CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Potential environmental impacts cannot be determined without first understanding existing conditions in an affected environment. For this reason, the impact analysis process for the Wister Lake project involves two steps. First, this Supplemental Final Environmental Statement (FES) presents the existing setting, as well as the setting since publication of the Wister Lake FES in 1973. These details about setting make up the "baseline" environment discussed in Chapter 3. Second, it uses details of the current operational procedures and knowledge of the changes in conservation pool levels to assess impacts on the existing environment, or the "environmental consequences." This chapter (Chapter 4) presents that assessment of environmental consequences for the proposed action and the no-action alternative.

The resources analyzed in this document are interdependent. For example, impacts of erosion to soils might affect local vegetation, which in turn could affect wildlife species that depend on the plants for food. An increase in flooding might affect land management techniques. Pool fluctuations might increase erosion near archaeological sites, which could expose buried deposits and lead to public collection and vandalism. The amount of water in the conservation pool could affect water quality and recreational activities, which could in turn affect the local economy. Because of these types of interdependencies, this Supplemental FES was prepared by an interdisciplinary team.

The process is designed to focus analysis on those environmental resources that could be affected by the proposed action. Potential effects may result from operating the Wister Lake project differently in the affected environment—flooding could affect the area around Wister Lake and downstream areas on the Poteau River, inundation (submergence) could impact resources around Wister Lake, and pool fluctuations could erode areas around the lakeshore. The frequency and duration of floods at 471.6 and 478.0 feet and effects from pool fluctuations on shoreline areas will be presented in section 4.2 which discusses hydrology and water quality. Additional resources will be discussed by examining increased effects from flooding, inundation, or pool fluctuations on land use, recreation, socioeconomics, and other resources. For instance, biological resources such as vegetation, wetlands, wildlife, fish, and threatened and endangered species could be affected by inundation (through loss of vegetation and habitat), flooding and siltation, and increased sedimentation and reduction in water quality (affecting fish habitats).

4.2 HYDROLOGY AND WATER QUALITY

Potential hydrology and water quality impacts within the affected environment resulting from the continued operation of the conservation pool at 478.0 feet could include increased flooding, erosion, sedimentation, and degradation of surface water and groundwater. Therefore, the analysis focused on determining the frequency and duration of floods for Wister Lake and downstream areas, the potential for erosion, and impacts of sedimentation on water quality.

For this analysis, flooding impacts are considered adverse if damages to structures or facilities within the of the 100-year floodplain are more frequent. Impacts from erosion and sedimentation would be considered adverse if runoff velocities at surface-water discharge areas increased and caused more sedimentation within the affected environment. Increased runoff impacts would be adverse if the alternative increased discharge of surface water and therefore affected pool elevation or downstream flooding. Water quality impacts would be adverse if development of the alternative degraded surface water or groundwater below established thresholds.

The Southwest Division computer program, known as the SUPER Model, was used to model the Wister Lake pool and outflow from the dam as well as the flows at the Poteau and Panama control points. The methodologies, output files, and a detailed description of the model are included in Appendix B.

4.2.1 Geology and Soils

Proposed Action

Geologic resources consist of all soil and bedrock materials. For the purpose of this study, soil and rock refer to all unconsolidated and consolidated materials, respectively, regardless of depth. Geologic resources include mineral deposits, significant landforms, tectonic features, and paleontologic remains. These resources have scientific, economic, and recreational value. Potential impacts associated with geologic resources and soils are evaluated in terms of damage to existing geologic resources or increases in soil erosion.

Changing the conservation pool from 471.6 feet to 478.0 feet did not adversely affect resources occurring between these elevations at Wister Lake. Within the 6.4 feet of affected area between the two conservation pool levels, there are no known significant geological (landforms, features, or paleontological remains) resources. Therefore, no impacts due to inundation around Wister Lake are associated with the alternative. Since the Wister Lake project contributes little to flooding, either downstream or at Wister Lake, no impacts to earth resources is anticipated with a conservation pool at 478.0 feet. Wave action on the shoreline has caused some erosion, particularly between 471.6 and 478.0

feet. Soil associations at 471.6 and 478.0 feet around the lake are similar, and practices to reduce shoreline erosion are necessary at both elevations. The erosion was compounded by seasonal inundation of shoreline vegetation at 478.0 feet between 1974 and 1996. Periodic inundation around Wister Lake killed some shoreline vegetation and led to additional erosion. Several management procedures have been initiated to reduce soil erosion. These procedures include establishing water-tolerant grasses and other groundcover, placing rock revetments below the dam, and shoreline stabilization.

Erosion downstream does not appear to be extensive due to the low volume of floodwater released from Wister Lake.

No Action

Impacts to geology and soil for the no-action alternative would be the same as the proposed action. There are no adverse effects from either raising the conservation pool level or from operating the Wister Lake project pool at 478.0 feet. Management practices have been instituted to reduce the effects of erosion along the shore.

4.2.2 Surface Water and Groundwater

Proposed Action

Continuing to maintain the conservation pool elevation at 478.0 feet would not have any impacts on the surface water sources in the Wister Lake watershed. All existing tributaries and intermittent streams would continue to flow into Wister Lake at current runoff rates during rainstorm events. Maintaining the top of the conservation pool at 478.0 feet has not impacted contracts to water users. Currently Oklahoma Water Resources Board (OWRB) is issuing permits for water below Wister Dam.

The highest pool elevation recorded at Wister Lake was 508.2 feet in May 1990. This is considered to be the 100-year flood event. No significant drawdown has been recorded at the lake due to the hydrology in the basin. A more detailed analysis of peak pool elevations is included in Appendix B.

