

# **CHAPTER 2**

## **DESCRIPTION OF ALTERNATIVES**

---

---

This chapter presents a description of the proposed action and no-action alternative. The proposed action involves maintaining the current operation and management of the Wister Lake project with the conservation pool at 478.0 feet, analyzing historical effects of raising the conservation pool from 471.6 to 478.0 feet, and mitigating for past and present resource loss.

Chapter 2 includes a discussion of the characteristics of the Wister Lake project, including its functions, procedures, and resources, as well as the characteristics of the downstream area along the Poteau River from Wister Dam to the Arkansas River. It discusses reasons for selecting the proposed action and the alternatives considered but not carried forward.

### **2.1 CURRENT OPERATIONS AT 478.0 FEET AND HISTORIC POOL CHANGES (PROPOSED ACTION)**

The proposed action is to operate and maintain the Wister Lake project at a conservation pool level of 478.0 feet and undertake measures to mitigate, or reduce, effects to resources from raising the pool level and from operating it at the current level. The following section describes current operating procedures and the history of conservation pool levels at Wister Lake.

At the congressionally mandated pool elevation of 478.0 feet mean sea level (msl), Wister Lake is a 7,386-acre body of water (Figure 2.1-1) with a shoreline length of 115 miles. The lake has a mean depth of 7.5 feet and a maximum depth of 44 feet. About 933 square miles of watershed drain into the lake above the dam, and the Poteau River runs approximately 61 miles between the dam and the confluence with the Arkansas River (USACE 1993) .

#### **Wister Lake Project**

Wister Lake project's primary function is flood control as part of the comprehensive plan for control of floods in the Arkansas River and its tributaries in Arkansas and Oklahoma. Flood control responsibilities include protecting lands in the Poteau River Valley below the dam. The estimated flood damages prevented by the Wister Lake project have a cumulative total of over \$117 million. The lake also functions as the local water supplier, provides water downstream during low-flow periods, and stores water for later use. In addition, the area around Wister Lake is used for public recreation, hunting, and wildlife management.

