Section 12

About Big Crawling Stone Lake

Asini-babaamoode-zaaga'igan (moving-about-stone lake; or, place of the moving portage stone.

—Our Earth[1]

In the northern part of Wisconsin is a large lake whose waters abound in fish. In this lake there is also a great rock which floats about in its waters. This rock is held by the Chippewa Indians as a sacred monument to the great Manito. The rock floats about, being pushed by the waves, hence the name "Crawling Stone Lake"

—Toledo Blade - November 17, 1910[2]

Moving Stone Lake. Name assigned to Big Crawling Stone Lake by A.C. Stuntz when commissioned by the U.S. Congress to conduct the first survey of the Reservation in 1863.[3]

Introduction

The *Bear River Watershed Comprehensive Lake Management Plan* includes sections for each of the ten lakes in the watershed. The lakes are in the largest watershed in Lac du Flambeau, within the Reservation's boundaries, associated with high use landings, and have complete data sets required for a lake management plan. The purpose of the plan is to establish the current health of the watershed and lakes and suggest how to maintain or improve their health in the future.

This section includes introductory information about Big Crawling Stone Lake, a summary of how uses of the lake have changed over time, data from the community survey, and an assessment of the lake's health based on data for the lake's biology, chemistry, nutrients, habitat, bacteria, lake levels, and aesthetics. This section also includes an action plan for improving or maintaining the overall health of Big Crawling Stone Lake.

Big Crawling Stone Lake is in the Bear River Watershed (Subwatershed HUC12-070500020201) west of Fence Lake (Figure 12-1).

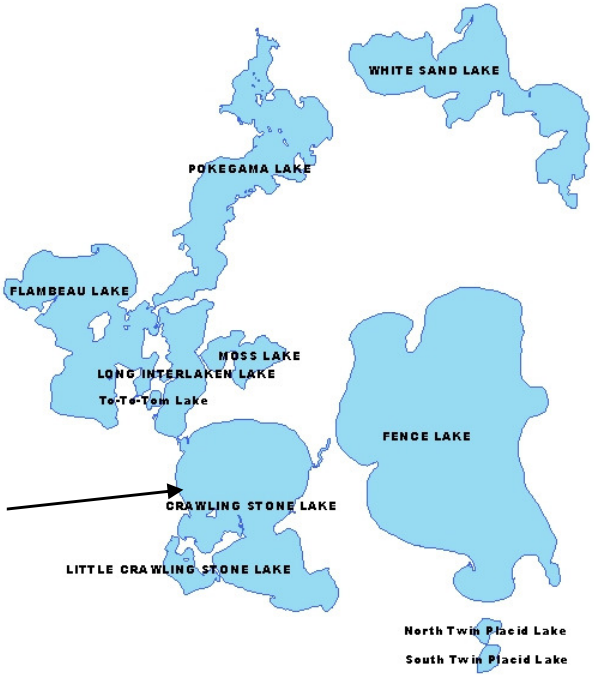

Figure 12-1. Map of Selected Lakes

The lake is approximately 1583 acres and has a maximum depth of 87 feet. Big Crawling Stone Lake is classified as a drainage lake, meaning that it is fed by streams, groundwater, precipitation, and runoff, and is drained by a stream or channel. Its flow enters the lake from Fence Lake and Little Crawling Stone Lake and exits the lake at its northwest end where it enters Long Interlaken Lake, ultimately flowing into the Bear River.

Big Crawling Stone Lake stratifies annually with the hypolimnion reaching dissolved oxygen below 5mg/L. With Secchi readings averaging 16.9 feet, the lake's water clarity is considered to be good. Table 12-1 provides a summary of Big Crawling Stone Lake's morphology, vegetation, and water quality.

Table 12-1. General Data for Big Crawling Stone Lake

Morphology	
Acreage (Acres)	1583
Maximum Depth (Feet)	87
Mean Depth (Feet)	29.8
Retention Time (Years)	8.82
Drainage Area (Acres)	3964
Drainage Basin/Lake Area Ratio	2.5
Vegetation	
Survey Data Collected	2010
Number of Native Species	29
Floristic Quality Index	36.7
Simpson's Diversity Index	0.9
Percent Vegetated (%)	43.9
Average Conservatism	7.07
Water Quality	
Trophic State	Mesotrophic
Limiting Nutrient	Phosphorus
Water Acidity (pH)	7.3
Sensitivity of Acid Rain	Low
Watershed to Lake Area Ratio	2:01
Aquatic Invasive Species	Rainbow Smelt Rusty Crayfish

Based on Secchi depth, total phosphorus, and chlorophyll *a* data, Big Crawling Stone Lake is classified as mesotrophic. Mesotrophic lakes generally have medium levels of nutrients and water clarity when compared to other natural lakes.

Big Crawling Stone Lake's watershed includes water (57%), forests (38%), wetlands (3%), and urban (2%).

There are 159 dwellings, mostly residential, within 300 feet of the lake's shoreline. Big Crawling Stone Lake does not have a public boat landing, but may be accessed conveniently via a WDNR landing on Little Crawling Stone Lake.

Brief History of Big Crawling Stone Lake

The history of Big Crawling Stone Lake, including how uses of the lake have changed over time, parallels the history of the other lakes in the Bear River Watershed as described at length in Section 3. Unless noted otherwise, the information here is footnoted in Section 3.

For hundreds of years Big Crawling Stone Lake was used by indigenous people for subsistence. Virtually every facet of their lives depended on their relationship with the lake and its surrounding habitats for food, medicine, building materials, and transportation.

With the arrival of the Europeans in the early to mid-seventeenth century, Big Crawling Stone Lake and the surrounding habitats took on a new use; to help provide the world with furs. Lac du Flambeau became a transportation center for the fur trade, and Big Crawling Stone Lake became part of the network of canoe routes and portages which linked Lac du Flambeau with trade routes in all directions. Big Crawling Stone Lake, for example, was part of the primary route linking Lac du Flambeau with Lake Tomahawk and the Wisconsin River to the east.[4]

By 1840 the fur-bearing animals were gone and Big Crawling Stone Lake and its surrounding habitats took on another new use; to provide the country with timber and timber products. To facilitate the movement of logs from Big Crawling Stone Lake to the mills on Long Interlaken Lake, a dam was constructed at the confluence of Flambeau Lake and the Bear River. Consequently, the water level of Big Crawling Stone Lake rose as much as three feet, destroying the shorelines.

By 1913, the trees around Big Crawling Stone Lake were gone and most of the surrounding habitats

were destroyed. In the early 1900's, however, the logging industry was already being replaced by the service industry, which used Big Crawling Stone Lake and its surrounding habitats to meet the recreational needs and demands of tourists and seasonal residents.

As a result of the Dawes Act (1887), much of the lakefront property on Big Crawling Stone Lake was transferred from the Tribe to non-Tribal residents, opening the shorelines to development.

In 1922, for example, Bill and Elsie Yeschek purchased virtually the entire shoreline of Big Crawling Stone Lake, some of which was divided into lots and sold. Much of what remained became the site of Yeschek's Crawling Stone Lodge at the lower southwestern end of the lake (Figure 12-2). The Yeschek's hired as many as 35 employees to take care of the main lodge which had 22 guest rooms, a huge lobby, and a dining room. The employees also maintained 11 guest cottages, and helped out at the gambling casino, dance hall, and billiard room.[5]

Figure 12-2. Yeschek's Crawling Stone Lodge

Elsie Yeschek was very disappointed with her first sight of the property. Instead of the tall pines she had expected to see, she found scrubby second-growth, aftermath of the logging era.[6]

Other resorts were also established along Big Crawling Stone's shores. In 1923, George and Claire Rohrbacher opened Maywood Lodge on the north shore[7], and in 1936 Dave Darling purchased about 400 acres for $2,900 along the southeast shore which over time became Darling's Resort.[8] By the 1960s, tourists could choose from the D-Bar-D Resort, Carr's Mimi Bay Resort, Radliff's Timberland Resort, Schram's Happy Landing, Fish 'n Bum Resort, and Ted's Up-To-The-Minute Resort.[9] Today tourists can stay at one of the two cabins at the Fish'n Bum Resort, formally the D-Bar-D Resort.[10]

Big Crawling Stone Lake is connected to Long Interlaken Lake at its northwest end, to Fence Lake at its northeast end, and to Little Crawling Stone Lake by two channels to the southwest. The channels provide access to all of the lakes on the chain. Also, there is a small stream, Whitefish Creek, in the lower southeastern part of Big Crawling Stone Lake connecting with Whitefish Lake.

The original channels were shallow, narrow streams, sometimes navigable and sometimes requiring portaging. All were important to early canoe transportation and trade routes. With the construction of the Bear River Dam in 1887, the primary channels were used to float logs from Fence, Little Crawling Stone, and Big Crawling Stone Lakes to the mills on Long Interlaken Lake.

In 1931, the Lakeland Times reported on work being done to widen and deepen the stream connecting Big Crawling Stone Lake and Fence Lake to allow for motorboat travel. *At present there is a rowboat channel between Fence and Crawling Stone lakes. The new canal will be a fine project of 1,000 feet in length and 50 feet wide at the top, making a four foot depth with a 25-foot dredge at the bottom.* The same article indicated that the Flambeau Waters Improvement Association was considering the possibility of improving the channels for motorboat traffic between Big and Little Twin Lakes (Placids), Fence, Crawling Stone, Long, Flambeau, Big Crawling Stone, Muskellunge, and Little Crawling Stone lakes.[11]

The association's influence led to repairing and heightening the Bear River dam on Flambeau Lake. This caused floods and damage along Big Crawling

Stone Lake's shoreline. In response, the State of Wisconsin ordered in 1934 that the dam be lowered.[12]

Community Survey[13]

Approximately 3,000 households in Lac du Flambeau were invited to participate in a mail survey during the summer of 2012 to provide information for preparing the *Bear River Watershed Comprehensive Lake Management Plan*. The survey was developed with assistance from the Wisconsin Department of Natural Resources and was approved by the WDNR before it was distributed.

The survey includes questions on topics such as residents' perceptions of the quality of lake water, fishery, and overall environment; residents' familiarity with aquatic invasive species and aquatic plants; residents' perceptions of current and ideal shoreline landscaping; and residents' interests in a variety of workshops. The survey, data tables, and other information related to the survey are in the appendix.

One-third of the questionnaires (996) were returned completed, representing 51 lakes. Of the returned questionnaires, 576 (58%) provide information on the ten lakes in the Bear River watershed and of these, 96 (17%) focus on Big Crawling Stone Lake.

Tables showing results of the survey are presented throughout the rest of this section. Care should be taken when interpreting the survey data because in many cases the number of respondents for Big Crawling Stone Lake is very low.

Assessing Lake Health

Medical doctors assess human health by examining a patient's blood work, height, weight among numerous other measures (quantitative data) and by considering information like the patient's answers to questions, comments, even body language (qualitative data). Similarly, lake managers assess lake health by examining the lake's oxygen, nitrogen, phosphorus, among other measures (quantitative data) and by considering additional information about the lake like the presence of aquatic invasive species, nuisance aquatic plants, or even presence of trash (qualitative data).

Big Crawling Stone Lake Health Report

Assessing the health of Big Crawling Stone Lake has included examining qualitative and quantitative data pertinent to the lake's biology, chemistry, nutrients, habitat, bacteria, aesthetics, and fish tissue. These categories are introduced in the next few pages and are addressed at length in the rest of the section.

Table 12-2 shows the categories, their subdivisions (Indicator Assessments), and the ratings that have been applied to them, *Excellent*, *Good*, *Fair*, *Poor*, *Concern* or *Not Assessed* (See Section 10 for details on rating).

Table 12-2. Big Crawling Stone Lake Health Report

Category	Indicator Assessment		Overall Status
Biology	Invasive aquatic plant	Excellent	Excellent
	Invasive fish	Good	
	Invasive invertebrate	Good	
	Invasive wetland plant	Excellent	
	FQI	Excellent	
Chemistry	Dis. Oxygen DO	Good	Excellent
	pH pH	Excellent	
	Temperature	Excellent	
	Ionic Strength	Excellent	
	Sus. Solids SS	Excellent	
Nutrients	Phosphorus P	Excellent	Excellent
	Chlorophyll *a*	Excellent	
Habitat	Plants H	Excellent	Good
	Riparian Zone	Good	
	Littoral zone	Good	
Bacteria	Bacteria	Excellent	Excellent
Aesthetics	Oil & Grease	Excellent	Excellent
	Taste & Odor	NA	
	Turb/Color	Excellent	
	Nuisance Plants	Excellent	
	Trash /Debris	Good	
Tissue	Spec. Chem. Hg	Concern	Concern
Lake Level	Level	NA	NA

The Biology Category (Table 12-3) reflects an assessment of the number and magnitude of invasive species. Big Crawling Stone Lake has rainbow smelt and rusty crayfish, but neither at nuisance levels. The lake does not have any invasive plants.[14] The floristic quality index[15] is excellent (FQI 37.23) yielding Big Crawling Stone Lake's overall status for the Biology Category is *excellent*.