Providing that releases are regulated to maintain discharges within 7,200 cfs, no increase in channel scour is expected. Discharges below the Wister outflow would be greater than the 7,200 cfs only when the pool elevation exceeds the 502.5-foot elevation of the spillway. Combined flows from the Wister outflow, spillway, and uncontrolled streams would cause flooding; however, the frequency and duration of the flooding would not be significantly influenced by the conservation pool level. Maximum pool elevation duration plot at Wister Lake (Figure 4.2-1) shows that a pool elevation of 502.5 would be reached one percent of the time. The comparative frequency plot (Figure 4.2-2) shows a pool elevation of 502.5 feet

would have a 16 percent chance of occurring in any given year with the top of conservation pool set at 478.0 feet. When the top of conservation pool elevation is set at 471.6, the 502.5-foot elevation would have a 14 percent chance of occurring in any given year. Thus, only a two percent increase in chance of the pool elevation reaching 502.5 would be seen as a result of the proposed action. Frequency and return period analysis are detailed in Appendix B. The 502.5 feet pool elevation would tend to occur approximately every 6 or 7 years (Appendix B).

Figure 4.2-1 Maximum Pool Elevation Duration at Wister Lake

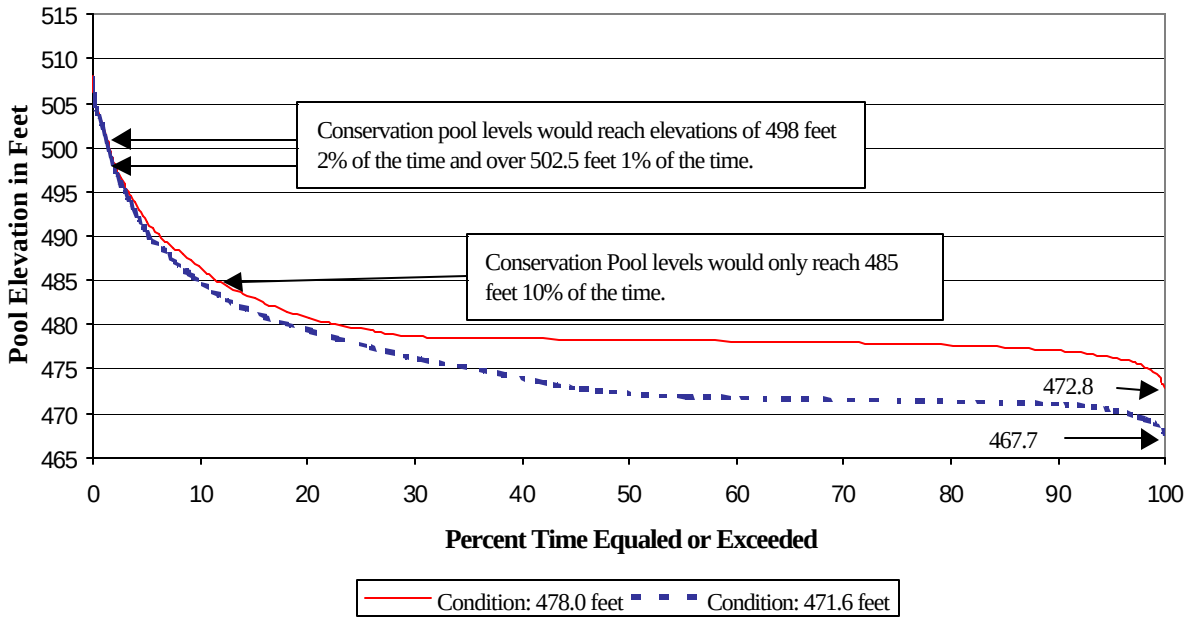
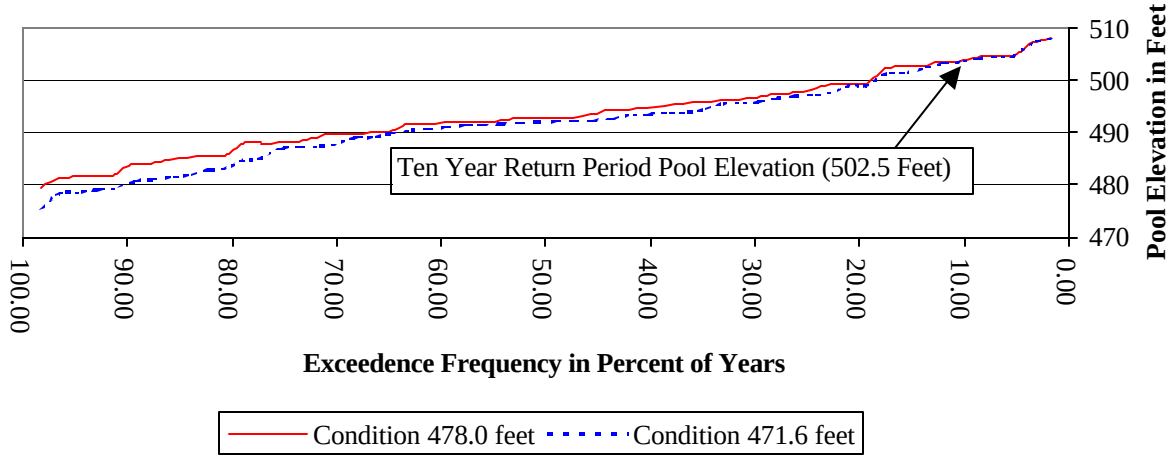


Figure 4.2-2 Comparative Frequency Plot of Wister Maximum Elevations



The 10-year flood event would not be significantly influenced by the conservation pool elevation increase to 478.0 feet.

Figure 4.2-1 shows that with the proposed action, the time in which the pool level reaches or exceeds the 502.5-foot elevation would not significantly increase. Above 490.0 feet, there is little difference in pool behavior between the two pool levels (Figure 4.2-1). In addition the majority of the time, operations are within the 471.6 to 485.0 range for both conservation elevations. The minimum and maximum pool elevations for 478.0 feet and 471.6 feet conditions would be 472.82 and 508.11 feet, and 467.74 and 508.01 feet, respectively.

