



**Living Wetlands  
Interpretive Nature Trail**

*in  
the Averill's Viking Creek Wetland Preserve*



**Trail Guide**

**Welcome** to the Averill's Viking Creek Wetland Preserve and *The Living Wetlands Interpretive Nature Trail*. The 28.82 acre Preserve was gifted to the Whitefish Lake Institute (WLI) by the Dan Averill family in 2009, as part of the Viking Creek Development proposal. Our goal in making this trail available to the public is to share the history, science, and beauty of the wetland, and to provide a glimpse into the lives of the wildlife with which we share this habitat. This publicly accessible Preserve is an excellent example of how citizens and developers can work together to protect the health of the watershed, to provide open space in the wildland/urban interface, and to allow for economic growth in the community.

### **Development History**

After several unfavorable development proposals, WLI worked together with the Friends of Wisconsin Avenue Wetlands—a group assembled to protect the wetland—and the Dan Averill family to solidify a development plan that satisfied everyone's goals. Now owned and managed by WLI, the Preserve offers an interpretive nature trail and a comfortable respite for people who live, work, and play in the area, as well as numerous outdoor education opportunities. Bordered to the north and east by the 215-acre Murdock Nature Conservancy Easement, the Preserve makes available a large contiguous area that protects water quality and provides habitat for aquatic, terrestrial and avian wildlife.

### **Restoration**

In addition to protecting the wetlands of the Preserve from development, the plan between WLI, Friends of Wisconsin Avenue Wetlands and the Dan Averill Family called for wetland restoration at the north end of the Preserve. The focus of the restoration is to re-create diverse habitat for wetland species. The restoration area can be viewed from the trail and the Viking Lodge Trailhead.

The meadow was cleared of timber in the mid-1990s, but still has small wetland pockets throughout that support a good variety of native wetland and wet-forest trees and shrubs. The restoration process involved planting native shrubs and trees. Fencing and plant cages were installed to protect plants from deer browse and fabric mat was placed on the ground to prevent weeds and reed canary grass from dominating the area. Weeds and invasive species are a result of earlier disturbances, and remain an ongoing management challenge.

## Importance of Wetlands

Wetlands form an important link and transition zone between our land and water and perform several functions vital to our environment and economy which depend on clean water. With their characteristic *hydric* (wet) soil, shallow water table, and unique plant life, wetlands, are considered the most biologically diverse of all ecosystems. Wetlands provide water purification, flood protection, groundwater recharge, and essential habitat for wildlife. Wetland soils globally store twice the amount of carbon as all the world's forests. However, about 60,000 acres of wetland in the US are lost to development each year!

Water Purification: Similar to how a kidney functions to cleanse waste from the bloodstream in the human body, wetlands trap sediments and pollutants, and filter excess nutrients from water before it enters another water body.

Flood Protection: Wetlands are crucial to preventing environmental and property damage from extreme weather events by absorbing and storing excessive rainfall. The excess water is then slowly released helping to alleviate the affects of prolonged periods of drought.

Groundwater Recharge: Wetlands have many intricate connections with groundwater, streamflow, and lake levels, making them essential in the proper functioning of the *hydrologic* (water) cycle.

Unlike most typical wetlands, the Preserve showcases a complex upland/wetland mosaic. It is classified by the U.S. Fish & Wildlife Service as *Palustrine Scrub-Shrub Wetland* and *Forested Wetland*. The movement, distribution and quality of water (*hydrology*), nutrient cycling, soil composition, and climate come together in the Preserve to form a unique wetland ecosystem of skunk cabbage mixed with spruce and cottonwood/aspen forest.

Two branches of Viking Creek join in the Preserve to form the main channel of Viking Creek which then flows beneath Wisconsin Avenue through a culvert to its outfall into Whitefish Lake. This wetland improves water quality before it enters Whitefish Lake and offers safe breeding and calving areas for elk and deer, nesting sites for avian species, habitat for fish, beavers, and aquatic insects, and room to roam for bears, mountain lions, and foxes.

# 1

## Nothing Wasted: Wildlife Cavities



Cavity trees are dead or dying trees that have been excavated by birds and small mammals. They provide cover from predators; and safe places to nest, rear young, hibernate and store food. Cavities are excavated by woodpeckers, red-shafted flickers, other birds, and squirrels. Some birds and small mammals use naturally occurring cavities or cavities constructed by others. Some common *secondary cavity users* include owls,

wood ducks, songbirds, mice, raccoons, and even black bears. Often they enlarge or reshape existing cavities for their purposes. Whenever possible, it is beneficial to leave cavity trees standing to provide valuable space for wildlife.

