively protected land uses but also have high surface water phosphorus concentrations. Additional monitoring should be completed on these streams and others in the watershed to determine sources of phosphorus and their controllability.

Lake Health

Bugle Lake is located in this watershed. Bugle Lake is a 35 acre impoundment of Elk Creek in the City of Independence. Bugle Lake has a maximum depth of eight feet and a mean depth of 5.8 feet, based on measurements in its lower 21 acres. The contributing watershed area is approximately 112 square miles (71,849 acres). Both upland and stream bank erosion are significant problems in the Elk Creek watershed. Because of extensive erosion within the watershed, Bugle Lake has a long history of sedimentation problems, dating back to its creation in 1877.

The Bugle Lake Protection and Rehabilitation Project Final Report (1982) estimated the sediment delivery rate to the lake could be reduced 50 to 60 percent, to about 19,800 cubic yards per year, by implementing watershed improvements. The report projected that the lake's life expectancy would be 25 to 30 years following dredging. Unfortunately, watershed improvements did not meet earlier expectations. Despite efforts of the priority watershed project, approximately 60 percent of identified eroding stream banks in the watershed were not controlled. (Schreiber, 2010). Stream bank erosion continues to be a serious problem.



Wetland Health

Wetland Status

The Elk Creek Watershed lies within three combined basins, the Black, Buffalo, and Trempealeau River (BBT), located in West Central Wisconsin. Roughly 4% of the current land uses in the watershed are wetlands. Only 4%, or half, of original wetlands in the watershed are estimated to exist. Of these wetlands, the majority are emergent wetlands (75%), which include marshes and wet meadows, and shrub wetlands (16%).

Wetland Condition

Little is known about the condition of the remaining wetlands but estimates of reed canary grass infestations, an opportunistic aquatic invasive wetland plant, into different wetland types has been estimated based on satellite imagery. This information shows that reed canary grass dominates 86% of the existing emergent wetlands and 8% of the remaining shrub wetlands. Reed Canary Grass domination inhibits successful establishment of native wetland species.

Wetland Restorability

Of the 2682 acres of estimated lost wetlands in the watershed, approximately 99% are considered potentially restorable based on modeled data, including soil types, land use and land cover (Chris Smith, DNR, 2009).

Groundwater

No new information is available for groundwater in this watershed at this time.

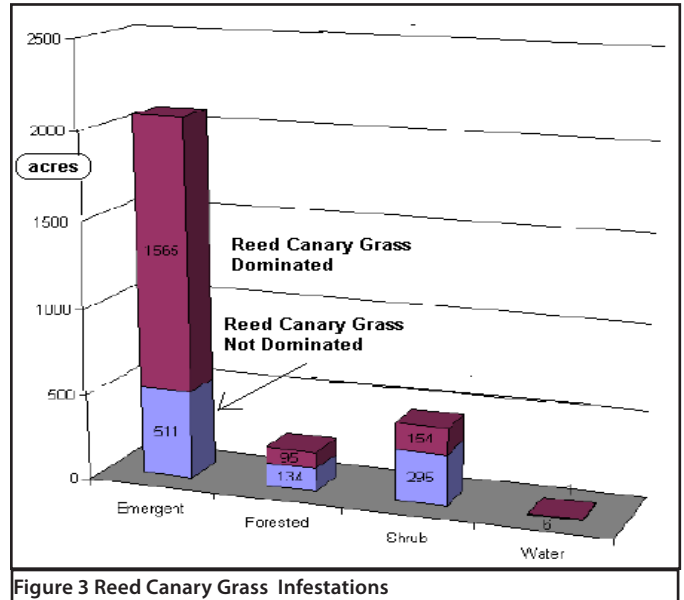


Figure 3 Reed Canary Grass Infestations

Waters of Note:

Outstanding and Exceptional Resource Waters

There are no Outstanding or Exceptional designated waters in this watershed.

Trout Waters

Trout waters in this watershed are listed below.

WADRS ID	Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class
14346	Borst Valley Creek	Borst Valley Creek	1783100	0	8.18	CLASS III
14380	Elk Creek	Elk Creek	1782500	0	21.51	CLASS III
14383	Sport Valley Creek	Sport Valley Creek	1783500	0	3.44	CLASS III
14384	Chimney Rock Creek	Chimney Rock Creek	1784900	0	8.41	CLASS III
14388	North Branch Elk Creek	Elk Creek-North Branch	1788900	0	6.6	CLASS III
1438245	Unnamed	Creek 34-6	1788400	0	3.28	CLASS III
14387	Bruce Valley Creek	Bruce Valley Creek	1786700	0	6.49	CLASS III

Impaired Waters

There are no impaired waters identified in this watershed.