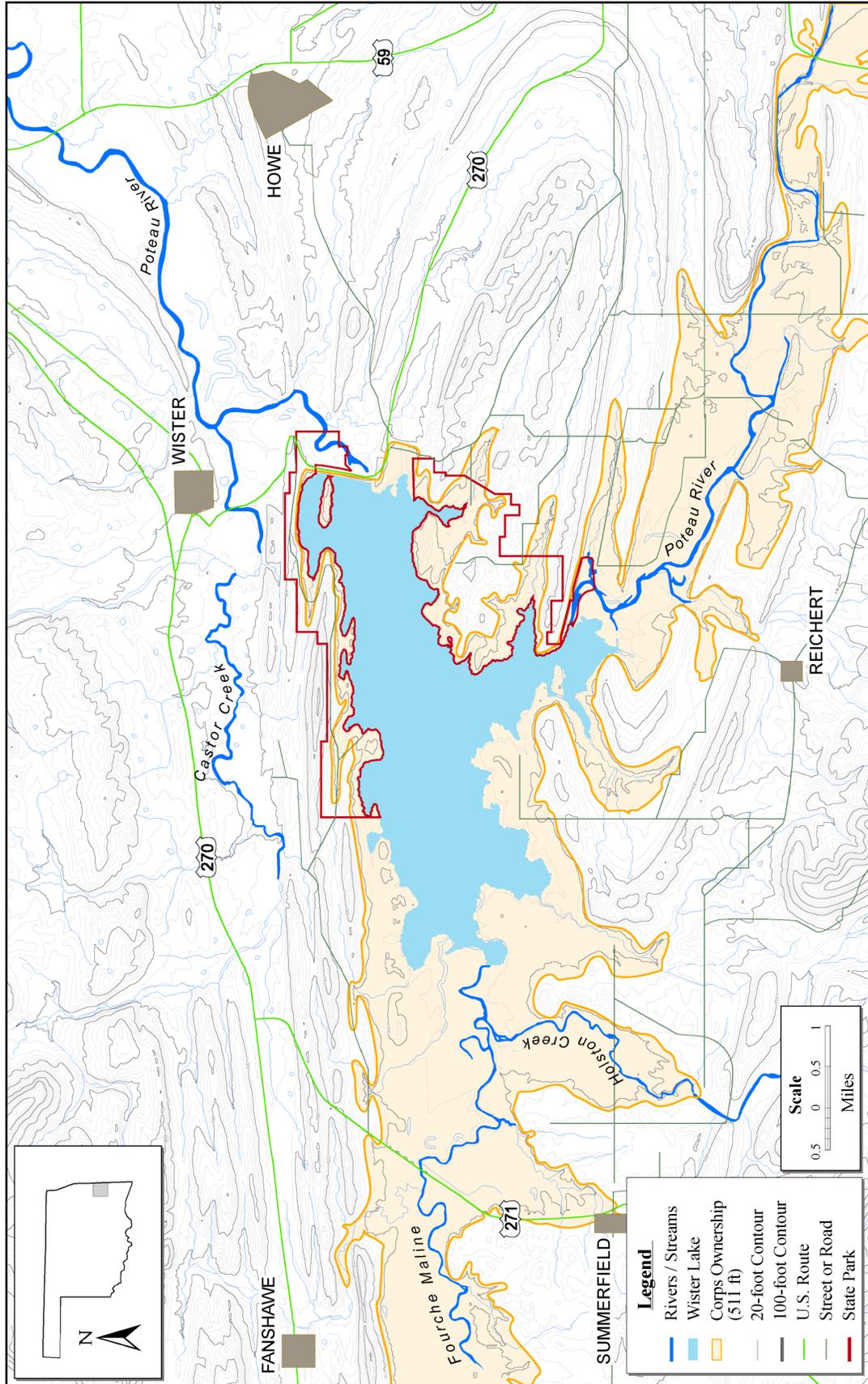


Figure 2.1-1 Current Conditions at Wister Lake Conservation Pool at 478 Feet

The Wister Lake project (USACE 1979) contains the following facilities (Figure 2.1-2).

