

Spirit Lake and the Mill Pond Mess

Some History and Some Proposals

By Dave Rodgers,
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FORMATION OF SPIRIT LAKE

Spirit Lake is unique among the world's lakes. At least parts of it, including the Mill Pond, depend on a "bottom seal" to retain its water. The bottom forms a seal much like a bathtub. If the seal is breached, water will run out like a draining bathtub. It will continue to drain until the currents deposit enough silt to plug the breach.

The basic configuration of North Idaho's mountains and valleys were carved out by the glaciers some 15,000 years ago. The essential configuration of Spirit Lake, including the Mill Pond, along with Twin Lakes, Hauser Lake, Newman Lake, and others were probably determined some 12,000 years ago when the last of the great Missoula Floods roared through the area. Thus, in the thousands of years since the floods, the lake has been shaped by the movement of water, which carried the silt, that formed its vital bottom seal. This paper uses the term "silt" as a convenient reference to silt, clay, sediment, and such other material that may form the seal. The Mill Pond part of the lake is located over deep gravel beds and adjacent to the Spokane Valley and Rathdrum Prairie Aquifer. If its bottom seal is breached the water flows immediately into the gravel beds.

The lake can hold about 54,000 acre-feet of water and has a surface area of 1445.4 acres. There are 70,542 feet of shoreline. The surface area of the Mill Pond is about 50 acres.

EARLY USGS MAPS

In 1903 the U. S. Geological Survey (USGS) published a map of the Rathdrum Quadrangle which included Spirit Lake. It was based on surveys conducted in 1899 and 1901. Up to that time there had been no significant activity on the lake. The shorelines were the same in the year 1903 as in the year 2002. In 1903, however, the Mill Pond was full of water. On the next page is an enlargement of the Spirit Lake section of this early map.

The lake's elevation in 1903 was 2442 feet above sea level. For reference purposes, the top edge of the boards at today's Spirit Creek spillway is very close to that 2442 level. Since the 1903 printing there

appears to have been one subsequent survey and one new printing by the USGS. The map completed in 1962 shows the water level in Spirit Lake to be 2440 feet as of July of 1961.

The floor of the lake's outlet at the Spirit Creek spillway is 2440 feet above sea level. This controlled the level of the lake, including the Mill Pond, for most of the "last century.

Apparently, the USGS has not measured the lake level since 1961 because the latest map (a 1996 Forest Service revisions) displays the same July 1961 level of 2440 feet.

There has been some conjecture about the Mill Pond being only a narrow stream until the Panhandle Lumber Company built the dam and spillway to form a log pond. The first surveys for the above map were conducted in 1899----eight years before the construction of the sawmill. They show the shorelines of 1899 to be identical to the shorelines of the revised USGS map based on 1961 surveys and published in 1962. The shorelines of 2002 are the same.

It is evident the shoreline of the Mill Pond before the sawmill was identical to the shoreline of the Mill Pond we know today-except today water drains out faster than it flows in.

THE PANHANDLE LUMBER COMPANY

Serious activity first came to Spirit Lake in 1907 when the Panhandle Lumber Company built a sawmill in the outlet area. A few of its structures were on timber pilings over the outlet. Logs were floated into the outlet area and held until they went to the sawmill. Thus, the name, Mill Pond. The lumber company platted what are now the streets of the city of Spirit Lake. Within a year or two the community of Spirit Lake as we now know it had sprung to life In1908 the lumber company cleared debris out of the channel at the Spirit Creek outlet and constructed a five-foot earthen dam. In the center was a spillway with removable planks to control the water levels in the Mill Pond.

The sawmill operated until 1941. It was put out of business when the huge forest fires of 1939 decimated its timber supply. Heat exhaust from the mill was pumped into the pond in a not very successful effort to keep it open during the winter months. Rod Erickson provided the picture of the pond full of logs with the sawmill and the city in the background. It was probably taken about 1937.

