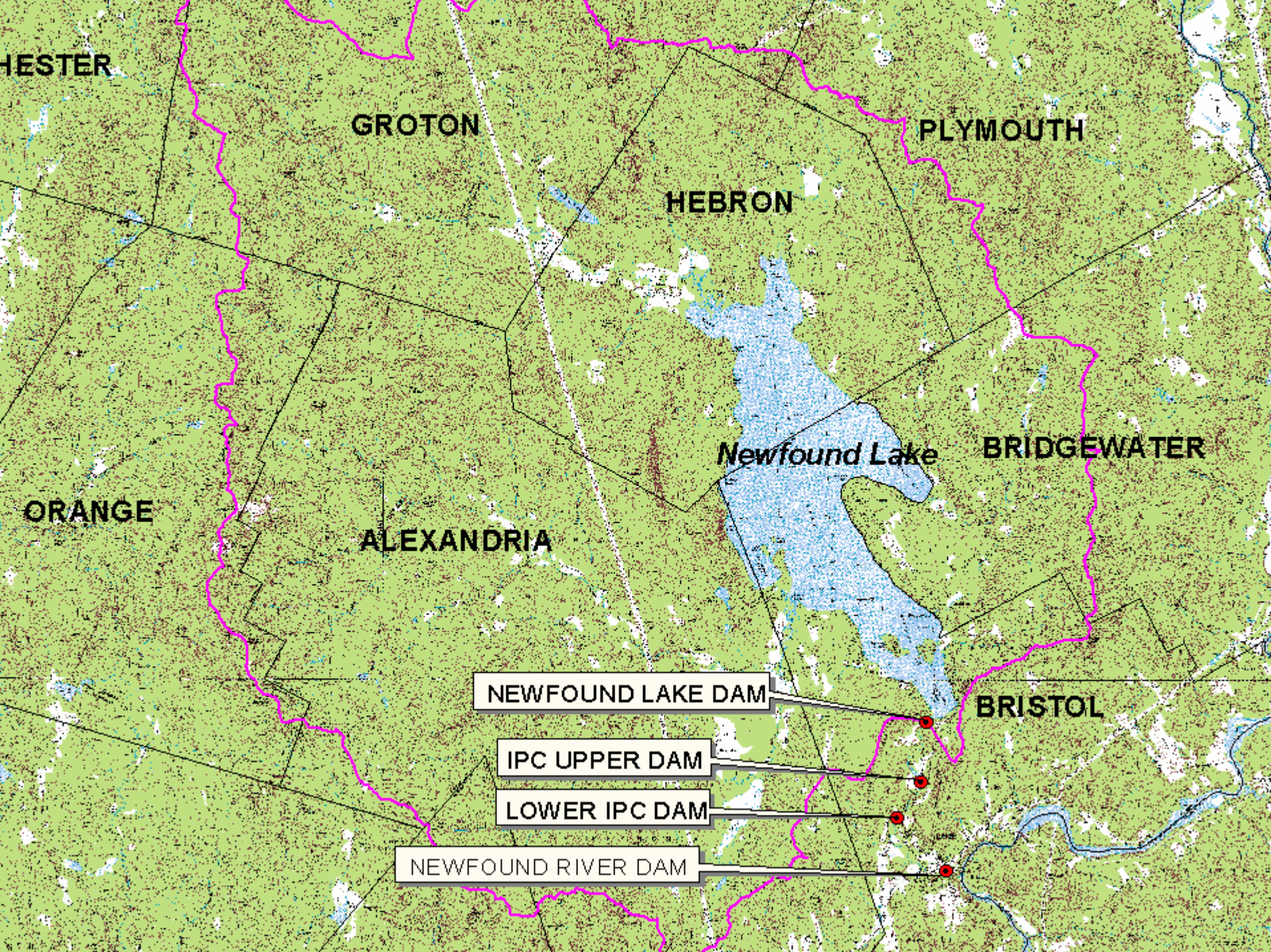
APPENDIX H

- H-1 Historic NHDES presentation – History and current goals of lake level management at Newfound lake

History and Current Goals of Lake Level Management at Newfound Lake

Steve N. Doyon, PE
Water Resources & Public Safety

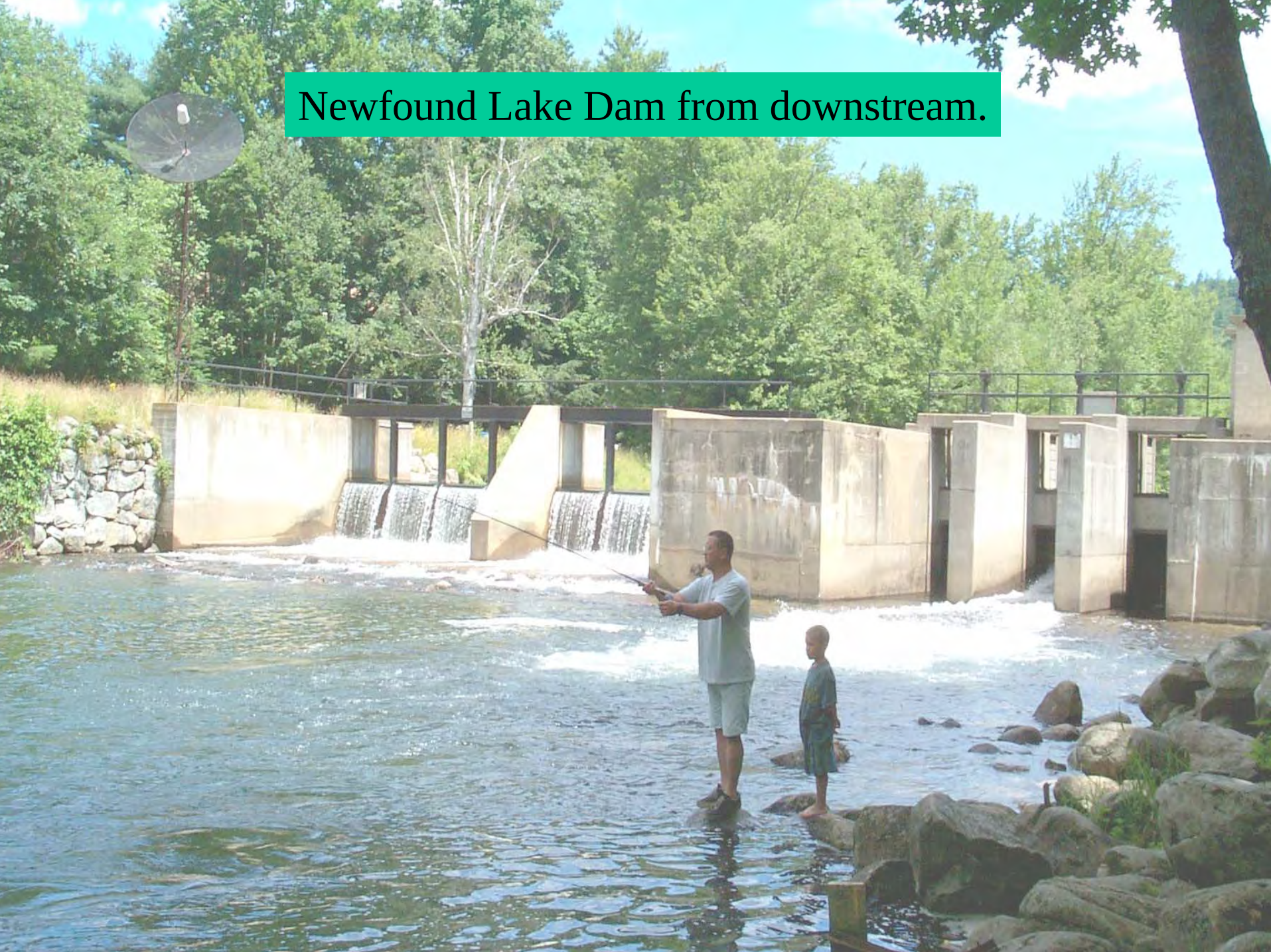

HESTER
GROTON
PLYMOUTH
HEBRON
Newfound Lake
BRIDGEWATER
ORANGE
ALEXANDRIA
NEWFOUND LAKE DAM
BRISTOL
IPC UPPER DAM
LOWER IPC DAM
NEWFOUND RIVER DAM

Lake and Watershed Data

- Lake is 4,200 acres or 6.6 sq. mi.
- Watershed is 61,250 acres or 95.7 sq. mi.
- 1” of runoff can raise the lake 14”
- Shoreline length is about 22 miles
- Deepest spot is about 180 feet
- Bristol, Alexandria, Hebron and Bridgewater abut the lake

Current Dam Data

- Maximum height of 12 feet.
- Length of 120 feet.
- Stores 9 BG normally and 13 BG full.
- There are 3 – 6’x6’ flood gates.
- There are 11 stoplog bays (equivalent to about 60 feet of overflow spillway length).


