

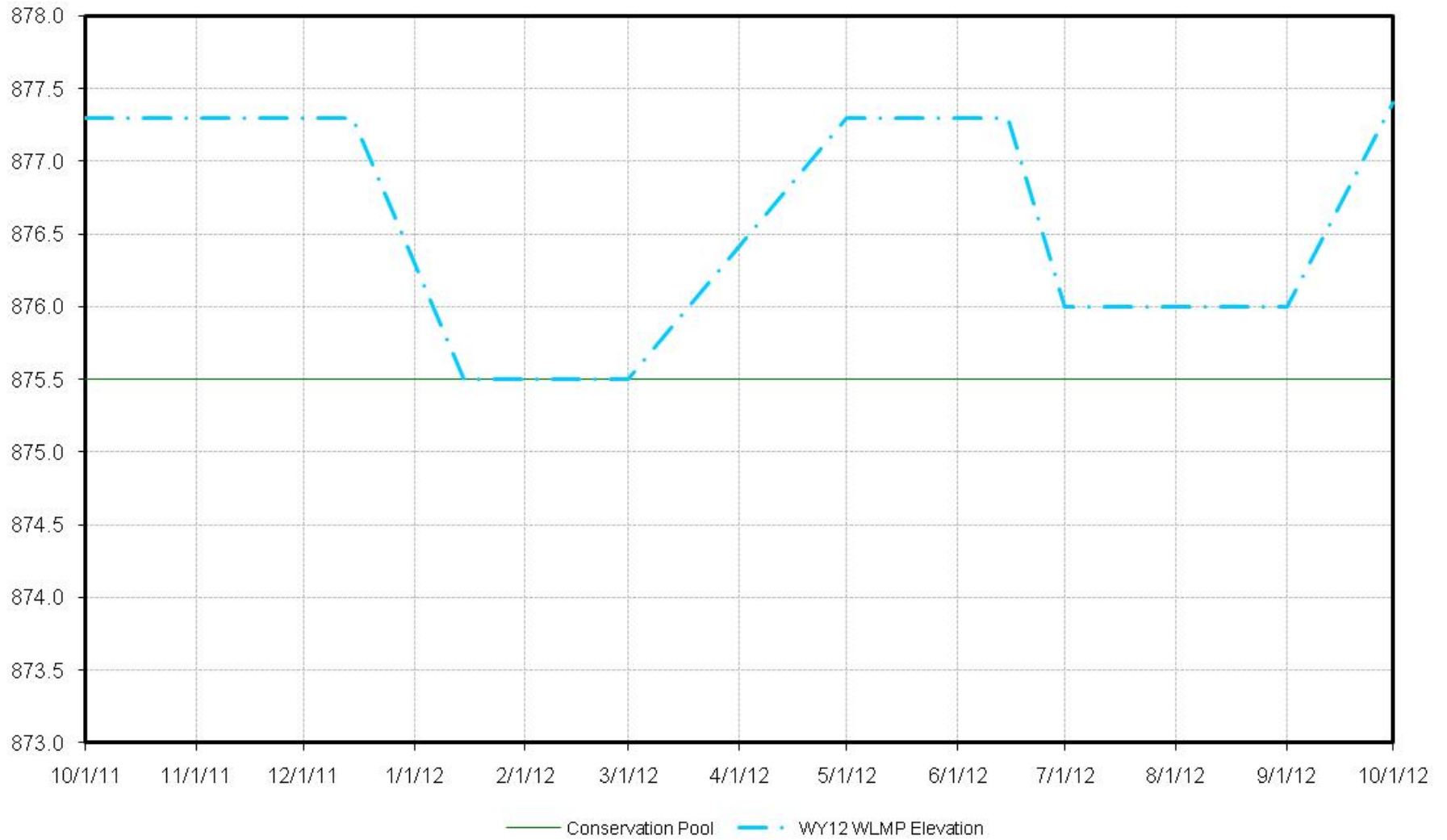
LAKE LEVEL MANAGEMENT PLANS WATER YEAR 2012

**Kansas Water Office
2011**

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Corps of Engineers, Kansas City District

Clinton Reservoir
Conservation Pool = 875.5 Flood Pool = 903.4 5% into FP = 877.4



CLINTON RESERVOIR

Clinton Reservoir Water Level Management is based upon alternating year plans. One plan enhances conditions for migratory waterfowl (i.e. *Wildlife Plan*), the other plan enhances conditions for fisheries (i.e. *Fisheries Plan*). The following is a *Wildlife Plan*.

October 1 - December 15 (postpone until January 1 if water temperatures permit):

Maintain lake elevation at 877.3 NGVD to keep water into vegetation for migratory waterfowl.

December 15 (or begin January 1 depending on conditions) - January 15:

Evacuate water to conservation pool (875.5 NGVD).

January 15 - March 1: Maintain level at CP to reduce ice damage to facilities and preserve vegetation. Maintaining water level during winter months at this elevation will have negligible effects on winter fish survival and water quality throughout the year. There should also be no measurable effects to algae populations throughout the year from the planned change in water volume during winter months.

March 1 - May 1: Allow water level to raise 1.8 feet above CP to 877.3 NGVD. Note: CORPS will not allow higher water levels into flood pool. This rise will inundate rocky area free of algae, which will benefit the walleye spawn. Inundated vegetation will provide additional food and cover for littoral species. March 1 to May 1 is the critical release period. To prevent excessive flushing of adult walleye and fry from the reservoir, releases should not exceed 500 cfs.

May 1 – June 15: Maintain water level at 877.3 NGVD to create and maintain good spawning, nursery, and growth conditions for crappie bluegill and largemouth bass.

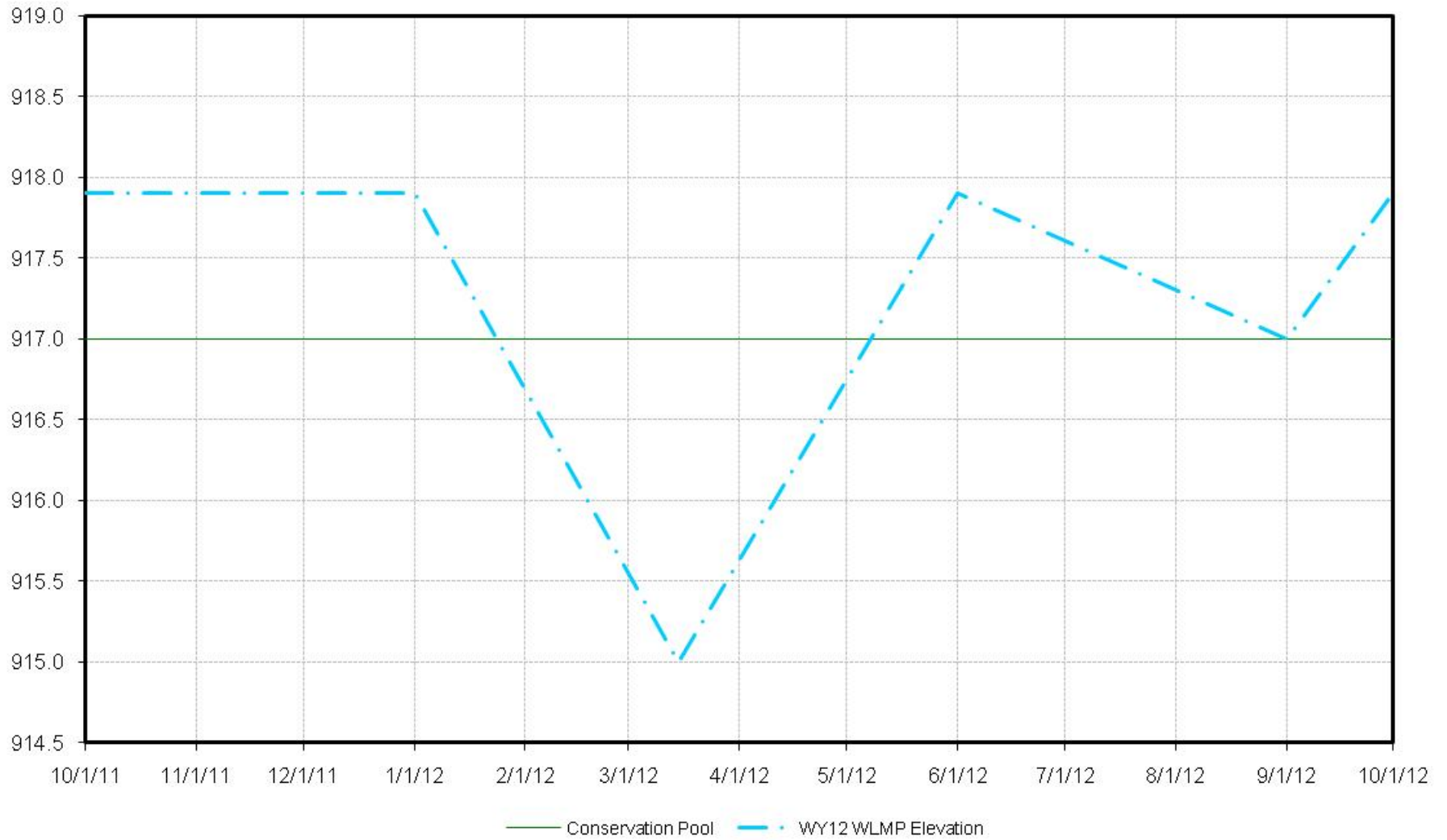
June 15 – July 1: Reduce water level to 876.0 to allow for re-vegetation of drawdown zone.

July 1 – September 1: Maintain water level at 876.0 NGVD.

September 1 – October 1: Allow water level to increase to 1.8 above CP to 877.3 NGVD.

Hillsdale Reservoir

Conservation Pool = 917.0 Flood Pool = 931.0 5% into FP = 917.9 10% into FP = 918.8



HILLSDALE RESERVOIR

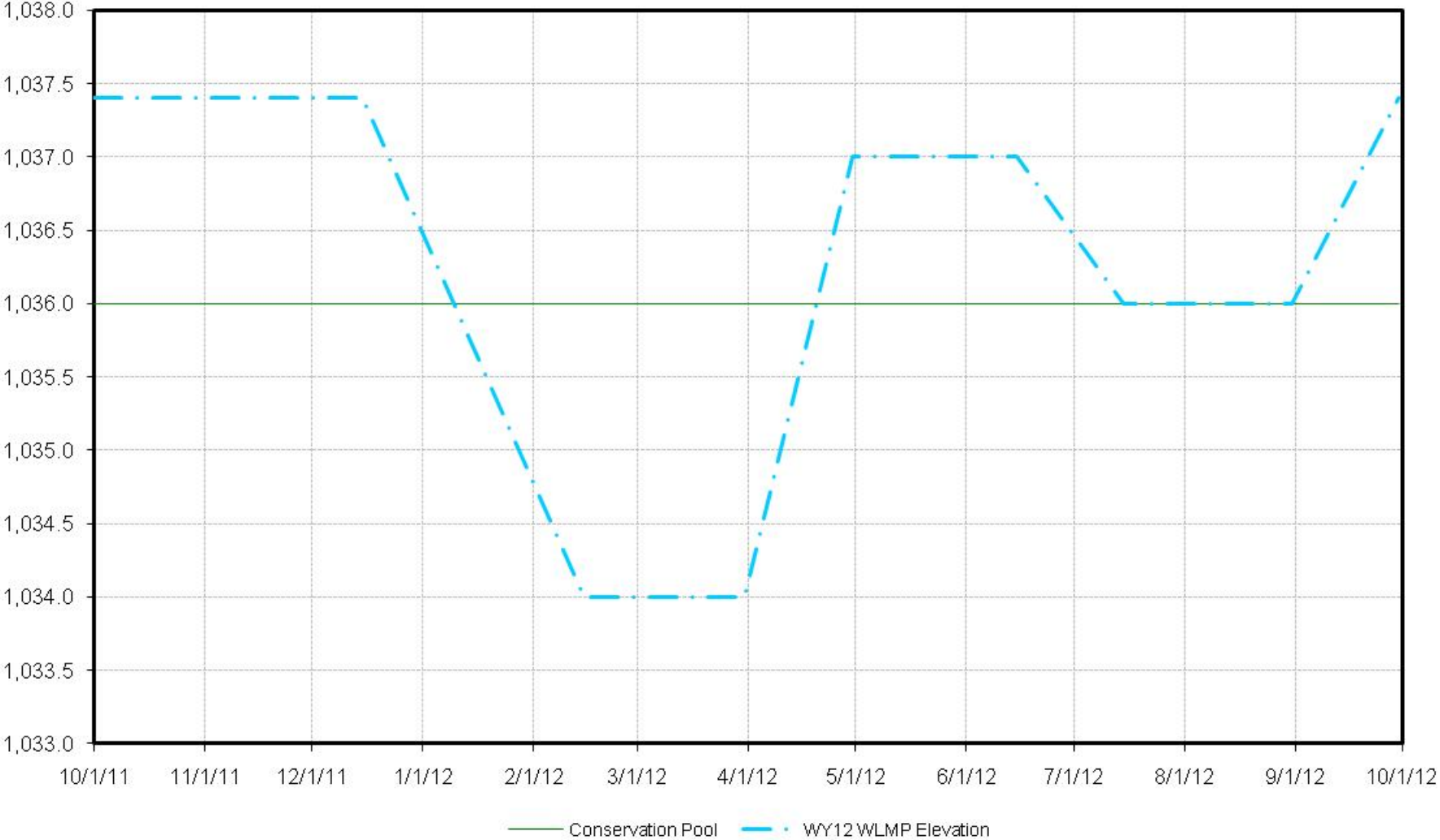
Corps of Engineer staff, Kansas Department of Wildlife and Parks personnel and Water supply interest designed the lake level management plan for Hillsdale Reservoir. This proposed plan is designed to benefit the natural resources and the recreational user. Lake level management will play a key role in the improvement of the current fishery. A major goal is to increase the duration of rising spring water levels to further benefit spawning sport fish populations, from the early spawning walleye through the later spawning largemouth bass and the number 1 sought after species, crappie. Habitat for spawning sport fishes and young of the year sport fish will be optimized with the rising water levels during this critical period. After May 1, a one-foot increase in water level above multipurpose pool 917.0 to 917.90 will greatly benefit spawning fish populations and increase the quality of habitat available for young of the year. It will also allow for increased evaporation rates of summer and water supply usage. Release rates should be kept under 500 c.f.s., when practicable, to accomplish these goals when practicable.