THE CHAUTAUQUA BRIDGE

In 1912 the 918-foot Chautauqua Bridge was built across the neck of the Mill Pond. It was constructed on timber pilings to allow the movement of logs into the Mill Pond. There was an important (but probably unintended) benefit from such construction. It permitted the continuation of the historic rate, volume, and pattern of flow from the main body of the lake through the Mill Pond to the outlet at Spirit Creek. For hundreds (possibly thousands) of years this 900-foot wide flow had carried with it the silt and other materials that had maintained the bottom seal in the Mill Pond. Mary Waller and Joy Porter found this old photograph in the files of the Spirit Lake Historical Society. It is of poor quality but clearly shows the timber pilings.

LAWSUITS OVER WATER LEVELS

In 1909 a property owner, Colonel D.P. Jenkins, claimed his land was flooded by the sawmill's dam at the Spirit Creek outlet. In April 1913 his claim was upheld by the courts. The sawmill resolved the dispute when it settled a condemnation action in the Kootenai County District Court. On September 19, 1913 the Spirit Lake Land Company, a subsidiary of the lumber company" was granted a perpetual right to flood Colonel Jenkins property. Among other things, the land company provided water to the residents of Spirit Lake. The sawmill kept its dam, and the Colonel was compensated for the flooding of his land.

According to 87 year old legal documents uncovered by some good folks at Phil Dolan's law firm, the lumber company said it needed "water in the Mill Pond to a depth of not less than three feet. " to store logs and operate the sawmill. A 2440 level would maintain at least three feet of water in most of the Mill Pond.

In the court's ruling there was no mention of specific water levels. The decree simply described the approved dam and spillway as 24 feet long and four and one-half feet high.

The planks at the Spirit Creek spillway have controlled the maximum water level for as long as most local folks remember. A benchmark at the top edge of the central pillar has been vandalized but, with some patient digging by Jim Brady at the Department of Lands, its elevation has been confirmed at 2443.3 feet. The floor of the spillway is at 2440 and the top edge of the upper control plank about 2442 feet. The picture below shows the spillway with the control planks and the tubes through which water flows out to Spirit Creek.

In the 1920s there was another lawsuit involving water levels. A jury awarded Margaret Lavin damages from the Panhandle Lumber Company. Her property was at the far south end of the lake. She alleged the dam at the Spirit Creek outlet had maintained water levels preventing her from using five acres of her property during the months of June, July, and August. In July of 1931 the Idaho Supreme Court upheld the award, but the resolution of the case did not prevent the lumber company from continuing its operation.

YOUR WRITER'S EXPERIENCE

Your writer's first experience on Spirit Lake was in 1954 when our family acquired property on the north shore about a half-mile west of Silver Beach. It remains in the family to this day-in the year 2002.

Every Spring the high water would peak at about 2442 feet and slowly drop to about 2439 by September. There were one or two exceptions in years with very heavy or very light run-off. In a year of low run-off the outlet end of the Mill Pond would be dry by September, but most of the Mill Pond would be functional for water activities throughout the summer. Since the mid 1980s, when the passage in the causeway had been reduced to about 30 feet at water level, the Mill Pond seemed to progressively lose its ability to hold water.

CAUSEWAY CONSTRUCTION

Between the 1951 and the 1983 the present causeway with its earth filled embankment replaced the Chautauqua Bridge and its timber pilings. The work was done in stages. Before construction started, the flow from the main body of the lake into the Mill Pond was 900 feet wide and so gentle as to be imperceptible to a casual observer. The 1962 USGS map shows the Mill Pond full of water at 2440 feet above sea level in July of 1961. That level fills the entire Mill Pond to the base of the spillway at the Spirit Creek outlet.

When the causeway was finished in 1983 the passage for water to flow from the main body of the lake into the Mill Pond had been reduced to a width of 30 feet at water level. The picture below is a composite snapshot of the causeway seen from the main body of the lake. The 30 foot passage is in the center and a six foot culvert, added later, is on the right.