Newfound Lake Dam from downstream.

A Bit of Dam History

- Photos from 1934 show a mostly timber dam (foundation and structure) with a short concrete spillway on the left end. This configuration existing throughout the PSNH ownership and leaked considerably.
- State conducted first major repair in 1975 by replacing the left half of the dam with a pier on slab arrangement. This 1975 work resulted in 3 new flood gates and 3 deep stoplog bays.
- The second phase of reconstruction in 1986 involved the removal of the timber spillway and extending the pier on slab construction to the right abutment. Eight additional deep stoplog bays resulted.

Water Rights History

- Bristol Water Power Co. and Mason Perkins Paper Co. ? to 1936
- Newfound Lake Power Company 1924 to 1936
- NH Power Company ? to 1936
- PSNH 1936 to 1974
- New Hampshire Water Resources Board (NHDES) 1974 to present
- It appears that several parties retained some form of water right until the rights were consolidated under the PSNH acquisition in 1936.

Important Lake Elevations

- NHDES has flowage ownership up to 7.24’ on the gage
- Natural Mean High Water Mark is 2.24’
- The land up to and below 2.24’ is held in trust by the State, while the land above it (up to 7.24’) is subject to flooding in accordance with flowage ownership.

Water Management History

- In 1971 the State received a petition requesting a review of PSNH's water management practices. The petition indicated that water withdrawals from April through August caused the lake to drop up to 6 feet in some years.
- The petition sought to change management to conserve spring flows to allow for higher levels from April through September.
- The State conducted a public hearing in 1974.

Water Management History (cont'd)

- In December of 1974 the State established the following management rules:

  -June 1st – 7.2' on the gage

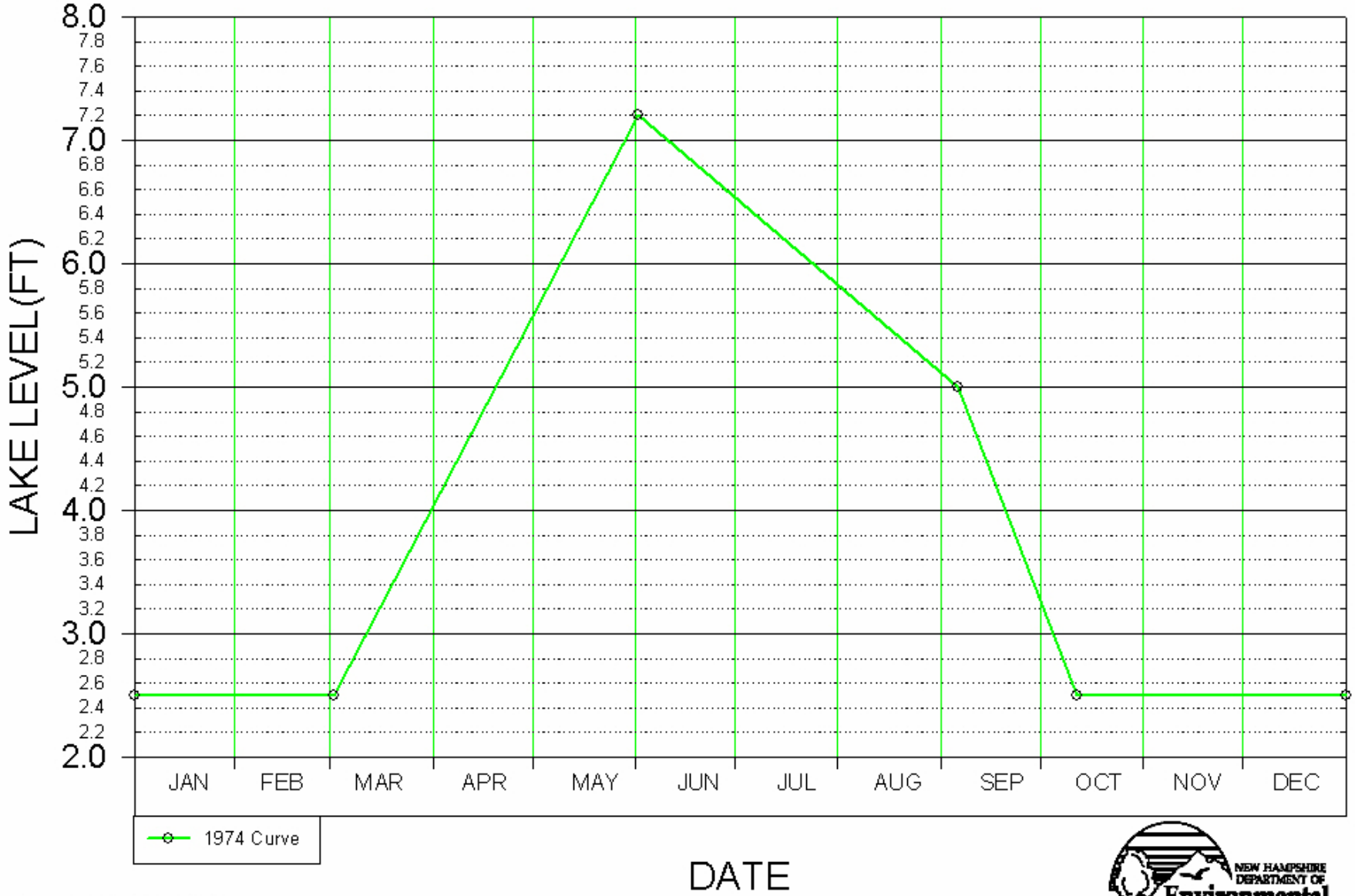
  -Labor Day – 5.0'

  -Columbus Day – 2.5'

  -Winter – hold near 2.5' until spring

ELEV. 0.0' ON GAGE = 581.88' NGVD ELEV.

NEWFOUND LAKE



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Water Management History (cont'd)

- In 1977 the management plan was modified to:

  -July 1st – 6.0' on the gage

  -Labor Day – 5.0'

  -Columbus Day – 3.5'

  -Winter – hold near 3.5' until spring

  -Spring levels held below 7.2', if possible.

ELEV. 0.0' ON GAGE = 581.88' NGVD ELEV.