The Chemistry Category reflects an assessment[16] of data for dissolved oxygen, pH, temperature, ionic strength, and suspended solids as compared to Water Quality Standards Criteria.[17] Dissolved oxygen for Big Crawling Stone Lake during the summer can reach below 5mg/L, the criteria for cool water fish, so it has a status of *good*. Big Crawling Stone Lake's overall status for the Chemistry Category is *excellent*.

The Nutrients Category reflects an assessment[18] of data for phosphorus and Chlorophyll *a* levels as compared to National Lake Survey (NLS) thresholds[19] for the Upper Midwest ecoregion health conditions and for the upper limit compared to Wisconsin's new Water Quality Standards for a two-story fishery lake.[20] The NLS was a study of Lakes across the United States, and thresholds for good, fair and poor were developed based on the data collected for each ecoregion. Big Crawling Stone Lake's overall status for the Nutrients Category is *excellent* as average total phosphorus is 11.55µg/L, and Chlorophyll *a* is 2.03µg/L.

The Habitat Category reflects an assessment[21] of Big Crawling Stone Lake's aquatic plants, riparian zone (shoreline), and littoral zone (shallow water along shoreline). Comparisons are made with ecoregional data and National Lake Survey thresholds.[22] Two of three indicators for Big Crawling Stone Lake have a rating of *good*, and the lake's overall status for the Habitat Category is *good*.

The Bacteria Category reflects an assessment[23] of summer *E. coli* measurements that were taken weekly and then compared to Water Quality Standards criteria[24] for human health protection. Big Crawling Stone Lake's overall status for the Bacteria Category is *excellent*.

The Aesthetics Category reflects an assessment of data and information on water quality, color, and turbidity as well as an assessment of reports received by the Tribal Natural Resources Department for Big Crawling Stone Lake on the presence of oil, grease, nuisance aquatic plants, and trash/debris. This information is compared to narrative criteria as described the Water Quality in the Water Quality Standards.[25] Big Crawling Stone Lake's overall status for the Aesthetics Category is *excellent*.

The Tissue Category reflects an assessment of the amount of mercury in the flesh of fish in Big Crawling Stone Lake as compared to the Water Quality Standards.[26] Larger edible fish have more mercury in their flesh than what is protective for human health concerns. Big Crawling Stone Lake's overall status for the Tissue Category is of *concern*.

The Lake levels were assessed for Big Crawling Stone Lake but a condition criteria has not been developed at this time. Information about lake levels is presented at the end of this section.

Biology Category

Biology is the science of living organisms. The organisms that live together in the lake interact in large part based on their food relationships (Food Web). The food pyramid for lakes (Figure 12-3) shows the proportion of biological production to the yield of large fish. The organisms are in balance after thousands of years of naturally evolving together within these food relationships. Invasive species, however, are organisms that evolved originally in other locations and when they move into a naturally balanced area they disrupt the native organisms' relationships.

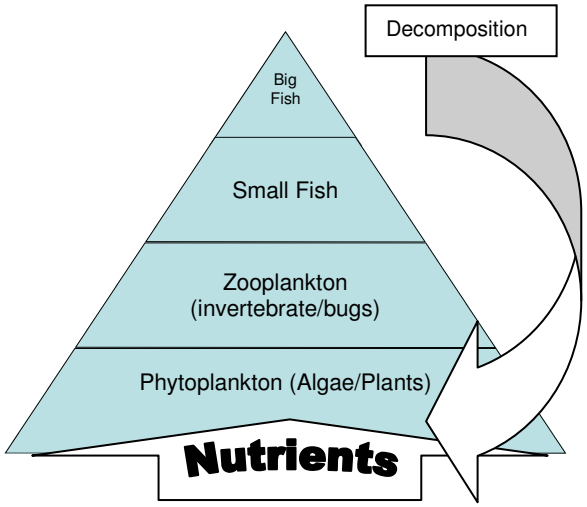

Figure 12-3. Lake Food Pyramid

Invasive species are a great concern. Their introduction can cause changes of native organisms' distribution and abundance and contribute to water quality degradation. The introduction of the invasive aquatic plant, Eurasian water milfoil, can cause the reduction in large game fish as the native insects and small fish have not evolved to eat EWM, causing a loss of food resource for large fish and an overabundance of plant matter.

Big Crawling Stone Lake has rainbow smelt and rusty crayfish (see Section 7 for specifics). At this time, however, there is no evidence that they are disturbing the abundance or distribution of native organisms or causing economic or ecological harm.

To help determine the extent of residents' familiarity with Aquatic Invasive Species (AIS), the community survey asked residents to answer a few questions about AIS. Their responses to some of the questions follow.

Residents were asked if they had heard of AIS before reading about them in the survey. For Big Crawling Stone Lake, 33 of 96 respondents (34%) indicated they had prior knowledge of AIS as compared to 171 of 576 (30%) for respondents of the ten lakes in the Bear Watershed, and 300 of 996 (30%) for all respondents from Lac du Flambeau.

Residents having prior knowledge of AIS were shown a list of AIS and then asked which, if any, they believe are currently in the lake. Table 12-3 shows the responses of 33 residents for Big Crawling Stone Lake (% Perceived Presence). The table also shows whether the AIS are actually in the lake (Actually Present). For example, 3 of the 33 residents believe that Eurasian water milfoil is in the lake, when in fact it is not. The table shows there is a general disconnection between residents' perceptions of the presence of AIS and the actual presence of AIS.

Table 12-3. Big Crawling Stone Lake - Perceived vs Actual Presence of AIS

AIS	# Respondents	Perceived Presence	Actually Present
Banded Mystery Snail	6 of 33	18%	No
Eurasian Water Milfoil	3 of 33	9%	No
Rainbow Smelt	3 of 33	9%	Yes
Chinese Mystery Snail	2 of 33	6%	No
Freshwater Jellyfish	0 of 33	0%	No
Rusty Crayfish	12 of 33	36%	Yes
Curly-leaf Pondweed	0 of 33	0%	No
Purple Loosestrife	6 of 33	18%	No
None of Above	8 of 33	24%	

The same 33 respondents were asked to identify what they believe is threatened by AIS. Table 12-4 shows that the largest percentage of responses for all three groups of respondents indicate that water quality is most threatened. The lowest percentage of responses for all three groups of respondents is for air quality.

Table 12-4. Big Crawling Stone Lake - Perceived to be Threatened by Aquatic Invasive Species

	Big Crawling Stone Lake		Bear River Lakes		All Lakes	
	# Respondents	%	# Respondents	%	# Respondents	%
Native Fish	8 of 33	24%	75 of 171	44%	113 of 302	37%
Air Quality	2 of 33	6%	9 of 171	5%	16 of 302	5%
Aquatic Plants	12 of 33	36%	60 of 171	35%	92 of 302	31%
Wetlands	11 of 33	33%	31 of 171	18%	45 of 302	15%
Shoreline Plants	11 of 33	33%	47 of 171	28%	72 of 302	24%
Amphibians	11 of 33	33%	33 of 171	19%	48 of 302	16%
Water Quality	14 of 33	42%	83 of 171	49%	125 of 302	41%
Crustaceans	11 of 33	33%	32 of 171	19%	42 of 302	14%
Other	1 of 33	3%	5 of 171	3%	8 of 302	3%
None	6 of 33	18%	28 of 171	16%	72 of 302	24%

The same residents were also asked if they are concerned about AIS getting into the lake. Table 12-5 shows that for 33 respondents for Big Crawling Stone Lake, 36% indicate are *extremely concerned*, 54% *somewhat concerned, 6% not too concerned*, 0% *not concerned at all*, and 5% *unsure*. Data for all three reference groups shows respondents have great concern about AIS getting into the lakes.

Table 12-5. Big Crawling Stone Lake - Concern about AIS Getting into the Lake

Lake	# Respondents	Extremely	Somewhat	Not Too	Not at All	Unsure
Big Crawling Stone Lake	33	36%	54%	6%	0%	5%
Bear River Lakes	170	49%	41%	4%	0%	7%
All Lakes	294	42%	42%	9%	2%	6%

The same residents were asked if they have been taking time to look for AIS in the lake. Table 12-6 shows that for 31 respondents affiliated with Big Crawling Stone Lake, 39% indicate *not at all*, 29% *once a season*, 10% *monthly*, 10% *weekly*, and 13% *daily*. The data for Big Crawling Stone Lake is similar to the data for the other lakes and shows that despite concern for AIS, very few residents indicate they spend time looking for AIS regularly.

Table 12-6. Big Crawling Stone Lake - Time Spent Checking for AIS During Open Water Season

	Big Crawling Stone Lake		Bear River Lakes		All Lakes	
	# Respondents	%	# Respondents	%	# Respondents	%
Not at all	12 of 31	39%	66 of 161	41%	114 of 280	41%
Once a Season	9 of 31	29%	45 of 161	28%	85 of 280	30%
Once a Month	3 of 31	10%	30 of 161	19%	47 of 280	17%
Once a Week	3 of 31	10%	12 of 161	8%	21 of 280	8%
Once a Day	4 of 31	13%	8 of 161	5%	13 of 280	5%

Chemistry Category

Chemistry is the science of matter and its properties and composition with a particular focus on the properties of chemical bonds. Dissolved oxygen, pH, temperature, ionic strength, and suspended solids each have a particular role in chemical bonding and movement of chemicals within the lake.

Seasonal changes and water temperature of the lake have an impact on the amount of dissolved oxygen in the lake (Figure 12-4), important for fish respiration and viability (see Section 9, *Understanding Lake Data*).

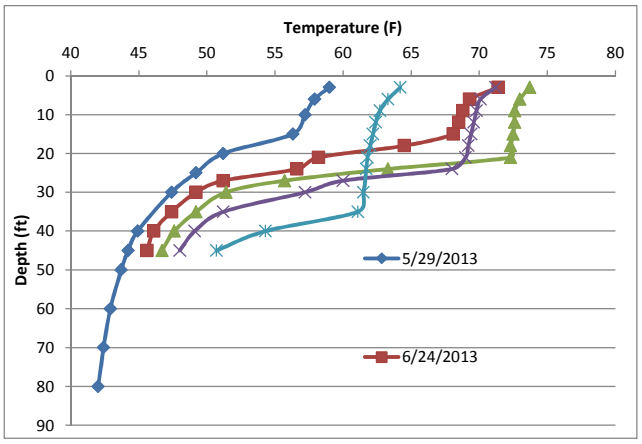

Figure 12-4. Temperature Values for Big Crawling Stone Lake at Various Depths

Dissolved oxygen in Big Crawling Stone Lake during the summer and late winter can reach below 5mg/L, the minimum criteria for cool water fish (Figure 12-5). Lake whitefish (*Coregonus elupeaformis*), for example, is a cool water fish that is very susceptible to temperature and dissolved oxygen. Big Crawling Stone Lake has had occasional die-offs of Whitefish in the shallow parts of the lake where the fish were confined.

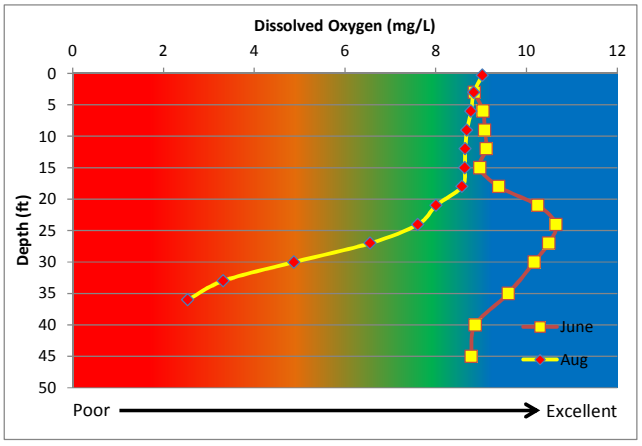

Figure 12-5. Dissolved Oxygen Values for Big Crawling Stone Lake at Various Depths

Calcium for Big Crawling Stone Lake as measured in 1990 was on average 3 mg/L, quite low, meaning Big Crawling Stone may be less susceptible to infestations of zebra mussels.

Nutrients Category

Based on Secchi, total phosphorus, and chlorophyll data, Big Crawling Stone Lake's trophic state is mesotrophic, meaning it has medium amounts of nutrients to support a productive food web. A productive food web includes a diversity of rooted plants, macro-invertebrates (insects), and healthy fish populations.

Phosphorus and nitrogen are two nutrients that play key roles in limiting the growth of aquatic plants and algae (see Section 9, *Understanding Lake Data*). Of these, phosphorus is most critical to Big Crawling Stone Lake.

Phosphorus originates from sources like human and animal wastes, soil erosion, detergents, septic systems and runoff from lawns. Phosphorus is the limiting nutrient for Big Crawling Stone Lake, meaning that when the amount of phosphorus increases, the probability of algae growth also increases (Figure 12-6). Total phosphorus between 10 and 18ug/L is associated with mesotrophic and medium production of biomass.

As the amount of algae increases, it is likely that the amount of Chlorophyll *a* increases. Chlorophyll *a* is a green pigment present in all plant life and is necessary for photosynthesis. The amount of Chlorophyll *a* is a common measure of water quality (Figure 12-7).