The flow duration curve at Wister (Figure 4.2-3) indicates that the duration and frequency for releases equal to or exceeding 7,200 cfs would not be significantly influenced by the 478.0-foot conservation pool elevation. Yearly peak discharges at the Wister Outflow would frequently be at or near bankfull flow. However, only large events such as the 25 or 100 years storms would create conditions where outflow would be greater than 7,200 cfs. Table 4.2-1 compares discharges and their associated return periods for both conservation pool elevations. The table shows minimal changes in discharges or return periods for the 478.0 feet and 471.6 feet conditions.

Table 4.2-1 Comparison of Wister Outflows and Return Periods

	Recurrence Interval (Years)*				
	2	*5*	*10*	*25*	*57*
Top of Conservation Pool Elevation 478.0 Feet	6,600 cfs	6,600 cfs	6,600 cfs	17,662 cfs	22,839 cfs
Top of Conservation Pool Elevation 471.6 Feet	6,600 cfs	6,600 cfs	6,600 cfs	17,678 cfs	21,581 cfs

*Modeled regulating outflow = 6,600 cfs
Current regulating outflow = 7,200 cfs

At the Wister outflow there would be a minimal increase in percent of time that the flood stage flows below Wister occur, when the Wister pool is set at 478.0 feet (Figure 4.2-3).

Figure 4.2-3 Annual Flow Duration at Wister Outflow

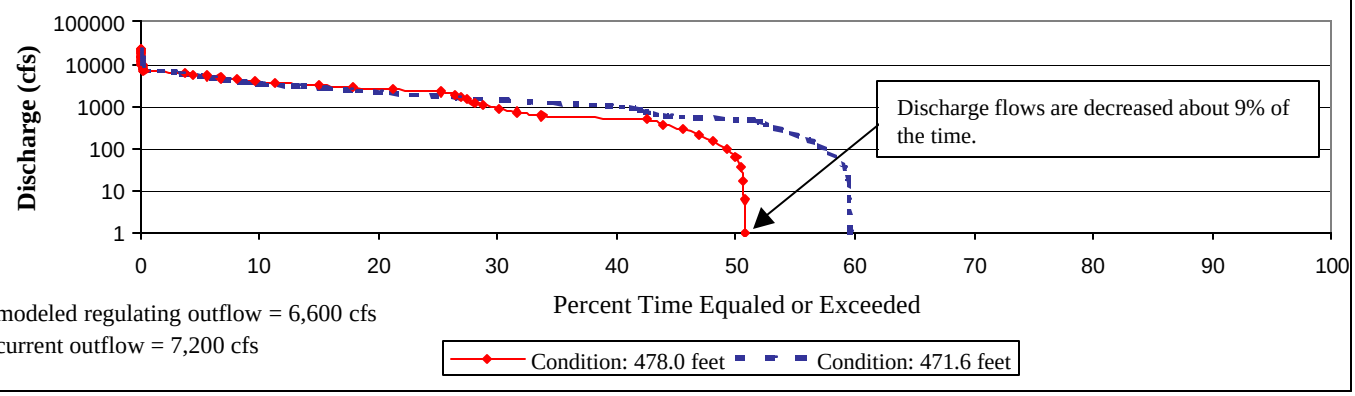
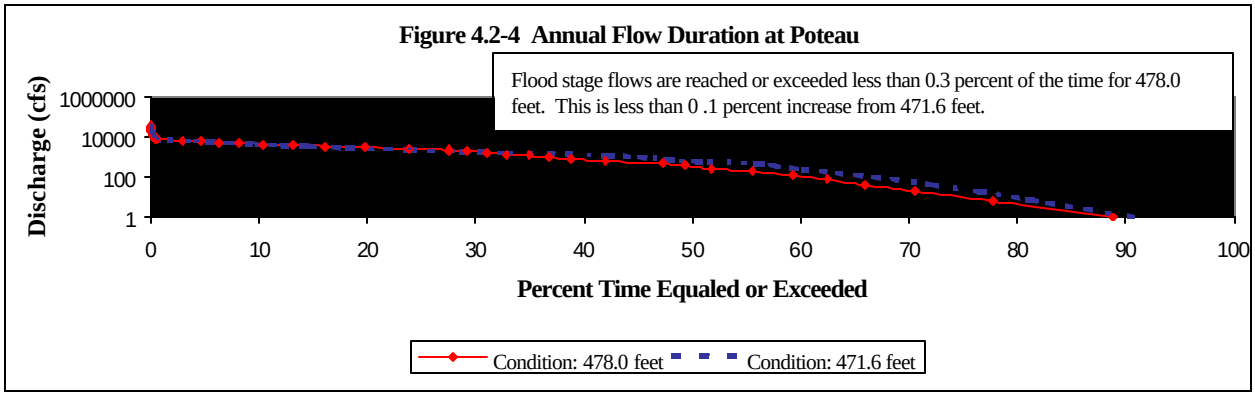


Figure 4.2-4 shows comparable flows at both pool conditions in the lower reaches of the Poteau River. The bankfull flow for the lower economic reach is 11,496 cfs and would be exceeded less than 0.5 percent of the time in both pool elevation conditions. The 478.0-foot conservation pool elevation has less effect on in stream flows in the lower reach. This is due to significant flow from uncontrolled tributaries that add volume to the lower reach.

Figure 4.2-4 Annual Flow Duration at Poteau



*Bankfull flow at Poteau was modeled with 7,200 cfs.

Downstream channel scouring has not been a problem in the Poteau River below the dam, as the geology of the channel prevents scouring and undercutting. Inspection and maintenance records indicate that the channel below the dam has remained stable since dam operation began. Groundwater supply and recharge is nonexistent in the affected environment and will not be impacted in this alternative.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. Minimal changes to surface water and groundwater would occur, and would be the same under the Proposed Action.