Aquatic Invasive Species

As of May, 2010, there are no documented aquatic invasive species infestations in the streams and lakes of this watershed.

Grants and Projects:

Lakes Grant - Large Scale Lake Planning Bugle Lake
04/01/2005 Complete

City of Independence -- Bugle Lake Sediment Evaluation: The City of Independence, in cooperation with River Country RC&D and other partner organizations, proposed to contract for sediment sampling and analysis on Bugle Lake in Trempealeau County. Major project elements included: 1) sediment sampling and 2) sediment analysis. Project results were shared with project partners and the general public through news articles, distribution of final report and a one page flyer.



Borst Valley Creek at State Hwy 121. Photo Credit: M. Hazuga, 2010

Monitoring

Fisheries Monitoring:

Fisheries "baseline" monitoring and targeted fieldwork to gain specific knowledge related to Wisconsin's fish communities: Borst Valley Creek, Bruce Valley Creek, Chimney Rock Creek, Elk Creek, Hawkinson Creek, North Branch Elk Creek, Sport Valley Creek

Aquatic Invasives (AIS)

In close cooperation with University of Wisconsin Extension and Wisconsin Sea Grant, education efforts focus on working with resource professionals and citizens statewide to teach boaters, anglers, and other water users how to prevent transporting aquatic invasive species when moving their boats. Additional initiatives include monitoring and control programs. Lake Onalaska, Marinuka Lake, Round Lake, Third Lake, First Lake, Eleva Pond, Strum Lake (Crystal), Second Lake, Trempealeau River -Un Slough, Martha Lake, Buffalo River, Henry Lake, Golf Course Pond, Bugle Lake, Osseo Club Pond.

Additional Projects

WCR Watershed Rotation Sites 2006

Stream water quality monitoring covering primarily biological, chemical, and habitat related monitoring to determine ambient conditions at "pour point" locations for each of state's 330 watersheds.

WCR Groundwater Phosphorus Levels 2009

WCR staff has documented high total phosphorus concentrations in baseflow samples from streams throughout the Region. Winter baseflow samples found total phosphorus concentrations in excess of 200 ug/L in several streams. Sampling during winter baseflow should provide an indication of groundwater contribution, however several streams in the Trempealeau River Watershed also had high suspended solids concentrations while another stream in Chippewa County had high total phosphorus (TP) concentrations with no suspended solids. This study identifies groundwater upwelling areas in selected reference streams (minimal agricultural landuse) using mini piezometers and collect groundwater and surface water samples to determine groundwater phosphorus contributions to these streams. Analysis of the data will include determining if a correlation exists between groundwater total phosphorus concentration and surface water dissolved phosphorus concentration, especially during winter baseflow sampling. The data may also be useful in determining the use attainability of streams with high groundwater phosphorus contributions and the proposed surface water criteria.

Recommendations

Streams:

- Similar to the work in Borst Valley and Bruce Valley Creeks, in-stream habitat restoration projects are recommended for cold water streams throughout the watershed, with potential funding sources from the DNR (river grants, fisheries management funding, Targeted Runoff Management grants, etc), Natural Resource Conservation Service (NRCS) or the county.
- Expansion of a citizen based stream monitoring program within the Elk Creek watershed is recommended.
- Future monitoring efforts should target long-term data records for temperature of cold and cool water stream in anticipation of climate change responses, in addition to diagnostic monitoring. This work would help establish baseline stream nutrient concentrations and potential relationships to climate change and future nutrient standards.

Lakes:

- DNR should continue to support the City of Independence's efforts to address the water quality and sediment deposition problems at Bugle Lake through the use of Targeted Runoff Management grants, lake/river planning and lake/river management grants.
- A citizen volunteer lake monitoring program, discontinued in 1989, should be reinitiated at Bugle Lake.

Wetlands:

- Opportunities to reconnect streams with their floodplain-wetland riparian areas during in-stream habitat work should be pursued.
- The use of DNR and federal grants should be used to assess the conditions of the wetland within the watershed following the implementation of the 2011 Federal Environmental Protection Agency EMAP study.



Borst Valley Creek 2010. Photo Credit: Dan Helsel



Elk Creek at Swede Valley Road, WDNR Photo. 2010.

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DNR PUB WT-934



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Elk Creek Watershed