CAUSEWAY'S IMPACT ON THE LAKE LEVELS

As a practical matter the causeway is an earthen dam which blocks the historic flow from the main body of the lake into the Mill Pond. Other than seasonal variations, the original 900 foot flow had not been impeded or changed for hundreds if not thousands of years. Only the 30 foot passage and the culvert near the public landing now allow water to drain into the Mill Pond. In the Spring water rushes through the narrow openings with enough force and volume to temporarily overcome the loss of water through the bottom of the Mill Pond. The pond usually fills for a few weeks in early spring, but by early Summer out-flow overcomes the in-flow.

Water levels and water volumes in all of Spirit Lake have been seriously impacted. Because the water now drains out the bottom of the Mill Pond before it reaches the Spirit Creek spillway, the spillway no longer controls the minimum lake level. These days the bottom of the causeway's 30 foot opening (at 2435 feet above sea level) has replaced the bottom of the Spirit Creek spillway (at 2440 feet) as the de facto control of the minimum water level for all of Spirit Lake.

The effective result is to allow the surface of the entire lake to drop by another five feet-to 2435. See the 1962 USGS map (behind the Foreword) which recorded the lake level at 2440 in July of 1961. This is an enormous loss of water--over 7000 acre feet--between 12% and 14% of all the water in Spirit Lake. If the summer flow from streams that replenish the main body of the lake do not offset evaporation and seepage the level falls even lower.

SPIRIT SHORES DEVELOPMENT

In 1973, some ten years before the causeway was finished, attractive lots on the east side of the Mill Pond were sold, and lake front homes were built at Spirit Shores. Timber pilings remaining from the saw mill were removed to give lake front owners open water in front of their property.

In the 1980's the Mill Pond began to lose its ability to hold water. It has been a progressive process with the pond now losing water at a rapid rate after Spring high water stops flowing. As illustrated in the above photo, water activities are no longer possible, and lake front homes on Spirit Shores can no longer be classified as "lake front". For much of the summer, folks who purchased waterfront property on the Mill Pond now look at-a muddy lake bottom instead of the lake view they acquired some 25 years ago.

CAUSEWAY'S IMPACT ON THE FLOW OF WATER AND SILT

When the causeway was completed, the historic flow had been forced through the 30 foot passage, only 1/30th the width of the 900 foot natural flow. Presumably (to move the same volume over the same period of time) water must now flow 30 times as fast as the flow established by Mother Nature. Later a six foot culvert was added near the public landing.

Reduced to its essentials, a year round, gentle flow providing water and silt to the entire 900 foot width of the Mill Pond has been replaced by eight or ten weeks of a high intensity, 30 foot stream during spring high water.

Neither the sawmill pilings nor the Chautauqua Bridge pilings had interfered with the historic movement of water or silt. Water was plentiful in the Mill Pond. The Panhandle Lumber company operated for 34 years using the pond to store and move its logs.

When high water recedes the flow is intense or just a dribble through the 30 opening act as a spigot emptying the water from the main body of the lake into the Mill Pond where it immediately drains out the bottom. On the face of it, the causeway's narrow opening has clearly changed the velocity and pattern of flow into the Mill Pond as well as the patterns in the main body of the lake i.e. before the water gets to the causeway.

It is apparent silt is not reaching the entire Mill Pond in the historic quantities that once maintained the pond's bottom seal. It is equally apparent that silt has been piling up against the face of the causeway-the side facing the main body of the lake. In particular, it has been accumulating in the corner formed by the west half of the causeway and the adjacent lake front property on the west side of the outlet area. This is very evident in the photo on the previous page.

Clearly, the distribution of silt is quite different in the year 2002 than it was before the causeway. A very troubling question is: In the absence of a systematic means of moving the accumulated silt (which historically flowed through the Mill Pond) how much more will accumulate against the face of the causeway and along the shore in the next ten, twenty, or thirty years?