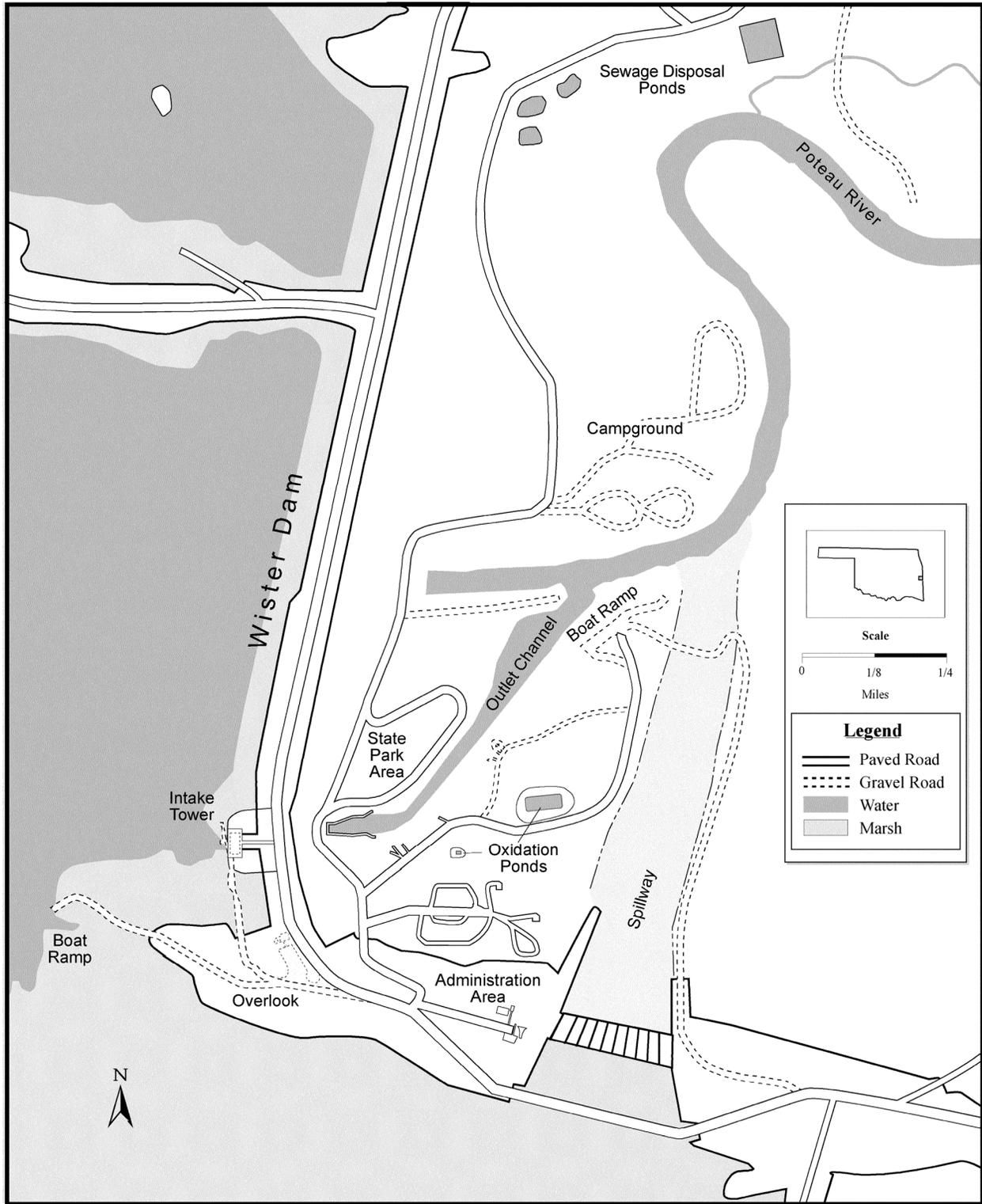


Figure 2.1-2 Wister Dam Site

*Embankment:* a rolled, earth-filled structure extending across the valley floor. It has a crest length of 5,700 feet and an average height of 68 feet above the valley floor. A paved roadway crosses the top of the dam. A dike near the spillway is designed similar to the main embankment, with a crest length of 2,400 feet and a maximum height of 40 feet.

*Spillway:* an uncontrolled, chute-type, concrete structure with a modified, broad-crested weir. The spillway crest is 502.5 feet and 600 feet long. The spillway discharges into the river channel about 1,800 feet below the dam.

*Outlet works:* twin, semi-elliptical conduits, gate tower, gates, and associated facilities, which are located in the valley near the right abutment of the dam. The gate tower is a concrete structure with six 7- by 12-foot tractor-type, vertical lift gates. Flow regulation is provided by means of a 30-inch-diameter conduit with centerline elevation at 450.0 feet. A 12-inch intake with two 8-inch outlets is provided for water supply connections,

All lands below the approximate elevation of 511.0 feet were purchased by the USACE. These lands, from the top of the conservation pool at 478.0, encompass most of the areas subject to reservoir effects, including the backwater of the 50-year flood event in the upper reaches of the reservoir. Elevations of the features of Wister Lake dam and reservoir (USACE 1993) are presented in Table 2.1-1.

**Table 2.1-1 Characteristics of Wister Lake under the Proposed Action**

<i>Feature</i>	<i>Elevation (feet, msl)</i>	<i>Storage (acre-feet)</i>
Top of dam	527.5	--
USACE land	511.0	--
Top of spillway	502.5	--
Top of conservation pool	478.0	--
Flood control storage	478.0-502.5	365,960
Conservation storage	478.0-468.8	46,557
Sediment pool	Below 468.8	--

Downstream areas are subject to overflow during periods of high water. The overflow area on the Poteau River varies in width from about 1.3 to 1.5 miles in the lower reach. The 100-year floodplain below Wister dam encompasses roughly 45,600 acres.

There are three basic reasons for floods in the downstream area between the dam and the confluence with the Arkansas River.