Figure 12-8 shows Secchi depth, total phosphorus, and Chlorophyll *a* for Big Crawling Stone Lake from 1991 until present. No significant change in water quality is noted over this time period.

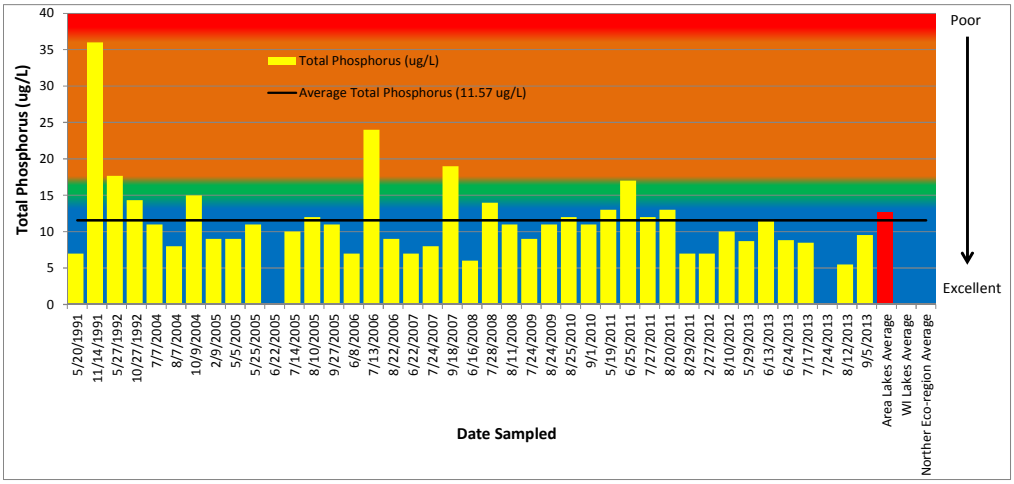

Figure 12-6. Big Crawling Stone Lake Phosphorus Concentrations

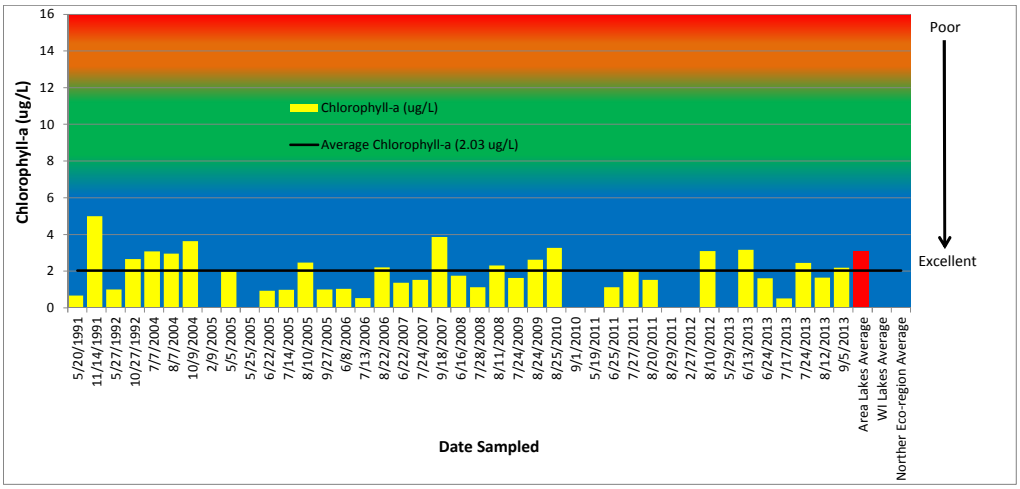

Figure 12-7. Chlorophyll *a* Concentrations in Big Crawling Stone Lake

Figure 12-8. Secchi Depth, Total Phosphorus, and Chlorophyll a Trends for Big Crawling Stone Lake

Future amounts of phosphorus for Big Crawling Stone Lake can be anticipated by using a tool (Wisconsin Lake Modeling Suite - WiLMS) designed to predict phosphorus levels based on changes of land use in the watershed (Figure 12-9).

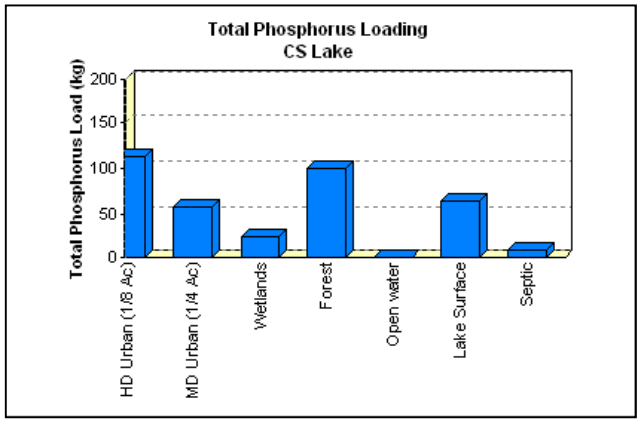

Figure 12-9. Primary Big Crawling Stone Lake Phosphorus Sources

Use of the WiLMS tool reveals that high and medium disturbance areas (Figure 12-10) characterized by the presence of roads, homes, buildings, parking areas, and lawns, yield the most total phosphorus per unit area. Forested and wetland areas contribute less total phosphorus as the runoff is slowed and allowed to seep into the ground instead of washing into the lake transporting sediment and phosphorus.

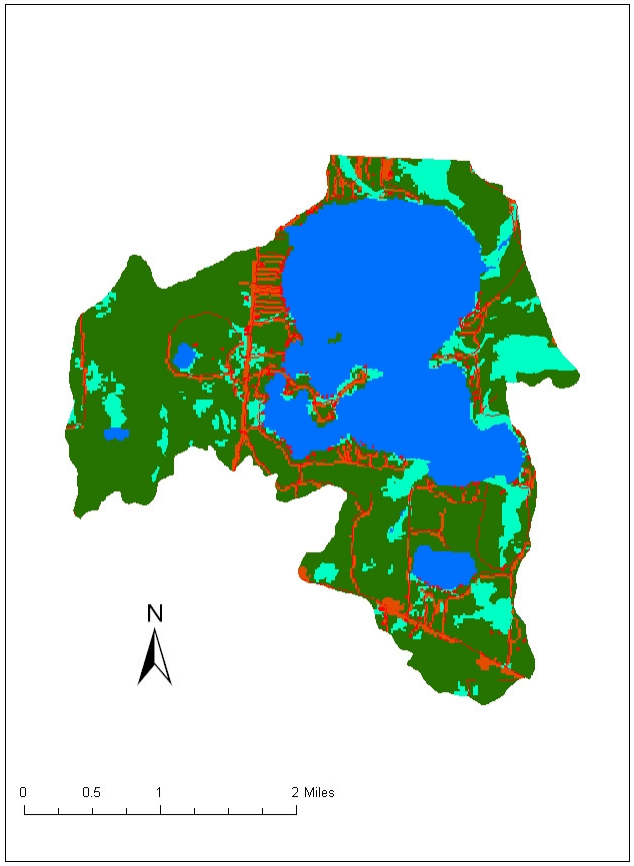

Figure 12-10. Big Crawling Stone Lake Land Uses (Red – Developed; Blue – Open Water; Light Green – Wetland; Dark Green – Forest)

Habitat Category

Habitat refers to a specific place that is inhabited by a particular organism. Habitat includes all that the organism needs to live, including physical factors such as soil, temperature, light; and biotic factors, such as the availability of food and shelter from predators. The Habitat category includes substrate (rock, sand, muck); aquatic plants; riparian zone (shoreline); and littoral zone (shallow water along shoreline).

Substrate is the surface on which an organism grows, and rock, sand, and muck are the primary substrates of a lake. Big Crawling Stone Lake's primary substrate is sand, with occasional locations of muck and rock (Figure 12-11). Substrate often indicates the type of plants that will grow in an area. The diversity of Big Crawling Stone Lake's substrate is important to the health of the lake's fishery.

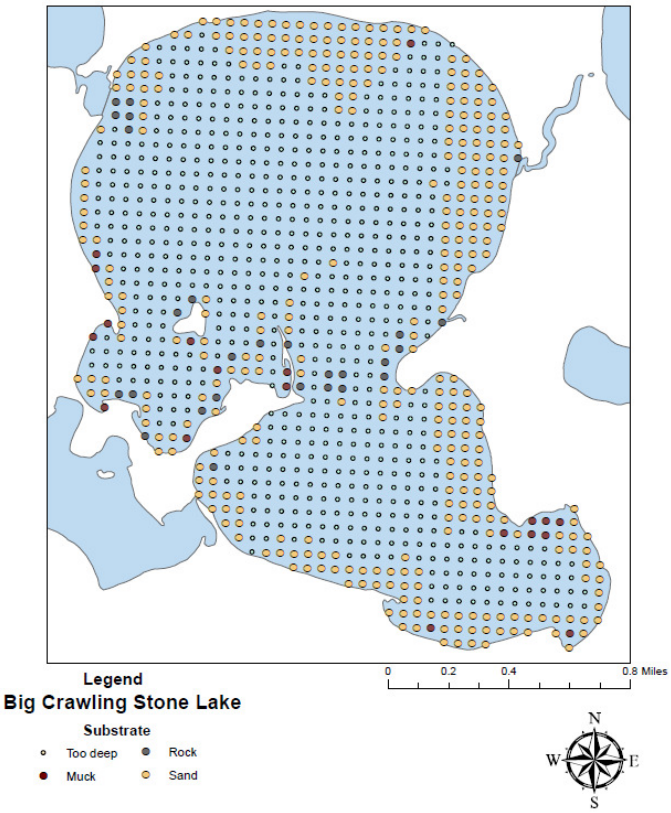

Figure 12-11. Substrate Map of Big Crawling Stone Lake

Aquatic plants (macrophytes) are plants that grow in the water either submerged (all under water), emergent (sticking out of the water), or floating leaf. The north end of Big Crawling Stone Lake has a large area of dense submerged plants with the most predominant being fern pondweed.

The Tribal Natural Resources Department assessed the aquatic plants in Big Crawling Stone Lake in 2010 by following the Wisconsin Department of Natural Resources Protocol for conducting an aquatic plant point intercept survey (see Section 8).

Table 12-7 presents the statistics associated with the point intercept survey, and Figure 12-12 shows plant locations and additional data. The table shows that of the 464 sites sampled, vegetation was found at 187 sites, and 426 sites were shallower than the maximum depth of plants, 27 feet. The total number of plant species found (Taxonomic Richness - Frequency of Occurrence) is 29, and the Simpson Diversity Index is 0.93.

- Frequency of occurrence is an estimate of how often a particular plant species is likely to be found within a lake. The estimate is based on an analysis of the data collected during the point intercept survey.
- Simpson's Diversity Index is a measure of how diverse a plant community is in the lake. The index is within a range of 0 to 1. The higher the value, the more diverse the plant community is in a particular lake. Plant diversity is an indicator of the lake's overall resiliency. Generally, a lake with high species diversity is considered to be more stable than a lake with low species diversity because it has a greater ability to withstand environmental fluctuations. A lake with a diverse plant community is better equipped to compete with exotic infestations than is a lake with low diversity.

Table 12-7. 2010 Aquatic plant Community Statistics, Big Crawling Stone Lake, Vilas County, WI

Aquatic Plant Community Statistics	2010
Total sites sampled	464
Total sites with vegetation	187
Total site shallower than max depth of plants	426
Frequency of occurrence at sites shallower than maximum depth of plants	43.90%
Simpson Diversity Index	0.93
Maximum Depth of Plants (Feet)	27
Taxonomic Richness (Number Taxa)	29*
Average Number of Species per Site (sites less than max depth of plant growth)	0.76
Average Number of Species per Site (sites with vegetation)	1.74

* There was one species sampled that was not identified.

Table 12-8 lists the aquatic plants found in Big Crawling Stone Lake and shows the Floristic Quality Index (FQI) for the lake. The FQI is the extent to which a lake's plant community is similar to that of a pristine or undisturbed lake. The higher the floristic quality index, the closer a lake is to an undisturbed system. FQI is used to determine whether a lake's plant community is changing over time. It is also used to determine the extent to which a lake's plant community is similar to other lakes in the same ecoregion. The Floristic Quality Index for Big Crawling Stone Lake was 37.23, meaning most of the plants can tolerate moderate disturbances. (See Section 8).

