

“A MAP; A PLAN; A CANAL; A BEACH – THE ‘TRAGEDY’ / ‘COMEDY’ OF CRYSTAL LAKE”
Dr. Stacy Leroy Daniels, “President *pro tem*, Benzie County River Improvement Co., Est. 1873.”

*“There is a tide in the affairs of men, Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life Is bound in shallows and in miseries.
On such a full sea are we now afloat; And we must take the current when it serves, Or lose our ventures.”
– Shakespeare, Julius Caesar, Act IV, scene iii.*

“I got more than enough ‘flood’ to ‘tide’ me over into ‘fortune’. I took to the ‘current’, but lost my ‘venture’.” – “A.J.” (Archibald Jones, Jr.)

ABSTRACT

In 1873, an attempt was made to construct a system of canals from Crystal Lake (Benzie Co., MI) to nearby Lake Michigan. This endeavor led fortuitously to the dramatic lowering of the level of a very large inland lake renowned for its water clarity and whitecap waves. A wide expanse of new beach was thusly created insuring its development as a prime recreational area. The historic lowering of Crystal Lake is unique among all other inland lakes in Michigan. Its unintended consequences were transformed serendipitously: from a perceived “failure” (the **“Tragedy”**) of an “ill-advised project” by an apparent “scapegoat” - to an unqualified “success” (the **“Comedy”**) of an “ambitious” plan by a “visionary” to be celebrated as a “local hero” ! A rediscovered historic project map showing proposed improvements was combined with new data to create a high-resolution topographic / bathymetric map showing both historic canals and modern features of interest. Quantitative comparisons before and after lowering of the Lake allowed “re-creation” of the sheer magnitude of this epochal event !

HISTORY

During the last Ice Age, 11,000 ybp, most of Michigan was covered by glaciers, with ice accumulating in layers thousands of feet thick and meltwaters flowing in large rivers. Ice sculpted the land into moraines and valleys. Meltwaters eroded the glacial drift into deposits as much as 300 ft thick. The levels of the ancestral Great Lakes rose and fell by hundreds of feet. A myriad of some 6,000 inland lakes formed and reformed. Those were tumultuous times! Prevailing winds and waves then separated the Crystal Lake embayment from Lake Algonquin, the glacial predecessor of Lake Michigan, by a narrow isthmus of dunes leaving it perched like a “bathtub” high above the “big lake”. Exposed terraces extended from the bases of high moraines around the edge of the “little lake”, and submerged terraces formed within its shoals. As settlements grew in the early 19th Century, needs developed to improve rivers, lakes, and harbors for navigation; to build dams to provide water power for grist and saw mills; to drain farm lands; to build canals for transportation, and other structures to control floods, irrigate land, and supply drinking water. Unlike other large inland lakes, the combination of an abundant water source at Crystal Lake and a sufficient hydraulic gradient down to Lake Michigan were to prove to be the future makings of a potentially fine canal !

Archibald Jones Jr., a self-styled “boot-strap” engineer, formed the Benzie Co. River Improvement Co. (**BCRIC**) in 1873. He proposed four improvements: (i) purchasing lands on Crystal Lake to secure and improve water-lots in places suitable for business; (ii) opening a passage for boats between “Betsy” River and Crystal Lake; (iii) removing obstructions in the way of navigating “Betsy” River; and (iv) building a steamboat and accompaniments for transportation of passengers and freight. This attempt was thwarted on 23 Aug 1873, when whitecaps breached a temporary dam at the Outlet before permanent locks could be installed leaving the proposed canal “high-and-dry” - a sad beginning (the **“Tragedy”**) (1) ; but exposing a new sandy beach “low-and-wet” - a happy ending (the **“Comedy”**) (2). Instead of the level of the Lake being intentionally lowered by only five feet, it dropped precipitously by 17 ft over a three-week period as a torrent of 56,000,000,000 gal (Bgal) of water flushed downstream into the Betsie River almost washing the port city of Frankfort into Lake Michigan ! Crystal Lake dropped from its “HIGH” level (612 ft), to its “LOW” level (595 ft), eventually rebounding 5 ft to its present “NOW” level (600 ft). During the lumbering era, temporary dams were haphazardly built, removed, and/or washed away, and the Lake level fluctuated wildly.

