

# **BOOTHBAY REGION WATER DISTRICT ADAMS POND AND KNICKERBOCKER LAKE WATERSHEDS**

## **EXECUTIVE SUMMARY**

The Boothbay Region Water District provides drinking water to approximately 5,100 customers from its primary source at Adams Pond, an 88-acre pond located in Boothbay. The Adams Pond source is supplemented from Knickerbocker Lake, a 109-acre lake located in the southwest corner of Boothbay. Knickerbocker Lake is currently classified as an emergency supply. The 946-acre Adams Pond watershed includes commercially developed land along Route 27, which borders the pond on the east. Remote areas of the watershed are generally undeveloped. The Water District owns the majority of the shoreline of the pond. In addition, the Town of Boothbay limits development within 250-feet of the shoreline with a Watershed Protection Overlay District. The 998-acre Knickerbocker Lake watershed is generally undeveloped, except for occasional residential development, a cluster of homes on the northeast shore and a day camp at the south end of the pond. The Water District owns a 16-acre parcel on the east shore including several hundred feet of shoreline near the intake.

The reconnaissance of the Adams Pond watershed and shoreland areas identified several land uses which increase the sensitivity of the lake to water quality concerns. These activities include commercial development along Route 27 and a gasoline station in Boothbay Village. Transportation activities along Route 27 and Adams Pond Road also pose a risk to the water supply. The reconnaissance of the Knickerbocker Lake watershed and shoreland areas identified several small commercial establishments, residential development and the YMCA day camp to be the primary activities that could pose a risk to the water supply.

Both the Adams Pond and Knickerbocker Lake watersheds are characterized by moderate to steeply sloping land with potentially erodible soils. Several properties were observed to the south of Adams Pond where fill or unvegetated soils are in close proximity to the tributary that flows into the southern end of the pond. The Water District has noted that turbidity concentrations increase in Adams Pond during periods of high run-off, indicating that stormwater run-off and sediment erosion within the watershed are reaching the pond.

Recreation on Adams Pond is limited to fishing from non-motorized boats. There are no restrictions on the recreational use of Knickerbocker Lake. Available Adams Pond water quality data from the 1970s to the present classify the pond as eutrophic, which suggests that land use activities have had a significant influence on water quality. The chemical data are consistent with taste and odor issues experienced periodically by the Water District. Available Knickerbocker Lake water quality data classify the lake as mesotrophic, which suggests some influence of land use on water quality. While Knickerbocker Lake does show evidence of impacts from the watershed, it appears to have a greater capacity to assimilate these impacts than does Adams Pond.

Based on the general conditions observed and the potential for future development, the SWAP assessment factors indicate that overall susceptibility of the water quality in Adams Pond is high, while the overall susceptibility of water quality in Knickerbocker Lake is moderate.

## SWAP RANKING AND RECOMMENDATIONS

The SWAP assessment factors indicate that overall susceptibility of the water quality in Adams Pond is high, while the overall susceptibility of water quality in Knickerbocker Lake is moderate.

This conclusion is based on the general conditions observed, including existing land uses and the potential for future development, transportation activities near the pond and water quality data. Specific factors considered in assessing the overall risk are summarized below.

### ADAMS POND SURFACE WATER ASSESSMENT

Zone	Measure	Findings	Risk Level
Watershed	Ambient Water Quality Existing Conditions	Class GPA is “threatened” The majority of land in the watershed is undeveloped. Existing land use on the east and south side of the pond includes petroleum storage and other commercial uses.	High Moderate-High
	Future Development	Development pressure is high. Land to the east of the pond is zoned for commercial development. (Future zoning changes could reduce this risk.)	High
	Overall		High
Shoreland	Lake Classification	Eutrophic, with periodic algae blooms	High
	Soils	Nearshore includes some steep slopes and moderately erodible soils.	Moderate
	Activities Posing a Threat	Majority of the shoreline is owned by the Water District. However, the Route 27 roadway corridor and Adams Pond Road pass through the shoreland zone.	Moderate
	Potential for Future Threats	Ongoing potential threat from roadway traffic and erosion of soil.	Moderate
	Overall		Moderate-High
Intake	Raw Water Quality	Recent pond quality is fair, but Water District experiences taste and odor issues.	High
	Ownership/Control	Water District owns most of land near intake.	Low
	Activities Posing a Threat	Adams Pond Road, limited recreation, sediment input from tributaries near intake.	Moderate
	Potential for Future Threats	Water District control will limit expansion of future threats near the intake.	Moderate
	Overall		Moderate
<b>Overall</b>			<b>High</b>

