The Betsie River, Platte River, and Otter Creek Watersheds Improvement Project
In 2008, the Environmental Protection Agency (EPA) awarded the Grand Traverse Band of Ottawa and Chippewa Indians (GTB) a grant for $823,500 through the Targeted Watershed Grant program. GTB partnered with the Conservation Resource Alliance (CRA) and others to raise $274,500 in match and complete 7 restoration projects. The focus was on major problems afflicting coldwater trout streams in Benzie County, tributaries to Lake Michigan, one of the world’s Great Lakes. Globally, these types of rivers are rare with their extremely stable groundwater flows and close proximity to the Sleeping Bear National Lakeshore, a matrix of glacial moraines, sand dunes, forests, lakes, and islands off the shores of Lake Michigan, named from the Native American “Legend of the Sleeping Bear.”

The Betsie and Platte Rivers, and Otter Creek course through large tracts of public land, and are popular for canoeing and kayaking, fishing and hunting, hiking and biking trails. Top concerns are common amongst the different rivers and include excessive sediment from erosion sites, altered hydrology and temperatures, and other human disturbances to headwaters and nearby wetlands. Excessive sediment or sand can compromise stream stability by abnormally changing channel depths and widths, often leading to habitat loss and extreme temperature variations that negatively impact trout and other coldwater species. Once washed into a stream it takes years, even decades, of flushing flows to move foreign sediment from the channel into Lake Michigan.
Betsie River & King Road Improvement

October 2010
The Betsie River is a State Designated Natural River and is known regionally for its steelhead and salmon fisheries. With its headwaters starting in Green Lake, the Betsie meanders through Grand Traverse, Manistee, and Benzie Counties where it then flows into Lake Michigan.

There are 106 road/stream crossings inventoried in the watershed with 64 of them recommended for repair or replacement, a costly endeavor. Site #B-20 is where King Road crosses the Betsie mainstem. This site was ranked severe for its steep, sandy road approaches that eroded during rain and snowmelt events, washing tons of sand over the bridge deck and into the river. Site #B-20 is located on the upper third of the river; thus with the Betsie being 52 miles long, the sediment from King Road impacted over 30 miles of the river downstream. By partnering together, funding was secured to enable the Benzie County Road Commission to pave and curb the approaches, and install spillways to channel runoff away from the stream, to nearby land.

PROJECT COST: $90,068
LOCATION: N 44.542343 W 85.942526
BEST MANAGEMENT PRACTICES:
• 1,700 feet of pavement & curbing
• 6 spillways complete with rock riprap
• Guardrail
PROJECT BENEFITS:
• Halt annual input of up to 12 tons of sediment from the road into the river
• Ensure safe roadway for vehicle traffic
• Reduce road maintenance
PARTNERS:
• Environmental Protection Agency
• Grand Traverse Band of Ottawa and Chippewa Indians
• Benzie County Road Commission
• CRA River Care Program – The Oleson Foundation, Serra Family Foundation
• Michigan Department of Natural Resources
• Betsie River Watershed Restoration Committee
• Michigan Department of Environmental Quality
• Natural Resources Conservation Service
Platte River & Burnt Mill Timber Bridge

October 2009 through August 2010

The Platte River is recognized as one of Michigan’s Blue Ribbon Trout Streams, and certain reaches are home to steelhead, salmon, brook and brown trout. The Platte River springs from Lake Ann, and then flows into and out of 3 other lakes (Bronson, Platte and Loon Lakes) before emptying into Lake Michigan in the Sleeping Bear Dunes National Lakeshore.

There are 98 road/stream crossings inventoried in the watershed. Site #I-10 is where Burnt Mill Road crosses the Platte River mainstem; this site ranked severe for its undersized culvert and steep, raw embankments that regularly washed into the stream. These conditions were exacerbated by intense recreational use, where folks trampled the banks in order to get to the stream and built a rock dam to form a huge swimming hole. The site is in the headwaters of the Platte River and thus impacted over 15 miles of river downstream to Platte Lake.

Funding was secured to build a beautiful timber bridge over the Platte River, reminiscent of the natural character of the surrounding woods and the history of the site. There used to be a sawmill where shingles were produced at the Burnt Mill crossing, along with a nearby railroad grade that connected to the town of Honor, and a marl mining operation upstream on a connecting creek.