"The event was so epochal in its nature and has such a permanent bearing on the subsequent development of Benzie County that it is rightly considered as one of the major incidents of the county's early history." -- Leonard L. Case, "A Bicentennial Reader", 1976, pp 56-57.

THE HISTORIC MAP

A historically significant map (3), drawn for the **BCRIC** by Buel C. Hubbell in 1873, was "rediscovered" in 2011 in the Benzie Area Historical Museum (BAHM), where it had resided uncatalogued and forgotten for 30 years. It had first been found hidden in a wall during the 1980 renovation of an 1870s farmhouse built by John Bailey, a Benzonia pioneer, and Vice President of the **BCRIC**! He was also a surveyor, who platted the "Beulah View and Crystal City Resort", which emerged from the swamp when the Lake was lowered to become the future County seat. He may have retained this map in hopes that the canal might be someday "reconsidered" ! The map shows outlines of lakes; sources and courses of rivers; proposed canals; wagon roads; township, county, and section lines; town corners; obstructions to navigation - logs, rocks, snags, etc.; and rocks and rapids. This map was patterned after the original government survey map by Albert and Alvin Burt (1838-1839), which was later replicated by Alexander Winchell (1860), the State geologist of Michigan, while conducting field work for the second State geological survey. After restoration, the map was formally unveiled at the 3rd Annual Archibald Jones Day, 25 Aug 2012. A handsome two-sided bronze historical site marker was later dedicated at the Crystal Lake Outlet to commemorate the historic event on 22 Aug 2015 (4). This historic map (patterned after the 1838-9 survey is a very accurate portrayal of Crystal Lake before it was lowered.

THE MODERN MAP

A high-resolution topographic / bathymetric map (5) (created in 2018 and revised in 2023), shows HIGH (1873), LOW (1904), and NOW (2015) lake levels; land elevations; beach contours; and the Watershed boundary; with three historic canal routes superimposed. A new QL2 LiDAR dataset (MiSAIL 2015) was used to: (i) assess present (NOW) size of the lake; (ii) develop dynamic 3-D models of the Watershed; (iii) reconstruct the original lowering, and (iv) determine Water lost = Beach gained, i.e. the "breadth" of new beach from lakeshore to bottom of bluff (dune crest). The beach area calculated (2001 ft) using a drop of 17 ft (HIGH-LOW) agreed well with "rough" estimates of 1873, when the Lake was "eight or ten feet higher" and "covered an area of some two thousand acres more of surface than at present (ca. 1922) and during severe storm(s), the waves were noticeably much higher" ! A net drop of 12 ft (LOW-NOW) created a perimeter beach of 288 ft breadth by 21.71 mi length ! This modern map is considered a very accurate portrayal of Crystal Lake after it was lowered.

In late 1911, Crystal Lake was one of the first inland lakes in MI to establish a "natural level" (600.48 ft), and to build a permanent control dam. A growing population of cottagers was being affected by low summer water levels insufficient to float boats, and/or by high winter levels causing erosion of beaches. In 1980, revised bi-levels of 600 ± 0.25 ft (summer high, winter low, resp.) were set . A continuous level gauge installed in 2014 now provides data to be evaluated and define seasonal changes, i.e. wind and wave surges, precipitation events, freeze-thaw events, and seiches (tides) - the intent being to provide better control of lake level and to reduce effects of extreme events.

Three canal routes were considered, proposed, and/or attempted from Crystal Lake to Lake Michigan (*):

- (1) **"SOUTH" Canal** (proposed, surveyed, and attempted in 1873 by the **BCRIC**) from the Outlet of Crystal Lake into the Betsey River, on to Betsey Lake. and into Lake Michigan at Frankfort;
- (2) **"NORTH" Canal** (proposed and surveyed in 1873, but never attempted by the **BCRIC**) from Platte Lake through Rush Lake, Long Lake, and Round Lake, and into Crystal Lake; and
- (3) **"WEST" Canal** (considered sometime prior to 1873, but independent of the **BCRIC**) to run directly from Crystal Lake across the isthmus of Point Betsey into Lake Michigan.