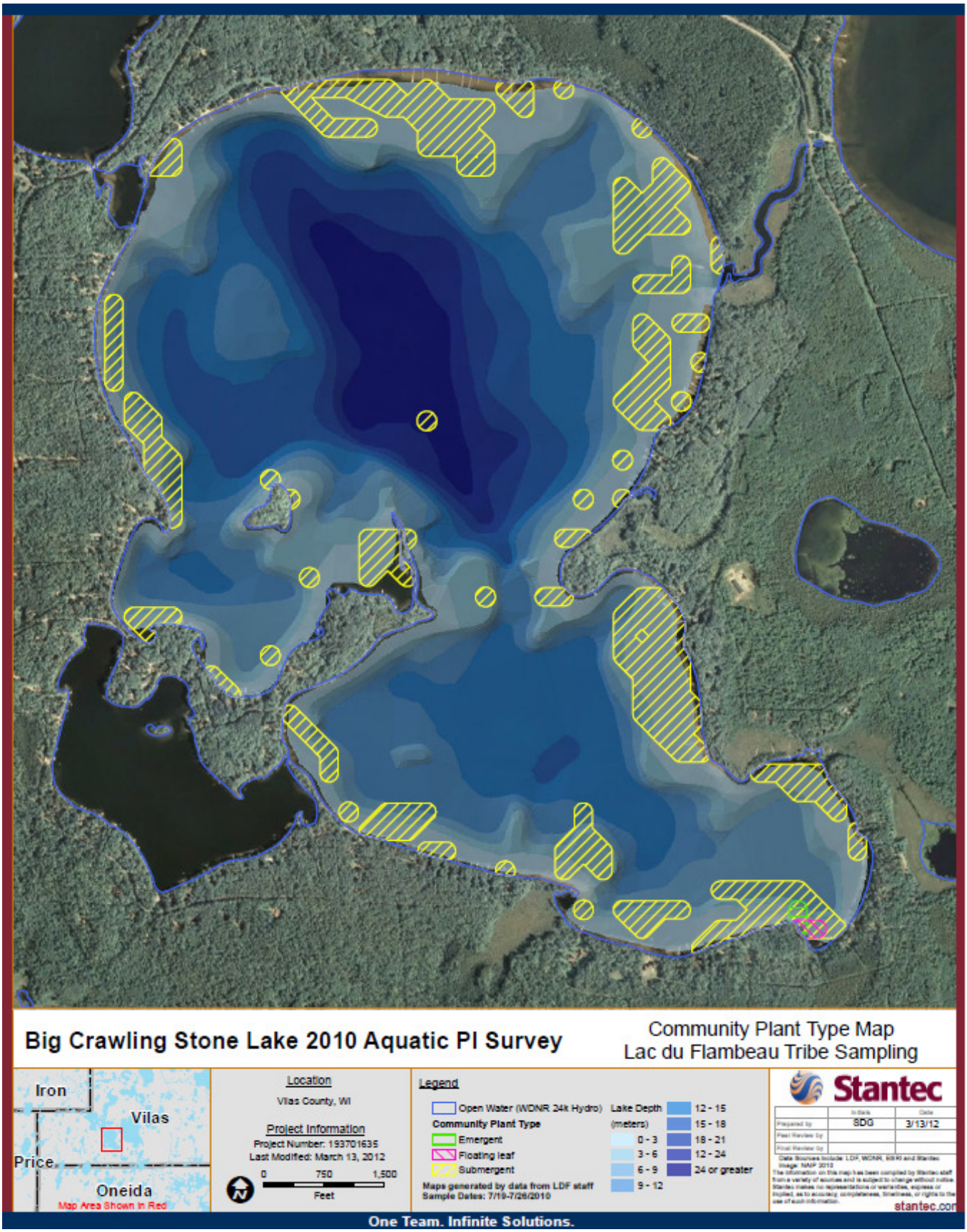

Figure 12-12. Big Crawling Stone Lake 2010 Aquatic Point Intercept Survey

Table 12-8. 2010 Floristic Quality Index, Big Crawling Stone Lake, Vilas County, WI

Genus	Species	Common Name	Coefficient of Conservatism C
Bidens	*beckii*	Water marigold	8
Ceratophyllum	*demersum*	Coontail	3
Chara	*sp.*	Muskgrass	7
Elecharis	*acicularis*	Needle spikerush	5
Elodea	*canadensis*	Common waterweed	3
Eriocaulon	*aquaticum*	Pipewort	9
Heteranthera	*dubia*	Water star-grass	6
Isoetes	*sp.*	Quillwort	8
Juncus	*pelocarpus*	Brown-fruited rush	8
Lobelia	*dortmanna*	Water lobelia	10
Myriophyllum	*alterniflorum*	Alternate-flowered water-milfoil	10
Myriophyllum	*sibiricum*	Northern water-milfoil	6
Myriophyllum	*tenellum*	Dwarf water-milfoil	10
Najas	*flexilis*	Slender naiad	6
Najas	*gracilllima*	Northern naiad	7
Nuphar	*variegata*	Spatterdock	6
Pontederia	*cordata*	Pickerelweed	8
Potamogeton	*amplifolius*	Large-leaf pondweed	7
Potamogeton	*epihydrus*	Ribbon-leaf pondweed	8
Potamogeton	*foliosus*	Leafy pondweed	6
Potamogeton	*illinoensis*	Illinois pondweed	6
Potamogeton	*praelongus*	White-stem pondweed	8
Potamogeton	*pusillus*	Small pondweed	7
Potamogeton	*richardsonii*	Clasping-leaf pondweed	5
Potamogeton	*robbinsii*	Fern pondweed	8
Potamogeton	*zosteriformis*	Flat-stem pondweed	6
Vallisneria	*americana*	Wild celery	6
		Total Species	28
		Mean C	7.04
		Floristic Quality Index (FQI)	**37.23**

Please note: There is no Coefficient of Conservatism for exotic species such as Eurasian Water-Milfoil or for species not identified to the species level (*Sagittaria sp.*).

Coefficient of Conservatism C

0-3 taxa found in wide variety of plant communities and very tolerant of disturbance.

4-6 taxa typically associated with specific plant communities and tolerate moderate disturbance.

7-8 taxa found in narrow range of plant communities and tolerate minor disturbance.

9-10 taxa restricted to a narrow range of synecological conditions, with low tolerance of disturbance.

Littoral Zone Habitat

The littoral zone extends along the shoreline from the water's edge into the water to a depth of about 27 feet for Big Crawling Stone Lake. This is the area where most of the aquatic plants grow, providing shelter for fish to reproduce and protect their young. The plants also reduce erosion caused by waves, stabilizing the shoreline.

To help determine the extent of residents' perceptions of aquatic plants, the survey asked residents if their enjoyment of the lakes was impaired by the presence of aquatic plants in the littoral zone. Table 12-9 shows that of 94 residents from Big Crawling Stone Lake, 33% indicate *never*, 47% *rarely*, 16% sometimes, 3% *often*, and 1% *always*. When comparing the data for Big Crawling Stone Lake with the data for the other lakes, it appears that aquatic plants are perceived to be somewhat of a greater impediment.

Table 12-9. Big Crawling Stone Lake - Whether Aquatic Plants Impede Enjoyment of the Lake

Lakes	# Respondents	Always	Often	Sometimes	Rarely	Never
		%	%	%	%	%
Big Crawling Stone Lake	94	1%	3%	16%	47%	33%
Bear River Lakes	556	3%	4%	16%	44%	33%
All Lakes	957	3%	7%	21%	40%	29%

Residents were asked if they or members of their households have tried to control aquatic plant growth by removing plants from the lake. Table 12-10 shows that 80% of 79 respondents for Big Crawling Stone Lake indicate *never*, 18% *some years*, and 3% *yearly*.

Table 12-10. Big Crawling Stone Lake - Removal of Aquatic Plants From the Lake

Lakes	# Respondents	Yearly	Some Years	Never
		%	%	%
Big Crawling Stone Lake	79	3%	18%	80%
Bear River Lakes	458	6%	14%	80%
All Lakes	816	8%	18%	74%

Residents were also asked if they or members of their household have removed trees that have fallen into Big Crawling Stone Lake. Table 12-11 shows that 74% of 76 respondents indicate *never*, 24% *some years*, and 3% *every year*. The data for the respondents of Big Crawling Stone Lake are very similar to the data to the other lakes. They rarely remove trees that have fallen into the lake.

Table 12-11. Big Crawling Stone Lake - Removal of Fallen Trees from the Lake

Lakes	# Respondents	Yearly	Some Years	Never
		%	%	%
Big Crawling Stone Lake	76	3%	24%	74%
Bear River Lakes	456	2%	27%	72%
All Lakes	814	1%	24%	75%

Residents were asked whether there is a need to control aquatic plants for Big Crawling Stone Lake. Table 12-12 shows that 13% of 17 respondents indicate *definitely no*, 33% *probably no,* 22% *probably yes,* and 3% *definitely yes*. Thirty percent indicate they are *not sure*.

Table 12-12. Big Crawling Stone Lake - Whether Aquatic Plant Control is Needed

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	17 Respondents	503 Respondents	868 Respondents
Definitely yes	3%	8%	8%
Probably yes	22%	21%	19%
Probably no	33%	27%	29%
Definitely no	13%	9%	12%
Unsure	30%	35%	32%

Residents were asked what should be done if an aquatic invasive plant is found in the lake. Table 12-13 shows that for 33 respondents for Big Crawling Stone Lake, 15% indicate *remove with chemicals,* 18% *remove mechanically*, 24% *remove with biological control*, 39% *remove by hand*, 3% *do nothing/no treatment*, and 36% indicate they *need more information*. When considering the data for all methods and lakes, it is evident that respondents seem most comfortable with removing aquatic plants by hand, and they want more information on the topic.

Table 12-13. Big Crawling Stone Lake - Preferences for Treating/Removing Aquatic Invasive Plants

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	33 Respondents	171 Respondents	302 Respondents
Apply chemicals	15%	18%	15%
Use machines	18%	21%	19%
Bio-control	24%	25%	24%
No treatment	3%	3%	2%
Pull by hand	39%	49%	51%
Need more info.	36%	41%	41%

Riparian Zone Habitat

The Riparian zone is the land area along the shoreline from the water's edge inland. In general this area is the area where most people access the lake via stairs or paths. It sometimes includes boathouses, storage sheds, homes, lawns, and other structures.

The riparian zone contributes the most nutrients from erosion, fertilizers, septic systems, and general runoff. The area is critical in providing woody habitat for fish and leaf material for invertebrates, like the dragon fly which lives a life cycle requiring both water and land. It is also critical in providing habitat to sustain other animals that rely on the lakes, like song birds, eagles, loons, otter, deer, along with a multitude of other creatures. A poor riparian habitat often results in fewer species and excess nutrients, while a good riparian habitat is replete with abundant wildlife and healthy levels of nutrients.

To help determine the extent of residents' perceptions of the riparian zone, the community survey asked residents to describe the landscape in the 35 foot buffer between the shoreline and their house, and to identify what they believe should be in an ideal landscape for the same area.

Table 12-14 lists several landscape features ordinarily found in riparian zones. Residents were asked to check those features that characterize the current riparian landscape (Current) for their property and then check those features that they believe should be in an ideal riparian landscape (Ideal) for their property. The table compares residents' descriptions of the current landscape with their perceptions of an ideal landscape. For example, 51% of respondents affiliated with Big Crawling Stone Lake identify mowed grass as a feature of the current buffer zone for their property, yet 35% of them identify mowed grass in an ideal landscape.

Table 12-14. Big Crawling Stone Lake - Current Shoreline Landscaping vs Ideal Shoreline Landscaping

	Big Crawling Stone Lake		Bear River Lakes		All Lakes	
	81 Respondents		481 Respondents		847 Respondents	
	Current	Ideal	Current	Ideal	Current	Ideal
Mowed grass	51%	35%	45%	30%	41%	28%
Rock terrace	14%	20%	19%	24%	16%	20%
Wild	38%	31%	44%	26%	44%	28%
Native prairie grasses	26%	30%	24%	27%	26%	24%
Wood terrace	6%	6%	4%	9%	5%	9%
Sand beach	27%	33%	25%	31%	26%	33%
Rain garden	1%	5%	2%	6%	2%	4%
Flower gardens	9%	4%	10%	10%	9%	9%
Shrubs	41%	27%	36%	25%	31%	22%
Wild with wood picked up	19%	17%	23%	21%	27%	22%
Trees	67%	48%	70%	50%	66%	47%
Something else	1%	3%	3%	2%	4%	3%
It doesn't matter		5%		7%		7%

The current primary features identified by all three respondent groups include mowed grass, wild, shrubs, and trees. When characterizing the ideal landscape, the same respondents prefer landscapes characterized by less mowed grass and less wild with fewer trees and shrubs, but more sand beach.

Residents were asked if they are interested in learning about landscape designs tailored to help protect the lakes and habitats. Table 12-15 shows that of 74 respondents for Big Crawling Stone Lake, 1% indicate *no interest,* 38% *little interest*, 5% *some interest,* 16% *a lot of interest*, and 39% *don't know*.

Table 12-15. Big Crawling Stone Lake - Interest in Learning About Landscape Design

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	74 Respondents	443 Respondents	787 Respondents
No interest	1%	4%	4%
Little interest	38%	40%	40%
Some interest	5%	5%	6%
A lot of interest	16%	11%	11%
Don't know	39%	40%	39%

Assessment of Riparian & Littoral Zones

The Habitat Category reflects an assessment of Big Crawling Stone Lake's aquatic plants, riparian zone (shoreline), and littoral zone (shallow water along shoreline). Comparisons are made with ecoregional data, National Lake Survey thresholds and WISCALM (Table 10-4).