JOHN SEMPRE'S PROPOSED DEVELOPMENT

In the late 1990s John Sempre acquired the undeveloped property around the Mill Pond with the intention of developing summer homes with a golf course and a marina. Recognizing the Mill Pond's leaky bottom must be

fixed if his plans were to have any viability, he contracted with Budinger & Associates, a Spokane engineering firm, to study the pond's inability to hold water and recommend solutions. Steve Burchett is the lead engineer on the project.

An effort to state in layman's language the findings and the proposals of the engineers are set forth in summary form in Part II of this paper.

THE HUMAN TOUCH

The previous pages describe almost 100 years of activity at the Mill Pond. Everything described is human activity, and the result has been a serious degrading of the entire lake.

In the past it has been suggested that, if left alone, Mother Nature would restore the Mill Pond (and Spirit Lake) to its pre-1903 condition with the lake's surface 2442 feet above sea level.

At one time the writer agreed with the "Mother Nature" solution. With the passage of time, however, the situation continues to deteriorate, and it is obvious a hands off approach will only make things worse. What man has done he will have to undo or modify. It will require very careful planning and, in all probability, significant sums of money.

PART TWO PROBLEMS, OPINIONS, CONJECTURE And PROPOSED SOLUTIONS

Spirit Lake's water problems may be divided into three general categories.

- (1) The most obvious, of course, is the Mill Pond's inability to hold water. Restoring the seal to the pond's bottom would be a big step in Spirit Lake's rehabilitation.
- (2) The water levels in the main body of the lake have been far below historic norms. Restoring the seal in the entire Mill Pond would, hopefully, solve this problem along with the Mill Pond problem.
- (3) The other problem is more subtle but with potentially devastating long term consequences. It is the inexorable accumulation of silt against the face of the causeway (the side facing the main body of the lake) all along the shore past Chautauqua and Lake Haven. Possibly as far west as Tesemini.

For centuries, until it was blocked by the causeway, the same silt was washed through the Mill Pond and, presumably, provided the material

that maintained the pond's bottom seal. One wonders how much more silt will accumulate between the causeway and Tesemini during the coming decades.

Will the lake eventually fill with silt between the causeway and Chautauqua?

BEWARE OF UNINTENDED CONSEQUENCES

The fact of at least three problems should cause concerned parties to more carefully. It is possible the solution to one problem could make another problem worse. The law of unintended consequences is a real possibility. Construction of the causeway would appear to be a classic case of a project that produced unintended consequences.

OFFICIALLY DESIGNATED WATER LEVELS

The Idaho Department of Water Resources requires removal of the planks at the Spirit Creek spillway by November 1st of each year. They cannot be replaced until the Spring floods have crested. The practical effect of this rule is to spill excess water into Spirit Creek when the lake level exceeds 2442 feet above sea level. Water is prevented from flowing into the creek (i.e. it is held in the lake) when the level falls below 2440 feet.

Officially adopted water levels serve a very practical purpose. They provide a base line and legal parameters for private property owners, businesses, and public entities involved in planning that may impact, or be impacted by, the lake's water levels.

The 2440 foot level at the base of the Spirit Creek spillway is probably the minimum needed to keep three feet of water in most of the Mill Pond. The top edge of the planks at the spillway are just under 2442. In place they would hold close to five feet of water in the pond. These are the historic levels indicated on the 1903 and 1962 USGS maps.

Obviously, during Spring run-off or exceptionally high or low water years, it is impossible to contain the lake within the officially designated level(s). Such episodes are normally transitory-except for recent decades. For the last 15 or 20 years water has been draining out the bottom of the Mill Pond faster than it flows in from the main body of the lake. Once Spring run-off is over, the Mill Pond cannot maintain the 2440 level and may drain both the pond and the main body of the lake another five feet to 2435. As

mentioned earlier, this robs Spirit Lake of 12% to 14% of its normal volume of water.