Wildlife, specifically waterfowl needs benefit by holding water in the fall months. By holding the lake elevation at 917.90 or higher, migratory birds will benefit greatly by the shallow habitat created. *Note: All participants at the coordination meeting were interested in holding the water level at the 10% of Flood pool level (918.8), during the September to January period.*

- October 1 - January 1:** Maintain lake elevation at 917.90 NGVD to keep water in the shoreline vegetation for migratory waterfowl.
- January 1 - March 15:** Gradually lower the lake elevation to 915.0 in order to increase water storage capacity to lessen the need to lower lake levels during fish spawning period. This level will allow for continued increases in water level and provide fishery benefits. March 1 to May 1 is the critical release period. To prevent excessive flushing of adult walleye and fry from the reservoir, releases should not exceed 500 cfs.
- March 15 - June 1:** Raise the lake elevation to 917.90. The extra foot above multipurpose pool will allow for summer evaporation, water supply usage and enhance fishery-spawning habitat. March 1 to May 1 is the critical release period. To prevent excessive flushing of adult walleye and fry from the reservoir, releases should not exceed 500 cfs.
- June 1 - September 1:** Allow the lake elevation to drop naturally with minimum monthly discharges to 917.0 Evaporation and water supply usage will bring water levels back to multipurpose pool.
- Sept. 1 – Sept. 30:** Raise the lake elevation to 917.90 as inflows allow.

Melvern Reservoir

Conservation Pool = 1036.0 Flood Pool = 1057.0 5% into FP = 1037.4



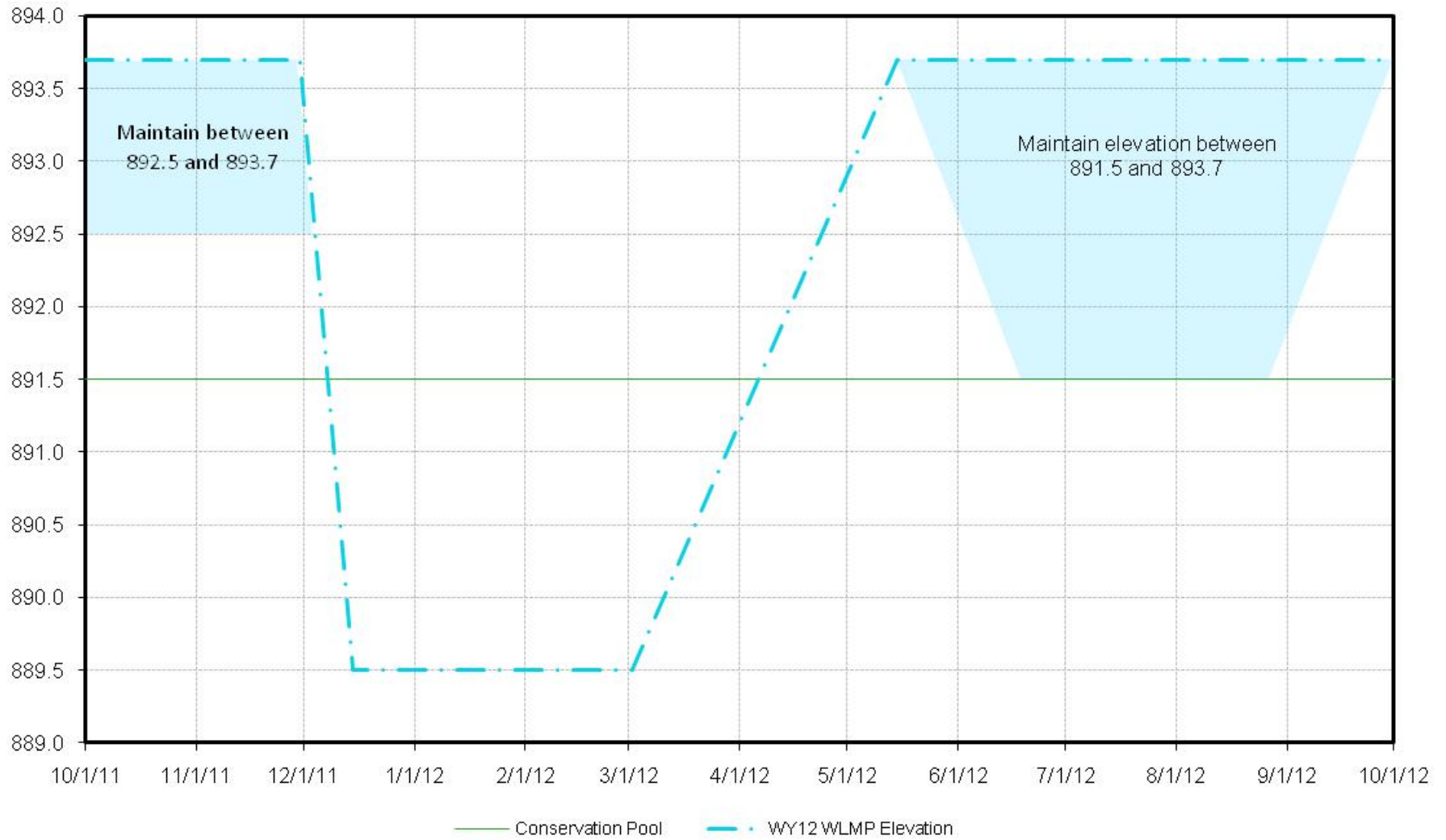
MELVERN RESERVOIR

Melvorn Lake is important to the eastern Kansas sport fishery and has often provided excellent waterfowl hunting opportunities. The purpose of this lake level management plan is to promote and enhance these activities. By continuing to allow for fall rises followed by carefully managed winter drawdowns and spring rises, then managing the lake level to encourage summer revegetation, the benefits provided by Melvorn Lake will be enhanced without negatively affecting its authorized project purposes.

- October 1 - December 15:** Maintain elevation 1037.4. Maintaining a 1.4-foot rise will enhance waterfowl habitat throughout the season.
- December 15 - February 15:** Lower the water level to 1034 to crowd fish and allow for increasing pool levels in the spring to contain outflows while improving spawning conditions for walleye and sauger. Discretion may dictate the actual discharge period and volume. If weather conditions permit, a gradual drawdown is much preferred, however discharges may have to be increased and the period constricted to prevent marina damage before heavy icing occurs.
- February 15 - March 31:** Maintain water level at 1034 for reasons stated above.
- April 1 - April 30:** Increase water level to 1037 to enhance forage production and maintain nursery habitat.
- April 30 - June 15:** Maintain water level at 1037 for fish and recreational benefits.
- June 15 - July 15:** Decrease water level to 1036 to initiate establishment of terrestrial vegetation.
- July 15 - August 31:** Maintain water level at 1036 to allow re-growth of vegetation.
- August 31 - September 30:** Allow rise to 1037.4 to irrigate waterfowl habitat.

Note: Discretion may dictate the actual dates and time/amount of discharge. The weather, lake, inflows and downstream conditions all are considered when adjustments are made to the water levels.

Perry Reservoir
Conservation Pool = 891.5 Flood Pool = 920.6 5% into FP = 893.7



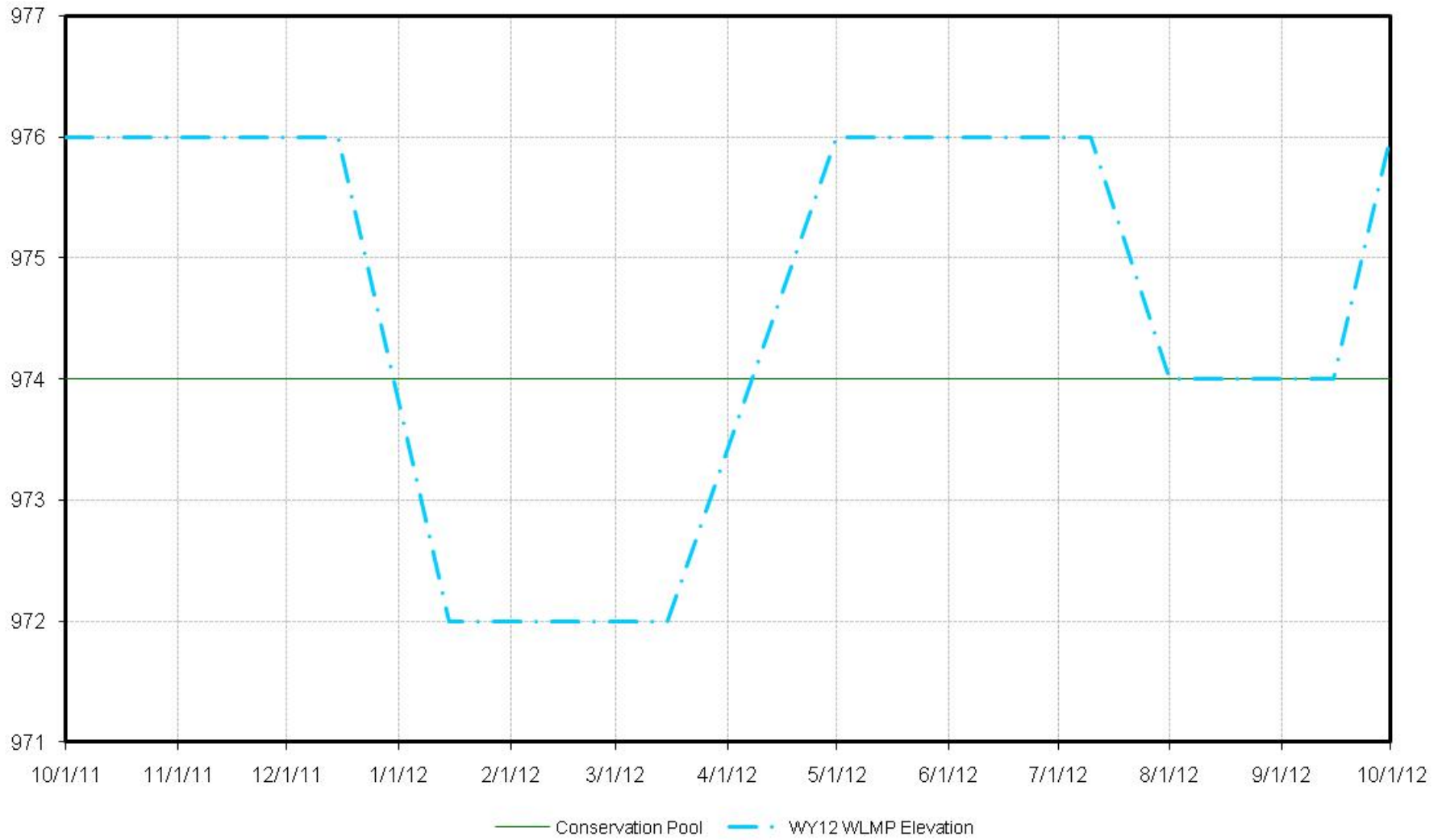
PERRY RESERVOIR

- October 1 to November 30:** Maintain water level between 892.5 and 893.7 for the benefit of migrating waterfowl, shorebirds and hunter access. Due to increased siltation at the upper end of the reservoir, this additional water is requested in order to inundate as much vegetation as possible.
- November 30 to December 15:** Drawdown of water level to 889.5 to reduce ice damage along shoreline as much as possible and to prepare the lake for the spring spawn. The beginning draw down date may be adjusted due to weather and ice conditions after coordination with resource managers.
- December 15 to March 2**:** Maintain winter draw down for beginning of spring spawn.
- March 2 to May 15**:** Increase water level from 889.5 to 893.7. This will inundate clear spawning habitat and will encourage future production of bass, bluegill, crappie, and walleye.
- Note: Anticipated date for beginning of spring spawn is March 2 and the anticipated date for the end of spring spawn is May 15. Lake level management will coincide with the spring spawn and not the anticipated dates.*
- May 15 to August 31:** Maintain the lake at lake elevation between 891.5 and 893.7.
- August 31 to Sept. 30**:** Increase water level to 893.7 to support waterfowl habitat and hunter access.

Note: When necessary, the water level management plan at Perry Reservoir will provide support for navigation. Changes in lake levels will be coordinated to support additional reservoir uses such as fish spawning, recreation, and waterfowl management.