Riparian cover includes cover-class estimates of large and small diameter tree cover in the >5m high vegetation layer; woody and non-woody vegetation in the mid-layer (0.5 to 5 m); and woody, non-woody, inundated, and barren classes in the ground cover layer (<0.5 m) of the 10 lakeshore plots. Littoral cover index excludes submerged aquatic macrophytes, but increases the weighting of floating and emergent macrophytes.

Table 12-16 compares the thresholds developed by WISCALM for Plants and the National Lake Survey for Riparian Zone and Littoral Zone to the index value were calculated based on the assessment of Big Crawling Stone Lake's habitat.

Table 12-16. Index Values for Environmental Assessment Parameters

Indicator Assessment	Index Value	Water Quality Assessment Thresholds			
		Excellent	Good	Fair	Poor
Plants	62.67	Below 79.7%	89.7% - 79.8%	89.8% - 94.8%	100% - 94.9%
Riparian Zone	1.01		>0.8074	0.5906-0.8074	<0.5906
Littoral Zone	0.28		>0.7001	0.4156-0.7001	<.4156

Lakeshore habitat is the biggest problem in the nation's lakes; over one-third exhibit poor Shoreline condition. Poor biological health is three times more likely in lakes with poor lakeshore habitat.[27]

To help learn about residents' perceptions on habitat and environmental change, the community survey asked residents if particular elements of the habitat have been changing over time. Table 12-17 shows the responses for Big Crawling Stone Lake, the Bear River watershed project lakes, and the other lakes. The data are very similar for all three response groups. Though the percentages of responses vary from element to element, the predominant response for all elements is *no change*.

Bacteria Category

Bacteria is assessed based on a measure of the most probable number (MPN) of *E. coli* in 100 milliliters of water. *E. coli* is the abbreviated name of the bacterium in the family *Enterobacteriaceae*, named *Escherichia coli*. The presence of *E. coli* in our intestines is normal. The presence of *E. coli* in swimming areas indicates that other microorganisms (including the ones that could causes illness) that live in the gastrointestinal track could also be

Table 12-17. Big Crawling Stone Lake - Perceptions of Environmental Change

	Shorelines	Wetlands	Streams	Air	Forests	Grasslands	All Environment
Big Crawling Stone Lake							
#Respondents	91	89	88	87	90	86	90
Improving	10%	5%	3%	5%	6%	6%	7%
No change	48%	54%	47%	69%	54%	54%	49%
Worsening	33%	12%	7%	6%	5%	5%	26%
Don't know	9%	29%	43%	21%	36%	36%	19%
Bear River Lakes							
#Respondents	534	522	513	522	524	513	526
Improving	5%	3%	1%	3%	4%	2%	5%
No change	52%	51%	42%	68%	52%	48%	54%
Worsening	30%	12%	11%	8%	24%	10%	23%
Don't know	13%	34%	46%	22%	20%	40%	18%
All Lakes							
#Respondents	923	901	873	909	910	882	903
Improving	4%	2%	1%	3%	4%	2%	4%
No change	56%	55%	45%	71%	57%	52%	59%
Worsening	28%	12%	9%	5%	20%	7%	19%
Don't know	13%	31%	45%	21%	19%	40%	18%

present. The water quality criterion to protect human health, 235 MPN, is based on an illness rate of eight per 1,000 swimmers. Figure 12-13 shows *E. coli* measurements taken at the public beach on the north end of Big Crawling Stone Lake weekly during the swimming months from 2007–2013. The high numbers correlate with the presence of Canada Geese in and around the swimming areas, particularly those near areas of grass and lawns.

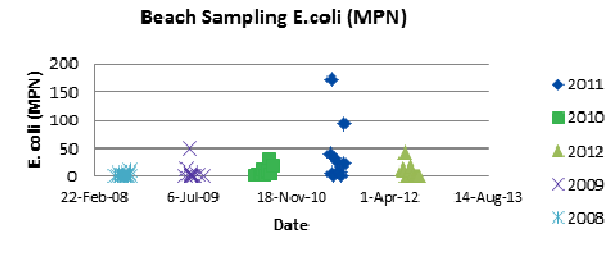

Figure 12-13. *E. coli* Measurements Taken and the Public Beach on Big Crawling Stone Lake

Generally, the Tribe is responsible for septic systems on property owned by the Tribe, and Vilas County is responsible for septic systems of property on non-Tribal land. Currently, all septic systems under the jurisdiction of Vilas County are on a three-year pumping/inspection schedule.

Residents were asked how often they have their septic tank inspected. Table 12-18 shows that for 60 respondents of Big Crawling Stone Lake, 2% indicate they *do not own the property*, 77% *at least every three years*, 2% *no septic tank*, 15% *more than every three years*, and 5% *no inspection*.

Table 12-18. Big Crawling Stone Lake - Septic Tank Inspection

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	60 Respondents	360 Respondents	609 Respondents
Do not own property	2%	7%	4%
At least every 3 years	77%	67%	71%
No tank	2%	9%	6%
More than every 3 years	15%	12%	12%
No inspection	5%	6%	7%

Aesthetics Category

The Aesthetics Category includes data and information on water quality, color, and turbidity. It also reflects an assessment of reports received by the Tribal Natural Resources Department for Big Crawling Stone Lake on the presence of oil, grease, nuisance aquatic plants, trash, and debris.

Reports and concerns submitted by residents to the Tribal Natural Resources Department on the turbidity and color of the lake water are not uncommon.

The extent to which lake water appears to be clear or murky is a function of the total amount of solids that are suspended in the water. Generally, the greater the amount of suspended solids in the water, the murkier it appears.

The major source of turbidity in open water away from shore is typically phytoplankton (algae). Closer to shore, suspended matter also comes from sources such as septic systems, sewage treatment plants, storm runoff, shoreline erosion and lake bottom sediments.

The major effect of turbidity noticed by lake property residents might simply be aesthetic—people do not like to look at dirty water. High levels of turbidity can, however, cause major problems by inhibiting the penetration of light, leading to the suffocation of larvae, damage to fish gills, fish reproduction, and loss of aquatic plants and habitat.

Turbidity or cloudy water can be measured in a variety of ways. A method commonly used in Lac du Flambeau to measure water clarity is to employ a Secchi disk. The 8-inch diameter disk with white and black quadrants is tied to a line and lowered slowly down into the water. The depth at which the white quadrants are no longer visible is taken as a measure of the transparency of the water. This information provides a way to look at changes in water clarity over a long period of time. Secchi data

also correlates to total phosphorus and trophic state index data. Figure 12-14 shows that over the past 22 years no significant change in water clarity has occurred for Big Crawling Stone Lake.

The Secchi disk was created by Father Pietro Angelo Secchi in 1865. He was a priest, astronomer, and professor of physics who taught for a time at Georgetown University in Washington, DC.[28]

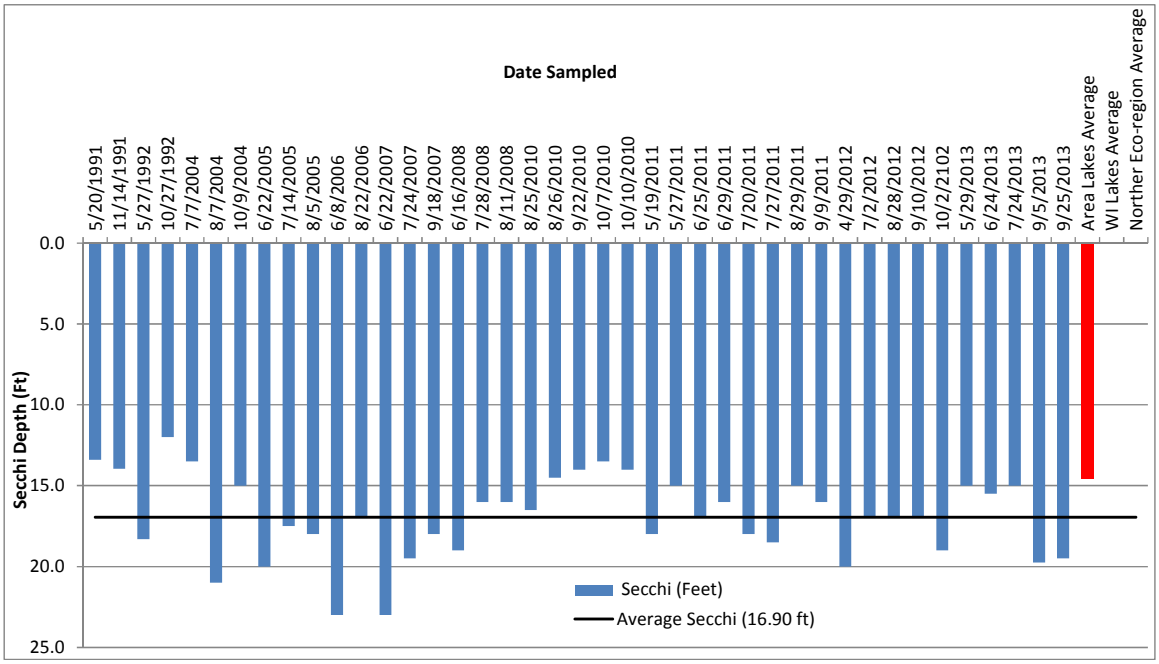

Figure 12-14. Secchi Depths for Big Crawling Stone Lake 1991-2013

The color of lake water reflects the type and amount of dissolved organic chemicals it contains. Transparent water with a low accumulation of dissolved materials appears blue and indicates low productivity. Dissolved organic matter, such as humus, peat or decaying plant matter, can produce a yellow or brown color. Some algae produce a reddish or deep yellow color. Water rich in phytoplankton and other algae usually appears green.

Volunteers for Big Crawling Stone Lake have been subjectively observing and recording the lake's water color since 2004 as part of the WDNR's Citizen Lake Monitoring Network. Table 12-19 summarizes the observations. The numbers preceding the colors indicate the frequency of observation. Green was recorded 18 times, blue 17 times, and brown 1 time. The specific dates of the observations are available on the Citizen Lake Monitoring (http://dnr.wi.gov/lakes/clmn/). The website also shows that despite the variations in water color, the observers reported that the water was clear.

Table 12-19. Big Crawling Stone Lake - Lake Water Color

Year	May	June	July	August	Sept	Oct
2004			1 Blue	1 Blue		1 Blue
2005		1 Blue	1 Green	1 Blue		
2006		1 Blue		1 Blue		
2007		1 Blue	1 Blue		1 Blue	
2008		1 Blue	1 Blue	1 Blue		
2009						
2010				1 Green	1 Green	1 Brown
2011	1 Blue	1 Blue 1 Green	2 Blue	1 Green	1 Green	
2012	1 Green		1 Green	1 Green	1 Green	1 Green
2013	1 Green	1 Green	1 Green	1 Green	2 Green	1 Green

In order to learn about residents' perceptions of the lake water quality, the community survey posed a few questions about water quality. Residents were asked to describe the current water quality of Big Crawling Stone Lake and whether they believe that quality has been changing. Table 12-210 shows that of 94 respondents for Big Crawling Stone Lake, 43% indicate that the current water quality of the lake is *excellent*, 50% *good*, 4% *fair*, 2% *poor,* 0% *very poor*, and 1% are *unsure*. The data for Big Crawling Stone Lake regarding perceptions of current water quality are reasonably consistent with the data for the other lakes identified in the table.

Table 12-20. Big Crawling Stone Lake - Perception of Current Water Quality

Lakes	# Respondents	Excellent	Good	Fair	Poor	Very Poor	Unsure
		%	%	%	%	%	%
Big Crawling Stone Lake	94	43%	50%	4%	2%	0%	1%
Bear River Lakes	554	38%	49%	7%	3%	0.2%	3%
All Lakes	956	34%	53%	7%	3%	0.1%	3%

Table 12-21 shows that 94 respondents for Big Crawling Stone Lake, 1% indicate that water has been *improving*, 61% *no change*, 22% *worsening*, and 16% are *unsure*. Again, the data for Big Crawling Stone Lake are reasonably consistent with the data for the other lakes noted in the table.

Table 12-21. Big Crawling Stone Lake - Perception of Change in Water Quality

Lakes	# Respondents	Improving	No Change	Worsening	Unsure
		%	%	%	%
Big Crawling Stone	86	1%	61%	22%	16%
Bear River Lakes	519	1%	60%	17%	22%
All Lakes	719	2%	62%	16%	20%

Fish Tissue Category & Fishery

The Fish Tissue Category refers to the amount of mercury in fish flesh as compared to Water Quality Standards. Larger edible fish have more mercury in the fish flesh than what is protective for human health concerns (Figure 12-15). Tribal Water Quality Standards are protective for subsistence fish consumption and the criterion to protect human health is 0.16 PPM.