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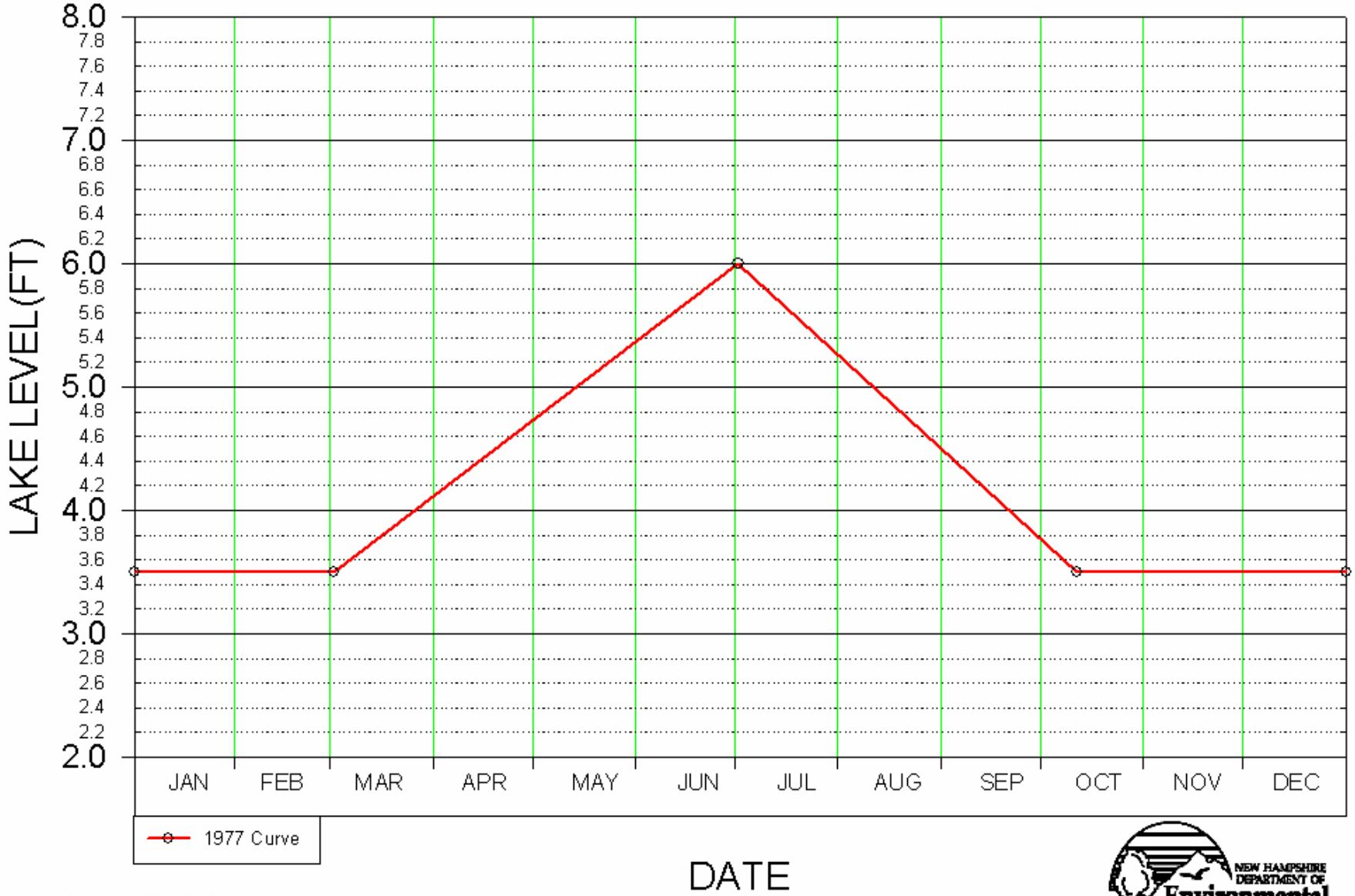

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Water Management History (cont'd)

- In 1982, the management guidance was amended again to:

  -June 1st – 6.0' on the gage

  -Columbus Day – 4.5'

  -Columbus Day to spring refill – gradually drop the lake to 3.5' on hold it there.

  -Spring levels held below 7.2', if possible.

ELEV. 0.0' ON GAGE = 581.88' NGVD ELEV.

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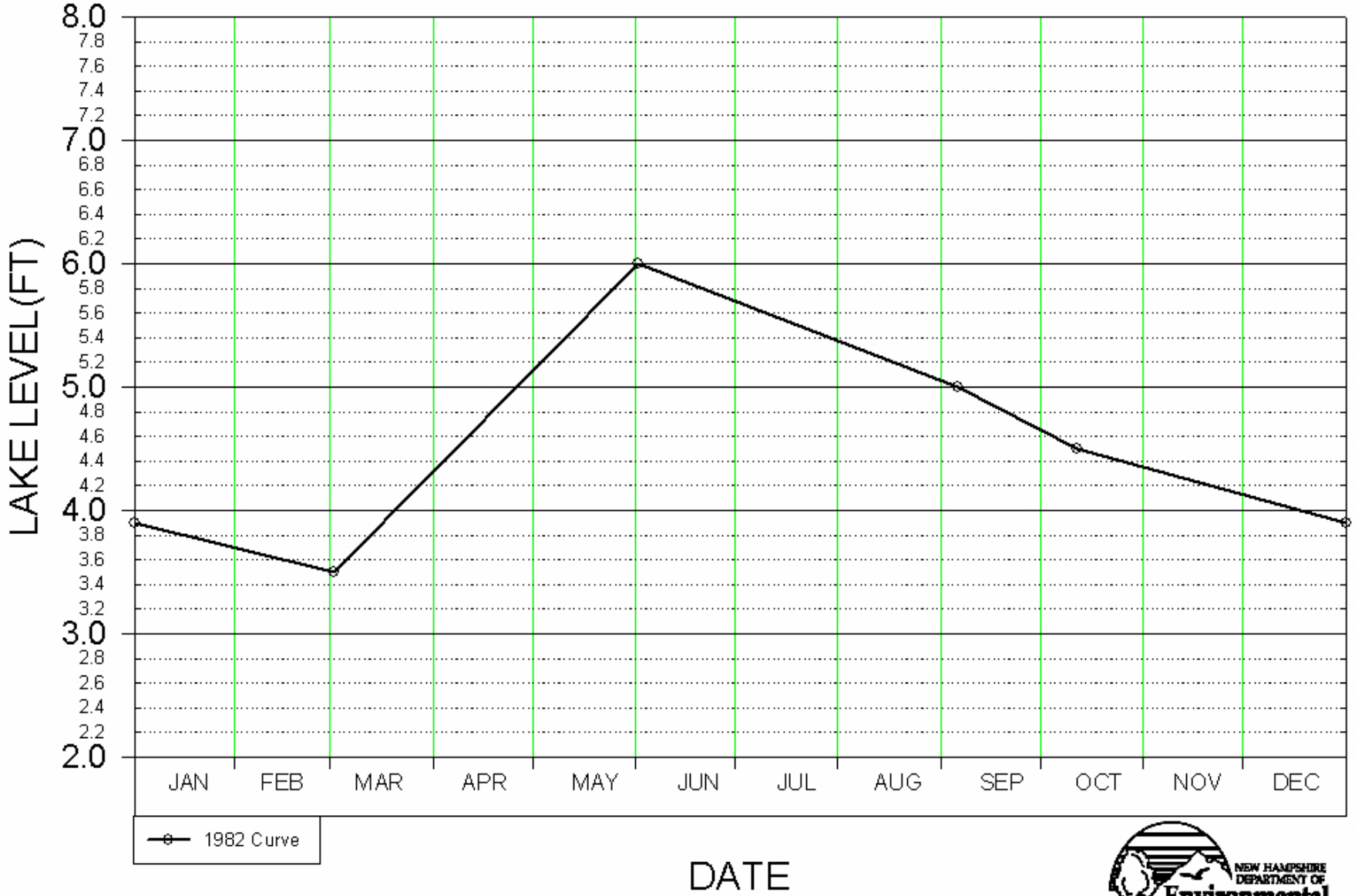