Sid Wurzburg has been keeping records of lake levels since 1995 and has accumulated valuable detail concerning Spring and Summer levels. It seems no matter how heavy the Spring snow pack, the lake level drops close to the 2435 foot level before the Summer and Fall are over.

FINDINGS OF THE ENGINEERS

Budinger and Associates have completed impressive studies of the Mill Pond including several excavations of the bottom. Under the top layer of silt the excavations revealed a layer of well preserved wood waste—mostly bark-obviously a by-product of the sawmill. Together the silt and the waste range from six to 18 inches thick but are not present on the perimeter of the pond. All of the wood waste has been in place for at least 60 years and some of it for almost 100 years. Two to four feet of dark organic sediment and light silty sediment lie between the wood waste and the underlying native alluvial sand and gravel.

Apparently, water has been seeping through the silt to the wood waste for most of the last century. Once in the waste layer the water travels horizontally and seeks the path of least resistance through the sediment. The problem was not apparent (in fact, it was not a problem) as long as the flow of water and silt through the Mill Pond provided enough sealant to overcome the adverse effects of the wood waste.

Since the causeway replaced the Chautauqua Bridge, the flow of silt into the Mill Pond has been greatly restricted. There is no longer enough to effectively seal the bottom. As a result more water drains into the layer of wood waste.

Once in the wood waste, the additional water travels horizontally pouring even more water down the paths of least resistance and enlarging the critical drainage routes through the sediment to the native sand and gravel below. In recent years out flow has exceeded inflow, and the Mill Pond has been effectively useless for water activities by mid summer. The picture below is from the engineer's files. It is a side view of one of the excavations. It shows the interface between normal lake bed sediment and the underlying sand and gravel.

ENGINEER'S PROPOSAL

The engineers propose seeking a government grant to restore bottom seal for those portions of the Mill Pond below the 2435 foot contour. This is the same elevation as the bottom of the 30 foot passage through the causeway.

If successful the bottom seal would be restored for about half the Mill Pond's 50 acres.

The plan is to strip away bottom material down to the native alluvial sand and gravel. This would remove the top layer of cracked silt and the next layer of wood waste as well as the sediment on which the wood waste currently rests.

Old pilings would be removed. Those which have rotted would be excavated two feet into the alluvial and covered with native material.

The native sand and gravel would be compacted and a very tough plastic filtering fabric would be spread over it. A minimum of two feet of the sediment would be put back in place on top of the fabric. If additional sediment is needed, the plan is to import clay or dredge silt which has accumulated against the face of the causeway and along the shore toward Chautauqua and Lake Haven. This may be necessary for the gravelly shoreline which does not currently have sufficient sediment.

It is expected this process would limit the seepage rate through the sediment to not more than eight inches per month in the treated area. Possibly as little as four inches per month. Currently water drains out of the Mill Pond at a rate of two to four feet per day, and the pond will accumulate water only when the inflow exceeds this rate of drainage.

In addition, rip rap and a plastic liner would be added at the culvert near the public landing. It is expected the rip rap would mitigate damage from the concentrated stream during high water.

The grant request includes funds to repair (but not replace) the spillway at the Spirit Creek outlet. The engineers suggest the spillway be rebuilt with a permanent, fixed control for dumping high water. This would eliminate the need to remove and re-install the boards every year-a difficult and potentially dangerous responsibility no one seems willing to assume.

THE MILL POND IS NOT THE ONLY PROBLEM

If the bottom integrity of the entire Mill Pond is restored it would be a big step toward restoration of Spirit Lake's pre-causeway condition. The Mill Pond would hold water and some 7000 acre feet of water in the main

body of the lake would be restored. However, other problems would remain

The engineer's proposal may (on a one time basis) remove some of the silt from the face of the causeway and possibly up the lake toward Chautauqua. It is beyond ~ present scope of the engineer's study to deal with the continuing accumulation of silt outside the Mill Pond. This will remain a serious long-term concern for the SLPOA and the folks on the Mill Pond.