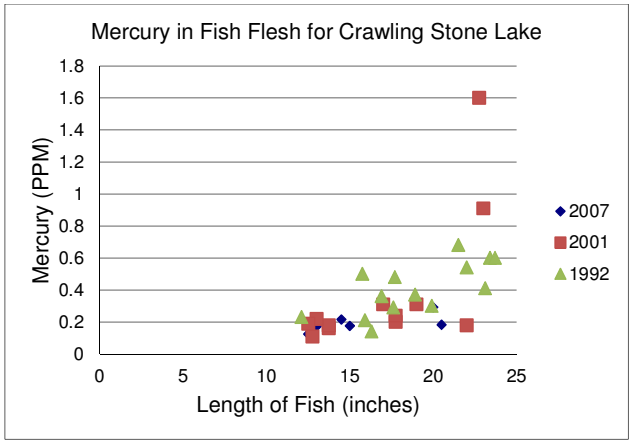

Figure 12-15. Fish Tissue Mercury Concentrations vs Fish Length in Inches for Big Crawling Stone Lake

Anthropogenic (meaning caused by human activity) sources of mercury are mainly from coal fired electric utilities emissions that ultimately enter the lake and watershed via rainwater. The chemistry of Lac du Flambeau Lakes is such that mercury becomes mobilized into the food chain accumulating in larger fish at the top of the food chain. Reductions in mercury emissions on coal fired power plants have helped to reduce mercury in the rain. A comparison of 1992 data to 2001 data (Figure 12-15) shows a trend of reduction, yet more than what is protective for human health.

Big Crawling Stone Lake's fishery supports both subsistence and sport fishing. The lake's fishery includes panfish such as bluegill and black crappie and game fish like smallmouth and largemouth bass, northern pike, musky, and walleye. The lake also includes lake sturgeon.

The Tribal Hatchery has a history of stocking Big Crawling Stone Lake, particularly with walleye, musky, and sturgeon. Table 12-22 shows the numbers of these fish that have been stocked in Big Crawling Stone Lake since 2003.

Table 12-22. Number of Fish Stocked 2003–2012 in Big Crawling Stone Lake (1,460 acres)

Year	Walleye		Sturgeon	Musky
	Fry	Fingerlings	Fingerlings	Fry
2012	500,000	5,141		
2011		10,584		10,000
2010		8,062		
2009	1,000,000	7,956	100	20,000
2008		7,956		30,000
2007	1,000,000	15,941	51	
2006	1,200,000	32,193		
2005		13,000	57	
2004	300,000	25,850		
2003	400,000	15,562		

In order to determine residents' perceptions on the quality of fishing and whether that quality has been changing, the survey asked residents a few questions about the fishery. Residents were asked if they have fished or speared on Big Crawling Stone Lake within the past ten years. Sixty-eight of 96 (71%) respondents for Big Crawling Stone Lake responded affirmatively.

These respondents were then asked to identify the type of fishing they employed. Of those who responded, 96% indicate *open water hook and line fishing*, 25% *ice fishing*, 3% *spearing*, and 1% *netting*.

The residents who have fished or speared within the past ten years were asked to describe the current quality of fishing on the lake, and how, if at all, the quality of fishing on the lake has changed.

Table 12-23 shows that of the 63 Big Crawling Stone residents who responded about the current quality of fishing, 3% indicate *excellent*, 38% *good*, 48% *fair,* 8% poor, and 0% *very poor*. Three percent indicate *unsure*. The responses for Big Crawling Stone Lake's residents are very similar to the responses for of the other lakes.

Table 12-23. Big Crawling Stone Lake - Perceptions of Current Quality of Fishing

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	63 Respondents	397 Respondents	750 Respondents
Excellent	3%	5%	5%
Good	38%	34%	34%
Fair	48%	42%	44%
Poor	8%	13%	11%
Very Poor	0%	4%	4%
Unsure	3%	3%	2%

Regarding whether the quality of fishing has changed during the past ten years, Table 12-24 shows that of 64 Big Crawling Stone Lake respondents, 13% indicate fishing has *been improving*, 28% *no change*, 38% *worsening*, and 22% *unsure*.

Table 12-24. Big Crawling Stone Lake - Perceptions of Change of Fishing Quality

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	64 Respondents	414 Respondents	750 Respondents
Improving	13%	9%	8%
No Change	28%	28%	31%
Worsening	38%	42%	42%
Unsure	22%	21%	20%

Lake Water Levels

Lake levels fluctuate naturally due to precipitation and evaporation which both vary widely from season to season and year to year. Low levels may cause stressful conditions for fish and increase the number of nuisance aquatic plants. High water levels can boost the amounts of nutrients from runoff of flooded lakeshore soils. Another consequence of fluctuating water levels is shoreline erosion.

Volunteers from Lac du Flambeau have been subjectively observing and noting lake water levels through the WDNR's Citizen Lake Monitoring Network for many years, while in 2012 the Tribal Natural Resources Department began to collect water level data systematically for selected lakes. With assistance from North Lakeland Discovery Center, Vilas County Association of Lakes, and Town Lakes Committee, monitoring equipment was installed and calibrated on sites at Little Crawling Stone Lake, Fence Lake, Flambeau Lake, Ike Walton Lake, and White Sand Lake. The equipment at the Flambeau Lake site is being monitored by the Tribal Resources Department while equipment at the other sites is being monitored by volunteer lakefront property owners.

The number of observations of lake levels noted through the Citizen Lake Monitoring Network for the past ten years are shown in Table 12-25.

Table 12-25. Big Crawling Stone Lake - Number of Observations of Lake Water Levels

Year	Low	Normal	High
2004		2	1
2005	3		
2006	1	1	
2007	3		
2008	1	1	1
2009			
2010			5
2011		6	2
2012	3	1	1
2013		2	3

Other Survey Results for Big Crawling Stone Lake

Residents affiliated with Big Crawling Stone Lake who responded to the survey in 2012 shared their perceptions on several topics in addition to those already presented in this section.

Activities & Watercraft

From a list of activities (fishing excluded), residents were asked to identify those in which they most often choose to participate. Of 96 respondents, the activities most often identified by residents affiliated with Big Crawling Stone Lake include motor-boating (79%), swimming (71%), and relaxing (67%). The activities least often identified include trapping (0%), and ricing (1%).

From a list of different types of watercraft, residents were asked to identify those which they and members of their household use most often. The watercraft most often identified by residents affiliated with Big Crawling Stone Lake include canoes and kayaks (50%), motorboats with more than 25 hp (65%), and pontoon boats (43%). Watercraft least often identified include row boats (23%), paddleboats (22%), and sailboats (15%). Three percent of the respondents indicate they and members of their household do not use watercraft.

Issues of Concern

From a list of 16 possible concerns for the lake, residents were asked to identify three concerns that they believe are of most concern. For those who responded, Table 12-26 shows the three greatest concerns include *aquatic invasive species* (44%), *loss of fish habitat* (23%), and *degradation of water quality* (24%). The three issues of least concern include *noise* (4%), *light pollution* (3%), *excessive fishing* (7%), and *degradation of native aquatic plants* (7%). The items on the list are of *no concern* to 14% of the respondents.

Table 12-26. Big Crawling Stone Lake - Lake Issues of Most Concern

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	96 Respondents	576 Respondents	1074 Respondents
Algae bloom	14%	17%	16%
Light pollution	3%	10%	8%
Shoreline runoff	13%	14%	12%
Aquatic invasive species	44%	42%	35%
Loss of fish habitat	23%	25%	22%
Water quality degradation	24%	27%	23%
Boat traffic	19%	16%	15%
Loss of shoreline	12%	13%	10%
Septic discharge	17%	18%	15%
Degradation of native aquatic plants	7%	11%	9%
Loss of wildlife habitat	14%	10%	10%
Excessive aquatic plant growth	9%	12%	10%
Noise pollution	4%	6%	6%
Shoreline development	12%	13%	11%
Excessive fishing	7%	12%	10%
Shoreline erosion	18%	18%	10%
Not concerned about any of these	14%	17%	19%

Interest in Attending Workshops

Residents were asked if they are interested in attending workshops on a variety of topics related to the lakes and habitats. Table 12-27 shows the percentages of responses for all three response groups. The largest percentages of responses for all three response groups include *identifying AIS* and *identifying aquatic plants*. Respondents from of Big Crawling Stone Lake also show an interest in *Limnology*.

Table 12-27. Big Crawling Stone Lake - Interest in Attending Workshops

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	96 Respondents	576 Respondents	1074 Respondents
Preventing AIS	12%	13%	11%
Starting a lake association	4%	5%	14%
Controlling Purple Loosestrife	12%	17%	14%
Identifying AIS	37%	42%	38%
Lake Stewardship	13%	13%	11%
Identifying aquatic plants	37%	38%	36%
Limnology	26%	22%	20%
Other	5%	5%	4%
No interest	27%	28%	28%

Town Website

Residents were asked how often, if at all, they check the town's website to get information about the Town Lakes Committee, such as newsletters, meeting agendas, and information on AIS. Table 12-28 shows that of 90 respondents for Big Crawling Stone Lake, (1%) indicate *often*, (11%) *sometimes*, (26%) *rarely* and (62%) *never*.

Table 12-28. Big Crawling Stone Lake - Accessing the Town's website

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	90 Respondents	541 Respondents	938 Respondents
Never	62%	60%	63%
Rarely	26%	26%	23%
Sometimes	11%	14%	12%
Often	1%	1%	1%

Accessing Information

Residents were asked where they would most likely go to get information about environmental issues. Table 12-29 shows that residents are most likely to seek information from the Wisconsin Department of Natural Resources and the Tribal Natural Resources Department.

Table 12-29. Big Crawling Stone Lake - Accessing Sources of Information for AIS

	Big Crawling Stone Lake	Bear River Lakes	All Lakes
	96 Respondents	576 Respondents	1074 Respondents
Tribal Natural Resources Department	31%	37%	31%
Town Lakes Committee	26%	21%	18%
Wisconsin DNR	73%	61%	59%
LdF Town Hall	26%	19%	19%
Tribal Main Office	4%	7%	5%
Other	5%	9%	9%

Crawling Stone Lakes Association[29]

Volunteer organizations in Wisconsin have long played an important role in protecting the lakes from declining water quality and other human impacts. To address such issues, residents on Lake Geneva established the first lake association in Wisconsin 1898.

A hundred years later, 1999, residents on Little Crawling Stone Lake conducted a survey of lake residents to determine whether to form a lake association. In addition to receiving the go-ahead, residents identified issues that concerned them, such as boating rules (ranked #1), lake water quality (#2), and exotic species (#7). An organizational meeting was held in 2000 when the Little Crawling Stone Lakes Association was officially established.

A major expansion occurred in 2008 when the association welcomed residents of Big Crawling Stone Lake and became the Crawling Stone Lakes Association (CSLA). The association now includes about 340 property owners, including off-water residents.

Several lake association members have attended various training sessions conducted by the Lac du Flambeau Town Lakes Committee and are now active lake stewards monitoring the public boat landing and shorelines for AIS, testing for and reporting on water quality, depth, and lake water levels each season.

Several association members assisted in the survey of the aquatic plant life of Little and Big Crawling Stone Lakes in preparation of the *Bear River Comprehensive Lake Management Plan*.

Relying in part on WDNR grant funds, the CSLA hired watercraft inspectors in 2013 and 2014.

In 2010, the CSLA obtained funding from property owners and approval from Federal, State, and Tribal organizations to deepen the channel between Little and Big Crawling Stone Lakes.

Residents from Little and Big Crawling Stone Lakes were instrumental in establishing the Lac du Flambeau Town Lakes Committee. Association members have served on the TLC since its founding in 2005.

Setting the Pace & Big Crawling Stone Lake

In summary, Big Crawling Stone Lake has a very healthy ecosystem with many strong qualities. The primary challenge is ensure these attributes do not degrade from their current conditions. At the same time, there is room for improvement, particularly with respect to improving the lake's habitat and aesthetics, monitoring the presence of mercury in fish tissue, and guarding against the arrival of aquatic invasive species.