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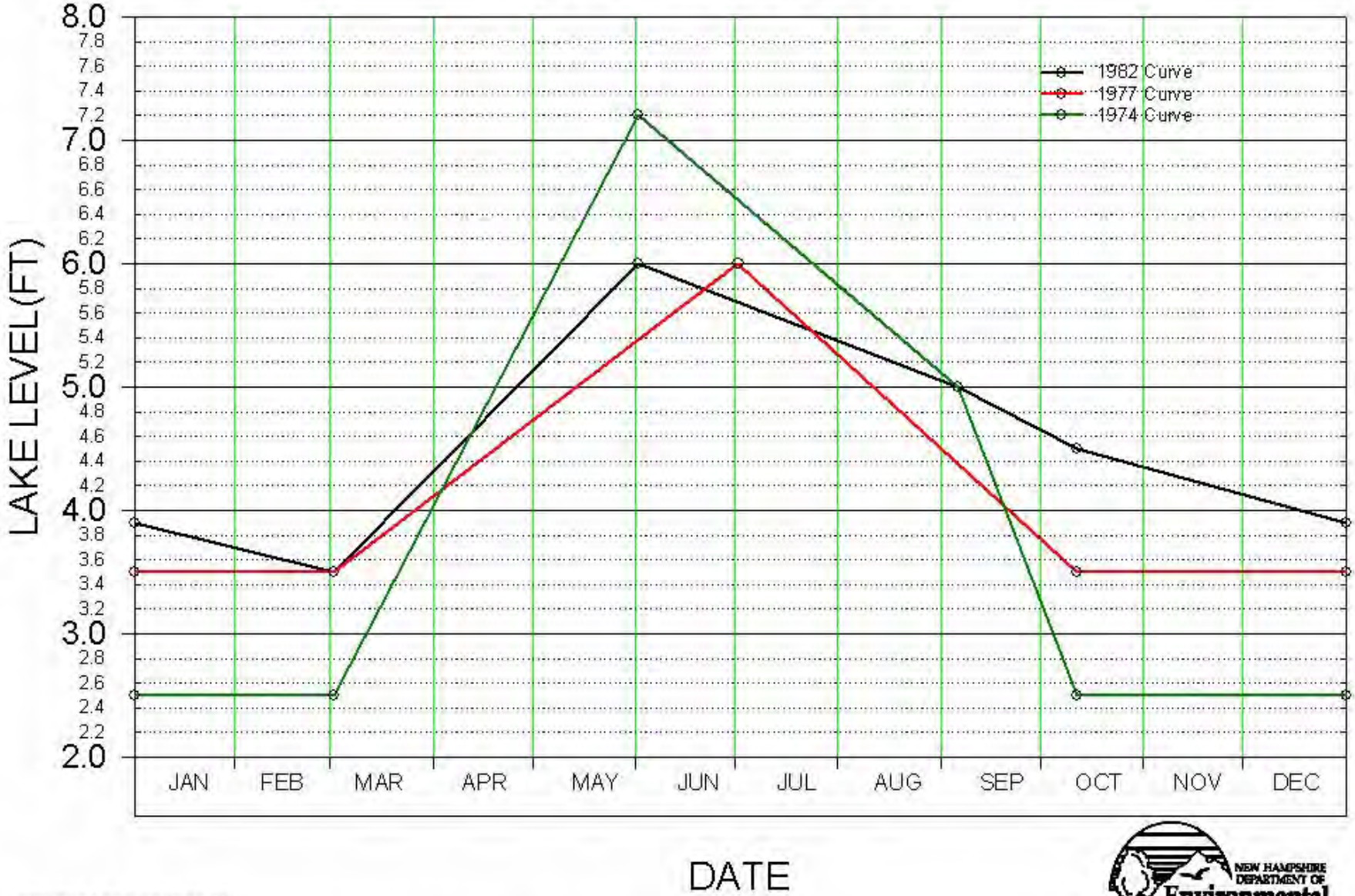

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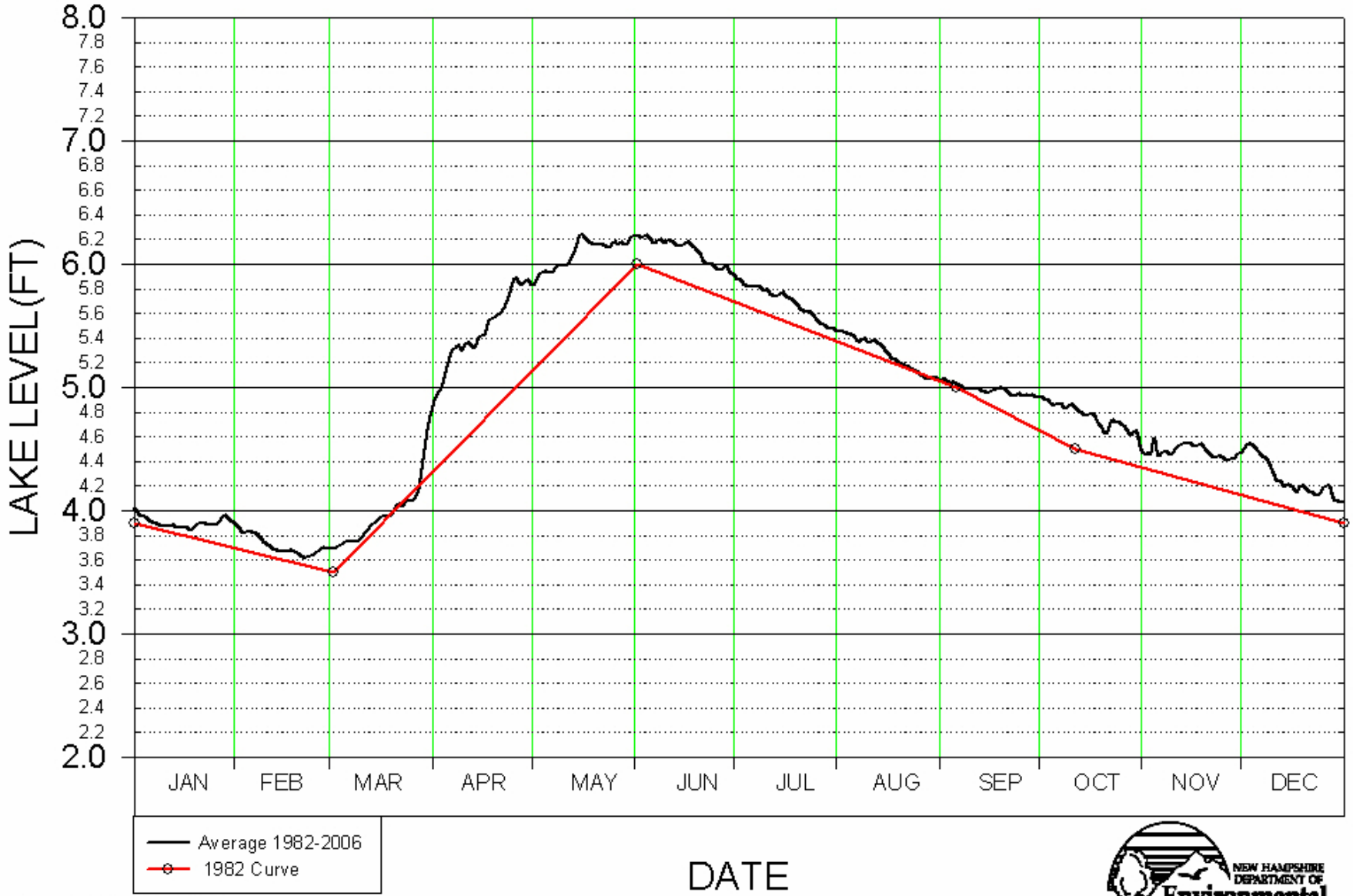