4.2.3 Water Storage/Allocation

Proposed Action

Raising the conservation pool elevation from 471.6 feet to 478.0 feet has resulted in a gain of 37,532 acre-feet of water storage. This amount represents an increase in conservation storage above the 471.6-foot elevation. The dependable yield of the reservoir at 471.6 feet is 14.31 million gallons per day (mgd), with conservation storage of 9,025 acre-feet. Currently, the dependable yield in the conservation pool at the 478.0-foot elevation is 60.11 mgd. This represents an increase in the dependable yield of 45.8 mgd. This dependable yield is based on a conservation storage of 46,557 acre-feet. Of this amount,

14,000 acre-feet of water is under water supply storage contracts. Under the proposed action, water storage would provide sufficient yield to meet water supply storage requests.

Projections for water use show that 13 mgd would be needed in the four-county area by 2010. An additional 20 mgd would be needed by 2050. Currently, OWRB is issuing natural flow permits for diverted water below Wister Dam. A calculated 908,031 acre-feet/year of water are available for appropriation (OWRB 2001). In the proposed action, there is no anticipated interference to diverted water for the users downstream of Wister Lake.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. No changes to water storage and allocation would occur. Additional conservation storage should be sufficient to meet future allocation needs.

4.2.4 Water Quality

Water studies at Wister Lake indicate that water quality problems are caused by turbidity and heavy nutrient load from poultry wastes.

Pollutant sources within the Wister Lake Watershed are both point and nonpoint in origin. Several point source wastewater treatment plants discharge within the watershed. Numerous nonpoint sources include abandoned and operating mines, county and forest roads, oil and gas exploration and production activities. Nonpoint sources of nitrogen and phosphorus are predominantly associated with agriculture. The largest producer of agriculture nonpoint pollution in Le Flore county is the poultry industry (OWRB 1996). Poultry waste is spread over fields, many of which are located within the flood plains along the Poteau River which subsequently wash into the surface water. OWRB has suggested that water quality can be most improved through land management techniques. Change in the level of the conservation pool would not impact nutrient loading.

A large percentage of Wister Lake is less than 3 feet deep at the conservation pool elevation of 471.6 feet. New data from a 2001 bathymeteric survey will be available in 2002 showing new depths at the 478.0-foot condition. The shallowness of the 478.0-foot condition permits loose sedimentary material such as silt, mud, clay, and organic material to become suspended in the water column as waves stir up the bottom. Turbidity has aesthetic effects that are difficult to quantify. The suspended solids may affect the fish and other aquatic fauna by causing abrasive injuries or by interfering with light penetration through the water and photosynthesis.

The conservation pool elevation has negligible impacts on water quality. Pool elevations are not raised enough to significantly reduce sediment resuspension. Modeling efforts predict mean depth would have to be increased more than 10 feet to alter water quality. This 10-foot increase is not feasible because of the topography within the easement. However, slight changes to turbidity have been documented at the lake when pool levels are higher for extended periods.

No historical data has been analyzed for affects of fluctuating conservation pool elevations and how they relate to stratification patterns in lake. Wister Lake is currently undergoing studies by the OWRB to look as such potential effects. The data collected in 1996 showed inconclusive results in trends of temperature profiles. This is due to the characteristics of Wister Lake and the sampling not coinciding with short-term weather events. Average Wister Lake depths are shallow, however, in the riverine, transitional, and lacustrine zones of the reservoir, temperature profiles can vary significantly.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. No changes to water quality would occur due to conservation pool increases or operation of the Wister Lake project.

4.3 AIR QUALITY

Proposed Action

The Metropolitan Fort Smith Interstate Air Quality Control Region, which contains Wister Lake, is designated as in attainment (DEQ 2001). National Ambient Air Quality (NAAQS) are in compliance for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than ten micrometers in diameter (PM_{10}), and lead (Pb).

Since the proposed action would not change the type or amount of pollutants currently emitted into the atmosphere, NAAQS would remain in compliance for all emissions and particulate matter.

No Action

No changes to air quality would occur under the no-action alternative and there would be no change in the types or amounts of pollutants emitted into the atmosphere.

4.4 BIOLOGICAL RESOURCES

Impacts to biological resources, including vegetation, wetlands, and unique and sensitive areas, were identified during analysis. The majority of impacts were caused by the initial raising of the pool level to 478.0 feet and subsequent seasonal lowering. Most impacts were lessened once the pool level was stabilized at 478.0 feet. However, because mitigation for the initial raise and seasonal fluctuations of the pool were not undertaken at the time, current mitigation measures would seek to rectify habitat loss originating from the initial level of 472.

4.4.1 Vegetation

Proposed Action

Initial impacts to vegetation occurred when the conservation pool was raised from 471.6 to 478.0 feet seasonally level (June through December). Approximately 3,254 acres of vegetation, including bottomland hardwood forests, grasslands and upland forests, were inundated. Studies done in 1974 indicated that the majority of impacts to vegetation were caused by the initial fluctuations of the pool level to 478.0 (USACE 1983). The higher water levels in summer affected vegetation by drowning seedlings and inundating root systems of larger established trees during their growing season. The permanent raising of the pool to 478.0 actually had a stabilizing effect on vegetation within the previously seasonally inundated areas. With a consistent source of water, stable emergent and submerged vegetation has established and provided winter and spring habitat. Shoreline habitat probably transformed into uplands and wetlands habitats similar to those that occurred prior to the pool level increase.

Vegetation types that occur within the current pool fluctuations of the study area include evergreen forest, deciduous/evergreen forest, woodlands, and grasslands. Current water fluctuations above the 478.0 foot conservation pool are temporary and have little impact to wildlife species or habitats. Since water levels are maintained above 472.0 feet with a conservation pool at 478.0 feet, the low water pool levels are now higher than the original level of the conservation pool. Therefore, low water levels are not an issue.

The USFWS found that a Habitat Evaluation Procedure (HEP) assessed the loss of terrestrial habitat to be approximately 2,600 acres (USFWS 2002) after a 100-year period. This included losses to forests, woodlands, grasslands, and shoreline (Appendix E). The HEP assessed potential habitat loss through the modeling of vegetation over a period of time, allowing for the reestablish of vegetation and habitat types after the water level fluctuation.

