

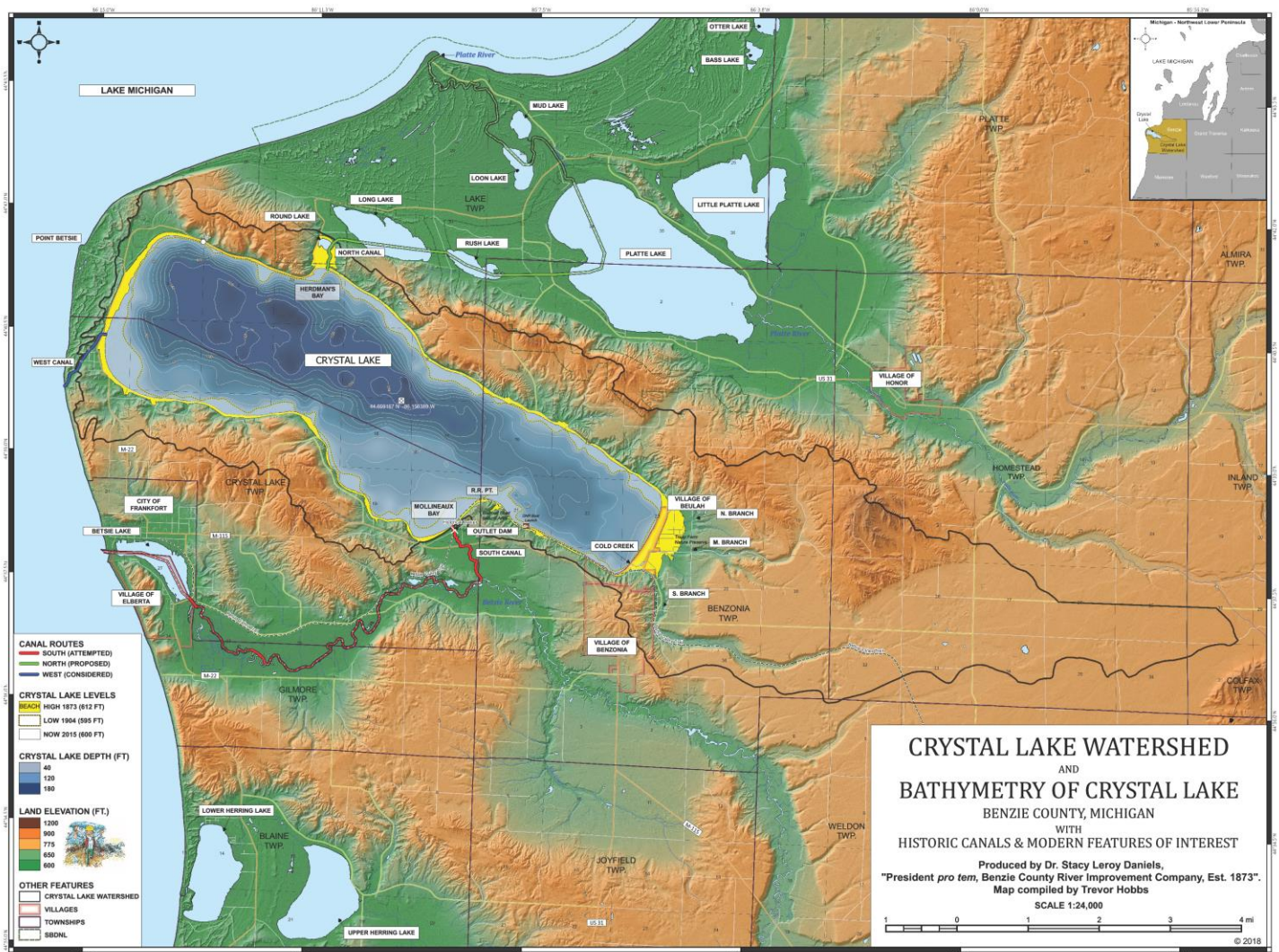
"CRYSTALANA"

A JOURNAL OF

Historical Reflections and Current Perspectives of Crystal Lake, Its Watershed, & Benzie County, MI.

As compiled by Dr. Stacy Leroy Daniels, a humble saunterer, and
"President *pro tem*, Benzie Co. River Improvement Co., Est. 1873".