The following tables, Setting the Pace, constitute a long-term action plan to maintain or improve the overall health of Big Crawling Stone Lake. The plan includes six goals with supporting objectives and activities. The goals include:

I. Preserve or Improve Current Water Quality.

II. Prevent Infestations of Aquatic Invasive Species.

III. Control or Reduce the Spread of Aquatic Invasive Species.

IV. Broaden Residents' Understanding of Swimmer's Itch.

V. Reduce User Conflicts.

VI. Strengthen or Increase Collaborations.

Table 12-30. Setting the Pace - Big Crawling Stone Lake

Goal I - Preserve or Improve Current Lake Water Quality					
Objective A - Provide residents with opportunities to learn about the current lake water quality and how they can help preserve or improve it.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Attend CLMN Workshops	Tribe, TLC, Lake Assoc.	# Attendees	Availability of workshops & support of Tribe, Town, Lake Associations	$50 per attendee	Annual
2. Attend CBCW Workshops	Tribe, TLC, Lake Assoc.	# Attendees	Availability of workshops & support of Tribe, Town, Lake Associations	$50 per attendee	Annual
3. Teach at After-School Program	Tribe/TLC	Pre & Post Survey	Support of Tribe & School, availability of volunteers	$35 per volunteer	Annual Spring Term
4. Host Limnology/Ecology Workshops	Tribe/TLC	# Attendees, workshop evaluation	Availability of presenters, # registrants	$100 per attendee	Every 2-3 years
5. Host Lake Steward Workshops	TLC/Tribe	# Attendees, workshop evaluation	Availability of presenters, # registrants, support of partnering organizations	$300 per registrant (based on 50 registrants)	Every 3-4 years
6. Host Landscaping/Shoreline Habitat Workshops	Tribe/TLC	# Attendees, workshop evaluation	Availability of presenters, # registrants, support of Tribe, Town	$100 per attendee	Every 2-3 years
7. Update Webpages	Tribe, TLC, Lake Assoc.	# Clicks	Support of Tribe, Town, Lake Associations	Variable	Ongoing
8. Host Lakes Fest	Tribe	# of Attendees	Support of Tribe, presenters, attendees	$7,000 per Event	Annual

Table 12-31. Setting the Pace - Big Crawling Stone Lake

Goal I - Preserve or Improve Current Lake Water Quality					
Objective B - Continue monitoring lake water quality.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Improve or establish standards for assessing aesthetics	Tribe/WDNR	Implementation of improved/new standards Report Card: Aesthetics	Support of Tribe & WDNR	$30,000 to establish	Ongoing once established
2. Collect data on lake water levels, temperature, chemistry, clarity, nutrients	Tribe/TLC/ Lake Assoc	Data Reports Report Card: Biology, Chemistry, Nutrients	Support of Tribe, WDNR, Volunteers	$20,000	Annual
3. Expand & implement schedule of Point Intercept Surveys	Tribe	WDNR Verification Report Card: Biology, Habitat	Support of Tribe, WDNR	$7,000 average per lake	Ongoing
4. Conduct shoreline sweeps	Tribe/TLC/ Lake Assoc	CLMN Data Sheets Report Card: Biology, Habitat, Aesthetics	Support of Tribe, TLC, Volunteers	$12 per hour, .58 per mile	Annual
5. Conduct individual property sweeps	Tribe/TLC/ Lake Assoc	CLMN Data Sheets Report Card: Biology, Habitat, Aesthetics	Support of Tribe, TLC, Property Owners	$48 per property	12 per season
6. Collect data on bio-accumulative pollutants (fish tissue)	Tribe	Database Report Card: Tissue	Support of Tribe	$20,000	Annual
7. Collect & analyze data on stream flow	Tribe/USGS	Report Card: Flow	Support of Tribe & USGS	$16,000	Annual
8. Expand participation in CLMN	Tribe/TLC/ Lake Assoc.	CLMN Data Sheets Biology, Chemistry, Nutrients	Support of TLC, Lake Associations	$12 per hour, .58 per mile	Ongoing
9. Collect & analyze data on weather/climate	Tribe/ Volunteers	List of sources	Support of Tribe	$10,000	Annual
10. Expand taking core samples from the lakes	Tribe	Reports of data Report Card: Biology, Habitat	Support of Tribe	$50,000-$100,000 for all lakes	One time lake
11. Identify impact of the operation of motor vehicles and motorboats on the lakes	Tribe	Report of study Report Card: Aesthetics	Support of Tribe	$10,000-50,000 per study	To be determined
12. Identify impact of forestry clear-cutting practices on the lakes	Tribe	Report of Study Report Card: Habitat, Nutrients	Support of Tribe	$20,000-70,000	To be determined
13. Consider monitoring species of concern, like frogs, bats., etc.	Tribe/TLC/ Lake Assoc	Document discussions	Support of Tribe, TLC, Lake Associations	$12 per hour, .58 per mile	To be determined
14. Consider maintaining/expanding Propagation of wild rice	Tribe	To be determined	Support of Tribe Availability of resources	To be determined	To be determined
15. Consider monitoring for spiny waterflea	Tribe/TLC/ Lake Assoc	To be determined	Support of Tribe, TLC, Lake Associations	To be determined	To be determined

Table 12-32. Setting the Pace - Big Crawling Stone Lake

Goal I - Preserve or Improve Current Lake Water Quality					
Objective C - Minimize impact from development.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Identify shoreline restoration needs	Tribe	Report of Study Report Card: Habitat, Nutrients	Funding	$10,000 for five lakes	Ongoing
2. Establish shoreline restoration demonstration project	Tribe	Finished project Report Card: Habitat	Funding, Available shoreline	$10,000 per 100 feet of shoreline	2015
3. Restore selected shorelines	Tribe	Finished projects Report Card: Habitat	Land ownership, jurisdictions	$10,000 per 100 feet of shoreline	2015, ongoing
4. Encourage lake home shoreline restorations	Vilas Co/Tribe	Finished projects Report Card: Habitat	Support of Tribe, County, & Landowners	$10,000 per 100 feet of shoreline	Ongoing
5. Install erosion controls bank stabilization	Tribe/Vilas Co	Finished projects Report Card: Habitat	Support of Tribe, Federal funding	$3,000 per erosion site	Ongoing
6. Review & suggest best management practices on all land-disturbing projects	Tribe	Report of study Report Card: Habitat	Support of Tribe, Federal funding	$10,000-$50,000	Annual
7. Review & comment on all storm water projects	Tribe	Reports/documents Report Card: Habitat, Nutrients, Bacteria	Support of Tribe, Federal funding	$10,000-$50,000	Annual
8. Review & comment on all National Pollution Discharge Elimination Permits	Tribe	Reports/documents Report Card: Habitat, Nutrients, Bacteria	Support of Tribe, Federal funding	$10,000-$50,000	Annual
11. Work with Planning and Land Department for future low-impact development initiatives	Tribe	Report Report Card: Habitat, Nutrients, Chemistry	Support of Tribe	Variable	To be determined
12. Review & update water quality standards and shoreline codes	Tribe	Revised documents Report Card: All categories	Support of Tribe, Federal funding	$50,000 per review	Triennial
13. Enforce inspection schedule for all development initiatives	Tribe	Completion reports Report Card: All categories	Support of Tribe, Federal funding	$20,000	Annual
14. Conducting septic inspections	Tribe/Vilas Co	Report of inspections Report Card: Nutrients Bacteria	Support of Tribe, Vilas County	$150 per unit	Ongoing
15. Evaluating Dam Permit Applications	Tribe, WDNR, Army Corps of Engineers	# permits evaluated Report card: habitat, lake levels	Jurisdiction, Federal funding	Variable	Ongoing
16. Review & comment on all potential rules or permits regulating mercury emissions	Tribe	Reports/documents Report Card: Fish Tissue	Support of Tribe, Federal funding	$10,000-$50,000	Annual

Table 12-33. Setting the Pace - Big Crawling Stone Lake

Goal II - Prevent Infestations of Aquatic Invasive Species					
Objective A - Provide the public with opportunities to learn about Aquatic Invasive Species and how to prevent their introduction.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Coordinate TLC/Tribal planning with lake associations' planning	TLC/Tribe Lake Assoc	Partner feedback	Support of TLC, Tribe & lake associations	Volunteers @ $12/hour & .58/mile	Annual
2. Encourage volunteers to attend training sessions provided by the Clean Boats Clean Waters (CBCW) program	TLC/Tribe/ Lake Assoc	Identify number of attendees	Availability of workshops, volunteers, & help from lake associations	$50 per attendee	Annual
3. Periodically offer workshops locally on how to identify and prevent AIS	TLC	Agendas, participant evaluations	Availability of presenters and registrants, & help from lake associations	$35 per attendee	Annual
4. Encourage volunteers to attend training sessions provided by the Citizen Lake Monitoring Network (CLMN)	TLC/Tribe	Identify number of attendees	Availability of workshops, volunteers, & help from lake associations	$50 per attendee	Annual
5. Disseminate information via media, including Town, Tribal, and Lake Association websites	TLC/Tribe/ Lake Assoc	Copies of releases	Availability of writer(s)	Variable	Ongoing
6. Highlight AIS and prevention in documents produced locally, such as newsletters, brochures	TLC/Tribe/ Lake Assoc	Copies of documents	Availability of writers	Volunteers @ $12/hour & .58/mile	Ongoing
7. Highlight AIS prevention at landings through signage & distribution of educational materials	TLC/Tribe Lake Assoc	Periodic review of signage	Availability of new signage & WDNR education materials	Cost of signage, volunteers @ $12/hour, .58/mile, WDNR materials	Ongoing
8. Identify local Key Communicators who will speak about AIS at community events	TLC/Tribe	List of individuals	Availability of communicators	Volunteers @ $12/hour, .58/mile	Annual
9. Ask resorts & select businesses to distribute AIS information	TLC/Lake Associations	List of accepting business	Availability of materials, approval of businesses	Volunteers @ $12/hour, .58/mile, WDNR materials	Annual
10. Continue hosting the Lake Steward Workshop	TLC/Tribe	Participant evaluation	Availability of presenters, # registrants, support of partnering organizations	$300/registrant (based on 50 registrants)	Every 3-4 years

Table 12-34. Setting the Pace - Big Crawling Stone Lake

Goal II - Prevent Infestations of Aquatic Invasive Species					
Objective B - Provide the public with opportunities to actively and purposefully look for Aquatic Invasive Species.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Coordinate TLC/Tribal planning with lake associations' planning (Only assoc lakes)	TLC/Tribe Lake Assoc	Partner feedback	Support of TLC, Tribe & lake associations	Volunteers @ $12/hour, .58/mile	Annual
2. Organize and support whole-lake shoreline sweeps	Tribe/TLC/ Lake Assoc	# sweeps, participant feedback Report Card: Biology	Support of TLC, Tribe & Lake Associations	$12/hour, .58/mile, supplies @ $300/lake	Annual
3. Support establishing system of personal property sweeps	TLC/Lake Assoc	# properties, participant feedback Report Card: Biology	Support of TLC & Lake Associations	Volunteers @ $12/hour, .58/mile	Annual
4. Inspect watercraft at landings	Tribe/TLC/ Lake Assoc	# inspectors, # hours inspection Report Card: Biology	Support of TLC, Tribe, Lake Associations, Volunteers, WDNR	$12/hour, .58/mile, supplies @ $200/landing	Annual
5. Coordinate SCUBA diving/ snorkeling sweeps near landings	TLC/Tribe	Log Report Card: Biology	Support of Tribe & volunteers	$500/season	Annual
6. Provide convenient drop-off points on each lake for suspected AIS samples	TLC/Lake Assoc	# participants Report Card: Biology	Support of TLC & lake associations	$100 per lake	Annual
7. Assist Lake Associations with grant applications for hiring watercraft inspectors	TLC	# attendees, workshop evaluation Report Card: Biology	Support of TLC & Lake Associations	$30 per attendee	Annual

Table 12-35. Setting the Pace - Big Crawling Stone Lake

Goal III - Control or Reduce the Spread of Aquatic Invasive Species					
Objective A - Provide the public with opportunities to learn about local infestations of Aquatic Invasive Species and how they can help control or reduce their spread.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Coordinate TLC/Tribal planning with lake associations' planning	TLC/Tribe Lake Assoc	Lake association feedback	Support of TLC & lake associations	Volunteers @ $12/hour, .58/mile	Annual
2. Encourage volunteers to attend training sessions provided by the Clean Boats Clean Waters (CBCW) program	TLC/Tribe/ Lake Assoc	# of attendees	Availability of workshops, volunteers, & help from lake associations	$50 per attendee	Annual
3. Offer TLC workshops on how to identify and control or reduce AIS	TLC	Agendas, participant evaluations	Availability of presenters and registrants, & help from lake associations	$30 per attendee	Annual
4. Encourage volunteers to attend training sessions provided by the Citizen Lake Monitoring Network (CLMN)	TLC/Tribe/ Lake Assoc	# of attendees	Availability of workshops, volunteers, & help from lake associations	$50 per attendee	Annual
5. Disseminate information via media, including Town, Tribal, and Lake Association websites	TLC/Tribe/ Lake Assoc	Copies of releases	Availability of writer(s)	Volunteers @ $12/hour, .58/mile	Ongoing
6. Highlight AIS and prevention in documents produced locally, such as newsletters, brochures	TLC/Tribe/ Lake Assoc	Copies of documents	Availability of writers	Volunteers @ $12/hour, .58/mile, printing	Ongoing
7. Highlight AIS control at landings through signage & distribution of educational materials	TLC/Tribe Lake Assoc	Periodic review of signage	Availability of new signage	Cost of signage, volunteers @ $12/hour, .58/mile, WDNR materials	Annual
8. Identify local Key Communicators who will speak about AIS at community events	TLC/Tribe/ Lake Assoc	List of individuals	Availability of communicators	Volunteers @ $12/hour, .58/mile	Annual
9. Ask resorts & select businesses to distribute AIS information	TLC/Tribe/ Lake Assoc	List of accepting businesses	Availability of materials & approval of businesses	Volunteers @ $12/hour, .58/mile	Annual
10. Continue hosting the Lake Steward Workshop	TLC/Tribe	Participant evaluation	Availability of presenters, # registrants, support of partnering organizations	$300 per registrant (based on 50 registrants)	Triennial