Any potential flooding downstream could temporarily affect habitat and vegetation. However, vegetation downstream was not affected by the change in conservation pool level, because flood stage releases from Wister Lake Dam increased less than 10 percent of the time.

No Action

Impacts to vegetation for the No Action Alternative would be the same as the Proposed Action, however no mitigation measures would be implemented.

4.4.2 Fish and Wildlife Resources

Raising the pool level to 478.0 feet decreased the amount of terrestrial wildlife habitat, however, maintaining the pool level at 478.0 feet has improved previously disturbed shoreline resources. Approximately 3,254 acres of wildlife habitat were submerged, including 300 acres of constructed waterfowl marshes. However, aquatic habitat was increased once the pool level was stabilized at 478.0 feet.

The majority of impacts to fish and wildlife habitat were not due to the raising of the pool level, but to the water fluctuations prior to the permanent pool elevation of 478.0 feet. Because submerged and emergent shoreline vegetation found along the shallow shoreline water was exposed or not allowed to fully develop, the lake fluctuations impacted both aquatic and terrestrial species. Emergent vegetation found around the shorelines of the lake during the summer months was lost as habitat during the winter as drawdowns lowered the water and exposed mud ring flats. This loss of vegetation removed the aquatic vegetation as potential foraging areas for waterfowl and spring spawning and nursery habitats for fish. Because water quality was not significantly affected by the raised pool, fisheries were not noticeably improved. However, both waterfowl and fisheries benefited from the additional shoreline vegetation as a food source and spawning and rearing habitat. Temporary drawdowns now allow for additional food plantings for waterfowl, which require moist but not inundated conditions to grow. These plants are then inundated at the end of the growing season to optimize spawning and nursery conditions for fish and foraging habitat for waterfowl. In addition, water levels are maintained above 472.0, higher than the original level of the conservation pool. Therefore, low water levels have no adverse impact to fisheries.

As discussed in the vegetation section above, the USFWS assessed the loss of terrestrial habitat to be approximately 2,611 acres (USFWS 2002) after a 100 year period (Appendix E). The same HEP study indicated an increase in aquatic habitat by about 3,213 acres. Baseline conditions for the HEP were considered to be prior to the seasonal pool change from 471.8, and take into account all lands impacted by the permanent level increase to 478. Vegetation types were given a value based on habitat suitability for certain indicator species such as deer, coyote, shorebirds, catfish and crappie.

The majority of land downstream consists of cultivated crops or pasture, minimizing potential wildlife habitat. Any potential flooding downstream would only have temporary impacts. However, because changes in water levels within Wister Lake also cause minimal changes in water flow releases downstream, impacts to fish and wildlife resources along the Poteau River are also expected to be minimal.

No Action

Under the No Action Alternative, operation and maintenance of Wister Lake would remain unchanged. Impacts to fish and wildlife would be the same as the Proposed Action, however no mitigation measures would be implemented.

4.4.3 Unique and Sensitive Areas

Proposed Action

As a result of the seasonal pool fluctuations to 478.0 feet conducted from 1974 to 1996, impacts to unique and sensitive areas included loss of approximately 3,254 acres of the wildlife management area (WMA); 288 acres of greentree reservoirs, marshes, and waterfowl resources; and increased inundation of the waterfowl refuge.

A 128-acre greentree reservoir and marsh was constructed by the Oklahoma Department of Wildlife Conservation (ODWC) to offset losses from the seasonal inundation. Recreational opportunities for other terrestrial game species such as deer and turkeys within the WMA may have decreased slightly because of the decrease in available habitat. Waterfowl hunting opportunities within Wister WMA were initially decreased due to the lack of wintering habitat (see section 4.4.2); however, with the permanent raising of the pool level, waterfowl hunting opportunities have been potentially increased by the additional habitat available. The ODWC indicated that the more frequent flooding of the waterfowl refuge would not impact habitat or operation of the facilities (USACE 1983).

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. Impacts to unique and sensitive areas would be the same as the Proposed Action, however no mitigation measures would be implemented.

4.4.4 Protected Species

No protected species are located within the study area around Wister Lake or downstream within the affected areas. One potential species, the American burying beetle, was not found during surveys in the study area. Other protected species such as the bald eagle or Indiana bat may temporarily forage in or migrate through the project area. However, changes in lake levels would not affect these activities. Overall, no impacts to threatened and endangered species, or their critical habitat, are expected from maintaining the pool level at 478.0 feet (USFWS 1993). In addition, because water levels in Wister Lake would result in only minimal changes in water releases downstream of the dam, protected species along the Poteau River floodplains would also be unaffected.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. There would be no impacts to protected species.

4.4.5 Waters of the U.S. and Wetlands

The change in pool level to 478.0 feet affected classes of wetlands. Approximately 3,254 acres of open water were gained with the seasonal rise to 478.0 feet. The exact amount of inundated wetlands can not be determined due to a lack of data prior to the pool level increase. However based on existing patterns of wetlands, the majority of wetlands inundated would have potentially been lacustrine. Lacustrine wetlands are located in the shallow shore waters and immediately adjacent to the pool. Palustrine wetlands would have occurred at slightly higher elevations with more terrestrial vegetation, further away from the conservation pool. Increased water levels would have brought the shoreline closer to these wetlands types. Reestablishment of wetlands was hindered until the permanent establishment of the pool at 478.0 feet. Within a few years of the stabilizing of water levels at 478.0 feet, wetlands reformed in patterns similar to those lost in the original inundation. About 4,000 acres of lacustrine wetlands and 1,100 acres of plaustrine wetland now occur within the shorelines of the 478.0 conservation pool. In the area just above the current 478.0 conservation pool the majority of wetlands are palustrine. Only 247 acres are lacustrine and almost 3,000 acres are palustrine. It is probable that there will be a minimal loss to wetlands after the pool level has stabilized and the wetlands reformed. Therefore, no mitigation for loss of wetlands is necessary.