# 2

## Thirsty Cottonwoods: Getting Their Feet Wet

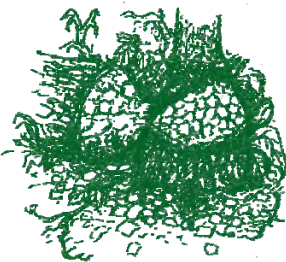


Black cottonwoods are the largest of the willow family and at full maturity can grow to 100 feet (30.5 m) high and six feet (1.8 m) in diameter. Cottonwoods are found near streams

and in wetlands, and provide shade for fish as well as habitat for birds and mammals. Black cottonwoods are extremely thirsty so they need to grow in places where they can “get their feet wet,” meaning they need to be rooted in the water table. The seeds of cottonwoods take long voyages on wind currents and by creek or river to seek out places to grow, and they require the perfect conditions for germination. Keep your eyes out for hawks, eagles and pileated woodpeckers when looking into the branches of black cottonwoods throughout the wetland.

# 3

## Nature’s Engineers: Beaver Activity



Beavers are nocturnal, semi-aquatic rodents that, next to humans, do more than any other animal to shape their landscape. Beavers fell trees to form the basis of dams which they use for protection against predators and to isolate their *lodges*. They also fell broadleaf trees for food (cont.).

Some of the fallen tree branches take root in the moist soil and sprout easy-to-reach foliage, providing food for many years. Often trees felled by beavers may seem to humans like destruction. But beavers keep water systems healthy and they work as engineers developing complex stream habitat and wetlands used by numerous other species. Beavers can swim up to 5 miles per hour, and stay under water for up to 15 minutes. They have a pair of transparent eyelids that are used like

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## A Changed Fishery: Brook Trout Reign



Historically, native westslope cutthroat trout (*Oncorhynchus clarkii lewisii*) inhabited Viking Creek but have been

displaced in modern times by exotic brook trout (*Salvelinus fontinalis*). Brook trout were introduced to Montana from eastern North America starting in 1889 and were extensively propagated and stocked in the state during the early half of the 20<sup>th</sup> century.

Resource competition between westslope cutthroat trout and brook trout is high because they have similar ecological niches and diets. Brook trout have outcompeted westslope cutthroat trout in Viking Creek due, in part, to a reproductive advantage of sexually maturing at a younger age than westslope cutthroat trout. Brook trout spawn in October in the limited small pockets of gravel found in Viking Creek. Using the tail fin, a female constructs a shallow nest called a *redd* where she deposits eggs that have been fertilized in the water and then covers them with gravel. There they incubate through the winter months and hatch out in early spring. Carefully peek over the edge of the bank and you might spot a brook trout.

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## Nature's Excavators: Building for the Future



Pileated Woodpeckers typically build large rectangular nests with multiple entrances in the cavities of dead trees. The excavated holes are so large they can cause a small tree to break apart. In April of each year, the males excavate holes to attract females for mating and rearing their young. Construction takes 3-6 weeks and the female usually contributes to the project towards its finalization. The nests are abandoned after the brood is raised and the woodpeckers rarely return to the same hole the following year. The large holes they leave behind provide great homes for a variety of other feathered species including owls, songbirds, and tree-nesting ducks; and mammals such as bats and raccoons. (cont.)

They also excavate for food—particularly ants—but will eat beetle larvae, termites, caterpillars, cockroaches, grasshoppers, and wild fruits and nuts as well. Their feeding excavations attract other birds to feed. Pileated Woodpeckers are one of the largest forest birds on the North American continent. Almost the size of a crow, they are mostly black, with a striking white stripe down their neck and a brilliant red crest. Pileated Woodpecker pairs remain together in their territory all year round.

## 6 Tree Carving for Bears Only: Territorial Behavior

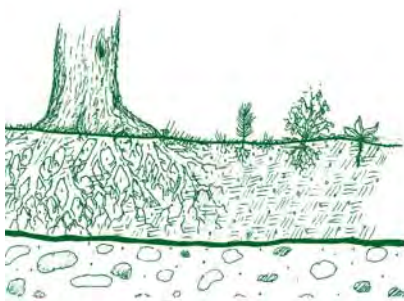


In addition to scat and large footprints, bears will also leave scratched trees where they sharpen their claws and mark their territory. Bear food is abundant in the Preserve, including roots, tubers, buds, twigs, worms, grubs, insects, fish and carrion.