PROJECT COST: $328,000

LOCATION: N 44.685193 W 85.888624

BEST MANAGEMENT PRACTICES:
• Replace pipe arch (5’7” x 7’11”, 91’ long) with 3 span 54’ wide timber bridge
• Increased waterway opening from 37 to 532 square feet
• Pavement & 3 spillways
• Rock placement & revegetation

PROJECT BENEFITS:
• Reconnect 2 miles of the upper Platte River
• Restore fish passage
• Restore natural movement of woody debris, substrate, & aquatic insects
• Halt annual input of up to 8 tons of sediment from the road into the river
• Provide natural stream bottom under road & stop pool formation
• Ensure safe roadway for vehicle traffic
• Reduce road maintenance

PARTNERS:
• Environmental Protection Agency
• Grand Traverse Band of Ottawa and Chippewa Indians
• Benzie County Road Commission
• CRA’s River Care Program –The Oleson Foundation, George Fund
• Natural Resources Conservation Service
• US Fish and Wildlife Service
• Platte River Watershed Council
• Benzie Conservation District
• McDowell Construction
• Michigan Department of Natural Resources
• Michigan Department of Environmental Quality
• Krenn Bridge Company
Another negative impact of the undersized culvert at Burnt Mill Road, was that the pooling and widening of the stream at the outlet caused river banks to cave in and nearby trees to fall into the stream. A healthy stream has large amounts of woody debris for fish to seek cover in, and aquatic insects to feed on. However, when multiple trees fall completely across a river and impede flows, the stream becomes wider and additional bank erosion occurs.

After the Burnt Mill Bridge was constructed, CRA worked with Kanouse Outdoor Restoration to complete 1,200 feet of woody debris work downstream of the bridge to restore a more natural shape and sinuosity to the Platte River. Fallen cedars and willows were cut and anchored at an angle along sensitive streambanks to deflect the strongest current to the center of the channel. Log structures along banks simulate undercut streambanks, and provide hiding and resting cover for fish and wildlife. Instream wood provides food and attachment spots for mayflies, caddisflies and stoneflies during their various life stages. These aquatic insects are an indicator of excellent water quality and are a vital food source for a variety of fish and wildlife. Wood is good for a river.
Dair Creek Recovery

June 2006 through October 2009

Dair Creek is the coldest and second largest tributary to the Betsie River, thus providing critical escape cover and spawning habitat for trout in a watershed known to have extreme water temperatures on the mainstem during the summer and winter months. In 1865, a man named Fred Dair constructed a dam, pond, footbridge, and sawmill near the confluence of Dair Creek with the Betsie River, and a portion of Dair Creek was re-routed to a man-made channel. The original wooden dam burned and collapsed, and the concrete dam built in its place also failed. Outdated road/stream crossings upstream and downstream of the dam were unable to handle stream flows and had major erosion problems.

With this project, remnants of the dam were removed, Dair Creek was put back into one stream channel, 2 road/stream crossings were replaced with bottomless arches, and a road embankment was rebuilt and stabilized. Approaches were paved and spillways were constructed; habitat platform structures were installed on the Betsie mainstem nearby for added fish cover. All of this work restored full fish passage to 8 miles of Dair Creek upstream, where the stream meanders through large tracts of public land that is heavily wooded and rich with wetlands.

PROJECT COST: $426,943

LOCATION: N 44.551885 W 86.054106

BEST MANAGEMENT PRACTICES:
- Dam removal
- Re-route & restoration of 500’ of stream channel
- Triple 5’ diameter culverts replaced with a 13’ wide bottomless arch, 4’ 1” high, 60’ long
- Single 24” diameter culvert replaced with a 10’ wide bottomless arch, 4’ 6” high, 54’ long
- 150’ of road embankment stabilization
- 400’ of pavement and 2 spillways
- 100’ of woody debris & fish habitat platform structures
- 80 cu.yds. fieldstone placement
- Removal of 30 cu.yds. sand

PROJECT BENEFITS:
- Reconnect 8 miles of Dair Creek to the Betsie River
- Restore fish passage
- Restore natural movement of woody debris, substrate, & aquatic insects
- Halt annual input of up to 10 tons of sediment from roads into the river & creek
- Halt bank erosion & scouring of stream bottom
- Provide natural stream bottom under roadways
- Ensure safe roadway & reduce road maintenance

PARTNERS:
- Environmental Protection Agency
- Grand Traverse Band of Ottawa and Chippewa Indians
- Great Lakes Fishery Trust
- National Oceanic Atmospheric Administration
- Fish America Foundation
- US Fish & Wildlife Service
- Conservation Resource Alliance
- Benzie County Road Commission
- Trout Unlimited – Adams, Pine River Area, Elliott Donnelley & Martuch Chapters
- NRCS – Conservation Innovation Grant
- Betsie River Watershed Restoration Committee
- Michigan Department of Natural Resources
- Michigan Department of Environmental Quality
- Wilcox Professional Services
- Landowner, Bryan Matthews
3. Before – Old King Road repeatedly washed into the Betsie River nearby. 4. After – stabilizing Old King Road prevents sedimentation of the Betsie River.