** These periods are critical to fish and wildlife habitat.

Pomona Reservoir
Conservation Pool = 974.0 Flood Pool = 1003.0 5% into FP = 976.2

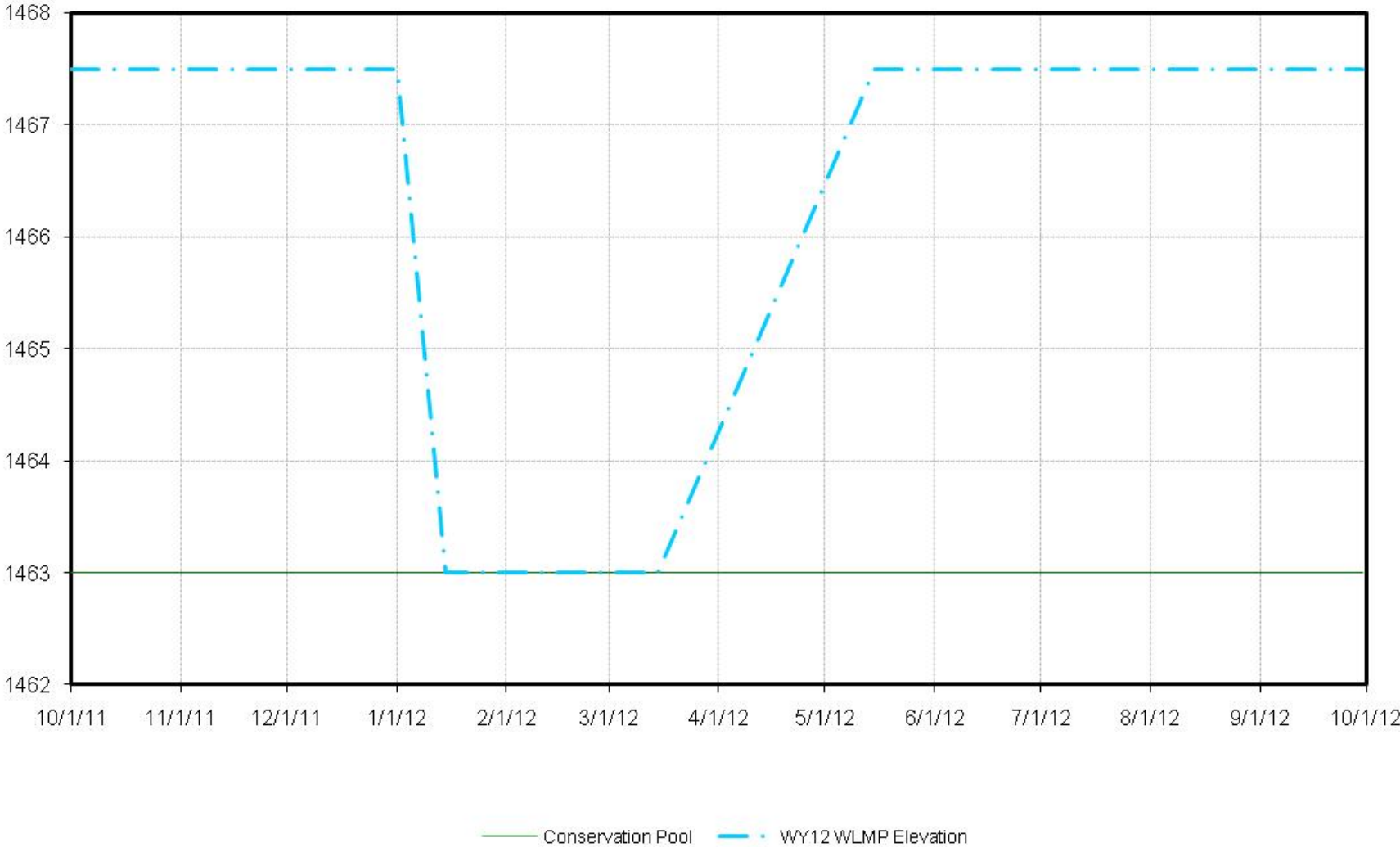


POMONA RESERVOIR

Release amounts and timing of the releases are based on the lake regulation plan, the weather conditions, and a variety of items that are impacted at the time. The water level management plan provides a general guideline that we strive to achieve, but is flexible enough for conditions that arise. The weather, lake, inflows and downstream conditions all are considered when adjustments are made.

October 1 - December 15:	Maintain elevation 976.0 m.s.l. to enhance waterfowl/shorebird migration and usage.
December 15 - January 15:	Lower the water level to 972.0 m.s.l. to crowd fish and allow for increasing pool levels in the spring to contain outflows while improving spawning conditions. In most years this drawdown has started later due to the extension of the waterfowl season, and extended later to allow a more gradual drawdown to reduce the effects of ice damage.
January 15 - March 15:	Maintain water level at 972.0 m.s.l. to improve predator fishing success and increase pool availability.
March 15 - April 30:	Increase water level to 976.0 m.s.l. to enhance forage production and maintain nursery habitat.
May 1 - July 10:	Maintain water level at 976.0 m.s.l. for fish and recreational benefits.
July 10 – August 1:	Decrease water level to 974.0 m.s.l. to initiate establishment of terrestrial vegetation.
August 1 - September 15:	Maintain water level at 974.0 m.s.l. to allow re-growth of vegetation.
September 15 – September 30:	Allow rise to 976.0 to improve waterfowl habitat.

Kanopolis Reservoir
Conservation Pool = 1463.0 Flood Pool = 1508.0 5% into FP = 1467.7

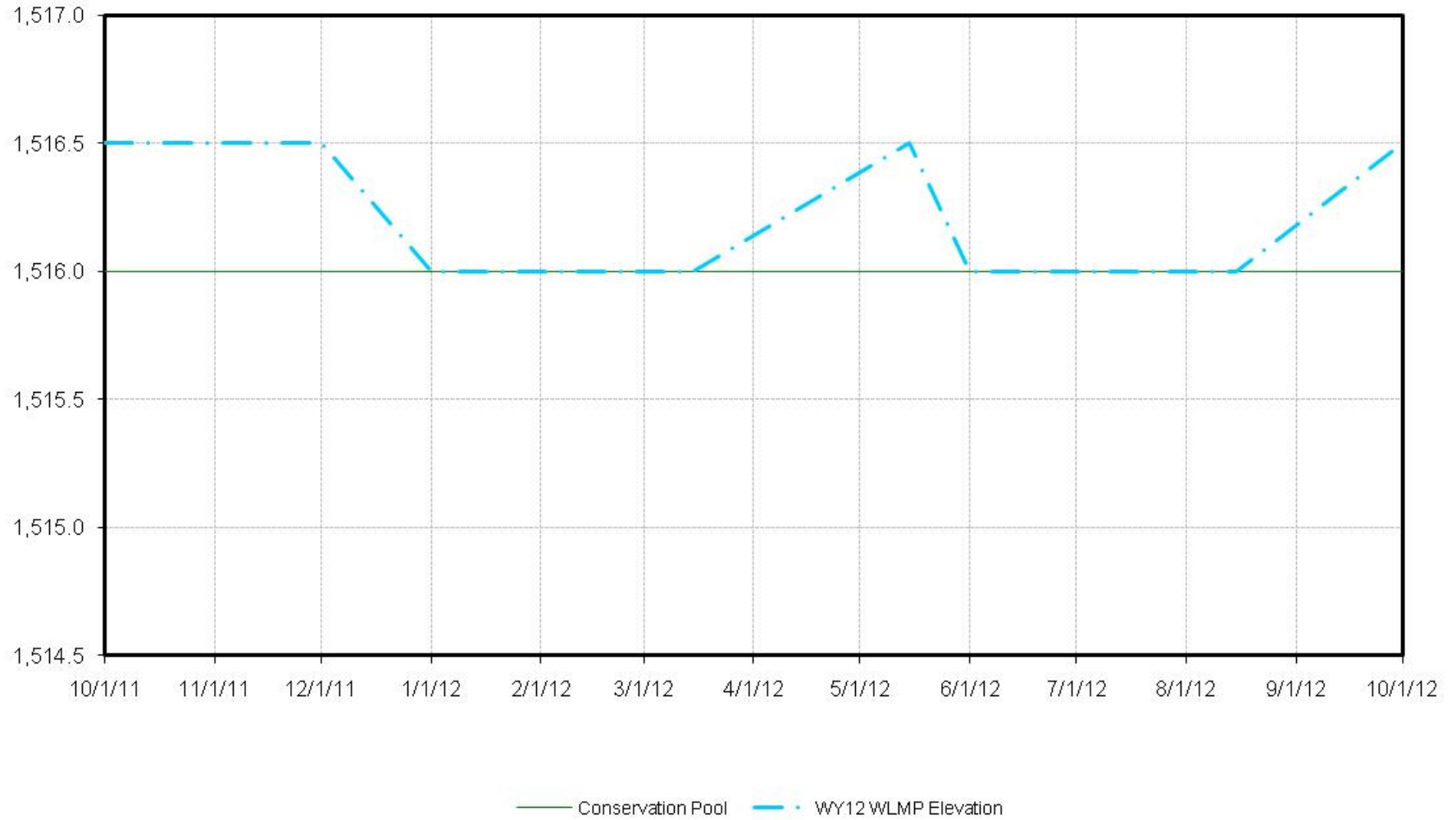


KANOPOLIS RESERVOIR

- October 1 – January 1:** Retain inflows in an attempt to increase the pool to 1467.5 NGVD.
- January 1 – January 15:** Draw down pool to 1463.0 NGVD to reduce the possibility of ice damage. This date will depend on whether or not ice forms. If ice forms earlier or later, pool will be lowered accordingly.
- January 15 – March 15:** Hold pool at 1463.0 NGVD.
- March 15 – May 15:** Allow pool to increase to 1467.5 NGVD and stabilize. Attempt to mediate inflows and outflows to preclude major elevation swings. Limit outflows to the uncontrolled port (if possible). Rapid drawdowns should be avoided during this time, if possible.
- May 15 to September 30:** Between elevations 1463.0 NGVD and 1467.5 NGVD, releases should be made through the uncontrolled port. History shows that the pool will naturally decrease during this period, but an attempt will be made to hold as much of this increased pool as possible to provide for maximum recreation benefits.

Wilson Reservoir

Conservation Pool = 1516.0 Flood Pool = 1554.0 5% into FP = 1518.8

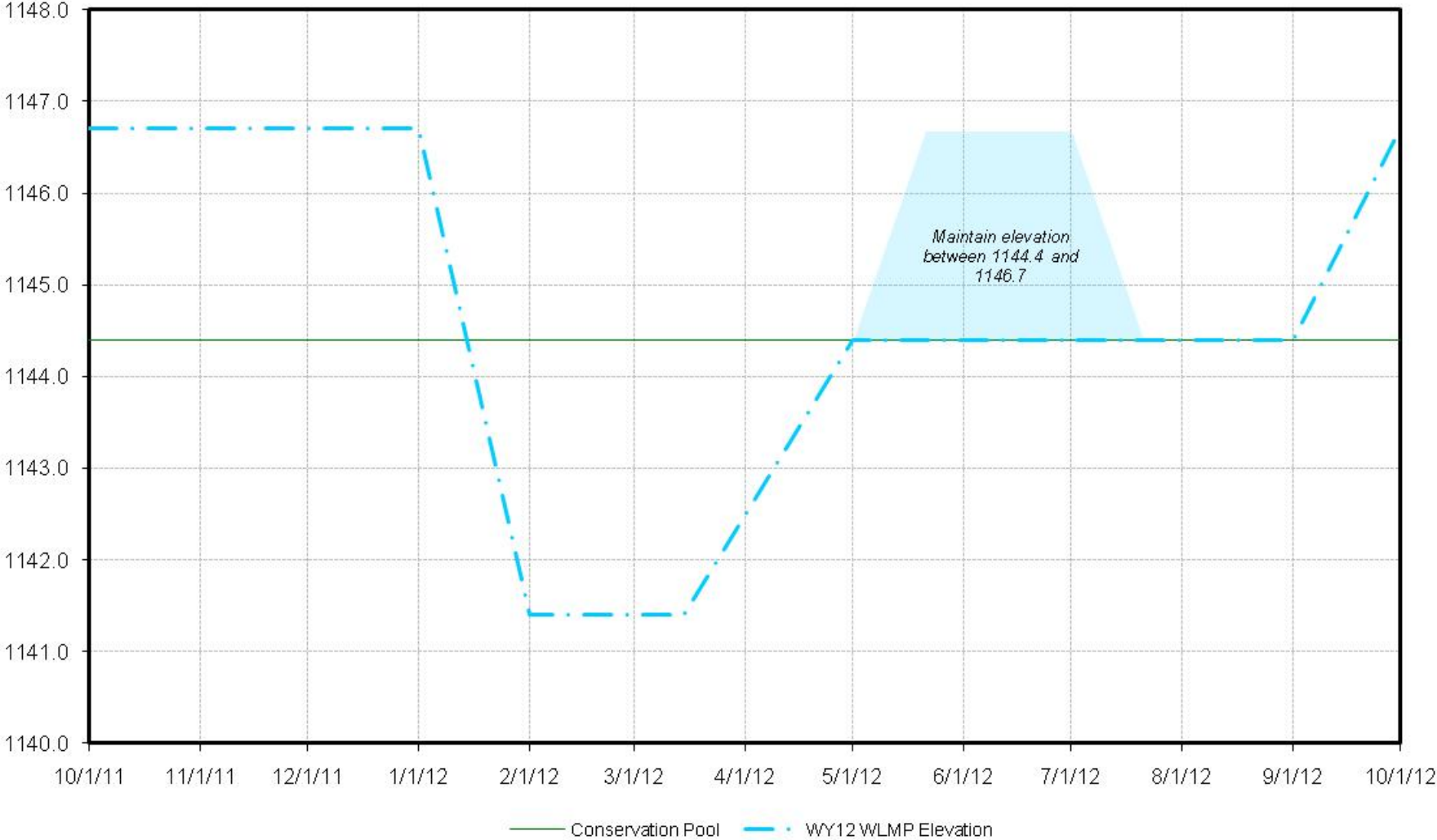


WILSON RESERVOIR

- October 1 – December 1:** Hold level at 1516.5 NGVD to flood aquatic vegetation for waterfowl management purposes.
- December 1 - January 1:** Lower the water level to 1516 NGVD before icing of the lake occurs.
- January 1 – March 15:** Maintain the water level at 1516 NGVD to reduce shoreline erosion in the Park areas and to provide buffer for spring rains.
- March 15 – May 15:** A stable or slightly rising water level up to 1516.5 NGVD is preferred for game fish spawning purposes. Rapid drawdowns should be avoided during March, April, and May, if possible.
- May 15 – August 15:** Lower the water level to 1516.0 NVGD and maintain to allow for shoreline re-vegetation.
- August 15 – Sept. 30:** Hold inflow to raise level to 1516.5 NGVD for waterfowl.