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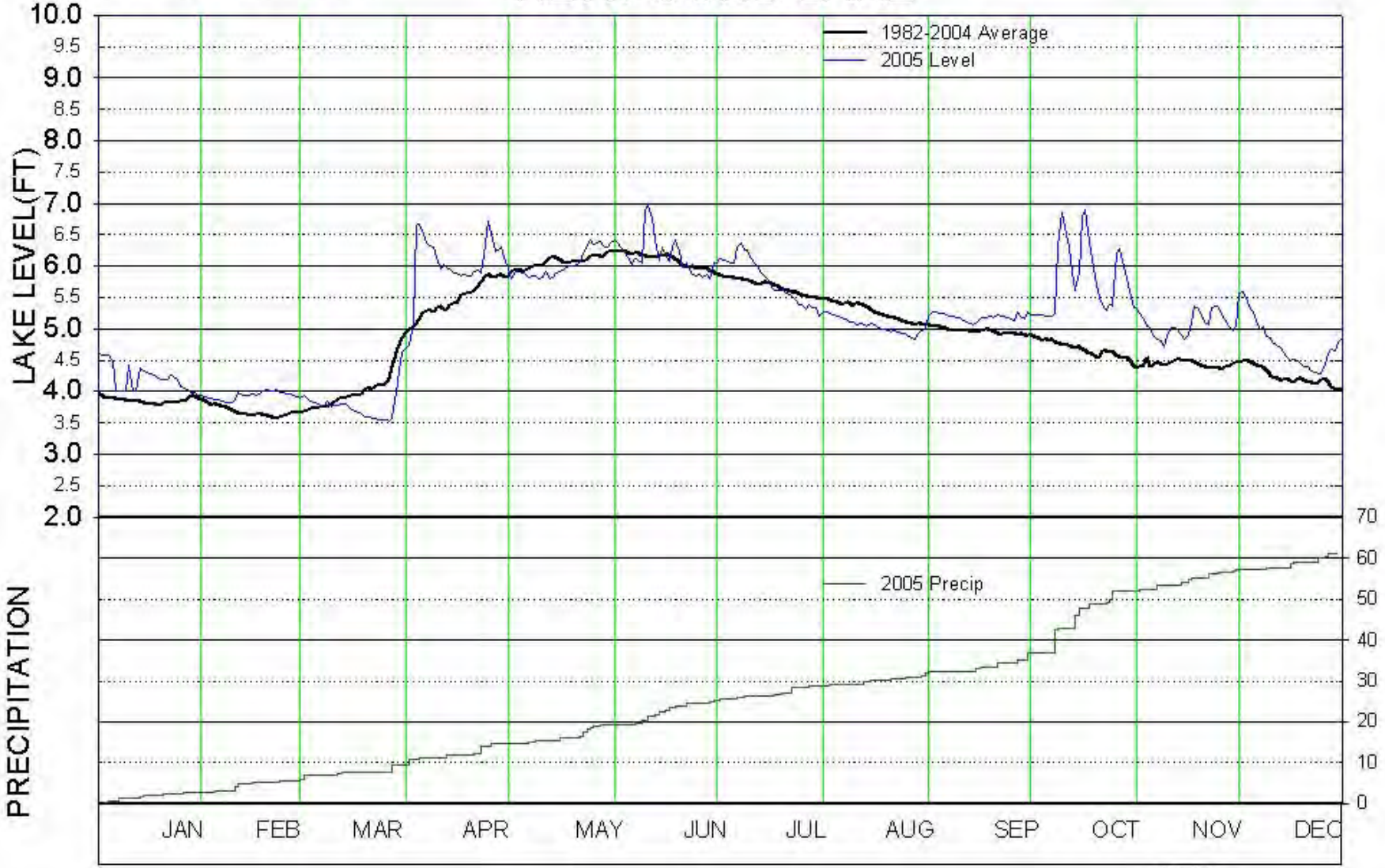

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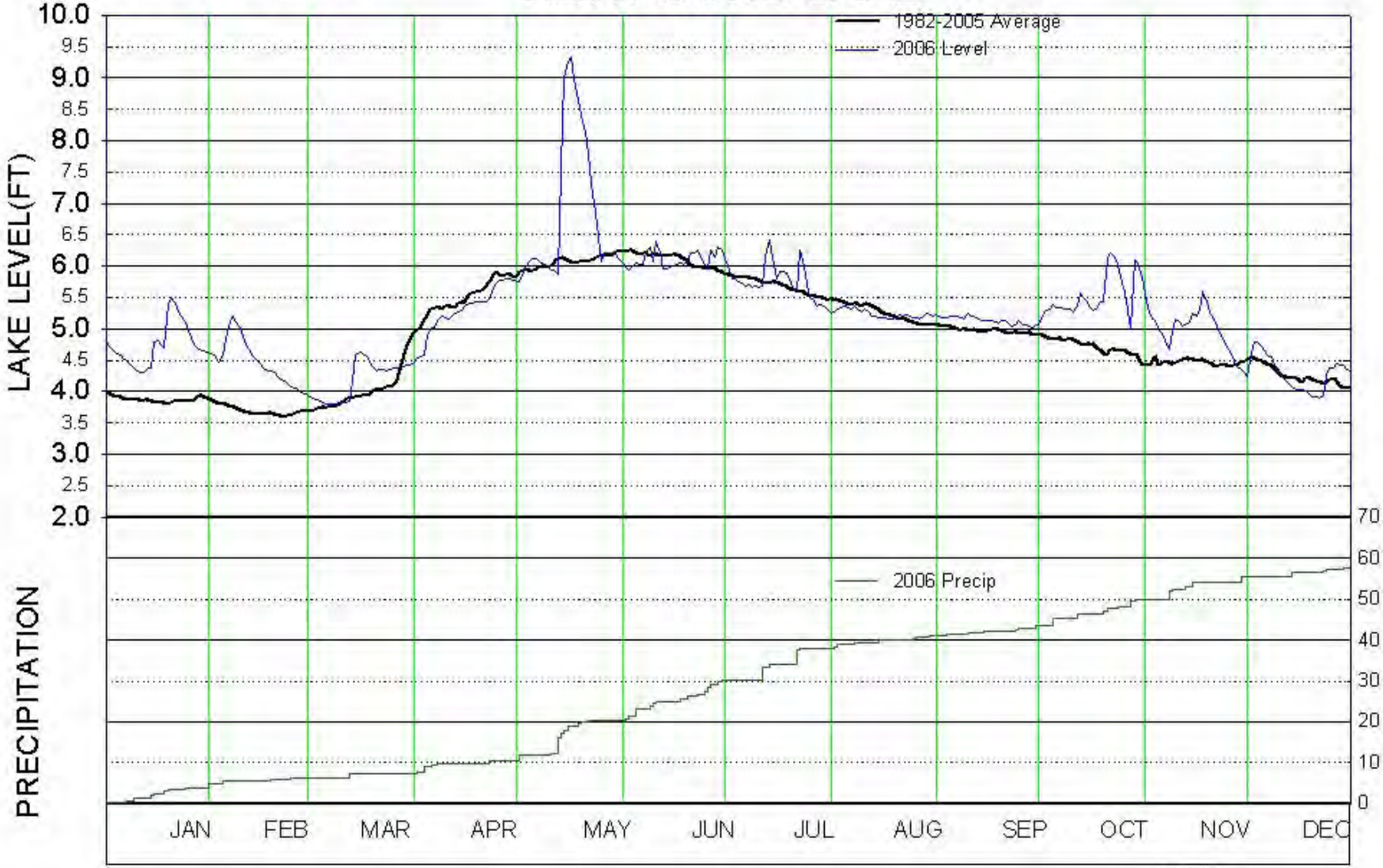