Bears need extensive territories, making the connected lands of the Preserve and the bordering 215-

acre Nature Conservancy Easement an important corridor for their life histories. Bears hibernate through the winter months, fattening up on high energy foods prior to hibernation, then scrounging for nourishment after they awaken in spring.

## 7 Yesterday and Today: Geology & Soils of the Wetlands



The area within the Preserve has a considerably young geologic history. Between eight and ten thousand years ago, the glacier that occupied the Whitefish Lake Basin melted,

producing a lake that was deeper and covered more area, including the wetland where you are standing today. Clay and silt accumulated on the lake bottom creating broad flats of poorly drained, gently sloping *lacustrine* (lake) sediments. The lacustrine deposits exposed after the lake retreated make up the parent material of the wetland soils. (cont.)

For the past six thousand years, organic material has accumulated on top of the lacustrine deposits forming a thin layer of top soil. Viking Creek and its tributaries have slowly cut down into these soils exposing clay and silt deposited thousands of years ago. The stream carries a light sediment load of clay and silt that is eventually deposited into Whitefish Lake.

## 8

### The Living Stream: Aquatic Insects



Caddisflies, mayflies and stoneflies all make their homes in the Preserve. Water scorpions have been found here, and though not dangerous to humans, they prey on the small brook trout that inhabit Viking Creek. Dragonflies are also found in the Preserve and are at the top of the “bug” food chain. When dragonflies go through

metamorphosis from their larval stages they emerge with two pairs of wings and compound eyes with thousands of lenses that give them a nearly 360° view. Dragonflies love to feast on the numerous mosquitoes of the wetland. The presence or absence of various aquatic *macroinvertebrates* (*insects, spiders, crustaceans with no backbone*) indicate the health of the water in the stream. Stoneflies, for example, generally indicate that the

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### A Creek Runs Through It: Viking Creek



Rivers, streams, and creeks are all names for water that flows from higher to lower elevation on the earth's surface. Typically rivers are the largest, creeks are the smallest, and streams are in the middle. They make complex and biodiverse ecosystems, with *biotic* (living) interactions

amongst microorganisms, plants and animals; and *abiotic* (nonliving) chemical and physical interactions.

Flowing waters are an essential resource to all life on earth. That is why plants and animals are found growing around them and why humans congregate and build cities nearby. Viking Creek flows beneath Wisconsin Avenue through a culvert to its outfall into Whitefish Lake. (cont.)

TOWARD  
WHITEFISH MOUNTAIN  
RESORT

BORDERING MURDOCK CO

RESTORATION

VIKING LODGE TRAILHE

VIKING LODGE

SKYBRIDGE

TOWARD WHITEFISH LAKE

W

MAIN TRAILHEAD

VIKING CR





CONSERVANCY (215 ACRES)