Note: Sustained pool elevations above 1516.5 NGVD are not desired. Shorelines are highly susceptible to wave induced erosion at higher lake levels. Due to the high frequency of summer and fall drought conditions in central and western Kansas, lowering the lake elevation below 1516.0 NGVD endangers the summer recreation potential. Lake evaporation usually results in the pool lowering to below 1515.5 NGVD by late summer.

Milford Reservoir
Conservation Pool = 1144.4 Flood Pool = 1176.2 5% into FP = 1146.7



MILFORD RESERVOIR

As in past years, this water level management plan for Milford Lake attempts to take into account the natural inflows of the lake to improve both fisheries and wildlife habitat. One of the fisheries functions of this plan is to control water releases in the early spring (April 1- June 15) during fish spawning. The winter drawdown will also help to provide a cushion against having to release high outflows (above 2000 cfs) when the walleye are concentrated along the face of the dam and susceptible to flushing from the lake. For wildlife purposes, the scheduled autumn rise in water level will flood marshy areas, improving waterfowl habitat and hunter access to the upper cove areas of the lake. Although the probability of large enough fall inflows only occurs in one of five years, the potential two-foot rise provides tremendous benefits for waterfowl when it does.

October 1 to January 1: Hold discharge to minimum outflows and allow the lake elevation to increase, and then be maintained at 1146.7.

January 1 to February 1: Drawdown the lake elevation to 1141.4 and maintain that elevation throughout the winter. Maximum discharge should not be greater than 2000 cfs.

February 1 to March 15: Maintain the lake elevation at 1141.4.

March 15 to May 1: Allow the lake elevation to gradually increase to 1144.4. Maximum discharge should not be greater than 2000 cfs.

May 1 to July 1: Maintain lake elevation between 1144.4 and 1146.7. From May 1 to July 1 it is preferred, for the fisheries program, that the lake elevation remain steady or a slow rise. Optimal maximum discharge should not exceed 2000 cfs.

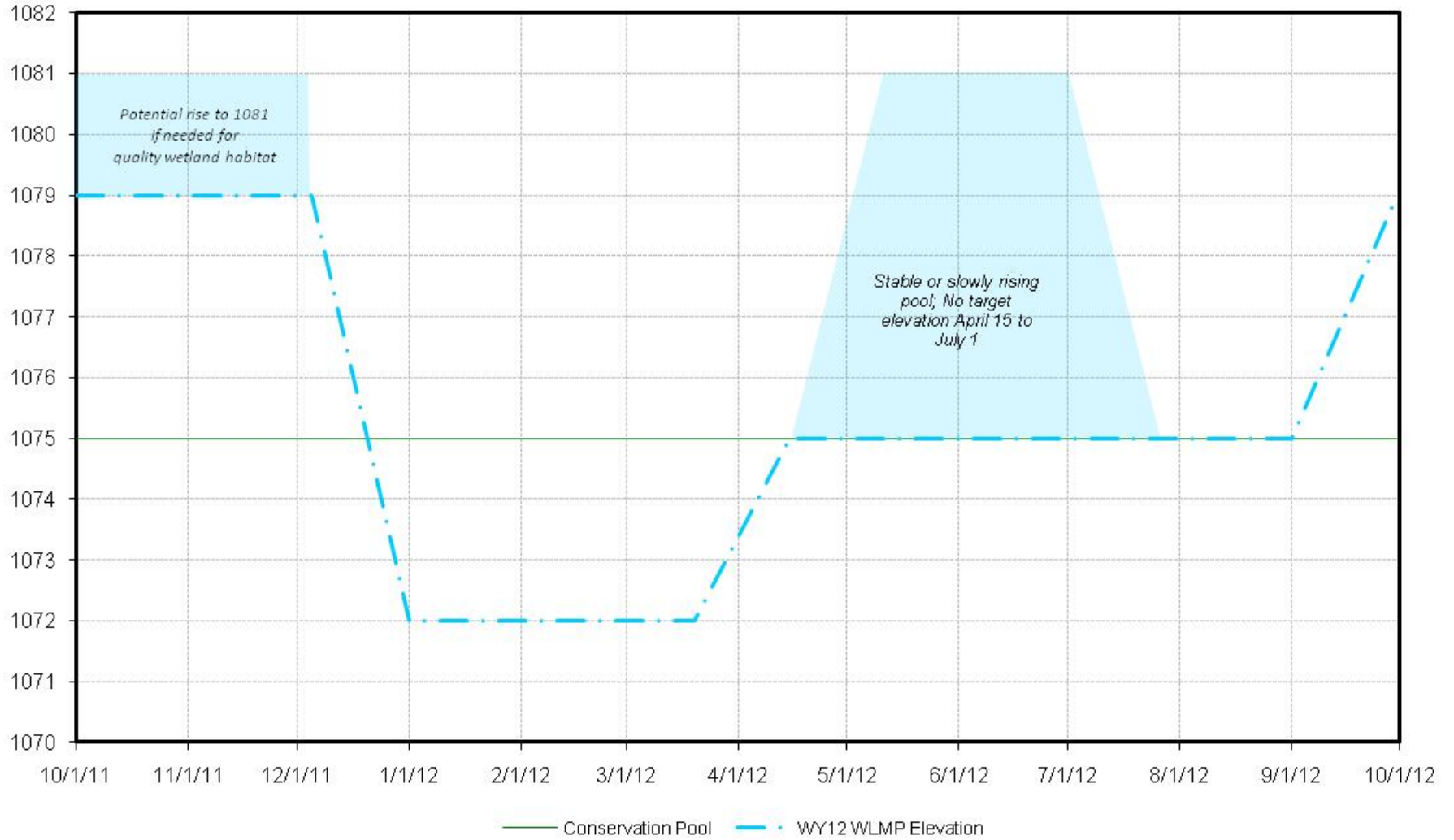
Note: Additional consideration that may affect outflows and lake elevations are the endangered species nesting on the Kansas River from May 15-August 15 and any construction projects that maybe on going. It is also realized that other Authorized Project Purposes may supersede this plan.

July 1 to September 1: Reduce Lake level to 1144.4 and maintain. Re-vegetation and seeding of the shoreline will be accomplished in the early part of July when the lake elevation is in the 1144.4 range. *Consideration will be given to any forecasted navigation demands before evacuating flood storage that may exist on or around July 1.*

September 1 to September 30: Hold discharge to minimum outflows and allow the lake elevation to increase and then be maintained at 1146.7.

Note: When necessary, the water level management plan at Milford Reservoir will provide support for navigation. The Kansas Water Office may submit a request to intentionally store water in the flood pool for navigation support. The intent of the request would be to minimize the use of conservation storage for navigation. Changes in lake levels will be coordinated to support additional reservoir uses such as fish spawning, recreation, and waterfowl management.

Tuttle Creek Reservoir
Conservation Pool = 1075.0 Flood Pool = 1136.0 5% into FP = 1080.9



TUTTLE CREEK RESERVOIR

One of the main objectives of water level management at Tuttle Creek is to increase recruitment of crappie in the lake. The success or failure of past management plans in many cases has been out of human control due to uncontrollable inflow rates, storage of water in the flood control pool for T&E species in the summer months, and late season releases in support of navigation on the Missouri River. However, coordination between state and Federal agencies during moderate flood and drought events can minimize damage to the lake's shoreline habitat that is essential for crappie spawning success from such uncontrolled events. The request for the lake level to be lowered in the winter months is to serve primarily as additional storage for frequent spring rises in lake levels which would require untimely releases. This request was intended to lessen the probability of untimely reservoir releases that adversely impact crappie spawning success.

October 1 to December 5: Maintain lake level at elevation 1079 for the attraction for migrating waterfowl.

December 5 to January 1: Lower the lake level to elevation 1072 to reduce ice damage and provide additional water storage. Drawdown dates are approximate and will depend on the fall waterfowl needs and the potential for icing. The drawdown will be coordinated with the State resource managers.

January 1 to March 20: Maintain lake level at 1072 NGVD.

March 20 to April 15: Allow lake level to rise to conservation pool (1075 NGVD) to enhance lake boating access.

April 15 to July 1: Coordinate evacuation of flood water to enhance potential for crappie population recruitment.

Note: Holding water above pool level during crappie spawning and nursery periods has improved crappie recruitment into the lake fishery. Storage of water in the flood control pool in late spring has also been required due to the presence of threatened and endangered terns and plovers nesting on the Kansas River's sand bar habitat downstream of the lake. Maximum sustained pool elevation during this period will be 1080.9.

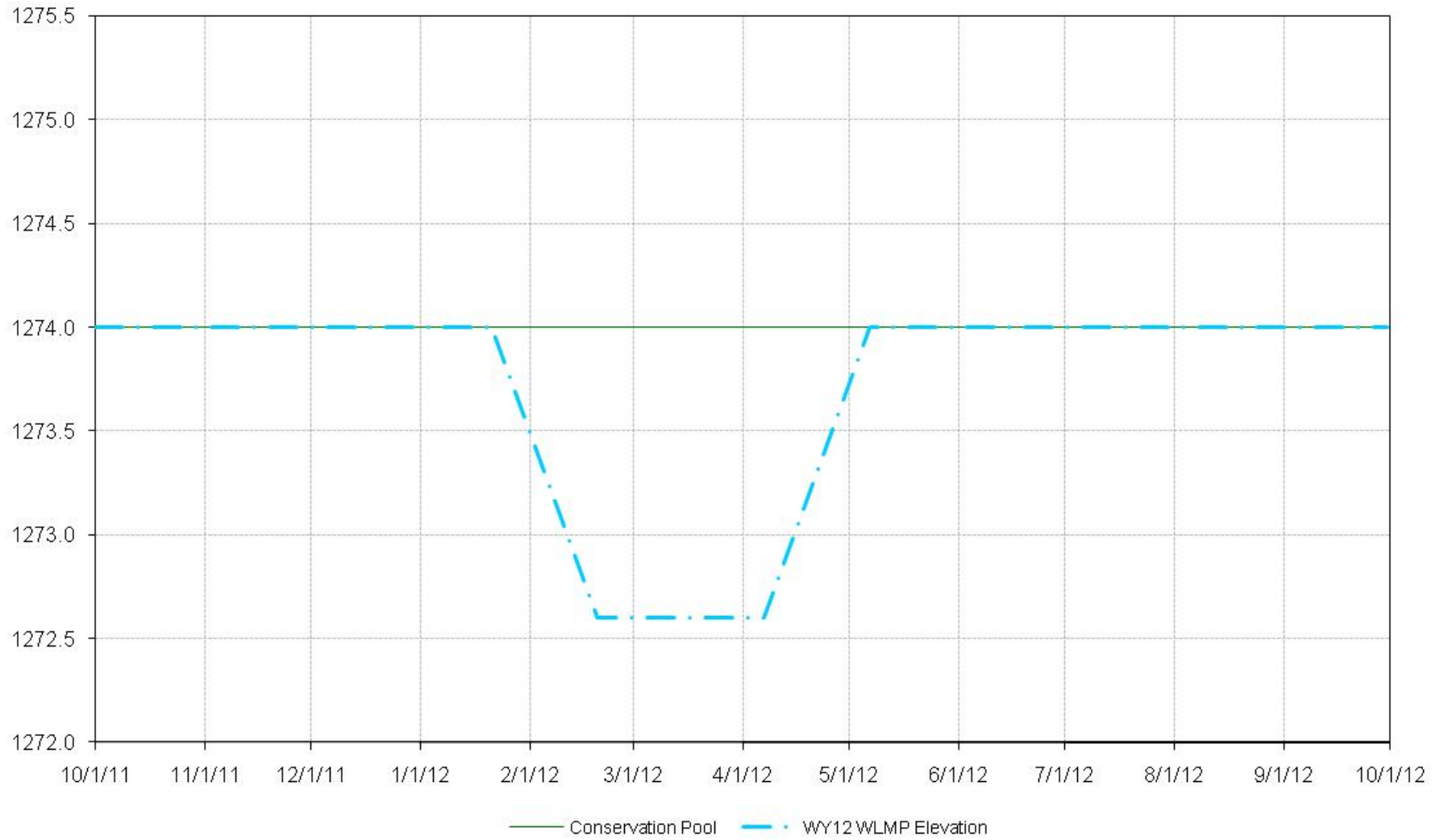
July 1 to September 1: Maintain lake elevation at conservation pool (1075 NGVD) to allow shoreline habitat to re-vegetate. *Consideration will be given to any forecasted navigation demands before evacuating flood storage that may exist on or around July 1.*

September 1 to September 30: Allow lake level to rise to 1079 NGVD to inundate wetland habitat and attract migrating waterfowl.