[(*) All three canal routes were assumed to run all the way from Crystal Lake (CL) to Lake Michigan (LM) to compare cross-sections.]

CRYSTAL LAKE WATERSHED (BENZIE CO., MI): LAKE / BEACH / CANALS / WATERSHED PARAMETERS © 2021							
PARAMETER	UNIT	LEVEL	LEVEL	LEVEL	CHANGE, Δ	CHANGE, Δ	CHANGE, Δ
		HIGH (H)	LOW (L)	NOW (N)	H -> L	L -> N	H -> N
		1873	1904	2015	GROSS	INTERIM	NET
I: LAKE							
ELEVATION	FT	612	595	600	17	-5	12
LENGTH	MI	8.71	8.09	8.13			
WIDTH	MI	3.31	2.75	2.79			
DEPTH	FT	177	160	165			
PERIMETER	MI	27.48	21.94	21.71			
AREA	ACRE	10,754	8,753	9,896			
Δ AREA	ACRE				2,001	-1,143	858
Δ AREA	% CHANGE				18.6	-13.1	8.0
VOLUME	BGAL	261	205	221			
Δ VOLUME	BGAL				56	-16	40
Δ VOLUME	% CHANGE				21.5	-7.8	15.3
II. BEACH							
BREADTH	FT (AVG)			288	668	-432	288
LENGTH	MI (TOTAL)			21.71			
III. CANALS							
		"SOUTH"	"NORTH"	"WEST"	S + N + W		
		ATTEMPTED	PROPOSED	CONSIDERED	SUM		
LAND (L)	MI	1.04	1.52	1.01	3.57		
WATER (W)	MI	8.65	8.77	0.00	17.42		
TOTAL (L+W)	MI	9.69	10.29	1.01	20.99		
DREDGING	% TOTAL	10.7	14.8	100.0	17.0		
DREDGING	1000 YD3	30.5	29.6	44.5	104.6		
IV. WATERSHED							
AREA	ACRE			28,145			
AREA	MI2			43.98			
NOTES:							
1. WATERSHED INCLUDES BOTH LAND (L) (~ 65 %) + WATER (W) (~ 35%).							
2. CRYSTAL LAKE WATERSHED CONTAINS 17 SUBWATERSHEDS.							
3. LAKE CENTROID: 44.659167° N LATITUDE ; -86.156389° W LONGITUDE.							
4. "OLD" LAKE SURFACE LOST = "NEW" BEACH GAIN [LEVEL DROP (+) ; LEVEL REBOUND (-)].							
5. PERIMETER LOW & REBOUND DELINEATIONS ARE UNCERTAIN.							
6. BEACH BREADTH MEASURED FROM LAKESHORE TO BLUFF ; TOTAL BEACH LENGTH ~ LAKE PERIMETER.							
7. DREDGING VOLUMES BASED ON NET CROSS-SECTIONAL AREAS.							
8. DREDGING: CANALS (114 K YD3) (1873) (EST.) VS. BETSIE BAY (105 K YD3) (1980).							
9. PARAMETERS REPORTED IN "THE COMEDY" (2015) ARE UPDATED (2018).							
10. OUTWASH PLAIN: (WETLANDS > EDGE OF BLUFF BELOW OUTLET DAM) ~3 MI2 (1,920 A) VS. ~2,000 A BEACH							
11. 56 BGAL INUNDATION (DUE TO DAM BREACH AT CRYSTAL LAKE), LARGEST IN U.S. HISTORY (UNTIL 2020) !							

FACTOIDS

Crystal Lake ranks 3rd (depth); 4th (volume); and 9th (area) of 26,266 inland lakes (≥ 1.0 A) in Michigan.