In the absence of a solution it would seem the unrelenting flow of new silt will eventually choke off the portion of the lake flowing up against the causeway. Unless a means of moving the silt through the causeway can be devised, we are probably faced with the expense and noise of a periodic dredging or, in several decades, losing that portion of the lake to swamp and cat tails.

One plausible means of moving more silt through the causeway would be more openings similar to the 30 foot passage now in place. Another possibility would be several additional tubes like the ones near the public landing. In either case, the object would be to return the flow to its historic pattern that dispersed the water and silt over the entire width of the Mill Pond.

Two positive effects would result. The additional openings would allow much more silt to flow through to the entire width of the Mill Pond and help seal the bottom. Also, more passages through the causeway would reduce the pressure at the present openings, thus slowing the destructive jet streams now experienced during high water.

A doctored photo illustrating the use of multiple tubes is shown below. The red spots indicate the additional tubes.

Unless a reasonable equivalent of the historic volume, pattern, and rate of flow through the Mill Pond is restored, periodic dredging seems the only Solution. Some corrective dredging will probably be necessary in any case.

PLENTY OF THEORIES FROM THE LAYMEN

Social gatherings and bull sessions have generated various theories with varying degrees of plausibility as to why the Mill Pond will no longer hold water: (1) One theory has the high speed stream through the 30 foot opening scouring away the bottom seal and sending the water straight into the aquifer. (2) Another has it concentrating the silt in one part of the Mill Pond and starving the remainder of its natural seal. (3) A third concept has the high speed stream scoured the bottom during the spring high water and then concentrating the silt just beyond the opening when the runoff is slow. (4)

There is the cracked bottom theory caused when the contractor blasted to produce fill material for the causeway. (5) Another theory assumes the bottom seal was breached when the causeway was built allowing water to seep into the base of the causeway and down into the aquifer before it reaches the Mill Pond. (6) There is general agreement that a "vicious cycle" is at work in the Mill Pond. As water drains and exposes the lake bed, the sun bakes and cracks the newly exposed bottom creating more leakage, thus exposing more bottom, leading to more drying and cracking and more leakage. Whatever the plausibility of these theories, it would seem the engineer's proposals would deal effectively with all of them with the possible exception of number five.

THE HISTORIC VOLUME, RATE AND PA'ITERN OF FLOW

Your writer adheres to a set of theories relating to the' effect of the narrow 30 foot opening in the causeway, and its powerful current during Spring high water. It has drastically altered the historic flow into the Mill Pond. As mentioned before, for hundreds, probably thousands, of years water and silt flowed slowly and gently across the entire 900-foot width of the Mill Pond carrying bottom sealing material with it. That Dow is now constricted to 30 feet plus the culvert by the public landing. On the face of it, the volume, rate, and the pattern of Dow into the Mill Pond have been drastically altered.

THE ULTIMATE SCENARIO

If a reasonable semblance of the flow through the Mill Pond is not restored the narrow portion of the lake flowing up against the face of the causeway has the potential to fill with silt. After several decades the area from Lake Haven to the causeway could be reduced from a lake to a stream coursing through the accumulated silt.

WHAT NEEDS TO BE DONE?

- (1) Restore the bottom seal for the entire Mill Pond.
- (2) Restore the flow of water and silt to the entire width of the Mill Pond.
- (3). Rebuild the spillway at the Spirit Creek outlet to maintain historic levels without the need to remove and replace the planks.

NOTE: The pictures on the back page are from the engineer's file. They were snapped in the Fall of 2001. The upper photo shows the dry Mill Pond with Spirit Shores' "lakefront" properties to the right. The lower photo shows both the culvert through the causeway and the Fish and Game docks at the public landing.