Note: When necessary, the water level management plan at Tuttle Creek Reservoir will provide support for navigation. The Kansas Water Office may submit a request to intentionally store water in the flood pool for navigation support. The intent of the request would be to minimize the use of conservation storage for navigation. Changes in lake levels will be coordinated to support additional reservoir uses such as fish spawning, recreation, and waterfowl management.

Corps of Engineers, Tulsa District

Council Grove Reservoir
Conservation Pool = 1274.0 Flood Pool = 1289.0 5% into FP = 1275.0



COUNCIL GROVE RESERVOIR

The plan is designed to enhance fishery production and recruitment benefits and accommodate a diverse recreational constituency. The 1.4 foot drawdown beginning in January will provide a buffer to allow for stable or rising water levels throughout much of the sport fish spawning period. Spring inflows are typically sufficient to inundate the drawdown zone and elevations frequently exceed conservation pool elevation pool. White crappie (the most sought after species as determined by creel survey) recruitment has been positively correlated to such events, therefore emphasizing the importance of minimizing (as much as feasible) release rates to encourage production. To minimize negative impacts to fish populations releases designed to remove water in excess of 1274.0 NGVD should be completed as slowly as possible.

October 1 - January 21: Maintain lake level at 1274.0 feet NGVD.

January 22 - February 19: (Beginning date of drawdown may be adjusted based upon lake and weather conditions). Lower water 1.4 feet to elevation 1272.6 NGVD, to reduce ice damage to the shoreline and infrastructure, and provide a buffer for spring storage.

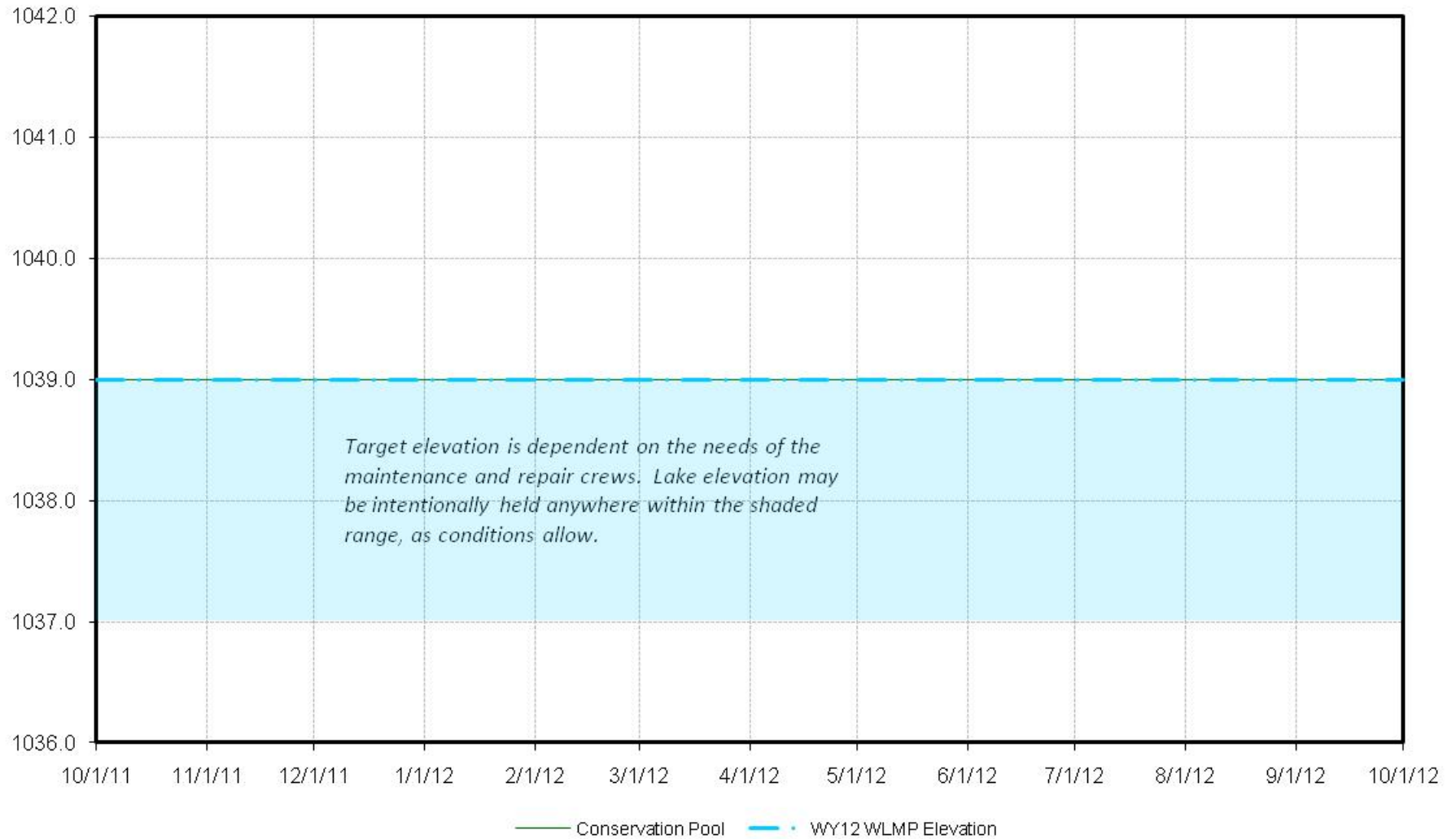
Note: Council Grove Reservoir is an important source for municipal water supply. The drainage basin is relatively small and during times of drought it may not be advisable to evacuate storage. The Kansas Water Office will be contacted prior to the winter drawdown. Conditions may warrant a decision not to evacuate storage.

February 20 - April 6: Maintain lake at elevation 1272.6 NGVD.

April 7 - May 6: Allow lake to rise to elevation 1274.0 NGVD to inundate terrestrial vegetation to enhance fish spawning habitat and subsequent recruitment.

May 7 - September 30: Maintain lake elevation at 1274.0 NGVD, to provide continued spawning and nursery habitat for fish.

John Redmond Reservoir
Conservation Pool = 1039.0 Flood Pool = 1068.0 5% into FP = 1041.0



JOHN REDMOND RESERVOIR

October 1 – September 30: In order to facilitate maintenance and repair of the Tainter gates, pool elevation may be intentionally held as much as two (2) feet below normal conservation pool level. A target elevation of 1039 NGVD will be maintained if the maintenance work is suspended or does not require a lower level.

Note: Operation at an elevation below 1039 NGVD will be contingent on weather conditions. Drought conditions may necessitate a higher than optimal level for maintenance. Less than 200,000 acre feet, cumulative inflow, during the months of March, April, and May will be used as a severe drought indicator.

Elk City Reservoir
Conservation Pool = 796.0 Flood Pool = 825.0 5% into FP = 798.5



ELK CITY RESERVOIR

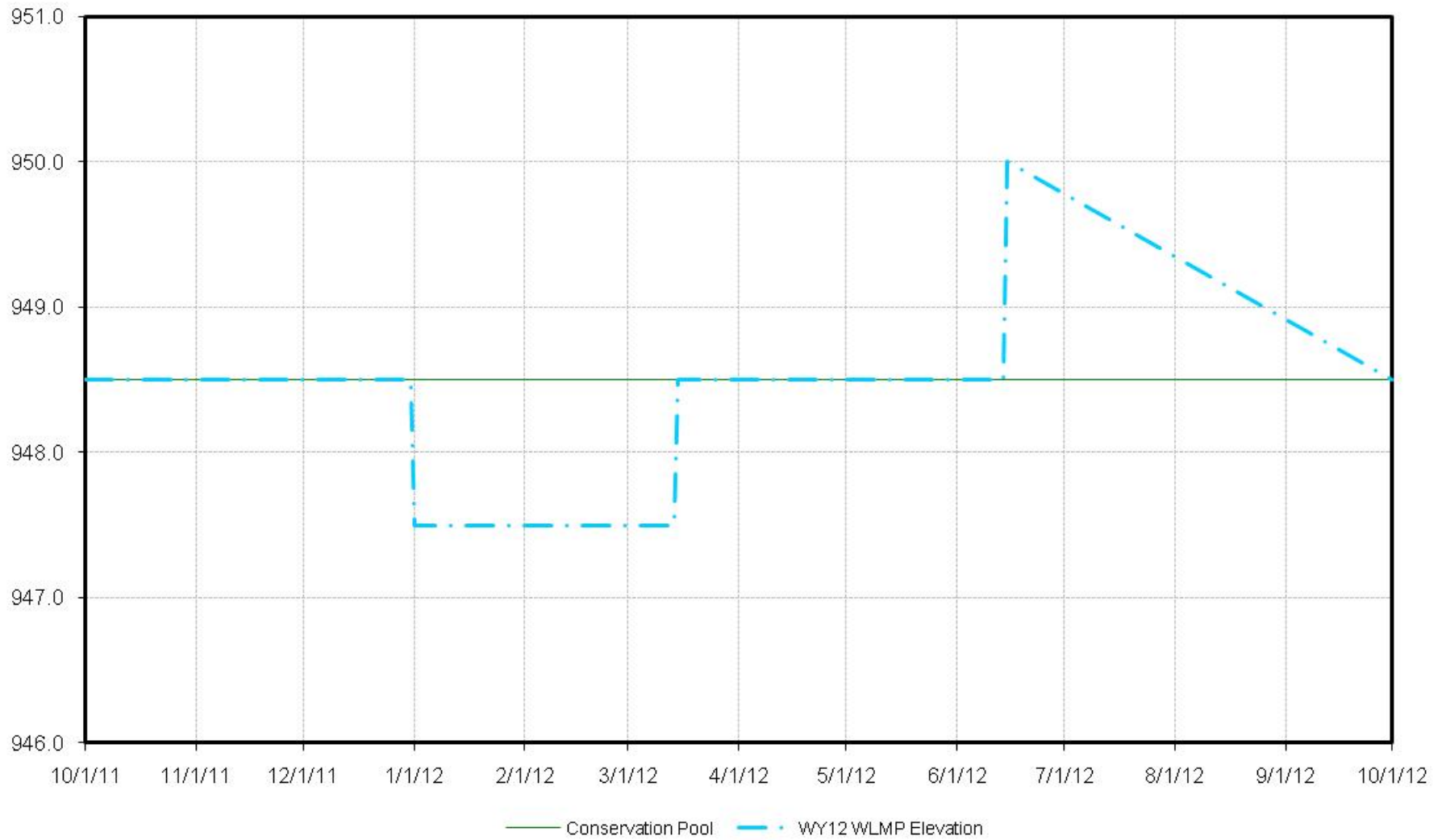
- October 1 - January 31:** Hold water level at 796 NGVD to enhance waterfowl attraction and optimize hunter dispersal and success. If water level raises 2.5 ft to 798.5 NGVD during November through January, control release rates when practical so that water is lowered no more than 0.21 feet per day to 796 NGVD to promote waterfowl utilization of flooded vegetation.
- January 31 - February 15:** Lower water level to 795 NGVD¹. This level would allow predatory fish to more efficiently forage on the prey base present. In addition, this level would reduce ice damage to the dam².
- February 15 - September 1:** Hold the level at 795 NGVD to allow the emergence of aquatic vegetation for fish spawning habitat and fall waterfowl habitat and food. This level would also continue to buffer against flooding, reduce spring water level fluctuation, and provide an additional safety factor for recreational boating. If water level rises above 795.0 NGVD in spring during active fish spawning periods, project personnel will coordinate with water regulators to maintain stable water levels, when practical, to allow spawn to be completed prior to major releases.
- September 1 - October 1:** Allow to fill to level 796 NGVD in order to flood shoreline vegetation³.

¹ K.S.A. 82a-1305 discusses the disposal of surplus water which is defined as water within the conservation storage water supply capacity committed to the state, but not required to meet contractual requirements. Surplus water evacuated for the LLMP must be less than 10% of the water supply yield capability.

² If early ice coverage occurs, drawdown would be delayed until favorable conditions existed.

³ During years of good vegetative response the filling should be done in small increments over a longer period of time. This would insure full benefits of the habitat to waterfowl and waterfowl hunters.