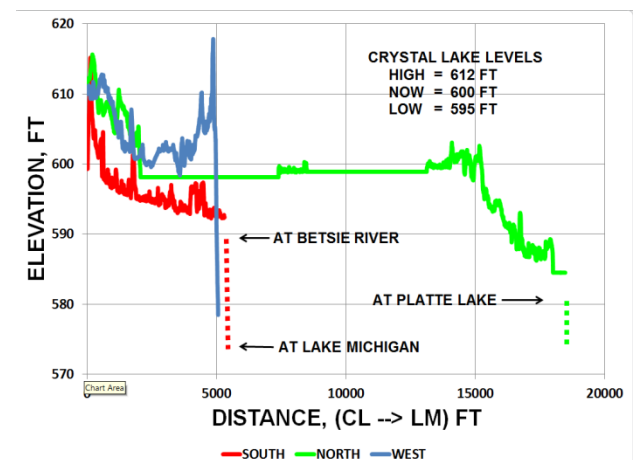
If Crystal Lake (~ 612 ft in 1873) had been lowered to the then level of Lake Michigan (581.79 ft), the level of the latter would have risen ~ 0.3 in (!) or about 0.009 %.

Crystal Lake is about "halfway" between "here" and "there" : "halfway" between the Equator and the North Pole, and "halfway" between the NW corner of the UP of MI and the SE corner of the LP of MI.

The common merganser duck (*Mergus merganser* , Fr. *Aux bec Scies*, sawbill duck) is considered the local namesake (Betsie, Betsey, Benzie).

The Atlantic Smelt (*Osmerus mordax*) planted in Crystal Lake in 1912 spread throughout the western Great Lakes!

CANAL CROSS-SECTIONS



CONCLUSION

The partial drainage of Crystal Lake, a very large lake (35% of a very small watershed), occurred unbeknownst to the outside world along a sparsely-populated lakeshore in a remote locale in NW Lower MI (23 Aug 1873). It was ~15 times larger than the infamous Johnstown (PA) flood (31 May 1889), billed as the “the worst inland ‘flood’ in U.S. history”! It was surpassed by the complete drainage of two of four small impoundment lakes (0.36%) in the very large Tittabawassee River (Four Lakes=FL) watershed in Central MI (19 May 2020). The Crystal Lake event created 2000 A of beach gains of (+)\$500,000,000; the Tittabawassee River event caused property losses of (-)\$500,000,000 ! **Tittabawassee River & Crystal Lake are the two largest inundations from inland lakes due to dam breachings in U.S. history !!! (6)**
[An “inundation” (not a “flood”!) is a sudden discharge of water from an inland water body due to an anthropogenic (not natural) event.]