Wetlands along the Poteau River remain unchanged, as river flows for the pool levels are similar.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. Impacts to wetland would be the same as the Proposed Action.

4.4.6 Floodplains

The Wister Lake floodplains were originally formed from the Poteau River; 100-year levels reached about 480.0 feet in elevation. When the dam was constructed, most of the floodplain area was inundated by the lake. Only those areas between 471.6 and 480.0 feet were left exposed. These areas would have been inundated more frequently due to rise in pool level. Areas up to the 480.0 feet would have been inundated approximately 18 percent of the time when the conservation pool level was at 471.6 feet (Appendix B).

When the conservation pool level was raised to 478.0 feet, only 2 feet of the original floodplain remained above the inundation level. Pool levels would reach or exceed the original floodplain level of 480.0 feet only 22 percent of the time (Appendix B). However, since these lands are not developed and are owned by the USACE, periodic flooding would not affect property or residential structures. Vegetation temporarily affected would regrow.

Downstream of Wister Dam, the floodplains would not be affected. No significant changes in releases would occur because the increase in pool level.

No Action

Under the no-action alternative, operation and maintenance of Wister Lake would remain unchanged. Floodplains would not be affected by management or maintenance either around Wister Lake or downstream.

4.5 LAND MANAGEMENT AND USE

Proposed Action

Lands would continue to be managed in the same manner by USACE and the Oklahoma Departments of Tourism and Recreation and of Wildlife Conservation. Lands would continue to be leased for grazing and agriculture. Leases for grazing and agriculture were continued in the same manner from 471.6 feet until the current time (personal communication, Larry Casey, 2001). Le Flore County plans, nor Wister and Poteau city plans, currently propose further development in the affected environment.

When the lake was at the 471.6-foot level and seasonally inundated to higher levels, the use and management of lands immediately adjacent to the lake were similar to those found at the 478.0 level.

Recreational uses such as boating, hunting, and fishing benefited when the pool level was raised. The potential for boaters to damage their water craft on underwater hazards was reduced.

Wildlife management activities and hunting and fishing were also affected. Before the conservation pool permanently raised to 478.0 feet, seasonal fluctuations in the pool levels caused erosion of the shoreline and instability of available habitat and vegetation to support waterfowl, wildlife, and fish. These effects made management of fish and wildlife more complex before the pool was raised. Therefore, impacts of raising the pool level to 478.0 feet were minimal, and mitigation measures such as restoring streamside habitat could occur when the pool level was not seasonally fluctuating.

The potential for flooding downstream at the 478.0-foot pool level would increase only 10 percent of the time than at the 471.6-foot pool level. The flooding that occurs within the 100-year floodplain would continue, but the rise in Wister Lake would not be a significant contributor to the downstream water flow or potential for flooding. Therefore, there are no impacts to downstream land uses from raising the conservation pool or operating the Wister Lake project with a conservation pool at 478.0 feet.

No Action

Under the no-action alternative, there would be no effect to land management or use either around Wister Lake or downstream.

4.6 RECREATION

Proposed Action

Impacts to recreational resources focus on the area around Wister Lake, since there is minimal change to downstream conditions from operating the pool at 478.0 feet.

In 1973, the permanent pool elevation was 471.6 feet. When the water was at this lower elevation, recreationists complained of the odor and submerged hazards to boaters and water skiers. From 1974 to 1996, the lake was seasonally adjusted (June to December) from 471.6 to 478.0 feet (1974 to 1983) and 474.6 to 478.0 feet (1983 to 1996). From 1974 to 1996, some parking and picnic areas, as well as several boat ramps, were submerged during the seasonal fluctuations in pool levels. To accommodate the rising levels in the lake, these areas and boat ramps were moved or modified to mitigate effects of to raising the conservation pool. Therefore, raising the water level may have benefited recreational activities at Wister Lake by providing boating and water-skiing opportunities on the lake.

Under current operations, Wister Lake remains at a permanent pool level of 478.0 feet. Occasional flooding does occur, and some boat ramps are temporarily submerged when the water level goes above 485.0 feet. Recreational activities could temporarily be affected by this occasional flooding. However, there would be little effect to recreational resources above 485.0 feet, since flooding above this level occurs less than 10 percent of the time. Therefore, negligible impacts are anticipated under this alternative. Any impacts could be reduced by recreationists using other boat ramps at the lake or pursuing opportunities in nearby parks and forests.

No Action

Under the no-action alternative, there would be no effect or minimal short-term effects to recreational resources due to the operation and maintenance of Wister Lake at 478.0 feet.

4.7 SOCIOECONOMICS

Analyses of potential impacts to socioeconomic resources performed for this Supplemental FES considered the size and demographic composition of the population, employment, income and other general economic indicators. Typically, socioeconomic resources could be affected by a change in recreational opportunities, loss of grazing lands, or other factors.

In this case, recreation revenues provide less than 1 percent of the income within Le Flore County. Therefore, changes to Wister Lake that may increase or decrease recreational use of the areas would not significantly affect socioeconomics.

Past losses of federal income from the submersion of grazing lease lands was approximately $2,600 (USACE 1987). This calculation included all lands submerged when the conservation pool was raised from 471.8 to 478.0 feet. The revenue lost by the state was $1,950 since 75 percent of the revenue received from grazing leases is returned to the state (USACE 1976). Loss of grazing land was potentially offset by increased surface area for boating and fishing.

No changes to payment in lieu of taxes (PILT) or water supply storage payments would occur. All water supply storage remains allocated, and no new water supply storage contracts were negotiated due to the raise in conservation pool level to 478.0 feet.

The hydrology analysis for this Supplemental FES as well as studies conducted in 1993 (USACE 1993) shows that the loss of flood storage would not significantly affect downstream flooding (increasing

approximately 0.10 percent of the time). Therefore, impacts to property, buildings, or crops due to flooding would not increase. No prime farmland is affected (USACE 1983; USACE 1987).