5. Before – dam remnants and a channelized Dair creek. 6. After – a restored Dair Creek.
Otter Creek is 2.1 miles long with its watershed entirely contained within the Sleeping Bear Dunes National Lakeshore. Otter Creek flows from the connected Deer, Bass and Otter Lakes, and empties into Lake Michigan. The marl soils found within this watershed are the source of constantly bubbling springs found in the nearby woods and feeder streams of Otter Creek. Otter Creek has a naturally reproducing brook trout population, with potential for the fish to migrate between the creek and Lake Michigan.

The major problem site on Otter Creek was the Aral Road crossing, comprised of rusting, undersized culverts that were constantly blocked with woody debris from beavers. An existing hiking and skiing trail, and needs for fire and hunting access required that a crossing be maintained at Aral Road. Partners worked together to construct a single lane timber bridge that allowed for the natural stream width and bottom of Otter Creek. Construction was a challenge with the marl soils, and timber piles having to be driven 20’ down until stable ground was found. Ironically, a wooden bridge was originally built at this site when the logging town of Aral was established on Otter Creek in the late 1800s.

**Otter Creek Timber Bridge**

**September 2008 through October 2009**

Otter Creek is 2.1 miles long with its watershed entirely contained within the Sleeping Bear Dunes National Lakeshore. Otter Creek flows from the connected Deer, Bass and Otter Lakes, and empties into Lake Michigan. The marl soils found within this watershed are the source of constantly bubbling springs found in the nearby woods and feeder streams of Otter Creek. Otter Creek has a naturally reproducing brook trout population, with potential for the fish to migrate between the creek and Lake Michigan.

The major problem site on Otter Creek was the Aral Road crossing, comprised of rusting, undersized culverts that were constantly blocked with woody debris from beavers. An existing hiking and skiing trail, and needs for fire and hunting access required that a crossing be maintained at Aral Road. Partners worked together to construct a single lane timber bridge that allowed for the natural stream width and bottom of Otter Creek. Construction was a challenge with the marl soils, and timber piles having to be driven 20’ down until stable ground was found. Ironically, a wooden bridge was originally built at this site when the logging town of Aral was established on Otter Creek in the late 1800s.

**PROJECT COST:** $84,107

**LOCATION:** N 44.761605 W 86.074147

**BEST MANAGEMENT PRACTICES:**
- Replace twin 48” diameter culverts with an 18’ wide single lane timber bridge
- Fieldstone placement & revegetation

**PROJECT BENEFITS:**
- Reconnect 2 miles of Otter Creek
- Restore fish passage
- Restore natural movement of woody debris, substrate, & aquatic insects
- Halt annual input of up to 4 tons of sediment from the road into the creek
- Provide natural stream bottom under roadway
- Ensure safe crossing for vehicle & recreational access
- Reduce road maintenance

**PARTNERS:**
- Environmental Protection Agency
- Grand Traverse Band of Ottawa and Chippewa Indians
- NRCS – Conservation Innovation Grant
- CRA’s River Care Program – The Oleson Foundation & George Fund
- Benzie County Road Commission
- National Park Service – Sleeping Bear Dunes Lakeshore
- Michigan Department of Natural Resources
- Michigan Department of Environmental Quality
- Krenn Bridge Company

1. Before – frequent beaver activity required maintenance.
2. The road constantly washed into the stream.
3. After – a timber bridge provides access to recreationists and allows for a natural stream bottom.
**Otter Creek Study**

Historically (pre-logging era), fish habitat in Otter Creek was provided by wind thrown cedar, dead or dying trees, and beaver cuttings from aspen, maple and white birch. Subsequent to settlement and associated land use practices such as logging, marl extraction and agriculture, the channel of Otter Creek was drastically modified to serve as a sluiceway for the logging and sawmill operation that once supported the historic thriving town of Aral. Consequently, little argument exists that the abundance of instream large woody debris (LWD) was significantly higher than what is seen today. This major disturbance combined with the delicate nature of the marl soils, has had the most effect on the stream’s ecological dynamics as Otter Creek has adjusted over the last hundred years.

**Unique Features of Otter Creek**

- It is one of very few tributaries to Lake Michigan where naturally reproducing brook trout exist with direct access to the Lake.
- Anecdotal information suggests that members of this brook trout population move freely to and from Lake Michigan.
- Otter Creek brook trout thrive even though heavy runs of non-native Pacific salmonids ascend from Lake Michigan annually and typically outcompete brook trout in other stream systems.
- Dominance of soft substrates (marl, sand, muck) enhance the influence of LWD on pool formation important for brook trout survival and growth, while serving to preclude Pacific salmonid reproduction (salmon and steelhead require gravel for spawning habitat).
- Overall physical and biological features of this stream are uniquely favorable to brook trout, and contribute to restoring an extraordinary nearshore brook trout fishery with relatively minor habitat restoration efforts.