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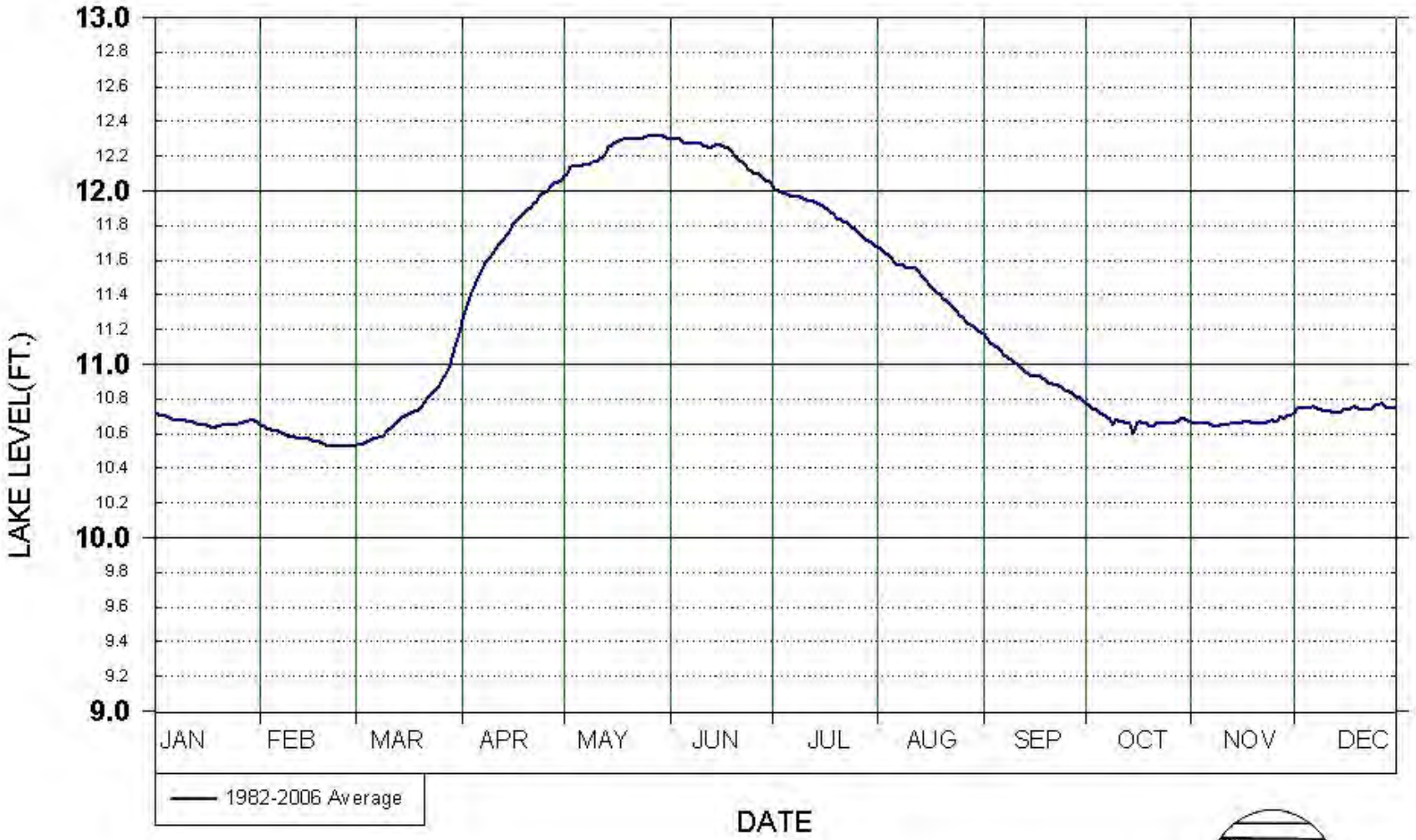
Typical Operating Ranges of Other Large Lakes

- Squam, Sunapee, Mascoma and Milton lakes show similar trends.
- Each watershed has variable land characteristics which affect runoff, such as average slope, type of soil, # of ponds, etc.
- “Flashy” basins produce runoff quickly but do not provide sustainable inflow.
- Basin characteristics affect management.

ELEV. 0.0' ON GAGE = 550.00' USGS ELEV.

SQUAM LAKE



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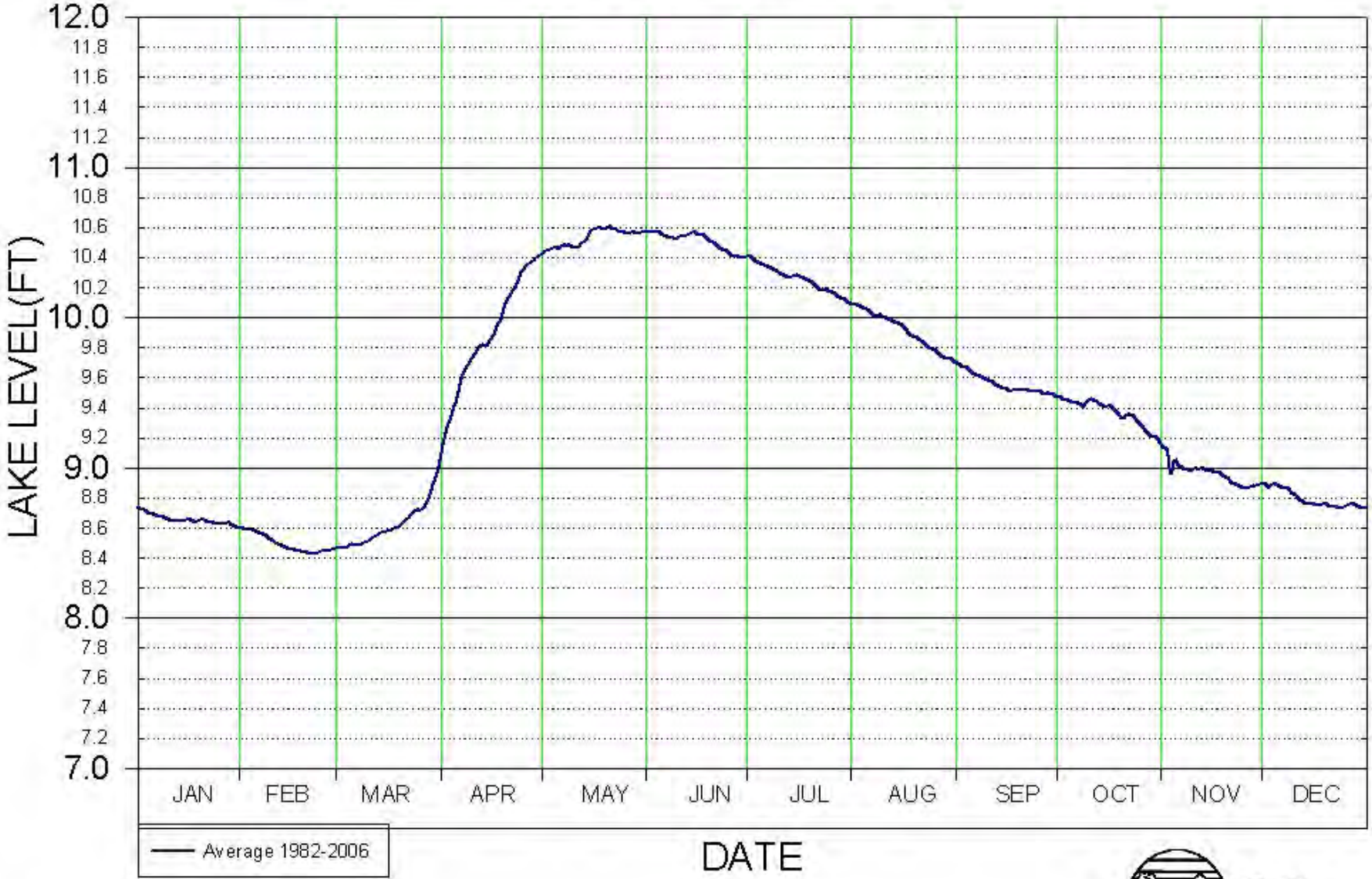
ELEV. 0.0' ON GAGE = 1082.65' USGS ELEV.