1. Excessive rainfall in tributaries downstream cause water to back up along the lower Poteau River. These floods can occur whether or not water is released from Wister Lake and are independent of the operations at the Wister Lake project.
2. Water levels exceed the height of the spillway and water flows into the lower Poteau River. In 1987, it was estimated that the flood levels would exceed the height of the spillway (502.5 feet) once in 10 years.
3. A large amount of precipitation falls more than once within a 30-day period. Because of restrictions on the amount of water that can be released downstream, the minimum length of time necessary to empty the flood control storage is 30.6 days. Excessive precipitation on more than one occasion during a 30-day period can result in water over the spillway and flooding along the margins of the lake and downstream of the dam.

Downstream overflow areas include rural and urban lands. The urban lands subject to flood damage are located in Poteau, Oklahoma. Rural properties potentially affected by flood damages include farms and livestock facilities. The principal crops grown in the downstream floodplains are wheat, sorghum, and soybeans.

### **Historical Changes in the Pool Elevation**

As originally constructed, the reservoir at Wister Lake had a conservation pool at 471.6 feet. At this level the conservation pool contained 27,000 acre-feet of water storage and had a surface area of 4,000 acres (Figure 2.1-3). Between 471.6 feet and the top of the spillway at 502.5 feet, there were over 400,000 acre-feet of floodwater storage (Table 2.1-2).

Since 1973, the pool level has been raised four times (see section 1.2), either through an operational plan (1974, 1976) or through federal laws (1983, 1996). The current elevation for the conservation pool is 478.0 feet for all months of the year. However, the conservation pool has been raised to 478.0 feet between June and December since 1976. The pool levels were raised by accumulating inflowing water in the reservoir until the appropriate pool level was reached.

**Table 2.1-2 Changes in Water Capacity Storage at 471.6 and 478.0 Feet**

<i>Capacity Water Storage</i>	<i>471.6 Feet</i>	<i>478.0 Feet</i>	<i>Difference in Storage (acre-feet)</i>
Conservation storage	9,025	46,557	+37,532
Flood control storage	403,492	365,960	-37,532