### LEGEND

-  Interpretive Sign
-  Bench
-  Bridge
-  Hiking trails
-  Viking Creek

AREA

AD

**AVERILL'S VIKING CREEK  
WETLANDS PRESERVE**  
28.82 ACRES

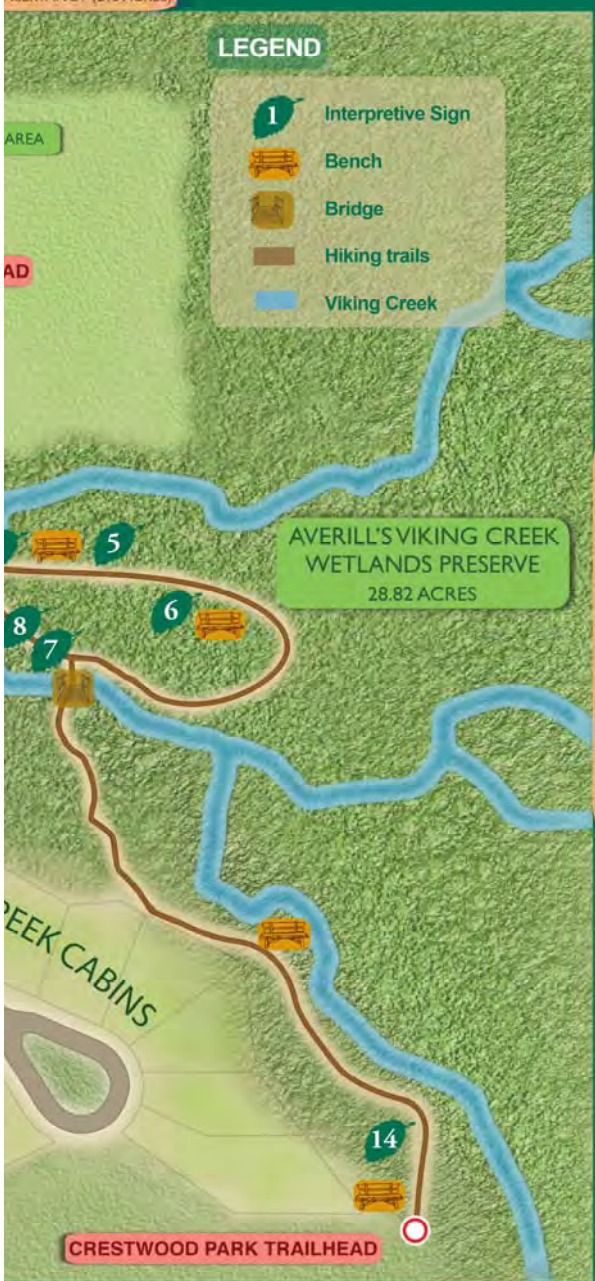
BORDERING MURDOCK CONSERVANCY (215 ACRES)

E

CREEK CABINS

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**CRESTWOOD PARK TRAILHEAD**



The Whitefish Lake Institute has been monitoring water quality in Viking Creek since 2007. The lacustrine soil found in the channel of Viking Creek makes it the largest contributing tributary of sediment—on a per volume basis—to Whitefish Lake. Most of Viking Creek is groundwater fed, with an average flow of approximately 2 cubic feet per second.

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## What's that Smell? Skunk Cabbage



Western skunk cabbage (*Lysichiton americanus*), also known as yellow skunk cabbage or swamp lantern, thrives in wet areas with poor drainage. It is called skunk cabbage because of the skunk-like odor it emits. Its strong odor attracts pollinators like flies, beetles and stoneflies. The plant has a characteristic yellowish-green *spathe* (a sheath that encloses a flower cluster).

After flowering, the plant unfurls massive (2-3 foot) long leaves that are the largest of any plant native to Montana. Skunk cabbage roots provide a food source for bears that use it as a laxative after hibernating. Indigenous people used the plant as medicine for burns and injuries, and for wrapping while cooking and storing food. Ingesting the plant, however, can cause serious illness or death.

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## Creating Wetlands: The Restoration Area

Welcome to the Wetland Restoration Area. In addition to protecting the wetlands of the Preserve, the development proposal for this project called for wetland restoration at this north end of the Preserve. More of the restoration area is visible just outside the Viking Lodge trailhead.

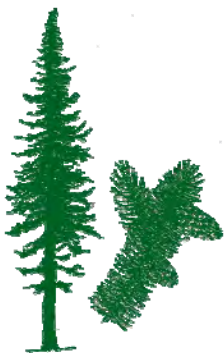
The focus of the restoration is to re-create diverse habitat for wetland species. The meadow was cleared of timber in the mid-1990s, but still has small wetland pockets throughout it that support a good variety of native wetland and wet-forest trees and shrubs.

The restoration process involved planting native shrubs and trees. Fencing and plant cages were also installed to protect plants from deer browse and fabric mat was placed on the ground to prevent weeds and reed canary grass from dominating the area. Weeds and invasive species are a result of earlier disturbances, and remain an ongoing management challenge.  
(cont.)

The lower elevation area at the west end of the meadow is a wetland mitigation project. An existing wetland area was enhanced and additional wetland was created to offset the effects of wetland encroachment when the Viking Lodge was built. The initial stages of the restoration included temporary weed fabric that protected the ground from weed invasion while the shrubs and trees established. Small areas of the fabric were removed every year to allow the growth of wetland sedges and other herbaceous plants.

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## Shallow Rooted Spruce: An Engelmann Spruce Micro Habitat



The Engelmann spruce (*Picea engelmannii*) has a shallow root system. The weak taproot of seedlings does not persist beyond the juvenile stage, and when trees grow where the water table is near the surface or on soils underlain by a clay lens—as is found in the Preserve—the lateral root system common to the seedling stage may persist to old age.