LAKE SUNAPEE



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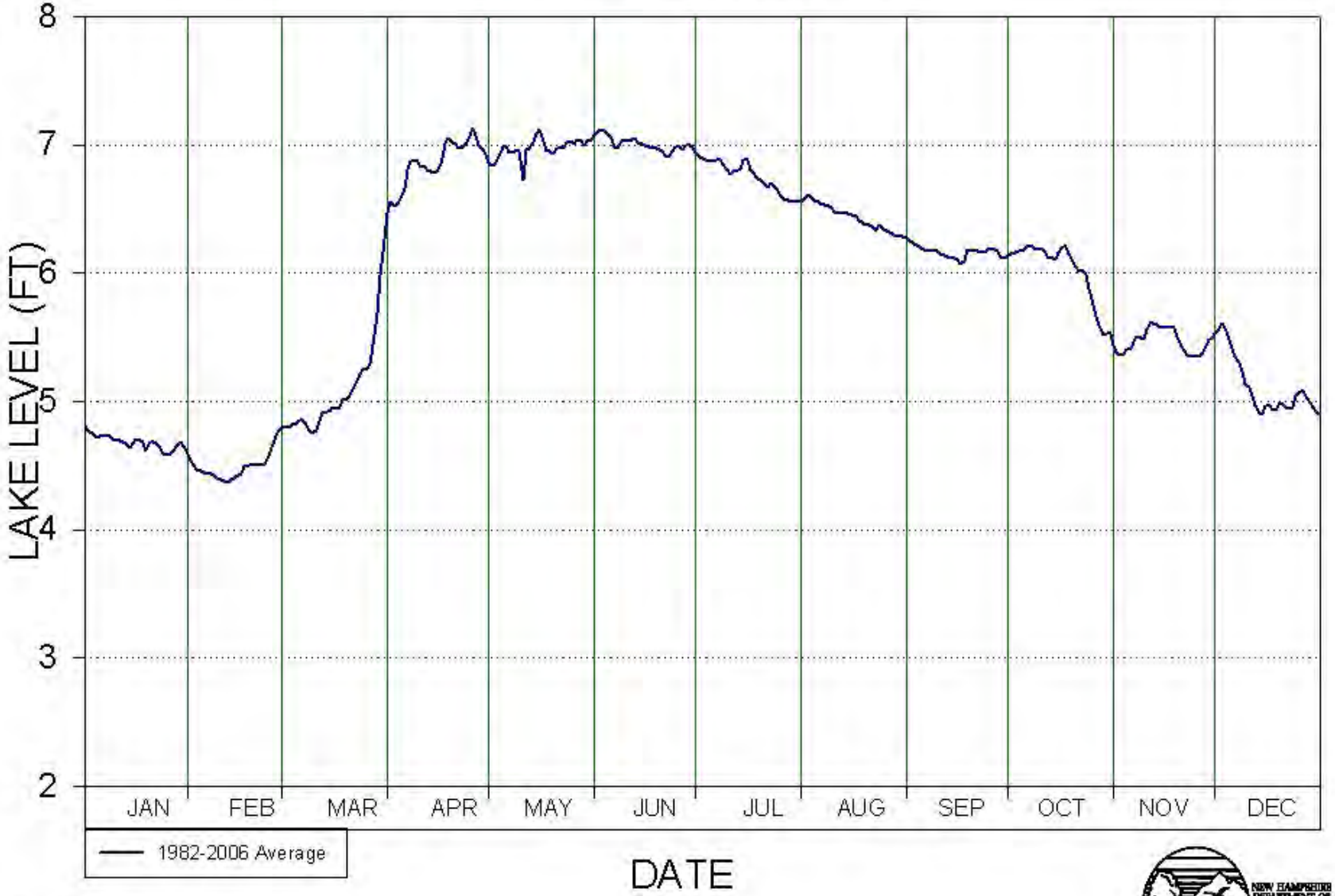
ELEV. 0.0' ON GAGE = 743.00' USGS ELEV.

MASCOMA LAKE



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ELEV. 0.0' ON GAGE = 398.62' USGS ELEV.

MILTON THREE PONDS

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Interests Affected by Management

- Recreation
- Property Use and Value
- Fisheries
- Wildlife
- Aquatic Plants
- Downstream Water Users (hydro and aquaculture)
- Business and Tourism

Many interests exist and are applicable to both the lake and the river.

Current Goals of Management

- Manage releases from the dam to adhere to the current management plan.
- Flood Reduction (both lake and river).
- Release of 250 cfs or less from the dam, when conditions allow, to maximize the generation potential of the river.
- Release minimum flows of 80, 60 and 40 cfs during the months of June, July and August for river fisheries health, if conditions allow.
- Limit the fluctuation of fall water levels to protect cold water species during spawning.

Management Tools

- Real-time flood forecasting and reservoir operation modeling software.
- Electronic field computers and remote gages to measure lake level, dam discharge, precipitation and air temperature.
- Groton gage on the Cockermouth River under development.
- Future project to automate one or more of the three flood gates is under consideration.

Future Goals of Management

- Is the current management plan adequate to meet the needs of the lake, river and their uses?
- Would changes to the plan result in benefits to some interests but increased risk to or degradation of others?
- Are changes possible? How?

Mother’s Day Event

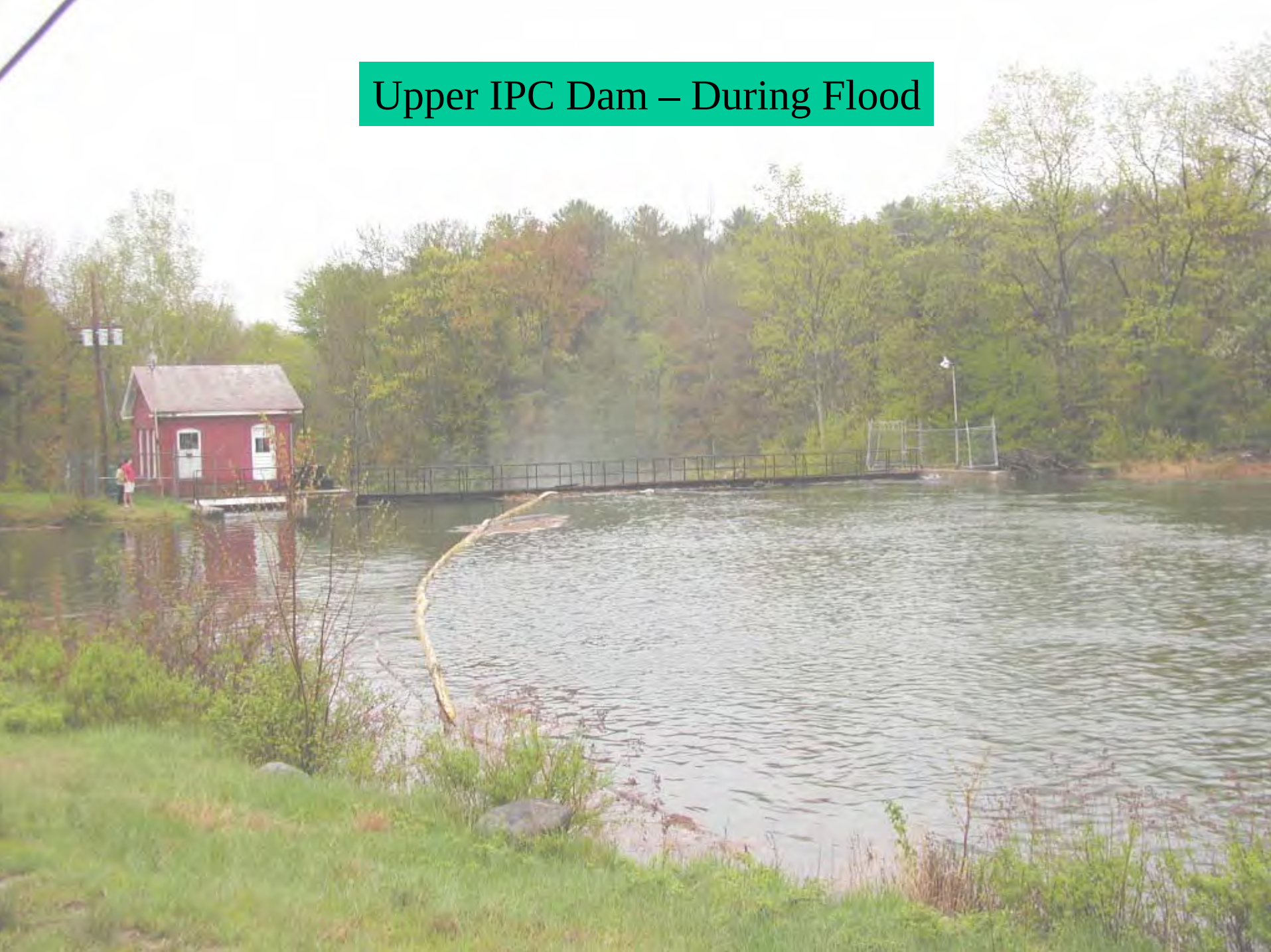
- Lake peaked near 9.7’ on the gage at West Shore Road on 5/17 (10.1 feet in 1973).
- Lake was at 5.9’ on 5/13.
- Flow at the dam exceeded the river rating table associated with our measuring gage, but the estimated discharge was between 3,500 and 4,200 cfs.
- Discharge was tempered to account for issues at downstream dams.