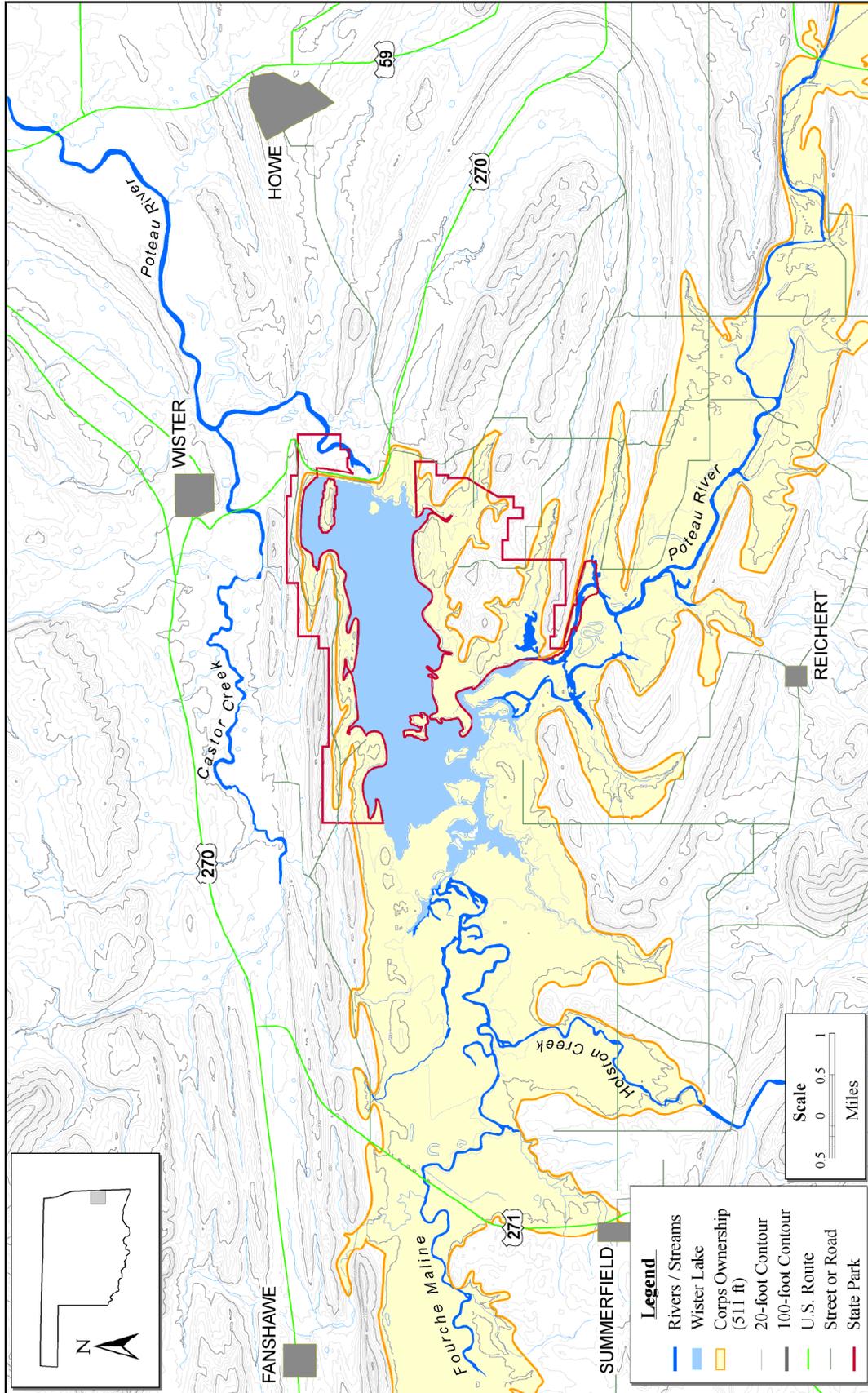


Figure 2.1-3 Wister Lake Conservation Pool at 471.6 Feet

During each of the raises in the pool, the following effects potentially occurred to resources along the shore and in the downstream area.

- Inundation of low-lying acreage on the shoreline with subsequent loss of vegetation, habitat, archaeological sites, grazing leases, and recreational areas
- Pool fluctuations along the new shoreline causing erosion
- Increase in flooding
- Increase in fisheries habitat
- Increase in water storage
- Increase in water recreation availability

Impacts to resources associated with raising pool levels are analyzed in detail under the proposed action. These effects would primarily occur between 471.6 and 478.0 feet around Wister Lake. Measures for mitigating these effects are described at the end of chapter 4.

### **Current Project Procedures**

Procedures for release of flood waters, water supply, and water quality were the same for the conservation pool at 471.6 and at 478.0 feet (USACE 1974).

*Flood Control Procedures.* The Wister Lake project, operated to provide optimum flood reduction from the dam to the mouth of the Poteau River, is coordinated with the flood control operation of the existing system of lakes on the Arkansas River and its tributaries to Van Buren, Arkansas. The normal procedures provide that certain stages or discharges are not to be exceeded, when practicable, at specified locations below the dam. The stages have been selected because of the likelihood of structural loss above the identified stage. The regulating stations, selected regulation stages, and the corresponding discharges are shown in Table 2.1-3.

**Table 2.1-3 Regulating Stages and Stations**

<i>Station</i>	<i>River</i>	<i>Regulating Stage (feet)</i>	<i>Regulating Discharge (cfs)</i>
Wister Outflow	Poteau	7.85	7,200
Poteau	Poteau	20	7,823
Panama	Poteau	29	11,496
Van Buren	Arkansas	22	105,000 – 150,000

Factors determining the size of the releases are general climatic conditions, season of the year with respect to probability of floods, and status of crops on low-lying farmlands. The procedures for the release of water from Wister Lake are as follows:

- When the lake level is at or below the seasonal pool level and no flooding is imminent, then release is equal to inflow or the downstream water right requirement.
- When the lake level is at or below seasonal pool level and flood estimates indicate water volume will exceed the available conservation capacity, releases may be made, which when combined with local inflow below the dam, would not produce flooding (i.e., would not exceed the regulating stages in Table 2.1-3).
- When the lake level rises above the seasonal pool level, regulated releases will be made at the maximum rate permissible, but will not produce flows exceeding 7,200 cfs when combined with local inflow. As the precipitation accumulates, the decision to release water is determined by using the height of the water at the downstream regulating stages. If the pool level is at or exceeds 502.5 feet, then discharge will occur at the maximum amount allowable (not to exceed 2,000 cfs in six hours).

