TRAIL CONSULTATION
Lynx Lake Road to EAST BUTTERFLY LAKE ACCESS TRAIL
Nancy Lakes State Recreation Area

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On July 31, 2008 I conducted a trail consultation on behalf of NPS-RTCA, at the request of staff of the Nancy Lakes State Recreation Area on the access trail to East Butterfly Lake. The site visit was conducted with Lisa Holzapfel and Kristin Pearson with NPS-RTCA, four members of State Parks staff and four local property holders. The purpose of the consultation was to make a general condition assessment of the trail, evaluate previous trail mitigation work and make general recommendations on future mitigation options.

The trail was traversed from north to south from a parking area adjacent to a private church camp to the north Shore of East Butterfly Lake. The trail crosses a variety of terrain on glacial ablation features and ground moraine. Trails grades ranged from a high of approximately 20% to flat and level ground. The area has a mixed deciduous and conifer tree and heavy shrub cover over an organic-rich soil surface. On the flat lands the organic surface is relatively thick (13-16”). Across most of the area is 12-16 inches of wind-deposited silt-sized loess over a mixed gravel (gravel content approximately 10-20%) and silt loam ground moraine deposit. The upland hills have higher sand and loam content and are likely glacial fluvial deposits from a glacial ablation episode.

<u>Condition Assessment-</u>

In general, the trail is in good to poor condition along its length. Some areas run on fall line alignments and are over steepened. There is inadequate water control on most of the sloped sections. There was little evidence of surface erosion on sloped segments, but some exceeded 100 feet without a drainage break. Never-the-less these sections and those crossing higher ground where generally in good condition.

On flat lying sections there was evidence of surface failure along some segments in the form of deep rutting, ponding, soil displacement and extremely muddy conditions. These sections (approximately 10-15% of the total length) were in poor condition. This was largely due to surface water accumulation on the trail surface and the direct churning and displacement of the surface loess material by wheeled traffic. The depth of rutting was limited when the surface silty loess was totally displaced and the underlying gravelly ground moraine material was exposed. Typically ruts did not exceed 12-16” –the original depth of the loess cap. Even large extensive water-filled degraded sections had a gravelly bottom and were crossable. Because of the low lying terrain, there are few opportunities to adequately drain ponded areas. Water held on the surface saturated underlying soils and significantly reduced their structural strength. The silty loess surface layers were particularly vulnerable to failure both from direct impact from wheeled traffic and by wave action generated from vehicle passage. From these processes degraded areas have tended to grow in length dramatically once the degradation process is initiated.

In general, the traffic impact area is limited to the existing trail corridor. No areas of duplicate trails or trail braiding were observed; and there was little extensive widening of the trail width, even at bog hole locations. There were also no noted extraneous spurs or side routes, except at old alignments and temporary bypasses. ATV users generally appeared to restrict their operations to the existing alignment. There was however, fairly extensive trail proliferation at the trail terminus. There, several new routes have been pioneered along the lake shore to newly developed boat slips and a significant area of new disturbance in the form of vegetation stripping, soil exposure and muddy conditions have developed. There was no evidence of the displaced sediment entering the lake at the time of our inspection, but there is high potential for that to occur.

Evaluation of Previous Mitigation Work-

There were several areas where locals had conducted mitigation work. Several included trail re-locations that were largely successful in avoiding extensive organic soil areas and wetlands. Other mitigation work was conducted in degraded sections by leveling ruts, placing local timber corduroy and top capping with material derived from adjacent ditches and in a few borrow areas from nearby uplands. This technique was largely successful. It would be classified as a "Ditch and Elevate" or "Turnpike" method of trail hardening. The timber corduroy provided a separation and a structural membrane and the overlying soil/gravel mix a traffic wear surface. The timber element also contributed a 4-8" lift in the fill section that helped reduce the amount of fill material needed to elevate the tread section. Most of the areas were capped with material from the underlying glacial ground moraine which contained an adequate mix of gravel to provide a durable wear surface. Adjacent ditches, in most cases, helped provide site drainage away from the tread surface and lowered the relative water table.

In some areas the treatment did not adequately extend to upland "hard points" and surface failure was evident at the end of the treatment sections. At others, the crowning of the surface cap was inadequate or requires maintenance. At those sites water accumulation was evident. This may lead to subsequent surface material displacement and rutting and degradation. A few areas had exposed corduroy indicating inadequate capping depth. And in a few areas ditches required maintenance and additional drainage work could be beneficial.

Borrow sites developed during the mitigation were roughly re-contoured and heavily re-vegetated. In most cases they were not noticeable.

In general, the work conducted by the locals was quite good. Their secondary impacts were limited and the treatments were effective. The work resulted in significant improvements to the trail and a significant reduction in off-site impacts to the surrounding environment.

Recommendations for future Mitigation Work-

There are several areas that require work.

1). Upland sections require water control in the form of **rolling grade dips** on a minimum of a 75-100 foot interval.

2). At least two extensive sections of trail that are deeply rutted and ponded require major mitigation along the lines of the work conducted previously. This may include a short re-route to increase the buffer to a nearby lake in one section. Mitigation in the form of a "Ditch and Elevate" or "Turnpike" method utilizing side ditches would work well in those areas. This could include the use of the local corduroy technique or the use of a light non-woven geotextile fabric to act as a separation and foundation membrane. Local borrow from adjacent uplands could also be utilized.

3) Numerous other areas that display degradation would benefit from a "Slot Trench Inversion" -the excavation of the ground moraine directly beneath the trail tread and burial, at the bottom of the same trench, the poorer overlying silt soils. The surface soils could also be intermixed with the ground moraine material to some degree in lieu of direct burial. In this technique, no geotextile fabric or corduroy would be used. The surface should be crowned or outsloped and ditches and other drainage features developed as necessary.

Both 2 and 3 could be addressed in a very cost-effective method with a moderate sized track excavator and a very small crew.

4). A plan to respond to the impacts occurring at the trail terminus needs to be developed. This could include the installation of a Porous Pavement Panel or other hardened surface to provide a hardened vegetated buffer along the lake edge at a designated boat loading area. Extraneous vehicle trails to the lake edge could be closed and re-vegetated; and improved foot trails developed. A gravel hardened trail could be developed to provide access to the buffered area and a large designated parking area could be developed well away from the lake.

Conclusion-

These are only preliminary and general observations based upon a short and necessarily limited site visit. The principal objectives of the visit were to interact with the local Park staff and interested public on conditions and options for the trail. Every effort was made to share concepts and these general conclusions with the parties in attendance. Additionally, standard NPS-RTCA literature on degraded trail mitigation techniques were distributed to the local property in attendance.

A formal Condition Assessment, and Prescription could be developed for the trail if requested by State Parks and NPS staff time and resources were allocated.