## KNICKERBOCKER LAKE SURFACE WATER ASSESSMENT

Zone	Measure	Findings	Risk Level
Watershed	Ambient Water Quality Existing Conditions	Class GPA is “threatened” The majority of land in the watershed is undeveloped. Residential land use on the northeast.	Moderate-High Low-Moderate
	Future Development	Development pressure is moderate to high. Land near the lake is zoned for residential development.	Moderate
	Overall		Moderate
Shoreland	Lake Classification Soils	Mesotrophic Nearshore includes some steep slopes and erodible soils.	Moderate Moderate
	Activities Posing a Threat	There is minimal protective ownership near the shoreline. Residential development is dense on northeast shore. YMCA camp is at southern end of lake.	Moderate
	Potential for Future Threats	Potential future threats if shoreline is developed.	Moderate
	Overall		Moderate
Intake	Raw Water Quality Ownership/Control	Recent lake quality is good. Water District owns most of the land near intake.	Moderate Low
	Activities Posing a Threat	There are no restrictions on recreational uses of the lake.	Moderate
	Potential for Future Threats	Future threats at the intake are limited by ownership and zoning.	Low
	Overall		Low–Moderate
<b>Overall</b>			<b>Moderate</b>

### Recommendations

The overall ranking for the susceptibility of Adams Pond to threats of contamination is high. The overall ranking for susceptibility of Knickerbocker Lake to threats of contamination is moderate. With the recent establishment of the Boothbay Region Water District, there has been an increased awareness of watershed and water quality protection by the town. The following additional actions could be considered by the Boothbay Region Water District and the Town of Boothbay to provide added protection to the source water quality.

#### General:

- Boothbay and the surrounding area experiences significant development pressure as a result of its location along the mid-coast of Maine and its desirable setting. This development pressure poses two threats to the Boothbay Region Water District supply. First, development increases demand. At the same time that demand increases, development encroaches on the watersheds of both Adams Pond and Knickerbocker Lake, threatening the District’s ability to meet the demand with acceptable quality water. Because development pressure is likely to continue into the future, protection of

the watersheds of both water bodies should be a priority for the Water District and the town. In order to be most effective, watershed protection should include strong zoning controls, acquisition of land and conservation easements to prevent incompatible development.

### **Adams Pond:**

- The water quality in Adams Pond is classified as eutrophic and the Water District experiences taste and odor issues on a periodic basis. These indicate that the pond is susceptible to land use influences that could impact water quality. The Water District should continue its ongoing water quality measurements to monitor changes over time and the possible effects of future protection efforts.
- Existing land uses include several commercial establishments that are in close proximity to the pond or its tributaries. The Water District and the town may want to work with these businesses to increase their awareness of the water supply and improve their on-site practices, stormwater management, etc.
- Route 27 passes within 200 feet of the pond and is used by commercial vehicles and a large volume of private automobiles. A lower volume of traffic uses Adams Pond Road, however this road is small and winding and passes immediately along the shore. The Water District may want to establish emergency response procedures with town and State highway officials that are directed toward protecting the water source in the event of a vehicle accident.
- Zoning for much of the land to the east of the pond permits commercial development, which would increase the risk to the water supply. Modifications to zoning that limit development to low density residential development would safeguard existing water quality.
- There are several properties located near the pond where there is unstabilized fill embankments that are likely to be contributing sediment to the tributaries and the pond, including the Fire Department property and private land along Adams Pond Road. Efforts to vegetate exposed soil in these areas and similar erosion control management throughout the watershed would preserve or improve existing water quality.

### **Knickerbocker Lake:**

- In comparison to Adams Pond, Knickerbocker Lake has better water quality, less encroachment by commercial development and is more remote from highly traveled roads. Knickerbocker Lake also has a higher safe yield than Adams Pond and is better able to meet the demands of the Water District. Based on these considerations, the Water District should continue to pursue approval of Knickerbocker Lake as a permanent water supply source.
- As the withdrawal from Knickerbocker Lake increases, it would be appropriate for the Water District to institute a water quality-monitoring program to fully evaluate water quality and track changes over time in the future.

- Land in the watershed and particularly near the shore is largely in private ownership. The Water District should develop a plan to increase ownership and conservation holdings within the watershed.
- The Water District and the town should work jointly to re-evaluate existing zoning and modify it to increase the protection of water quality. The Watershed Overlay zone from Adams Pond could serve as a model for Knickerbocker Lake as well.
- The Water District may want to consider working with the existing shorefront landowners, including the YMCA to increase awareness of the water supply and develop mutually agreeable procedures to protect water quality.
- The Water District and town should also consider taking steps to reduce future recreational uses of the lake through local ordinances and initiatives at the state level.

## **SEPTEMBER 2002**

prepared for

Source Water Assessment Program  
Drinking Water Program  
Maine Department of Human Services  
11 State House Station  
Augusta, Maine 04333



prepared by

Drumlin Environmental, LLC  
15 Franklin Street, P. O. Box 392  
Portland, Maine 04112-0392  
(207) 771-5546