Mother's Day Event (cont'd)

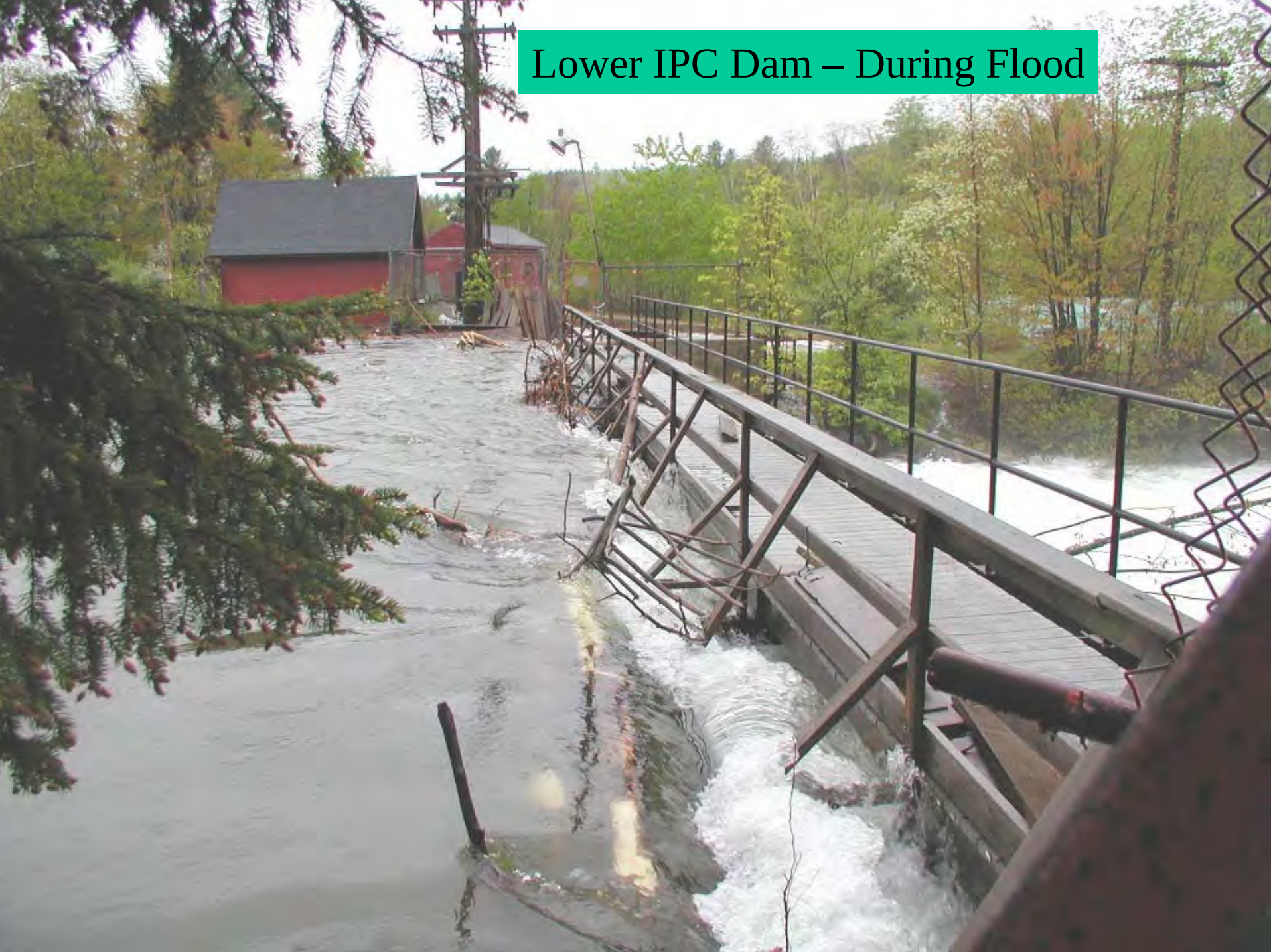
- Near failures of two downstream dams owned by Freudenburg NOK.
- Lower dam was overtopped causing significant damage to adjacent property.
- Significant damage to Newfound Hydro dam.
- Town implemented evacuation of affected area for several days until failure danger had been addressed.


Upper IPC Dam - Drained

Upper IPC Dam – During Flood

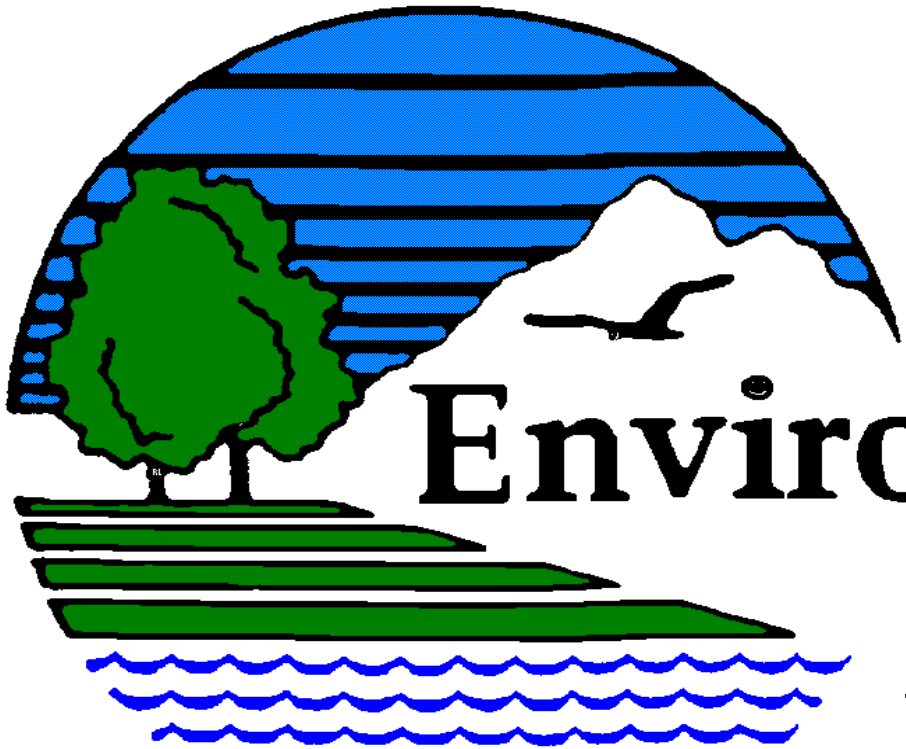


Upper IPC Dam – Typical Damage


Lower IPC Dam – During Flood

“Fun” Rain Facts

- DES measured 8.2” of rain @ Lakeport Dam between 5/13 and 5/22 – with 4” on the 14th
- May = 9.68”
- June = 8.32”
- July = 9.44”



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Dam Bureau