No Action

Like the proposed action, the no-action alternative would have minimal effects on the population, employment or personal income.

4.8 TRANSPORTATION

Proposed Action

When the pool level is at 478 feet MSL, flooding of some roads does occur. When the lake goes above the 478-foot level, the road just north of the Victor Area campground is inundated. Flooding of the roadway east of Victor Landing occurs when the lake level reaches 485.24 feet. Also, the top of the boat ramp at Wards landing becomes submerged at a lake level of 485.30 feet. When flooding occurs above 495 feet, the spillway road (Route 270) is inundated.

Flooding would temporarily inconvenience local commuters using Highway 270 when the spillway is underwater, because they would have to make a 15-mile detour. In addition, the road going west from the State Park Headquarters into the Victor Area campground would not be accessible during flooding. However, this area can be accessed from an alternative access west of the Victor area. Since transportation impacts are temporary and would occur approximately once every 6 to 7 years (approximately the same as prior to raising the pool), impacts to transportation are considered to be insignificant.

No Action

Under the no-action alternative, short-term effects to transportation would occur, however they would not differ substantially from effects with a pool level of 471.6 feet.

4.9 CULTURAL RESOURCES

Proposed Action

Procedures for assessing the adverse effects to cultural resources are discussed in 36 CFR 800, regulations for the National Historic Preservation Act. An action results in adverse effects to a cultural resource listed or eligible to be listed on the National Register when it alters the resource's characteristics that qualify it for inclusion on the National Register. Adverse effects are most often caused by physical

destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's significance; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; neglect of the resources that leads to deterioration or destruction; or transfer, lease, or sale of the property out of federal ownership.

For this Supplemental FES, impacts to cultural resources are evaluated for the areas around Wister Lake from 471.6 to 478.0 feet in elevation. They are also assessed for the floodplain areas adjacent to the lower Poteau River from Wister Dam to the confluence with the Arkansas River. The proposed action could affect significant cultural resources from flooding, inundation, and pool fluctuations along the shoreline of Wister Lake. Effects to archaeological sites at Wister Lake from collecting and vandalism could also occur once they are exposed by pool fluctuations.

Of the 207 sites recorded around Wister Lake, 21 are listed on the National Register or are eligible, 16 are ineligible, and 170 have not been evaluated. Although numbers of sites and the number of eligible sites may change with on-going investigations and consultation, the general effects to significant cultural resources would not change. Surveys in 1999 and 2000 provided evidence of site disturbance from erosion and vandalism. Archaeological sites showed the following impacts:

- erosion (downslope movement of soils, thin A horizon, exposed bedrock)
- inundation (could not relocate or evaluate)
- shoreline erosion
- flooding and siltation
- cutbank erosion
- recreational use and vehicle traffic
- cultivation
- vandalism and collecting

An examination of site conditions around Wister Lake (Table 4.9-1) indicate that 40 percent of the sites recorded to date are found between 471.6 feet and 485.0. Conditions of these sites are generally poor to very poor or unknown. Sites in good or fair condition are most likely located above 502.5 feet.

At least 18 sites have been destroyed or severely disturbed at 471.6 to 478.0 feet, 7 sites at 478.1 to 485.0 feet, 7 sites at 485.1 to 495.8 feet, and 4 sites from 495.9 to 502.5 feet.

Table 4.9-1 Site Condition around Wister Lake

Elevation around Wister Lake	*Excellent*	*Condition Unknown*	*Good/Fair*	*Poor/Very Poor*	*Total Sites*
471.6 – 478.0		29	4	18	51
478.1 – 485.0	1	19	5	7	32
485.1 – 495.8		12	2	7	21
495.9 – 502.5		21	4	4	29
502.6 – 511.0	1	23	8	6	38
511.1 – 519.0		14	2	1	17
520.0 – 550.0		14	4	1	19
Total	2	132	29	44	207

An investigation at 45 archaeological sites also indicated that adverse impacts occurred primarily to sites between 471.6 and 478.0 feet (Table 4.9-2). Eighty-eight percent of the ineligible sites, 83 percent of the destroyed sites, and all of the submerged sites were found in this zone.

Table 4.9-2 Impacts to 45 Sites around Wister Lake

Elevation around Wister Lake	*Relocated*			*Not Relocated*		
	Eligible	*Unknown*	*Ineligible*	*Unknown*	*Destroyed*	*Submerged*
471.6 – 478.0	3	3	7	3	10	10
478.1 – 485.0	3	0	0	2	2	0
485.1 – 495.8	0	0	0	0	0	0
495.9 – 502.5	1	0	1	0	0	0
502.6 – 511.0	0	0	0	0	0	0
Total	7	3	8	5	12	10

Based on recent investigations, erosion, particularly shoreline and cutbank erosion, are most likely to occur at 471.6 to 478.0 feet. Partial or complete submergence occurred at 470.0 to 478.0 feet. Collecting and vandalism of the larger sites are likely above 495.9 feet. A few of the sites above 502.5 were affected by construction, soil removal, and wild animal foraging.

Overall pool fluctuations and wave action have disturbed at least 20 percent of the known sites around Wister Lake. Erosion from wave action could also be affecting the sites either not evaluated or in good to fair condition. Flooding is less likely to affect sites. However, sites above 485.0 feet are currently being disturbed by recreational use and vandalism.

No adverse effects to significant cultural resources would occur along the lower Poteau River under the proposed action. The difference in the frequency of extreme flooding events is minimal with the conservation pool at 471.6 and 478.0 feet. Flooding effects remain in the area between the 100-year floodplain and the river bank, an area commonly subject to flooding regardless of the release of water

from the Wister Lake project. When extreme flood events, such as the storm event in 1957 do occur, the resulting effects to downstream resources are confined to siltation.

No Action

Under the no-action alternative, there would be adverse effects to cultural resources from inundation, wave action and erosion, and vandalism. No mitigation measures would be implemented and adverse effects would continue to take place.