At times, the Poteau River basin below the dam does flood despite these procedures. However, flooding associated with water releases from Wister Dam should only occur in extreme flood events when the water goes over the spillway.

*Water Supply.* As a water supply storage, Wister Lake serves a tri-county area of approximately 40,000 people (USACE 1993). The total water supply available is about 14,000 acre-feet, with a dependable yield of 20 million gallons per day (mgd). The remaining storage of 8 mgd is reserved for sediment accumulation and other conservation purposes. Water supply storage in Wister Lake is under contract and assigned to specified users (Table 2.1-4).

**Table 2.1-4 Wister Lake Water Supply Storage Contracts**

<i>User</i>	<i>Allocated Storage (acre-feet)</i>	<i>Yield (mgd)</i>
Heavener Utilities Authority	1,600	2.28
Poteau Valley Improvement Authority	4,800	6.85
AES Shady Point, Inc.	7,253	10.36
<b>Total</b>	<b>13,653</b>	<b>19.49</b>

(USACE 2001)

*Low-flow Procedures.* To satisfy the existing water rights downstream from Wister Lake in low-flow periods, the following procedures were approved in 1957. When the lake level is below the seasonal pool level, up to a maximum of 12 cfs will be released to satisfy the water rights applied for by Poteau, Panama, and Wister. All excess inflows will be stored in the lake until needed.

*Water Quality.* Releases made during low flows to meet downstream water rights are usually adequate to maintain water quality. Additional requests to release water are handled on a case-by-case basis.

*Land Management.* Approximately 3,000 acres around the lake have been leased to the state of Oklahoma for state parks. There are five state park areas and three public-use areas around the lake. Recreational facilities consist of roads, cottages, parking areas, trails, boat ramps, picnic developments, and water and sanitary facilities. Concession facilities operated by private interests supply food, bait, and fishing and hunting supplies. An average of 375,000 visitors use the facilities at Wister Lake every year.

Approximately 3,500 acres of the lake and surrounding area are a designated state wildlife refuge. In addition, the ODWC has license to 27,000 acres of lake easement for public use, primarily for upland game management. The nearby Ouachita National Forest comprises 234,326 acres of the lake watershed and is also used for recreation.

In addition to recreation, the USACE administers grazing leases and has leased most of the mineral rights. The mineral rights have not been developed, however.

When the conservation pool is at 478.0 feet, the following effects potentially occur to cultural resources along the shore and in the downstream area.

- Temporary inundation from flood waters.
- Pool fluctuations along the shoreline causing erosion.
- Siltation and burial of resources.

Measures for mitigating these effects (if applicable) are described under the appropriate resource discussions.

## **2.2 NO-ACTION ALTERNATIVE**

The no action alternative reflects the status quo, or baseline conditions. Under no action, the Wister Lake project would continue to operate using current procedures, however, adverse effects to resources from operations or from raising the pool level to its present height would not be mitigated.

## **2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD**

In the reconnaissance study for the Wister Lake project (USACE 1993), the feasibility of several alternative conservation pool levels were evaluated:

- elevations of 474.6 feet with a seasonal fluctuation to 478.0 feet
- 474.6 feet with no seasonal fluctuation
- 474.6 feet with a year-to-year change in the seasonal fluctuations of the conservation pool

Operating the Wister Lake project with a conservation pool below 478.0 feet would not comply with WRDA 1996. Seasonal fluctuations in the conservation pool were eliminated from consideration because they provide little benefit to fish and wildlife resources. A more stable pool level was considered more favorable to wildlife habitat than increases and declines of seasonal pool operation. A conservation pool at 474.6 feet would only increase water supply by 6,000 acre-feet but not substantially improve flood control. These alternatives were removed from further consideration because they would not meet identified needs or legal requirements.