**Evaluation of Restoration Feasibility**

The simplicity of restoring habitat inspired Grand Traverse Band’s Fishery Biologists to take a closer look at this brook trout population and its habits.

- Otter Creek brook trout growth rates were nearly double the statewide average.
- Wide ranging movement patterns were observed suggesting that, in some years, fish leave and return to the system from Lake Michigan or other connected lakes.
- Instream temperature, while potentially limiting in extreme circumstances, is likely more of an influence on migratory patterns than mortality.
- The lack of instream LWD and low frequency of LWD inputs into the system were identified as key limiting factors to brook trout survival, abundance and behavior.
- Findings helped support the Otter Creek Bridge project and future plans to increase woody debris habitat in Otter Creek.
Platte River & South Street Stabilization

May 2009 through June 2009

The Platte River flows through the Village of Honor, where it meanders through private land and receives more attention and use from recreationists. At the South Street crossing (site #H-10), folks had trampled the road embankments to get to the river and had built a rock dam to form a large swimming hole. The Benzie County Road Commission had previously placed smaller stone, geotextile, branches and leaves in an effort to protect the banks, to no avail. Partners worked together to stabilize the embankments with large, heavy rock while still providing for recreational access with strategically placed rock steps.

PROJECT COST: $33,576

LOCATION: N 44.659893 W 86.018915

BEST MANAGEMENT PRACTICES:
• 350 tons of rock riprap placement
• Grading and revegetation
• Road embankment stabilization
• Removal of rock dam downstream of culverts

PROJECT BENEFITS:
• Halt annual input of up to 3 tons of sediment into the river
• Reduce pool formation
• Ensure safe recreational access
• Reduce road maintenance

PARTNERS:
• Environmental Protection Agency
• Grand Traverse Band of Ottawa and Chippewa Indians
• Benzie County Road Commission
• Conservation Resource Alliance
• Michigan Department of Environmental Quality
• Michigan Department of Natural Resources
• Benzie Conservation District
• Natural Resources Conservation Service
• Village of Honor
Moving Forward

With the success and momentum gained, and the relationships built over the last 3 years with the EPA’s Targeted Watershed Grant to the Grand Traverse Band, the Conservation Resource Alliance secured a Great Lakes Restoration Initiative (GLRI) grant from EPA for $762,500 (spanning 2011-2013) to continue restoration efforts on high quality streams in Benzie County. Additional funds for this second phase will include $171,990 from a GTB grant with the NRCS Environmental Quality Incentives Program, $100,000 in match from the Benzie County Road Commission, in-kind services from KPM Engineering, GTB, Trout Unlimited, US Fish and Wildlife Service and other grants. This next phase will include the following projects:

- **Final major earthwork needs on Dair Creek, the Betsie River’s most significant coldwater tributary.** Undersized twin 36” diameter culverts on Landis Road (#B-40) will be replaced with a bottomless arch (18'2” span x 4’7” rise, 27' long) to promote fish passage and the natural movement of woody debris and substrate.

- **Restoration of Kinney Creek, a Platte River tributary, at a site on Stanley Road (#I-17) where aging undersized culverts 24” and 18” in diameter, are constricting flows and causing a velocity barrier to fish and other aquatic species.** Installation of a bottomless arch (10’11” span, 4’3” rise, 27’ long) will provide for passage of all species.

- **Construction of a timber bridge (66’ long and 34’ wide, three span) at Reynolds Road over the Platte River.** Currently, a 4’ diameter culvert, 98’ long is funneling all the water from the Platte mainstem under the road, and causing a buildup of muck and sediment 500 upstream of the road, almost 3’ deep in some areas. There are 800’ of fallen trees upstream and downstream of Reynolds Road, from the unnatural widening and pooling of the river due to the culvert. Fallen trees will be strategically placed and secured in the stream, as well.

- **Tamarack Trout Farm in the Platte River Watershed is no longer in operation and consists of abandoned ponds with a connecting stream channel laden with sediment due to agricultural use and road impacts from upstream.** Restoration of the stream and management of the ponds will return this area to a functioning wetland area. Northern white cedar dominates the landscape and brook trout have been caught in Tamarack Creek in prior years.

- **Continued monitoring of the phase 1 sites, with survey work and instream woody debris work targeted for Otter Creek and Dair Creek.**
This endeavor was a success thanks to the help of more than 32 partners and $1,098,000 in funding and local match. Thank you for restoring our rivers!