Under these conditions, most roots are in the first 12 to 18 inches of soil making the tree “top heavy” and susceptible to wind throw. Once exposed, the rootwad provides unique micro habitat for mosses, lichens, insects, birds and small mammals.

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## Enchanted Forest: Enchanter’s Nightshade



To the right of Engelmann Spruce rootwad is a small patch of Enchanter’s Nightshade which belongs to the Evening Primrose family (*Onagraceae*). This wildflower is found in damp woodlands in shaded areas revealing a modest small white flower for about a month in the summer.

The flowers have only 2 petals, 2 sepals, and 2 stamens. Enchanter’s Nightshade also belongs to the genus *Circaea*, named after *Circe*, an enchantress featured in *The Odyssey* by Homer. Some say this plant was part of the potion she used to turn Odysseus companions into swine. Enchanter’s Nightshade was one of the plants whose possession was sufficient evidence to warrant an accusation of witchcraft.



Aspens are a medium-sized deciduous tree, typically reaching 50 -100 ft (15-30 m) in height. Individual trees can live for up to 150 years, but the root systems live for thousands of years. Like identical human twins, trees in a stand are genetically identical.

The largest known aspen grove—called “Pando”—is found in Utah, and some experts call it the largest organism (by mass volume) in the world. Pando is estimated to be 80,000 years old, making it possibly the oldest living colony of aspens in the world. Aspens contain *salicylates*, compounds related to aspirin. The leaves have been used to treat aches and burns, and to make a tea for treating urinary tract inflammation. Aspen wood is soft but strong, fairly rot resistant, and not very flammable, so it is often used for making matchsticks. It is also popular for construction, furniture, and animal bedding.

## Interpretive Native Plant Garden

The *Interpretive Native Plant Garden* at the main trailhead includes examples of regionally unique native trees, shrubs, flowers, and grasses found throughout the wetland. Each plant is identified by its common and scientific names. This garden was installed so that visitors might more easily identify plant life as they journey along the trail. Many of the plants were saved from the trail building activities. The dominant species of the wetland preserve include:

- Engelmann spruce (*Picea engelmannii*)
- Paper birch (*Betula papyrifera*)
- Black cottonwood (*Populus trichocarpa*)
- Quaking aspen (*Populus tremuloides*)
- Red-osier dogwood (*Cornus stolonifera*)
- White buckthorn (*Rhamnus alnifolia*)
- Mountain alder (*Alnus incana*)
- Rocky mountain maple (*Acer glabrum*)
- Bebbs willow (*Salix bebbiana*)
- Saskatoon serviceberry (*Amelanchier alnifolia*)
- Yellow sedge (*Carex flava*)
- Beaked sedge (*Carex utriculata*)
- Bunchberry (*Cornus canadensis*)
- Skunk cabbage (*Lysichiton americanus*)

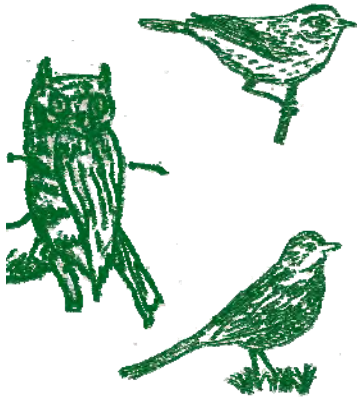
The Interpretive Native Plant Garden was made possible in part by a grant from the **Cadeau Foundation**.

## Flathead Audubon

### Birds of the Averill's Viking Creek Wetland Preserve

These bird species have been identified by Flathead Audubon volunteers and WLI staff by sight, song or sound in the Averill's Viking Creek Wetland Preserve:

American crow  
Black-billed magpie  
Black-capped chickadee  
Black-headed grosbeak  
Blue jay  
Common raven  
Downy woodpecker  
Golden-crowned kinglet  
Gray catbird  
Great-horned owl  
Hairy woodpecker  
Killdeer  
Least flycatcher  
Mallard  
Mountain chickadee  
Northern flicker  
Northern water thrush  
Pileated woodpecker  
Red-breasted nuthatch  
Red-eyed vireo  
Red-naped sapsucker  
Red-tailed hawk  
Ruby-crowned kinglet  
Ruffed grouse  
Song sparrow  
Swainson's thrush  
Tree swallow  
Vaux's swift  
Violet-green swallow  
Warbling vireo  
Western tanager  
Wild turkey  
Wilson's warbler  
Yellow-rumped warbler  
Yellow warbler



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*The Trail Guide made possible by a grant from  
Applied Materials*



## Brokering a Solution

When it comes to the high value of real estate in the Flathead Valley, finding creative solutions that balance a developer's bottom line while protecting natural resources can be a challenge. There's no better example of a success story than the expansion of The Lodge at Whitefish Lake, which included this 28.82-acre wetland gift to WLI.