Fall River Reservoir
Conservation Pool = 948.5 Flood Pool = 987.5 5% into FP = 952.5

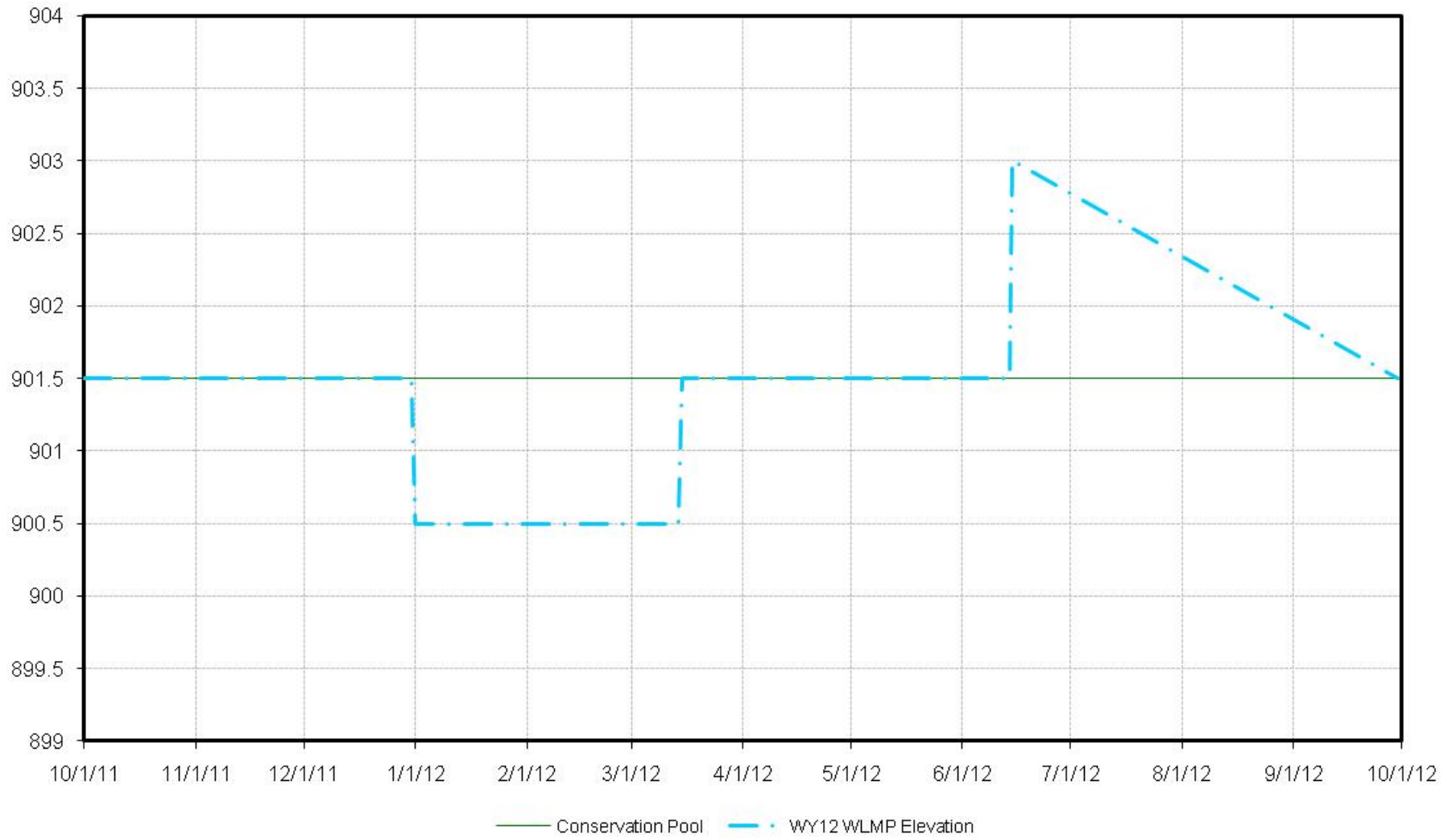


FALL RIVER RESERVOIR

The water level management plan proposed for Fall River Reservoir was designed to promote lake fisheries, improve water quality, increase waterfowl utilization, and to provide access for recreational boaters.

- October 1 – December 31:** Maintain water level at conservation pool (948.5 fsl). If water level raises more than three feet above conservation pool to 951.5 fsl, control release rates so that the water level is lowered no more than 0.5 feet per day when practical to promote waterfowl utilization of flooded vegetation.
- January 1 – March 14:** Lower water level one foot below conservation pool to 947.5 fsl to reduce ice damage to shoreline and balance planned rise so that the planned annual water level average is at conservation pool (948.5 fsl).
- March 15 – June 14:** Maintain water level at conservation pool (948.5 fsl) to allow for maximum flood control benefits. Control release rates so the water level decline is no more than 0.5 feet per day, when practical. This slow release of water is needed to maintain flooded spawning habitat and reduce desiccation of fish eggs.
- June 15 – September 30:** Allow water level to rise 1.5 feet above conservation pool to 950.0 fsl. Release up to 45 cfs from the 1.5 feet of water stored above conservation pool on weekends and Independence Day until conservation pool is reached. Then maintain conservation pool. This will enhance the tailrace fishery for the peak user time, promote utilization of outlet facilities, and enhance boating access.

Toronto Reservoir
Conservation Pool = 901.5 Flood Pool = 931.0 5% into FP = 904.5

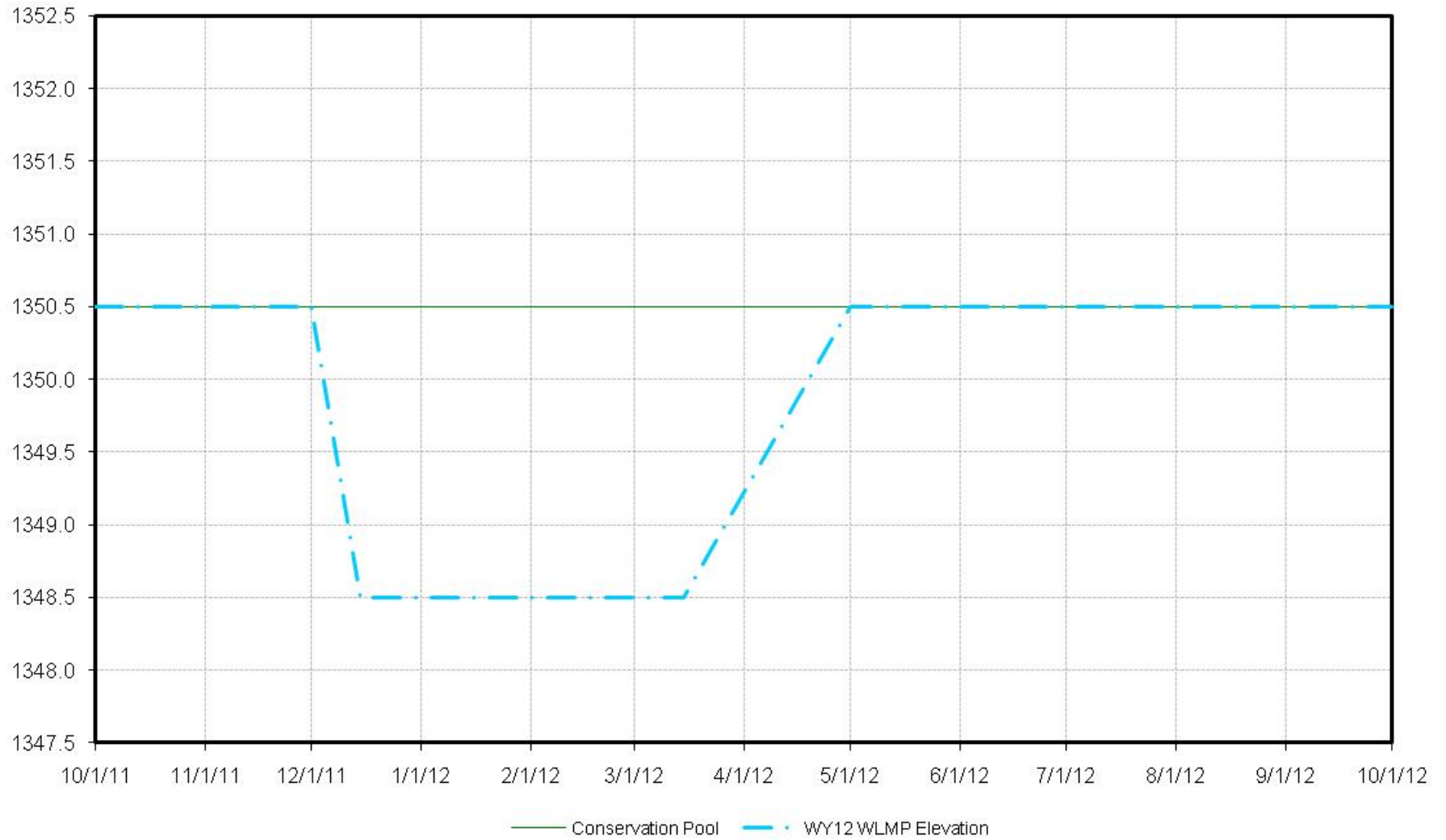


TORONTO RESERVOIR

The water level management plan proposed for Toronto Reservoir was designed to promote lake fisheries, improve water quality, increase waterfowl utilization, and to provide access for recreational boaters.

- October 1 – December 31:** Maintain water level at conservation pool (901.5 fsl). If water level raises more than three feet above conservation pool to 904.5 fsl, control release rates so that the water level is lowered no more than 0.5 feet per day when practical to promote waterfowl utilization of flooded vegetation.
- January 1 – March 14:** Lower water level one foot below conservation pool to 900.5 fsl to reduce ice damage to shoreline and balance planned rise so that the planned annual water level average is at conservation pool (901.5 fsl).
- March 15 – June 14:** Maintain water level at conservation pool (901.5 fsl) to allow for maximum flood control benefits. Control release rates so the water level decline is no more than 0.5 feet per day, when practical. This slow release of water is needed to maintain flooded spawning habitat and reduce desiccation of fish eggs.
- June 15 – September 30:** Allow water level to rise 1.5 feet above conservation pool to 903.0 fsl. Release up to 45 cfs from the 1.5 feet of water stored above conservation pool on weekends and Independence Day until conservation pool is reached. Then maintain conservation pool. This will enhance the tailrace fishery for the peak user time, promote utilization of outlet facilities, and enhance boating access.

Marion Reservoir
Conservation Pool = 1350.5 Flood Pool = 1358.5 5% into FP = 1351



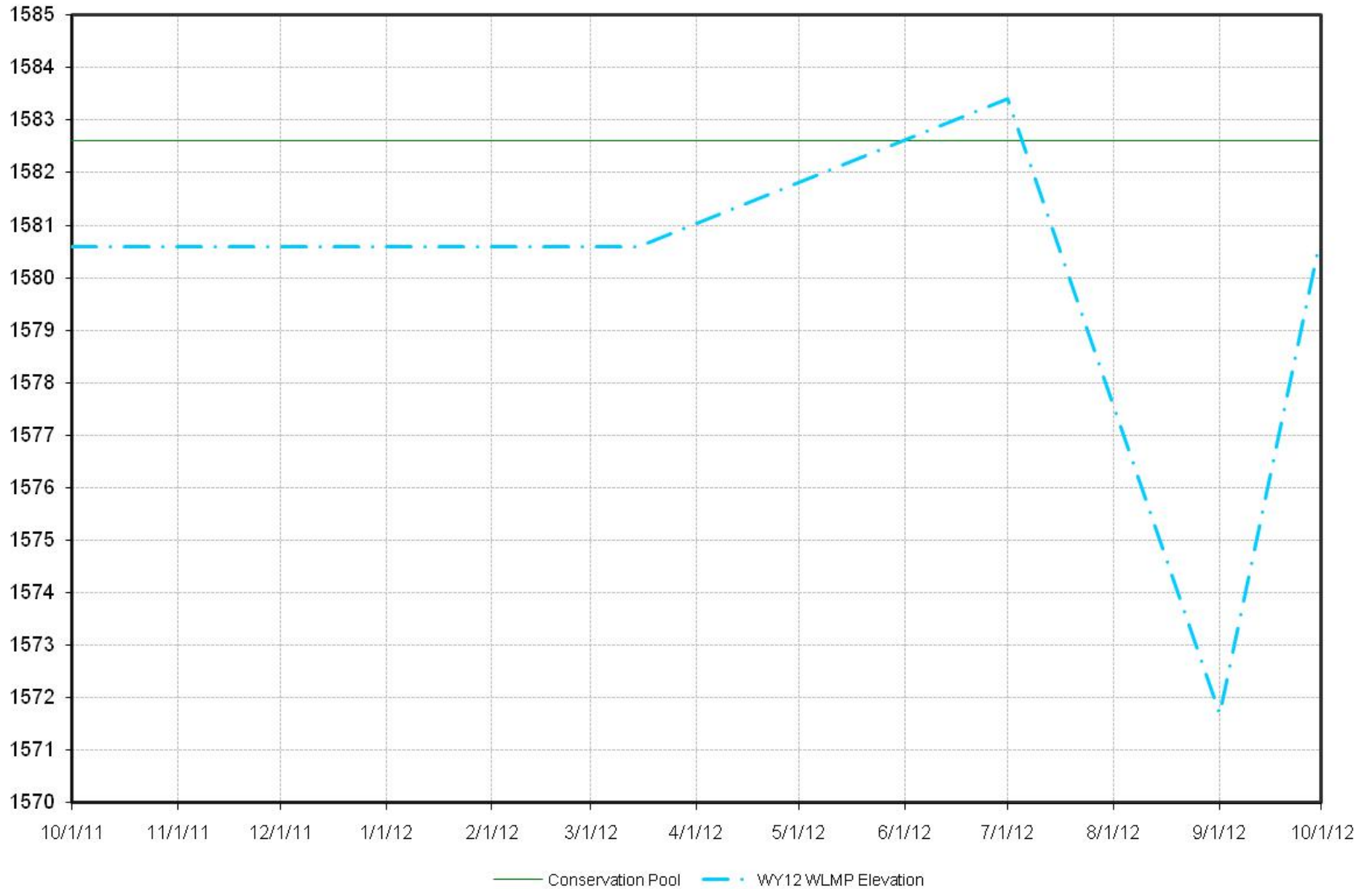
MARION RESERVOIR

- October 1 – December 1:** Maintain lake at elevation 1350.5 NGVD. Fall rise has been omitted due to severe shoreline erosion in the campgrounds caused by prevailing autumn winds and holding the lake high.
- December 1 – December 15:** Lower lake level to elevation 1348.5 NGVD. The anticipated discharge for drawdown will be, approximately, 600 c.f.s.
- December 15 - March 15:** Maintain lake at elevation 1348.5 NGVD. A winter drawdown will provide a wide variety of benefits.
- Fisheries** – Enhance walleye fishing by decreasing the likelihood that adult walleye fry will be pulled through the gates during floodwater releases and provide a clean substrate for walleye to spawn upon. The rock riprap of the face of the dam (where the walleye spawn) is normally covered with filamentous green algae. By exposing the rocks, the algae will die and be weathered away to provide a clean substrate.
 - Water quality** – Lessen blue-green algae blooms. By drying the bottom sediments, phosphorous is more tightly bound to the sediments. The phosphorous is less likely to become available in the water column where it enhances blue-green algae growth.
 - Operations & maintenance** – Lessen ice damage to park facilities; Provide extra flood storage for heavy spring rainfall; Lessen downstream bank erosion by releasing water at a reduced rate and at a time when the stream banks are dry; Enhance opportunity for bank revetment (riprap) projects.
 - Zebra Mussels** – Kill individuals shallower than two feet deep.
- Note:** Marion Reservoir is an important source of water for several communities. The drainage basin is relatively small and during times of drought it may not be advisable to evacuate storage. The Kansas Water Office should be contacted prior to the winter drawdown. Conditions may warrant a decision not to evacuate storage.
- March 15 – May 1:** Allow pool rise to 1350.5 NGVD.
- May 1 – October 1:** Maintain lake at elevation 1350.5 NGVD.