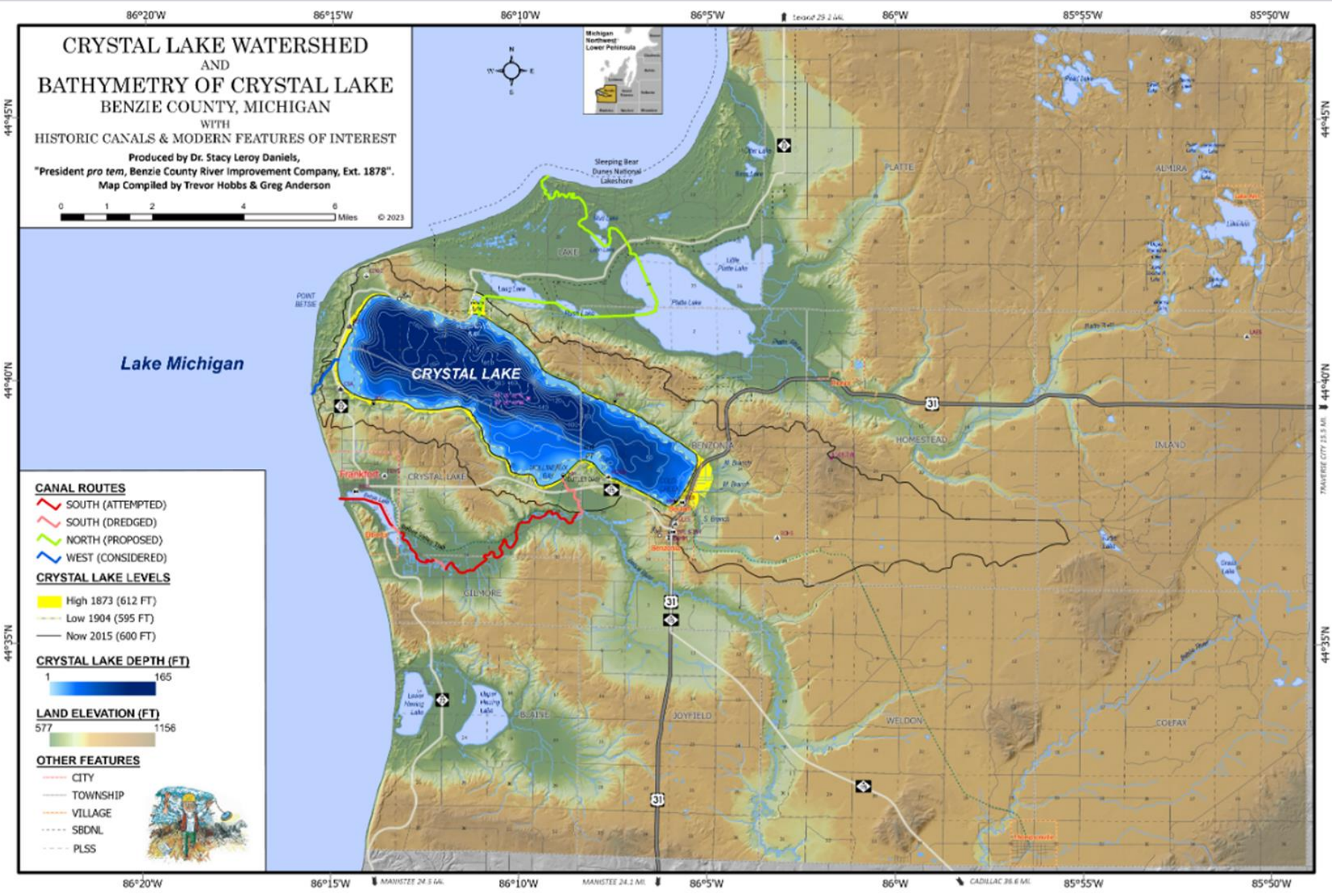
Crystal Lake (CL) & Tittabawassee River (4L) (LAKE & WATERSHED, WS) (VALUES & RATIOS): (Conditional: 082123)

PLACE	LAKE DMAX, FT	LAKE DAVG, FT	LAKE SHORE, MI	LAKE AREA, A	LAKE AREA, MI2	LAKE VOL, BGAL	WS AREA, A	WS AREA, MI2	INUNDATION VOL, BGAL	RANK U.S.
CL	165	70.7	21.71	9,896	15.46	221	28,145	43.98	56	# 2
4L	20.	20.	177.5	5,726	8.95	24.8	1,581,440	2,471.	86	# 1
CL / 4L	8.25	3.5	0.12	1.72		8.9		0.017	0.65	
4L / CL	0.12	0.28	8.17	0.58		0.11		56.	1.5	