Vol. 2, No. 3, 2019.



"Crystal Lake Watershed and Bathymetry of Crystal Lake, Benzie County, Michigan, with
Historic Canals and Modern Features of Interest",

Produced by Stacy Leroy Daniels, "President *pro tem* Benzie Co. River Improvement Co." © 2018.

(Copies of this map (12" x 18") & synopsis of the "Tragi-Comedy" available for separate purchase.)

Issue Theme: “A MAP: A PLAN; A CANAL; A BEACH – THE COMEDY OF CRYSTAL LAKE”

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Prologue

The sun awaits its birth o'er quiet Lake
A glow behind the night, yet to dispense the dark.
The lightening hills, still ghostly, anticipate the dawn
But peace still reigns; no discontent lies within my heart.

And as I stroll along the rippled sands
Peace walks with me – I wait and sigh
For that beckoning voice beneath the ripple of the waves
To tell me, "Be ye still, for God is neigh".

And so, yet lovely Lake, I pour out forth to you
This message from my soul. No longer ache
Forever after me as I depart this life.
Remember calm and stormy inspiration, Crystal Lake.

-- Dr. Stacy Leroy Daniels, 29 Aug 1937 - (), “*The Comedy of Crystal Lake*”, 2015.

“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.
I took to the ‘current’, but lost my ‘venture’.”

-- “A.J.” (Archibald Jones, Jr.)

Historical Reflection: Synopsis of The “Tragi-Comedy” of Crystal Lake

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 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 a newly created high-resolution topographic/bathymetric map showing historic canals and modern features of interest. Quantitative comparisons before and after the lowering of the Lake allowed reconstruction of the sheer magnitude of this epochal event.

During the last Ice Age, 12,000 ago, 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 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 to the lake edge and submerged terraces formed within the 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 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 five feet, it accidentally dropped by 17 ft over a three-week period as some 56,000,000,000 gal (Bgal) of water flushed downstream into the Betsy 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), and eventually rebounded 5 ft to its present “NOW” level (600 ft). During the lumbering era, temporary dams were haphazardly built, removed, and/or washed away, and levels 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.

Current Perspective: Consequences of the “*The Tragi-Comedy*” of Crystal Lake

The “*Tragedy*” of Crystal Lake of 1873 involved the partial drainage of a very large lake - almost 15 times greater in volume than the infamous Johnstown (PA) flood of 1889, which was later billed as “the worst inland flood in U.S. history” ! The former occurred with no loss of life and resulted in great future benefit by creating some two thousand acres of new beach worth ~ \$500,000,000. The latter resulted in the loss of 2,209 lives and property losses of \$474,000,000 in current dollars. The “*Tragedy*” occurred unbeknownst to the outside world along a sparsely-populated lakeshore in a remote locale in NW Lower MI. A temporary dam at the outlet of Crystal Lake was breached by whitecap waves during a storm. The average flow of 4,126 cfs, twice the 100-year flood, was spread over a three-week period. The Johnstown Flood destroyed a thriving steel town due to the catastrophic failure of a dam holding back a small artificial lake. A small tranquil stream turned into a raging torrent with peak flow lasting only 65 min, but rivalling the average flow of the Mississippi River.

The combined “*Tragedy*” / “*Comedy*” was a less destructive and more constructive event that led to the development of a modern recreational community: the founding of the Village of Beulah, the coming of the railroad, installation of telegraph and telephone lines, lakeside resorts, and cottages, all connected by an infrastructure of perimeter roads and trails. The beach now supports ~1,100+ cottages, numerous resorts, several church camps, a yacht club, and an MDNR State Boating Access Site. The former railroad bed is now a popular trail from the nearby Port City of Frankfort. The “*Crystal Lake Canal System*”, however, 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 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 (6).

People: 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 “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 map is an accurate portrayal of Crystal Lake before it was lowered.