4.10 HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE

Proposed Action

Potential impacts for hazardous, toxic, and radioactive wastes are only expected if hazardous materials used or generated by the project constitute a substantial increase in risk to human health or threat to the environment. Assessment of impacts focus on the degree to which the alternative would affect management practices, generation, disposal, and handling of hazardous materials.

The amounts of hazardous materials and waste located within the affected environment would not change in response to the proposed action. Wister Lake currently complies with the use, storage, and disposal of hazardous materials and waste. In addition, because procedures for managing these materials and waste would not change, there would be no impacts to hazardous materials and waste due to the operation of the Wister Lake project.

No Action

Under the no-action alternative, there would be no impacts associated with hazardous materials and waste due to the operation of Wister Lake.

4.11 ENVIRONMENTAL JUSTICE

Proposed Action

The existence of disproportionately high, adverse impacts depends first on identifying impacts associated with each of the individual resources such as water quality, hydrology, and land use. If implementation of the proposed action were to affect people in any of these, or other, resource areas, then it would be necessary to examine those impacts for their potential to disproportionately affect minority or low-income communities.

Because existing conditions would not change, there would be no environmental justice issues. No impacts to people would occur around the Wister Lake area since all lands impacted are owned by the USACE and not part of a population center. Raising the level of the conservation pool from 471.6 to 478.0 feet does not significantly change the frequency of flood events downstream of Wister Dam. These would be minimal change in flooding at the 478.0-foot pool level. Therefore, a conservation pool at 478.0 feet would not have a disproportionate adverse environmental, economic, social, or health effect on minority or low-income populations.

No Action

Under the no-action alternative, there would be no disproportionate adverse effect on minority or low-income populations.

4.12 PROTECTION OF CHILDREN

Proposed Action

Socioeconomic data showing the proximity of youth-related developments, such as daycare center and schools, indicated no facilities around Wister Lake, but 12 schools within the potential impact area of the Poteau River floodplain.

Raising the level of the conservation pool from 471.6 to 478.0 feet minimally changes the frequency of flood events downstream of Wister Dam. No youth-related facilities are located around Wister Lake. In fact, the potential flooding of schools downstream would increase by less than 0.1 percent for 100-year events at the 478.0-foot pool level. Therefore, a conservation pool at 478.0 feet would not entail any adverse environmental, safety, or health effects on children.

No Action

Under the no-action alternative, there would be no adverse environmental, safety, or health effects on children.

4.13 CUMULATIVE EFFECTS

A cumulative effects analysis considers the potential environmental impacts resulting for the "incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Cumulative effects are most likely to arise when a proposed action is related to other actions in the same location or at a similar time. Effects of actions geographically overlapping or close to the proposed action would likely

be stronger than those farther away. Similarly, actions coinciding in time with a proposed action would increase cumulative effects.

To identify cumulative effects the analysis needs to address three questions:

1. Could affected resources areas of the proposed action interact with the affected resources areas of past, present, or reasonably foreseeable actions?

2. If one or more of the affected resource areas of the proposed action and another action could interact, would the proposed action affect or be affected by the impacts of the other action?

3. If such a relationship exists, are there any potentially significant impacts not identified when the proposed action is considered alone?

Chapter 4 assesses the specific environmental consequences of each resource, but it also accounts for the combined effects of all resources. Since these cumulative effects were presented in earlier sections of this chapter they will not be discussed further in this section.

All known past and present actions that might result increase cumulative effects are related to USACE activities. These past and present actions resulted from the seasonal and permanent raises of the conservation pool at Wister Lake. Since earlier sections of this chapter discuss past impacts of the pool level changes, they will not be further discussed here.

Reasonably foreseeable actions would include the reallocation of the additional 347 acre-feet of additional water supply storage available when the conservation pool is maintained at the 478.0 level. There is a total of 14,000 acre-feet of water supply storage. Of this amount, 13,653 acre-feet are under contract. Poteau Valley Improvement Authority (PVIA) is in the process of contracting the remaining 347 acre-feet of available water supply storage not under contract to augment the 4,800 acre-feet it currently has under contract. PVIA's application would coincide with the finalization of this Supplemental FES. Because the water is already in storage, there would be no additional cumulative impacts to any resources. Additional water could be made available to PVIA for distribution. Projections show that water supply exceeds expected water requirements for all uses, including population growth, for at least the next 20 years. Therefore, the increase to PVIA's storage contract would have no cumulative impact on water supply. Additional funds generated from the water supply storage contract would go to repay storage investment costs and operations and maintenance costs.

4.14 PROPOSED MITIGATION

Biological Resources. Mitigation measures for the loss of wildlife habitat were based upon the HEP study and the USFWS recommendations. Due to the type and commonness of the habitat type, the USFWS allows mitigation to be out-of-kind, as long as there is not net loss of habitat value. This allows mitigation to be focused upon waterfowl habitat and management, per ODWC request. Mitigation measures would include reimbursement for the loss of green tree reservoirs and the construction of new areas. No mitigation is necessary for fish habitat, as the impacts from the permanent raising of the pool are beneficial.

Cultural Resources. In accordance with 36 CFR 800, Protection of Historic Properties, the USACE has determined that the Proposed Action to operate and maintain Wister Lake at a conservation pool level of 478.0 feet will have an adverse effect on significant historic properties that are currently listed on or eligible for the National Register of Historic Places, including some historic properties that are contributing elements to the Lake Wister Archeological District.

Tulsa District has initiated consultation with the Advisory Council on Historic Preservation, the Oklahoma State Historic Preservation Officer, the Caddo Tribe of Oklahoma, the Wichita and Affiliated Tribes of Oklahoma, and other interested parties in accordance with 36 CFR 800.6 in order to develop means of minimizing or mitigating the adverse effects of the proposed action on historic properties. The results of this consultation will guide future actions the Tulsa District may take involving historic properties at Wister Lake.