The “**Tragedy**” / “**Comedy**” led to the development of a modern recreational community: founding of the Village of Beulah, coming of the railroad, installation of telegraph/telephone lines, lakeside resorts, and cottages, connected by an infrastructure of perimeter roads and trails. The beach supports ~1,100+ cottages, numerous resorts, several church camps, a yacht club, and an MDNR State Boating Access Site. The former railroad bed is a popular trail from the Port City of Frankfort. The “*Crystal Lake Canal System*” remains an unfulfilled dream !!! The “**Tragedy**” is still transforming into the “**Comedy**”, as the landscape continues to slowly evolve along the “new” shoreline, within the depths of the Lake, and in the surrounding wetlands. Submerged terraces have become sandy beach; peripheral marshes have become lakefront property. Lake sediments, dormant since the last glacial period have been resuspended and redistributed; and underwater sandbars are still reforming. Nearby wetlands are slowly subsiding as organic peat oxidizes to gaseous carbon dioxide that disperses into the atmosphere. Except for large-scale Great Lakes shipping, the era of canals about Michigan has passed. A few short inland waterways still connect neighboring water bodies for recreational purposes. Inland lake levels still rise and fall thereby affecting water quality and quantity; animal and plant life; recreational uses; property values; and environmental conditions. We cannot “turn back the tide” of progress, but we must “mind” our lakes by managing their levels. The legacy of “**CRYSTALANA**” is preserved in a new online journal (7).

REFERENCES

- (1) William L. Case, “*The Tragedy of Crystal Lake*”, With Some Sidelights, By a Survivor, J.W. Saunders, Beulah, MI, 1922, 17pp. et seq.
- (2) Stacy Leroy Daniels, “*The Comedy of Crystal Lake*”, I. The Lowering of Crystal Lake; II. The Biography of Archibald Jones, by a Humble Saunterer, Flushed With Pride Press, © 2015, 496pp. ISBN 978-0-692-21715-3. <http://www.CrystalLakeComedy.com>
- (3) “**Map Showing Sources and Courses of the Platte and Betsie Rivers, Benzie County, Together with Some of the Obstructions and Proposed Improvements for the Benzie County River Improvement Company, Benzonia, MI, drawn for the Benzie County River Improvement Co.**”, by Buel C. Hubbell, Draftsman, Benzonia, Mich., 1873. (“*The Comedy*”, centerfold); “**SESQUI-CENTENNIAL Celebration** www.crystalana.com/sesqui.htm
- (4) **Dedication of Historical Site Marker**, 22 Aug 2015, 16pp. <http://crystallakecomedy.com/PDF/HistoricalMarkerProgram.pdf>
- (5) “**Crystal Lake Watershed and Bathymetry of Crystal Lake, Benzie County, Michigan, with Historic Canals and Modern Features of Interest**”, Produced by Stacy Leroy Daniels, Benzie Co. River Improvement Co. Map compiled by Trevor Hobbs & Greg Anderson, © 2018 © 2023.
- (6) Stacy Leroy Daniels, “**A Comparison of Flood Inundations in Michigan: Crystal Lake Watershed and Tittabawassee River Watershed**”, 2020, et seq.
- (7) “**A Journal of Historical Reflections and Current Perspectives of Crystal Lake, Its Watershed, & Benzie County, MI**”. <http://www.CRYSTALANA.com>)



**CRYSTAL LAKE WATERSHED
AND
BATHYMETRY OF CRYSTAL LAKE**
BENZIE COUNTY, MICHIGAN
WITH
HISTORIC CANALS & MODERN FEATURES OF INTEREST

Produced by Dr. Stacy Leroy Daniels,
"President pro tem, Benzie County River Improvement Company, Ext. 1878".
Map Compiled by Trevor Hobbs & Greg Anderson

0 1 2 4 6 Miles © 2023



- CANAL ROUTES**
- SOUTH (ATTEMPTED)
 - SOUTH (DREDGED)
 - NORTH (PROPOSED)
 - WEST (CONSIDERED)

- CRYSTAL LAKE LEVELS**
- High 1873 (612 FT)
 - Low 1904 (595 FT)
 - Now 2015 (600 FT)



- OTHER FEATURES**
- CITY
 - TOWNSHIP
 - VILLAGE
 - SBDNL
 - PLSS



Lake Michigan

CRYSTAL LAKE

86°20'W 86°15'W 86°10'W 86°5'W 86°W 85°55'W 85°50'W

MANISTEE 24.5 MI CADILLAC 38.6 MI

44°45'N

44°40'N

44°35'N

44°45'N

44°40'N

44°35'N