

### 5.12 Vector Control

#### 5.12.1 Introduction

As described in Section 4.12, changes in reservoir operations policy may affect the breeding success of mosquitoes in both permanent and temporary pools (floodwaters) created within water control system reservoirs. Of principal importance are changes in water elevations and their persistence or duration on the landscape. The following analysis assumed that the water management techniques to control mosquitoes (see Section 4.12.2, Regulatory Programs and TVA Management Activities) would remain in place under all the reservoir operations policy alternatives.

#### 5.12.2 Impact Assessment Methods

To estimate the potential increase in mosquito populations and the associated increased risk of disease, projected water elevation forecasts prepared with the Weekly Scheduling Model were reviewed for each alternative. These forecasts were compared to the outputs for existing operations under the Base Case. Water elevations held higher or longer were the criteria for determining that higher mosquito populations and the associated risk of disease would result.

Policy alternatives that would increase water elevations or extend the area and duration of inundation may increase mosquito breeding habitat and populations, depending on temperature and rainfall during the mosquito season (March through October). The effects of these modifications depend primarily on weather (temperature and rainfall) and the resulting water levels. During a dry year, there would be little to no effect on the mosquito populations. An extension of summer pool would also increase the potential for floodwater mosquitoes if a major rain event occurred. Since the water is already high, the floodplain would drain less efficiently.

Representative tributary reservoirs were chosen for analysis because of their mosquito history; the selected tributary reservoirs historically had more mosquito activity than other tributary reservoirs. All of the mainstem reservoirs were evaluated except Nickajack Reservoir; Nickajack Reservoir is a run-of-river reservoir for which no water elevation modeling data were available. Changes in levels that result from the alternatives are expected to be minimal.

The potential of a policy alternative to increase mosquito breeding habitat and populations was considered an adverse impact relative to the Base Case. The potential of a policy alternative to decrease mosquito breeding habitat and populations was considered a beneficial impact relative to the Base Case.

#### 5.12.3 Base Case

The Base Case would continue TVA's present operations schedule and would not affect existing mosquito breeding habitat or population abundance for permanent pool or floodwater mosquitoes. Although many unknowns or poorly understood influences are associated with

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mosquito-vectoring diseases; the Base Case is not anticipated to affect the present rates or trends for disease occurrence.

### **5.12.4 Summer Hydropower Alternative**

The Summer Hydropower Alternative would reduce the water elevations and duration of inundation, and thus the mosquito breeding habitat in both mainstem and tributary reservoirs. Depending on weather—which could dominate the effect of reduced water elevations for a particular year or for a period of years—this alternative would result in diminished mosquito populations for both permanent pool and floodwater species. The associated risk of mosquito-vectoring diseases would also be reduced under the Summer Hydropower Alternative.

### **5.12.5 Commercial Navigation Alternative**

The Commercial Navigation Alternative would result in very little or no change from existing operations. Depending on weather—which could dominate the effect of proposed modifications for a particular year or for a period of years—this alternative would not substantially affect mosquito population abundance. The associated risk of mosquito-vectoring diseases is also not anticipated to change under the Commercial Navigation Alternative.

### **5.12.6 Reservoir Recreation Alternative A, Reservoir Recreation Alternative B, Equalized Summer/Winter Flood Risk Alternative, Tailwater Recreation Alternative, and Tailwater Habitat Alternative**

Reservoir Recreation Alternative A, Reservoir Recreation Alternative B, the Equalized Summer/Winter Flood Risk Alternative, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative to some degree would increase the water elevations or duration of inundation in mainstem and tributary reservoirs. These alternatives would result in an increase in mosquito breeding habitat and populations for both permanent pool and floodwater species, and an increased risk of mosquito-vectoring diseases. The individual effects of these alternatives would differ slightly. Due to the complexity of the natural system and the dominating effects of weather, these differences cannot be described in a meaningful way. Potential effects associated with Reservoir Recreation Alternative A, Reservoir Recreation Alternative B, the Equalized Summer/Winter Flood Risk Alternative, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative would be greater on tributary reservoirs because the operations changes for tributary reservoirs under these alternatives would deviate more from existing operations (the Base Case). Historically, water levels in tributary reservoirs have fluctuated more than those in mainstem reservoirs. Some of the alternatives would no longer allow the amount of historical fluctuation in tributary reservoirs, thus resulting in more substantial changes for tributary reservoirs than for mainstem reservoirs.

### **5.12.7 Preferred Alternative**

The Preferred Alternative would increase the water elevations and/or duration of inundation in some mainstem and some tributary reservoirs. Mosquito populations on Kentucky Reservoir would not change from the Base Case. The delayed fill on Chickamauga, Watts Bar, and Fort Loudoun Reservoirs could decrease mosquito populations in April and May. Extension of

summer pools on Chickamauga, Gunterville, Wheeler, and Pickwick Reservoirs could result in an increase in mosquito breeding habitat and populations for both permanent pool and floodwater species. An increased risk of mosquito-borne diseases in late summer would result. Potential effects associated with the Preferred Alternative would vary on tributary reservoirs. Historically, water levels in tributary reservoirs have fluctuated more than those in mainstem reservoirs. Mosquito populations could increase on Norris and Fontana Reservoirs, and the mosquito season could be extended on these reservoirs. Water levels of these tributaries would be higher and longer than in the past. During the first few years, this increase in mosquitoes could be worse because the vegetation along the shore line would be inundated, creating more mosquito habitat. This effect should lessen over the years, as this vegetation begins to die because of the inundation.