Table 12-36. Setting the Pace - Big Crawling Stone Lake

Goal III - Control or Reduce the Spread of Aquatic Invasive Species					
Objective B - Reduce the scope of existing infestations of purple loosestrife and minimize the spread of the infestations to new locations.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Establish Action Team & Action Plan	TLC	Written Plan	Support of TLC/Tribe/Town	$12/hour. .58/mile	Annual
2. Encourage lake association participation	TLC/Lake Assoc	# Lake Associations involved	Support of Lake Associations	$12/hour, .58/mile	Annual
3. Continue inter-agency relationships on Purple Loosestrife (Tribe, WDNR, Public School)	TLC/Lake Assoc	Survey agencies	Support of agencies	Variable	Annual
4. Raise & distribute beetles	TLC/Lake Assoc	150 plants & 200,000 beetles Report Card: Biology, Habitat	Support from Tribe, WDNR, school, & availability of volunteers, materials, roots & seed beetles	$3,000-5,000	Annual
5. Host or conduct workshops on Purple Loosestrife	TLC/Lake Assoc	Agendas, participant evaluations	Support of volunteers & other agencies	$30/attendee	Annual
6. Provide residents with information on bio-control	TLC/Lake Assoc	Documents provided	Support of TLC/Tribe/Lake Associations	$1000 printing/supplies	Annual
7. Consider restoring tall native wetland plants to infested areas	TLC/Tribe/ Lake Assoc	Document discussions	Support of TLC, Tribe, Lake Associations, others	To be determined	To be determined

Table 12-37. Setting the Pace - Big Crawling Stone Lake

Goal III - Control or Reduce the Spread of Aquatic Invasive Species					
Objective C - Continue monitoring infestations of Rainbow Smelt and Rusty Crayfish.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Publicize history of previous actions to monitor/control infestations	Tribe	Documents	Tribal support	$12/hour, .58/mile	Ongoing
2. Conduct workshop on the fishery, including monitoring smelt and crayfish	Tribe/TLC	Agenda, participant evaluations	Tribal Support	$12/hour, .58/mile	Ongoing
3. Continue monitoring Rainbow Smelt & Rusty Crayfish	Tribe/ Volunteers	Documents Report Card: Biology	Tribal Support, TLC Support	$12/hour, .58/mile	Ongoing

Table 12-38. Setting the Pace - Big Crawling Stone Lake

Goal IV - Broaden Residents' Understanding of Swimmer's Itch					
Objective A - Provide residents with a variety of educational experiences and materials on Swimmer's Itch, including alternatives treating it or reducing the probability of contracting it.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Establish Action Plan (All except M,LT,IW)	Bear River Team	Written Plan	Support of Tribe, Town, Availability of volunteers	$12/hour, .58/mile	Annual
2. Review current research and literature	Bear River Team	List of items reviewed	Availability of research & literature	$12/hour, .58/mile	Ongoing
3. Contact appropriate professionals and authorities about Swimmers' Itch	Bear River Team	List of individuals/organizations	Availability of professionals	$12/hour, .58/mile	Ongoing
4. Host community-wide workshops	Bear River Team	Agenda & evaluation of participants	# registrants, availability of presenters	$30/attendee	Annual
5. Distribute information in newsletters, bulletins, and PSAs	Bear River Team	Copies of items distributed	Support of partnering agencies	$12/hour, .58/mile	Annual
6. Identify alternatives for treating it or reducing the probability of contracting it	Bear River Team	Summative report	Availability of alternatives	$12/hour, .58/mile	To be determined
7. Conduct or participate in a research study of Swimmer's Itch	Bear River Team	Final research report	Support of partnering agencies	$150,000	To be determined

Table 12-39. Setting the Pace - Big Crawling Stone Lake

Goal V - Reduce User Conflicts					
Objective A - Provide the public with opportunities to learn about user conflicts.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Determine extent of user conflicts	Tribe	Survey	Tribe/TLC/Funding	To be determined	Triennial
2. Develop & distribute education materials on minimizing user conflicts	Tribe, WDNR	Availability of materials, distribution list	Support of Tribe, WDNR, availability of resources	To be determined	Ongoing
3. Host workshop on fishery (size limits, stocking, etc.)	Tribe	# attendees, workshop evaluation	# registrants, support of Tribe, availability of resources	$100/attendee	Quadrennial
4. Joint review of current enforcement (# wardens, incidents, etc.)	Tribe/Town	Report	Support of Tribe & Town	To be determined	To be determined

Table 12-40. Setting the Pace - Big Crawling Stone Lake

Goal VI - Strengthen or Increase Collaborations					
Objective A - Encourage participation in educational experiences related to partnerships and collaborations.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
2. Encourage attendance at Lake Leaders Institute	TLC/Tribe/ Lake Assoc	# attendees	Availability of volunteers, resources	$800/attendee	Biennial
3. Encourage attendance at Wisconsin Lakes Conference	TLC/Tribe/ Lake Assoc	# attendees	Availability of volunteers, resources	$800/attendee	Annual
4. Encourage attendance at Vilas County Lakes Association	TLC/Tribe/ Lake Assoc	# attendees	Availability of volunteers, resources	$100/attendee	Annual
5. Encourage attendance at Lakes Fest	Tribe/TLC/ Lake Assoc	# attendees	Support of partnering agencies	$7,000/event	Annual
6. Provide workshop or meeting for lake associations on planning	TLC	# attendees, workshop evaluation	Support of TLC, # registrants	$30/attendee	Annual
7. Provide a workshop for lake associations on preparing grant applications	TLC	# attendees, workshop evaluation	Availability of grants, support of TLC, # registrants	$30/attendee	Annual

Table 12-41. Setting the Pace - Big Crawling Stone Lake

Goal VI - Strengthen or Increase Collaborations					
Objective B - Provide a variety of ways to share information about watershed and lake planning.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Host a Lake Association Gathering	TLC/Tribe	# attendees, program evaluation	Support of Tribe/TLC/ Lake Associations	$50/attendee	Annual
2. Establish an ongoing exchange of newsletters, brochures, etc. between lake associations, the Tribe, and the TLC	TLC	Participant evaluation	Support of partnering agencies	$100	Annual
3. Disseminate information to lake associations about the Wisconsin Lakes Association, Annual Convention, Leadership Program, & other local, County and State offerings	TLC	Lake association feedback	Support of TLC and lake associations, availability of materials	Volunteers @ $12/hour, .58/mile	Annual
4. Present information at Local, County, State, & National conferences and meetings	Tribe/TLC	Per host agency	Support of Tribe, Town, availability of presenters	Variable	Per host agency
5. Consider issuing joint TLC/Tribe/Lake Association newsletter	TLC/Tribe/ Lake Assoc	Newsletter distribution	Support of partnering agencies, availability of author	$7,000/issue	Annual

Table 12-42. Setting the Pace - Big Crawling Stone Lake

Goal VI - Strengthen or Increase Collaborations					
Objective C - Focus on ways to reach out to individuals and organizations.					
			Limitations		
Potential Activities	**Facilitator(s)**	**Evaluation**	**Limitations**	**Cost Estimates**	**Timeframe**
1. Establish system for contacting new residents	TLC	# Residents contacted	Support of TLC	$100/visit	Ongoing
2. Encourage the WDNR to establish a protocol for writing watershed and lake management plans.	Bear River Action Team	Development of protocol	Support of WDNR	TBD	To be determined
3. Revise the current *Rapid Response Plan*	Tribe/TLC	Availability of revised plan	Tribal support	$1,000-$5,000	Quinquennial
4. Consider establishing a watershed plan for the other watersheds in Lac du Flambeau	Tribe/TLC	Additional watershed plans	Positive evaluation of Bear River Watershed plan, support of Tribe & TLC, availability of volunteers and resources	$50,000/ watershed	To be determined
5. Evaluate establishing the position of Invasive Species Coordinator for Lac du Flambeau	Tribe/TLC	Report	Support of Tribe, Town, & Lake Associations	TBD	To be determined
6. Develop an indigenous arts and sciences institute	Tribe/ Universities	# Participants	Support of Tribe and Universities	$4,,000,000	To be determined

Notes for Section 12

1. *GIDAKIIMINAAN (Our Earth): An Anishinaabe Atlas of the 1836, 1837, and 1842 Treaty Ceded Territories* (Great Lakes Indian Fish & Wildlife Commission, 2007) 36.
2. *Its Floating Rock Once the Throne of the Great Spirit* (Toledo Blade, November 17, 1910) 2.
3. See map (Figure 3- 2, Section 3) of this document.
4. James K. Bokern, *History and the Primary Canoe Routes of the Six Bands of Chippewa from the Lac du Flambeau District* (Unpublished Masters Thesis, 1987) Chapter IX. Online at: http://www.marshfield.k12.wi.us/socsci/discovery/bokern/default.htm
5. Joyce Laabs, *Bill Yeschek, His Love Affair* (in A Collection of Northwoods Nostalgia, Joyce Laabs & Don Walker, 1978) 178-183.
6. Ibid.
7. Michael J. Goc, *Reflections of Lac du Flambeau: An Illustrated History of Lac du Flambeau, Wisconsin, 1745-1995* (New Past Press Inc., 1995) 150.
8. George Tanner, *Memories of Darling's Resort*. "The Lakeland Times Extra." October 9, 2009, Section 3.
9. Information from two Chamber of Commerce maps of the 1960s: *Lac du Flambeau Indian Reservation* and *Lac du Flambeau Lake Region*.
10. Fish' n Bum webpage. http://fishnbumresort.com/.
11. *Waterway May Be Completed Before Winter* (Lakeland Times, Back Through the Times, 1931) 14.
12. Goc, 151.
13. The survey data presented throughout the section is from the *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012. See Appendix.
14. Quality Assurance Protection Plan (QAPP) , Lac du Flambeau Band of Lake Superior Chippewa Indians, Aquatic Plant habitat Point Intercept Survey of Lakes for Plants 2010.
15. Results of the WISCALM Botanist Review Panel for Aquatic Macrophyte Impairment.
16. Quality Assurance Protection Plan, Lac du Flambeau Band of Lake Superior Chippewa Indians, General Chemistry Assessment of Waters within the Lac du Flambeau Reservation 2012 (QAPP) for General Chemistry.
17. Tribal Water Quality Standards.
18. Quality Assurance Protection Plan (QAPP) , Lac du Flambeau Band of Lake Superior Chippewa Indians, Aquatic Plant habitat Point Intercept Survey of Lakes for Plants 2010.
19. National Lakes Assessment: Technical Appendix, Data Analysis Approach; Lakes, Ponds, and Reservoirs January 2010, 10-12.
20. Wisconsin 2012 Consolidated Assessment and Listing Methodology (WISCALM) for Clean Water Act Section 305(b), 314, and 303(d) Integrated Reporting, April 2012 http://dnr.wi.gov/topic/surfacewater/documents/FINAL_2012_WisCALM_04-02-12.pdf.
21. Quality Assurance Protection Plan, Lac du Flambeau Band of Lake Superior Chippewa Indians, (QAPP) Shore land Development Habitat 2008.
22. National Lakes Assessment: Technical Appendix, Data Analysis Approach; Lakes, Ponds, and Reservoirs January 2010, 10-12.
23. Quality Assurance Protection Plan, Lac du Flambeau Band of Lake Superior Chippewa Indians, (QAPP) for Beach Monitoring 2008.
24. Tribal Water Quality Standards.
25. Ibid.
26. Quality Assurance Protection Plan, Lac du Flambeau Band of Lake Superior Chippewa Indians, General Chemistry Assessment of Waters within the Lac du Flambeau Reservation 2012 (QAPP) for General Chemistry.
27. National Lake Survey Report.
28. http://www.manresa-sj.org/stamps/1_Secchi.htm.
29. Information in the first paragraph is from *People of the Lakes: A Guide for Wisconsin Lake Organizations*, DNR Publication PUB-FH-821-2006. The remaining information about the Crawling Stone Lakes Association was provided by founding member, Ralph Kerler, 2014.

Figure Notes for Section 12

Figure 12-1. Map of Selected Lakes. Provided by Tribal Natural Resources Department.

Figure 12-2. Photograph of Yeschek's Crawling Stone Lodge. Provided by the George W. Brown, Jr. Museum, Lac du Flambeau.

Table Notes for Section 12

Table 12-3. Perceived vs Actual Presence of AIS. *Bear River Watershed Comprehensive Lake Management Plan Survey* Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #26. See Appendix.

Table 12-4. Perceived to be threatened by Aquatic Invasive Species. Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #27. See Appendix.

Table 12-5. Concern about AIS Getting into the lake. Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #29. See Appendix.

Table 12-6. Time Spent Checking for AIS During Open Water Season. Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #28. See Appendix.

Table 12-9. Whether Aquatic Plants Impede Enjoyment of the Lake. Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #15. See Appendix.

Table 12-10. Removal of Aquatic Plants from the Lake. Data from *Bear River Watershed Comprehensive Lake Management Plan Survey, Lake-by-lake Comparisons*, June 2012, Question #18. See Appendix.

Figures

Tables

"A Healthy Lake"
Agnes Boho, Grade 1, 2013
Lac du Flambeau Public School