Places: The Modern Map

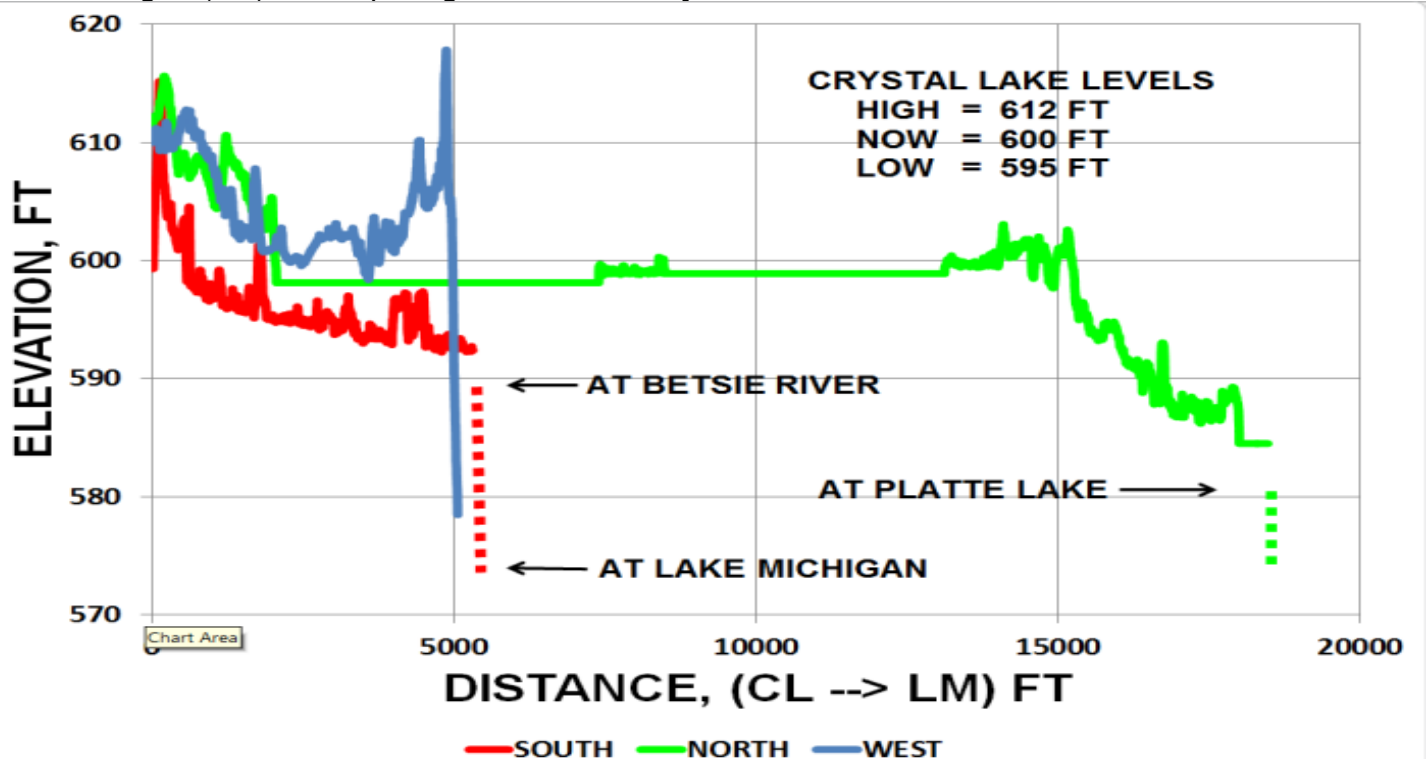
A high-resolution topographic / bathymetric map (5) was created in 2018, showing HIGH, LOW, and NOW lake levels, land elevations, beach contours, and watershed boundary, with three historic canal routes superimposed. A new QL2 LiDAR dataset (MiSAIL 2015) was used to: (i) assess present (NOW) size of 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 “depth” of new beach from lakeshore to bottom of bluff (dune crest). A drop of 17 ft (HIGH-LOW) created 2,001 A (!) of beach agreed very 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 21.71 mi long and averaging 288 ft in depth !

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 to define seasonal changes, 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: 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 and on to Betsey Lake and 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 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.

[(*) Watershed parameters describing the Lake, the Beach, the Canals, and the Watershed of Crystal Lake are summarized. All three canals were assumed to run all the way from Crystal Lake (CL) to Lake Michigan (LM) in comparing cross-sections.]