The Averill family proposed to expand The Lodge across Wisconsin Avenue on the 40 acres they had purchased. The area, comprised largely of wetland habitat, acts as a kidney filtering out pollutants and excessive nutrients adjacent to the clear waters of Whitefish Lake.

All previous development proposals at this site were considered too big, too dense and too intrusive. Public opposition to these development proposals led to the formation of a citizens group called the "Friends of Wisconsin Avenue Wetlands." After two years of negotiations between the Averill family, the Friends of Wisconsin Avenue Wetlands and WLI, a deal was brokered that benefited all—most importantly protecting the wetlands.

In addition to the wetland donation, the deal included the development of additional guest space for The Lodge subject to wetland mitigation requirements outlined by the group and endorsed by the U.S. Army Corps of Engineers. The deal also included funding for wetland restoration, monitoring, initial interpretive trail development, and fencing.

The wetlands are seasonally open to the public via this *Living Wetlands Interpretive Nature Trail* and the area offers a great outdoor classroom for school groups and other community organizations. Citing the collaborative approach that served all parties, the local planning board and city council unanimously approved the plan.

The Whitefish Lake Institute now owns and manages this public resource for wildlife and water quality.

***Science & Education Today—A Vision for Tomorrow***

# Whitefish Lake Institute

## What We Do

WLI is a science and education based 501(c)(3) non-profit corporation led by a volunteer board of directors and assisted by two volunteer committees—the Science Advisory Committee and Citizens Advisory Committee. WLI is not an advocacy organization—we conduct research and provide scientific data. WLI accomplishes its work through three key program areas, **Scientific Research**, **Education & Outreach**, and **Community Stewardship**. Within these three focus areas, we establish programs appropriate to achieving the goals of our mission. WLI is funded by a broad base of members, research and education grants, special events, and through programmatic partnerships with other organizations and resource agencies. Together, we're investing in our future.

## How We Do It

WLI partners with other organizations to creatively fund research and develop programs that benefit Whitefish Lake and other local water resources. Data resulting from our Scientific Research programs is provided to the community and to resource managers to enable them to make informed decisions about water quality issues. WLI focuses most of its research work on Whitefish Lake and its tributaries, but also researches other lakes—through special project funding—in Flathead, Lake and Lincoln Counties.

Efforts through our Education & Outreach program include classroom visits to grades K-12, in-house college internships, educator in-service training, presentations to civic groups, and Road Scholar programs for seniors. Through our Citizen Stewardship Program, community members participate in activities that protect Whitefish Lake and its tributaries, and WLI participates in community groups and efforts that extend our reach. Collectively, these programs allow us to reach almost 1000 citizens of all ages annually.

WLI also trains volunteer citizen scientists in monitoring lakes through the Northwest Montana Lakes Volunteer Monitoring Network (NWMTLVMN), a partnership with the Flathead Basin Commission, Montana Fish, Wildlife & Parks; and the Flathead Lake Biological Station.

## Project Partners

This was a community project. It took foresight, patience, funding, many volunteer hours, and several talented professionals to envision and develop this trail. The following organizations and individuals contributed to this

Applied Materials  
Balancing Axe  
Cadeau Foundation  
Cinnabar Foundation  
City of Whitefish  
Dan Averill Family  
Forestration, Inc.

Friends of Wisconsin Avenue Wetlands

Mobile LoGISTics Mapping

Montana Fish, Wildlife & Parks Recreational Trails Project

Nelson's ACE Hardware

OTB Designworks

River Design Group, Inc.

Todd Bergett Designs

Watershed Consulting, LLC

Whitefish Community Foundation

Whitefish Lake Institute Members

and the many volunteers who helped on our Wetland Work Days!

*Special thanks to Todd Bergett for donating line drawings which are used in this guide and on signs along the trail.*

*Trailhead and interpretive signs were designed by McHale Creative Services and produced by Successful Signs and Awards.*

### **Mission**

*Founded in 2005, the Whitefish Lake Institute is committed to acquiring scientific research and engaging the local citizenry to protect and improve the Whitefish area lake resources of today, while providing a collective vision for tomorrow.*



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INSTITUTE**

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