U.S. Bureau of Reclamation, Nebraska-Kansas Area Office

Lovewell Reservoir

Conservation Pool = 1582.6 Flood Pool = 1595.3 5% into FP = 1583.4



LOVEWELL RESERVOIR

The Kansas Bostwick Irrigation District is the main user of the water resource at Lovewell. The goal of the Lovewell Reservoir Water Level Management Plan is for all users to benefit from water levels ranging from .8 foot above conservation pool to 10.9 feet below conservation pool, while addressing both positive and negative impacts of these water levels.

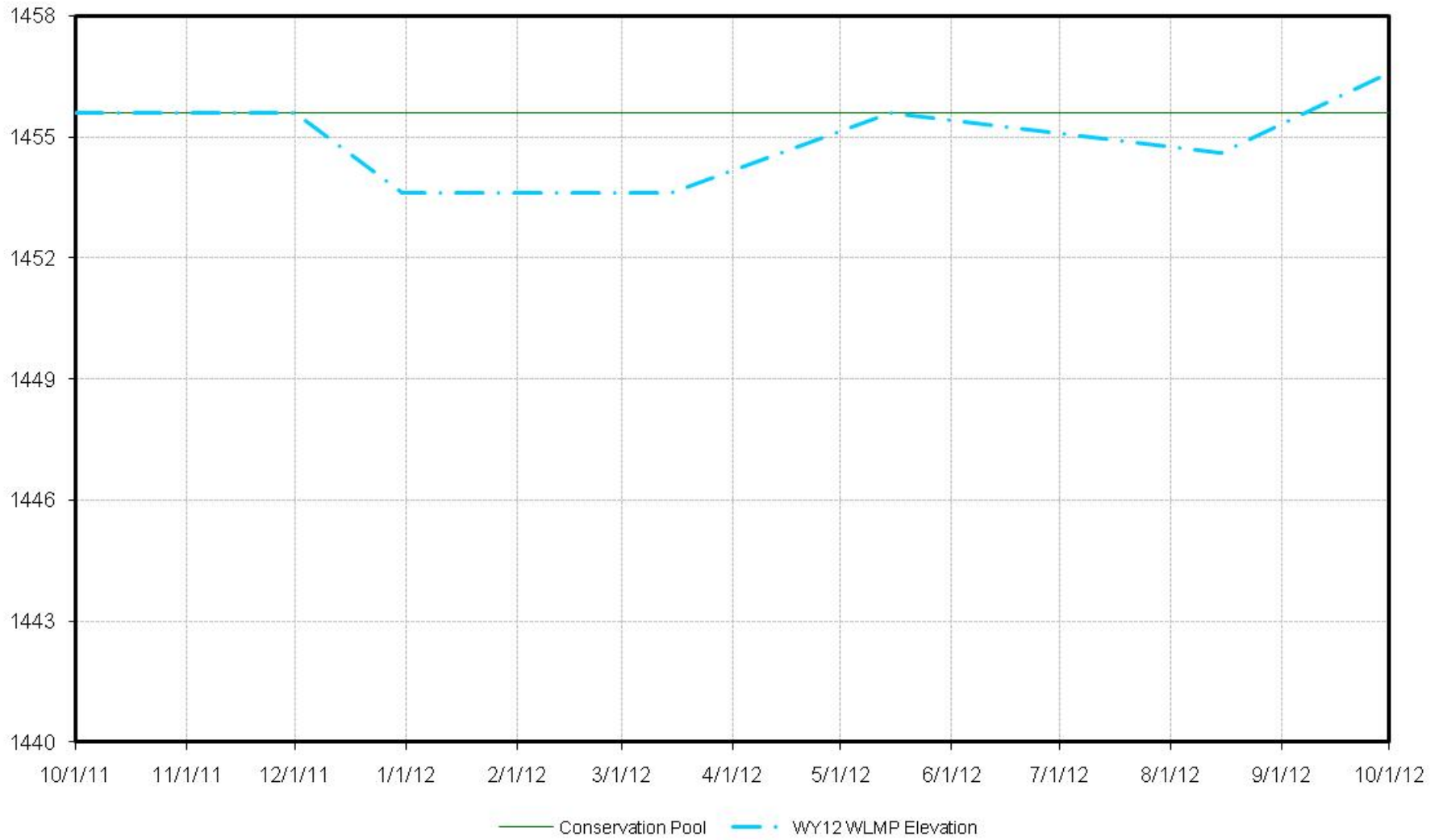
This reservoir level management plan proposed for Lovewell Reservoir is designed to coordinate with Kansas Bostwick Irrigation District's past operations, and will continue to request specific water levels below conservation pool. Spring elevations greater than 2 feet above conservation pool damage the reservoir shoreline, park and wildlife area recreation facilities and flood important wildlife habitat. Summer lake levels more than 10.9 feet below conservation pool reduce access to the reservoir by rendering the boat ramps, docks, and swimming beach inoperable. These levels also de-water the upper end of the reservoir and feeder creeks. When these areas have water in the fall, they provide excellent marshy areas, which are conducive to waterfowl retention and fisheries rearing areas. When these areas are too dry or too wet, fisheries, wildlife, recreation resources and reservoir capacity are reduced for all users.

Lovewell Reservoir was designed to provide flood control, irrigation, recreation and fish and wildlife habitat. In this way it is similar to the other five western Kansas BOR reservoirs. What makes Lovewell Reservoir unique from the other reservoirs is the ability to dependably refill the reservoir with water via the Bostwick Irrigation District's Courtland Canal. The 33 mile long canal and diversion dam begin at Guide Rock Nebraska, and bring Republican River water from Nebraska to Lovewell Reservoir. This system allows Lovewell to refill after irrigation season with the exception of an extreme drought year like 1991. This dependability allows Lovewell to have more detailed water level management than the other 5 reservoirs.

Lovewell Reservoir's past water levels have experienced record lows in 1991 and record high in 1993: fisheries were stressed in 1991, whereas facility damage and severe shoreline erosion occurred in 1993.

- | | |
|------------------------------------|---|
| October 1- December 15: | Allow water level to rise to elevation 1580.6 NGVD. If waterfowl habitat conditions warrant, it may be requested to increase the lake level to conservation pool (1582.6 NGVD) by October 15. |
| December 15- March 15: | Maintain a stable water level at or near elevation 1580.6 NGVD. |
| March 15 - July 1: | Water level recharges slowly, from natural run-off or recharging by Irrigation District, to elevation 1583.4 NGVD, if necessary. |
| July 1- September 1: | Allow evaporation and irrigation releases to lower the lake level to elevation 1571.7 NGVD (10.9 feet below conservation pool). |
| September 1 – September 30: | Following the irrigation season begin refilling of reservoir |

Waconda Lake
Conservation Pool = 1455.6 Flood Pool = 1488.3 5% into FP = 1458.3



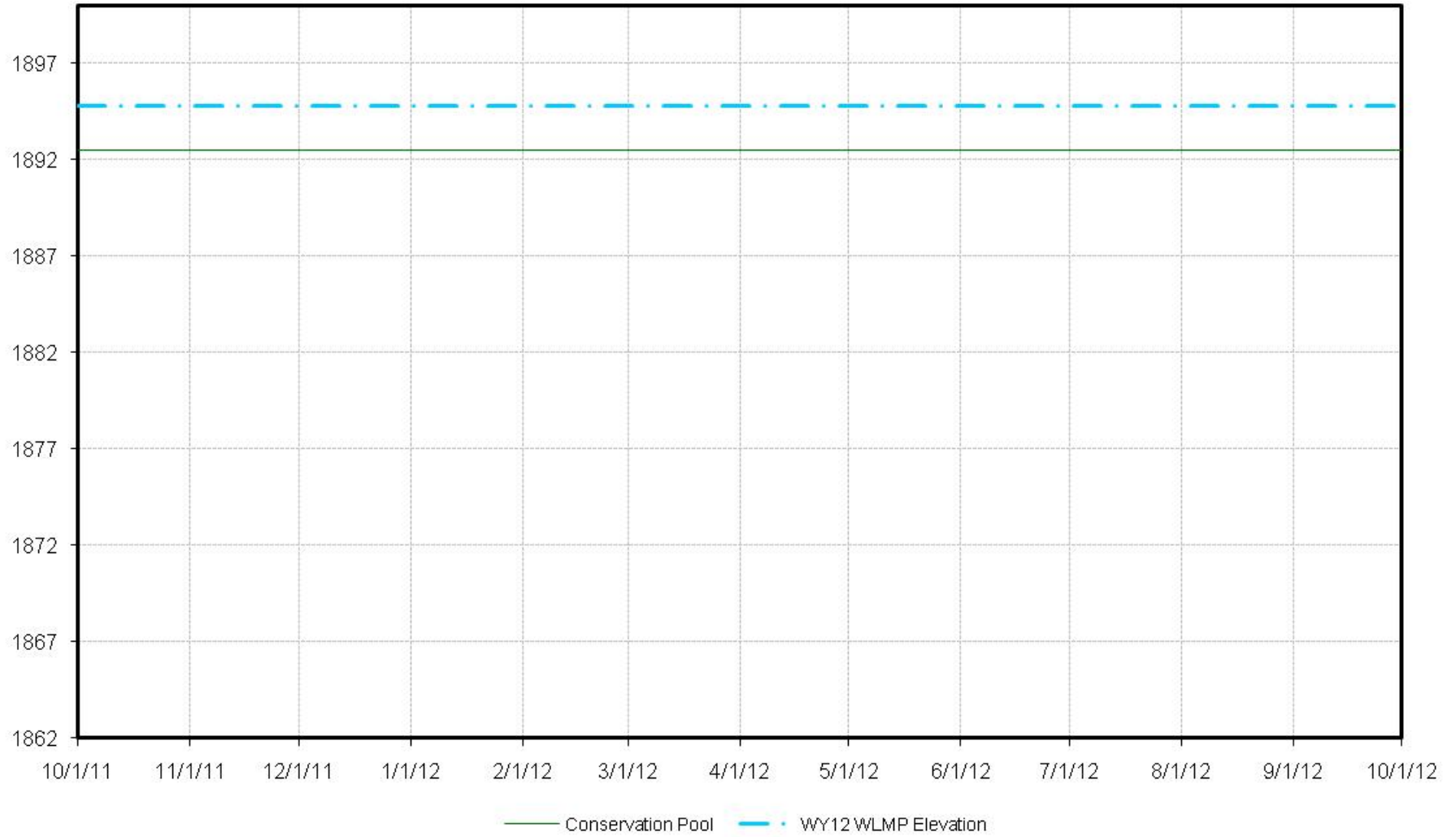
WACONDA LAKE

When the water level is below 1454.6 NGVD, hold as much water as possible while still meeting downstream needs. The purpose of the lake management plan is to make use of the available water for benefit of fish, wildlife and recreational uses.

- October 1 - December 1:** Maintain a level of 1455.6 NGVD.
- December 1- December 31:** To reduce shoreline erosion in the park areas and to provide a buffer for spring rains, lower the water level and maintain it between 1454.6 NGVD and 1453.6 NGVD, as prescribed in the lake operating plan. Beginning date of the drawdown may be adjusted on the basis of weather conditions and lake water temperature.
- December 31- March 15:** Maintain lake level between 1454.6 NGVD and 1453.6 NGVD.
- March 15 - May 15:** A stable or slightly rising water level up to 1455.6 NGVD is preferred for game fish spawning purposes. Rapid drawdowns and large operational releases should be avoided during March, April, and May, when possible.
- May 15 - September 15:** Preference for shoreline re-vegetation is to lower the water level to 1454.6 NGVD from May 15 to June 1 and then hold the water level at 1454.6 NGVD. Irrigation releases for the period May 15 to Sept. 15 are anticipated to draw the lake level down by one to two feet in a normal year and by more than two feet in extremely dry years. By allowing irrigation releases to control the timing of the drawdown, the goal of shoreline re-vegetation will hopefully be achieved while maximizing benefit of the storage for irrigation use.
- September 15 - October 1:** Following the irrigation season begin storing inflow. Raise level to 1456.6 NGVD for waterfowl, subject to approval by the Corps of Engineers, who may limit the rise to conservation level at 1455.6 NGVD for flood control.