### 5.12.8 Summary of Impacts

Tables 5.12-01 and 5.12-02 provide a summary of impacts on mosquito population abundance by policy alternative. Alternatives that would increase water elevations or extend the area and duration of inundation may increase mosquito breeding habitat and populations, depending on temperature and rainfall during the mosquito season (March through October). The effects of these modifications depend primarily on weather (temperature and rainfall) and the resulting water levels.

The Base Case and the Commercial Navigation Alternative are not anticipated to affect present rates or trends for mosquito population abundance or disease occurrence. Depending on weather, which could dominate the effect of reduced water elevations in a particular year or for a period of years, the Summer Hydropower Alternative would result in diminished mosquito populations for both permanent pool and floodwater species, and a corresponding reduced risk of mosquito-borne diseases.

Reservoir Recreation Alternative A, Reservoir Recreation Alternative B, the Equalized Summer/Winter Flood Risk Alternative, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative would result in an increase in mosquito breeding habitat and populations for both permanent pool and floodwater species, and an increased risk of mosquito-vectoring diseases. The individual effects of these alternatives probably would differ slightly but cannot be described in a meaningful way because of the complexity of the natural system and the dominating effects of weather. Potential effects associated with Reservoir Recreation Alternative A, Reservoir Recreation Alternative B, the Equalized Summer/Winter Flood Risk Alternative, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative would be greater on tributary reservoirs because the operations changes for tributary reservoirs would deviate more from existing operations on those reservoirs.

In general, the Preferred Alternative would increase mosquito populations and extend the mosquito season for both permanent pool and floodwater species on some mainstem and tributary reservoirs. The effects would vary by reservoir. An increase in mosquito populations or an extension of the mosquito season would increase the risk of mosquito-vectoring diseases.

**Table 5.12-01 Summary of Impacts on Mosquito Population Abundance at Selected Reservoirs by Policy Alternative**

Reservoir	Alternative										Preferred
	Reservoir Recreation A	Reservoir Recreation B	Summer Hydropower	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat				
<b>Mainstem Reservoirs</b>											
Fort Loudoun	No change	No change	Decrease	No change	No change	No change	No change	No change	No change	No change	Decrease
Watts Bar	No change	Increase	Decrease	No change	No change	Increase	No change	Increase	No change	No change	Decrease
Chickamauga	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase
Guntersville	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase
Wheeler	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase
Wilson	No change	No change	Decrease	Increase	No change	No change	No change	No change	No change	No change	No change
Pickwick	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase
Kentucky <sup>1</sup>	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	No change
<b>Tributary Reservoirs</b>											
Cherokee	Increase	Increase	No change	Increase	No change	Increase	No change	Increase	Increase	Increase	No change
Douglas	Increase	Increase	Decrease	Decrease	Increase	Increase	Increase	Increase	Increase	Increase	No change
Hiwasee	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	No change
South Holston	Increase	Increase	No change	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase
Fontana	Increase	Increase	Decrease	Decrease	No change	Increase	No change	Increase	Increase	Increase	Increase
Tims Ford	No change	Increase	Decrease	Decrease	No change	Increase	No change	Increase	Increase	No change	No change
Norris	Increase	Increase	Decrease	Increase	No change	Increase	No change	Increase	Increase	Increase	Increase

Notes:

“Decrease,” “increase,” and “no change” indicate the effect of a particular alternative on mosquito breeding habitat and the consequent effect on mosquito population abundance and the associated risk of disease.

The selected tributary reservoirs were chosen for analysis because of their mosquito and aquatic plant history.

<sup>1</sup> The effects of increasing the water level on Kentucky Reservoir are amplified because TVA does not fluctuate water levels to control mosquito populations on that reservoir.

**Table 5.12-02 Summary of Impacts on Vector Control by Policy Alternative**

Alternative	Description of Impacts
Base Case	No change to the number of days mosquito breeding habitat would be present.
Reservoir Recreation A	Adverse – Extending summer pools would extend the number of days mosquito breeding habitat would be present.
Reservoir Recreation B	Adverse – Extending summer pools would extend the number of days mosquito breeding habitat would be present.
Summer Hydropower	Beneficial – Drop in elevations earlier would provide less mosquito breeding habitat.
Equalized Summer/Winter Flood Risk	Slightly adverse – The equalization of flood risk would slightly increase the number of days mosquito breeding habitat would be present.
Commercial Navigation	No change to the number of days mosquito breeding habitat would be present.
Tailwater Recreation	Adverse – Extending summer pools would extend the number of days mosquito breeding habitat would be present.
Tailwater Habitat	Adverse – Extending summer pools would extend the number of days mosquito breeding habitat would be present.
Preferred	Adverse – Extending summer pools would extend the number of days mosquito breeding habitat would be present.

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