Phenomena: Table of Parameters

CRYSTAL LAKE WATERSHED (BENZIE CO., MI): LAKE / BEACH / CANALS / WATERSHED PARAMETERS © 2018							
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							
DEPTH	FT				668	-432	288
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			
NOTES:							
1. WATERSHED INCLUDES BOTH LAND (L) ~ 65 % AND WATER (W) ~ 35%.							
2. LAKE CENTROID: 44.659167° N LATITUDE ; -86.156389° W LONGITUDE.							
3. "OLD" LAKE SURFACE LOST = "NEW" BEACH GAIN [LEVEL DROP (+) ; LEVEL REBOUND (-)].							
4. BEACH DEPTH MEASURED FROM LAKESHORE TO BLUFF ; BEACH LENGTH ~ LAKE PERIMETER.							
5. DREDGING: CANALS (114 K YD3) (1873) (EST.) VS. BETSIE BAY (105 K YD3) (1980).							
6. PARAMETERS REPORTED IN "THE COMEDY" (2015) ARE UPDATED (2018).							

Potpourri: 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!

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www.CrystalLakeComedy.com

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(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, © 2018.

(6) "**CRYSTALANA**": *A Journal of Historical Reflections and Current Perspectives of Crystal Lake, Its Watershed, & Benzie County, MI.*, www.CRYSTALANA.com

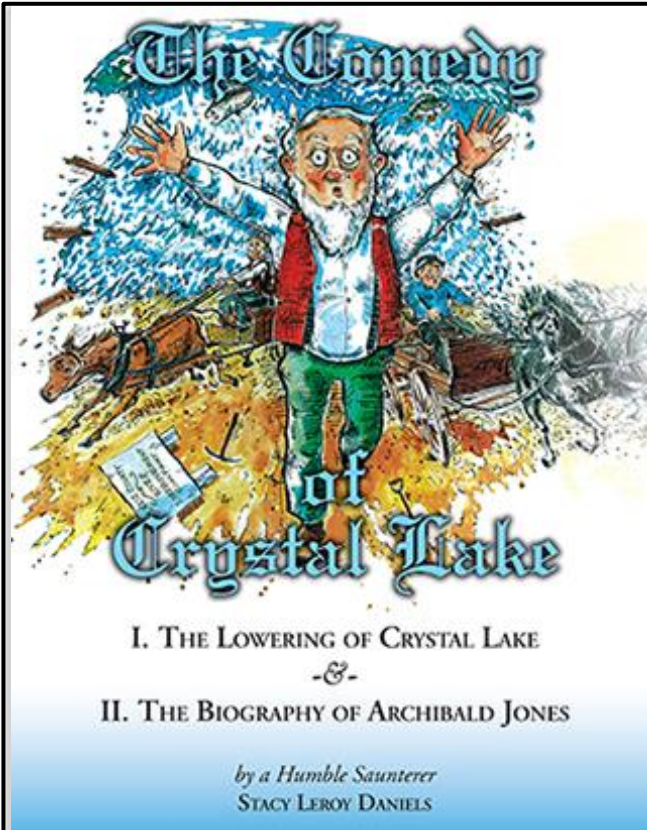
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“THE COMEDY OF CRYSTAL LAKE”
[Sequel to the classic “Tragedy” (1922)]

The story of Archibald Jones and the attempt to build a canal from Crystal Lake to Lake Michigan in 1873. The dramatic lowering of a very large inland lake and the creation of its sandy beach.

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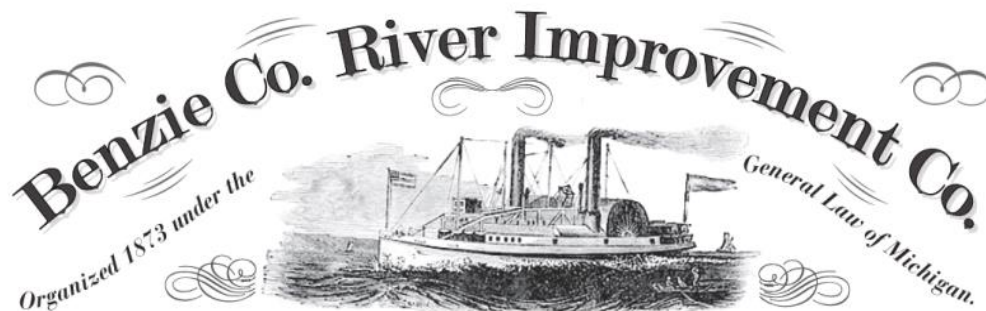
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