Webster Reservoir

Conservation Pool = 1892.45 Flood Pool = 1923.7 5% into FP = 1894.8



WEBSTER RESERVOIR

Webster Reservoir has a history of not recharging after irrigation drawdowns. Such recharges have happened in the past, but are infrequent. In 1993 and 1995, the lake elevation rose up to 15 feet over conservation pool (1892.45). Recharges to five percent of flood pool (1894.8) occurred from 1996 to 2000.

Webster Reservoir was designed to provide flood control, irrigation, and recreational opportunities. Throughout the history of this reservoir, low supplies of water have limited the ability of the resource to satisfy all demands. The Webster Irrigation district has experienced water shortages and the fisheries resource has been adversely impacted by erratic fluctuations, extreme drawdowns and high content withdrawals associated with the irrigation function throughout periods of inadequate recharge.

The Webster Reservoir water supply issue is addressed in the State Water Plan and is an important concern among managing entities and the general public. Numerous efforts to deal with this problem have thus far been unsuccessful. The five-percent storage plan, while not a solution, is a positive move towards wise use of surface water supplies whenever above-average reservoir recharge occurs. Five percent of the flood pool (9,161 acre-feet) represents nearly 50% of the average annual diversion required for full irrigation.

The chances of maintaining lake elevations at or above conservation level in the future are remote. Water levels have returned to the declines seen in the past with irrigation releases and inadequate inflow. Holding water up to 5% into the flood pool in the future will provide significant short-term benefits for fishing, park visitation and water based recreation. However, habitat redevelopment around conservation pool elevation in the longer-term future may impact decisions on the overall benefits of holding water above conservation level.

This plan proposes to continue to store five percent of the flood pool whenever possible. Irrigation releases and evaporation will lower the lake level. Recharge in the fall that is sustained to the start of the irrigation season would be of the most benefit to all aspects of the reservoir but will only occur with significant natural inflow.

Positive impacts associated with this plan include:

- 1) Provides a buffer against the effects of irrigation withdrawals.
- 2) Increase productivity of the aquatic environment thereby enhancing the fishery resource: The conditions depicted by the proposed water level management plan are considered ideal the fisheries management at Webster Reservoir. Rising or stable water levels during the spring promote reproduction, survival and growth of various fish species by providing quality spawning habitat and nursery cover and enhancing primary productivity. Drawdown during the summer and early fall allows natural re-vegetation of exposed areas which can be subsequently flooded whenever recharge is adequate. Utilizing the five-percent option provides greater shoreline development and increased angler access to both the State Park and Wildlife Area throughout the year by maintaining a higher annual water level trend. The importance of water level fluctuations in regards to the prosperity of the Webster Reservoir fishery are documented in Region 1 Fisheries Progress Reports, Kansas Department of Wildlife and Parks 1979 – 1998.

- 3) Optimizes the economic benefits associated with the sport fishery: In a study conducted by the Kansas Department of Wildlife and Parks for the U.S. Bureau of Reclamation (1998), the total estimated economic value of the Webster fishery (stilling basin included) was \$11,129,238 during the 20 month period of evaluation (March, 1995, October, 1996 and March, 1997 – February, 1998.) This resource is an important component of the local economy. The proposed water level management plan would enhance the economic value of this fishery.
- 4) Increases visitation at the State Park: Past visitation records at Webster State Park, show that the higher the water level, the higher the visitation. This is highly dependent on a healthy fishery created by high water levels. Other activities enhanced by the higher more stable lake levels are boating, skiing, swimming, and camping. Park aesthetics are improved by developing permanent campgrounds and other facilities near the water edge. All these activities increase park customer satisfaction, which increases visitation and optimizes the economic benefits associated with the State Park and the local economy.
- 5) Increases the ease and usability of Webster Reservoir boat ramps: The boat ramps within the State Park and the Wildlife area are usable when water levels are maintained as proposed in this plan. As water levels decline to five feet below conservation level, the ramp on the Wildlife Area becomes unusable and the ramps within the State Park become increasingly longer and make launching boats more difficult.

Negative impacts associated with this plan include:

- 1) Loss of terrestrial, riparian and wetland acreage: Storing five percent of flood pool inundates 266 acres of terrestrial, riparian and wetland habitats, which are part of the wildlife mitigation acreage surrounding the reservoir. Recovery of this acreage is delayed by repeated flooding. Migrating waterfowl and shorebirds benefit if recharge occurs in the fall and inundates vegetation. However, high water levels in the spring, reduced slowly by irrigation, destroy vegetation established the previous year and expose the shoreline, which enhances germination of less desirable plants. Mechanically reseeding these areas to date has generated marginal success.

Expanding range of Canada thistle: The distribution of Canada thistle around the reservoir is directly related to water levels. Continued flooding and drawdowns above the conservation level creates a new area that allows the expansion of Canada thistle.

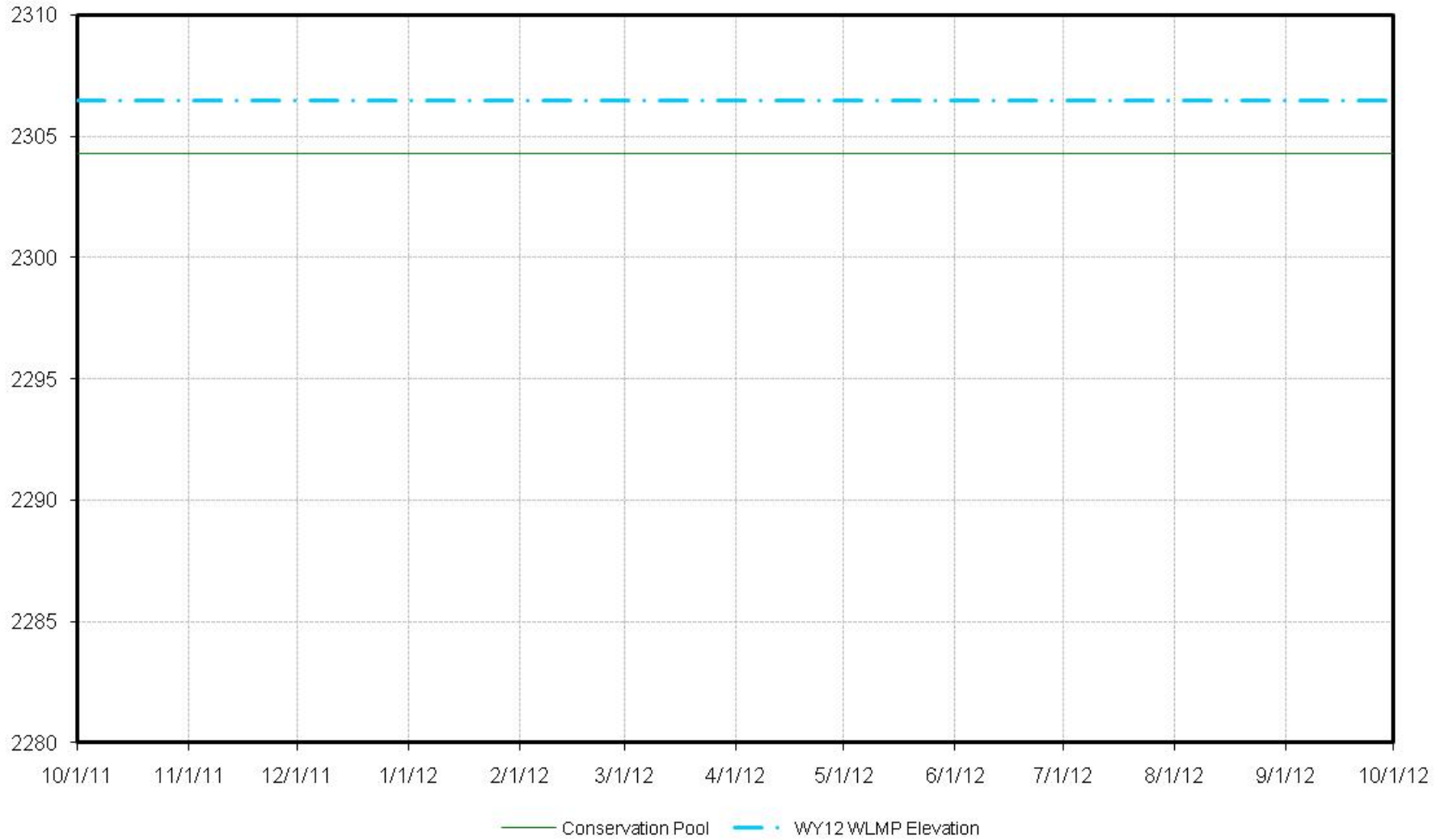
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Keith Sebelius Lake
Conservation Pool = 2304.3 Flood Pool = 2331.4 5% into FP = 2306.4



KEITH SEBELIUS LAKE

Kansas Department of Wildlife and Parks are responsible for providing quality recreational opportunities to all users of Keith Sebelius Lake, Prairie Dog State Park, and Norton Wildlife Area. The opportunities provided to the public must be consistent with the conservation of those resources.

Keith Sebelius Lake was designed to provide flood control, irrigation, municipal, fish, wildlife and recreation benefits. Throughout the history of this reservoir (Figure 1), irrigation drawdowns and evaporative losses in excess of inflow have caused significant decreases in fishing; water based recreation and park visitation. Low water levels are benefiting wildlife but having an adverse impact on the available fish habitat that currently exists within the reservoir.

Above average rainfall during the 1990s created inflows sufficient to refill the reservoir. Holding the reservoir two feet above conservation elevation destroyed the trees around the perimeter of the reservoir and eliminated their value as shade and wind protection for park visitors and eliminated the wildlife habitat that took several decades to establish. However, holding water levels above conservation has also reduced the impact of irrigation losses in the short term and extend the quality of fishing, water based recreation and park visitation.

Water levels remaining at or above conservation level in the future are remote. Water levels have returned to the declines seen in the past with irrigation releases and inadequate inflow. Holding water levels 5% in the flood pool in the immediate future when possible will provide significant short-term benefits for fishing, park visitation and water based recreation. However, habitat redevelopment around conservation elevation in the longer-term future may impact decisions on the overall benefits of holding water above conservation level.

The Water Level Management Plan specifically addresses storage of five percent of the flood pool, whenever inflow can reach this elevation, which is at (2304.3 msl). Holding the reservoir five percent into flood pool will raise the elevation pool 2.16 feet above conservation elevation. The following table was derived from the Bureau of Reclamation (BOR) daily hydrological sheets and BOR capacity and surface area tables.

	Elevation Feet	Area (Acres)	Content (Acre Feet)
Conservation Elevation	2304.30	2181	34510
5% Above	2306.46	2409	39469
Difference	2.16	228	4959

This plan proposes to continue to store 5% of the flood pool whenever possible. Irrigation releases and evaporation will lower lake levels. Recharge will only occur with significant inflows.

Positive impacts associated with this plan include:

- 1) Provides a buffer against the effects of irrigation withdrawals and conservation of the surface water supply.
- 2) Increases productivity of the aquatic environment thereby enhancing the fishery resource: The fisheries resource has been adversely impacted by erratic fluctuations, extreme drawdowns and high content withdrawals associated with the irrigation function throughout periods of inadequate recharge. The importance of water level fluctuations in regards to the prosperity of the Sebelius Reservoir fishery is documented in Region 1 Fisheries Progress Reports, Kansas Department of Wildlife and Parks, 1979 – 1998.
- 3) Optimizes the economic benefits associated with the sport fishery: In a study conducted by the Kansas Department of Wildlife and Parks for the U.S. Bureau of Reclamation (Mosher, 1997), the total estimated economic value of the Sebelius fishery was \$4,134,450 in 1995 and \$3,908,502 in 1996. This resource is an important component of the local economy. The proposed water level management plan would extend and enhance the economic value of this fishery.
- 4) Increases revenue and visitation at Prairie Dog State Park: Since 1965, records indicate that the parks' revenue and visitation increase with higher water levels. The opposite is also indicated where the revenue and visitation decrease during times of low water levels and during reservoir drawdown. Record visitation has always occurred when the reservoir was at or near conservation pool.
- 5) Increases the ease and usability of boat ramps and floating docks: The boat ramps within the State Parks and the Wildlife Area are usable when water levels are maintained as proposed in this plan. As water levels decline to five feet below conservation level; the ramps within the park became increasingly longer and make launching boats more difficult; the wildlife area ramps become unusable.
- 6) Extends water based recreational opportunities and the economic benefits to the local economy.
- 7) Improves park aesthetics: Development of permanent campgrounds, roads, and docks has already occurred. The park facilities have been adjusted to accommodate the increase in water storage.

Negative impacts associated with this plan include:

- 1) Destruction of 218 acres of terrestrial habitat with the potential destruction of more: Conservation elevation was established to provide for water storage for irrigation, water-based recreation, fishing and park visitation. It also

- establishes the area above conservation for wildlife habitat as mitigation for habitat lost in the establishment of the reservoir.
- 2) Loss of flood protection for wildlife habitat: A flood experienced when the reservoir is 5% above conservation elevation would affect an undetermined amount of habitat. A one-foot increase above 5% would also affect through roads in three locations, make one boat ramp unusable, and flood three toilets.
 - 3) Increases the long-term expansion of noxious weeds above conservation elevation.

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