

Dam Drawdown During Emergency Flood Events

Vermont Dam Safety Program



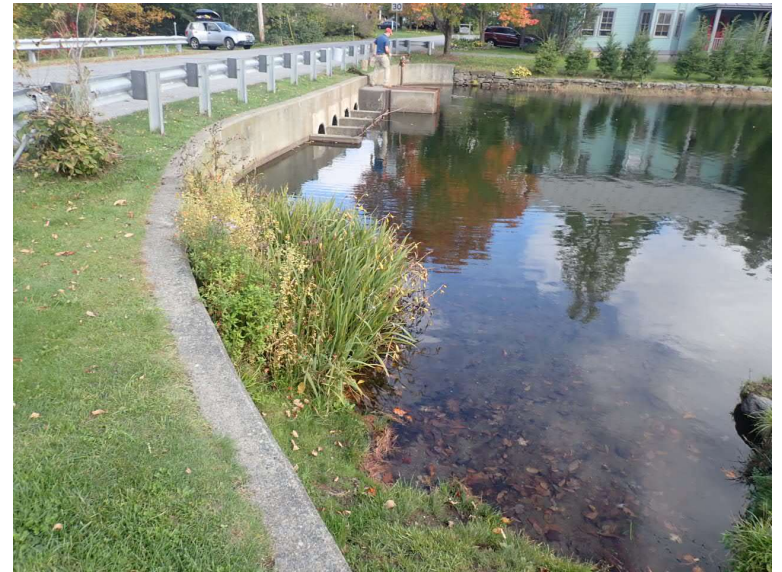
Waterbury Dam, Waterbury

**Senate Committee on Government Operations
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VTDEC Dam Safety Program

Brief Dam Safety Program (DSP) Overview

- Located in the Water Investment Division (WID) within VTDEC
- **"The mission of the DSP is to reduce risks to life, property, and the environment from dam incidents and dam failure through effective communication, education, regulation, and dam ownership"**
- **RESPONSIBILITIES:**
 - dam regulation
 - dam ownership
 - lands management
- **CURRENT STAFFING:**
 - (2) licensed engineers
 - (3) staff engineers/technician
 - (1) project manager
 - (1) program administrator
- **REGULATORY:**
 - 10 V.S.A Chapter 43: Dams, Non-federal, Non-power dams (Admin. Rules - 2020 / Standards Rules in development)
- **DAM OWNERSHIP:** 13 dams including the (3) Winooski River Flood Control Dams.



Silver Lake Dam

Recommendation

Dam owners with dams that could provide public safety and flood reduction benefits from pre-flood event drawdowns through temporary waiver of permits/environmental regulations should be required to develop an approved drawdown plan that includes communications, drawdown rates, target flows and levels, as well as monitoring and reporting requirements.

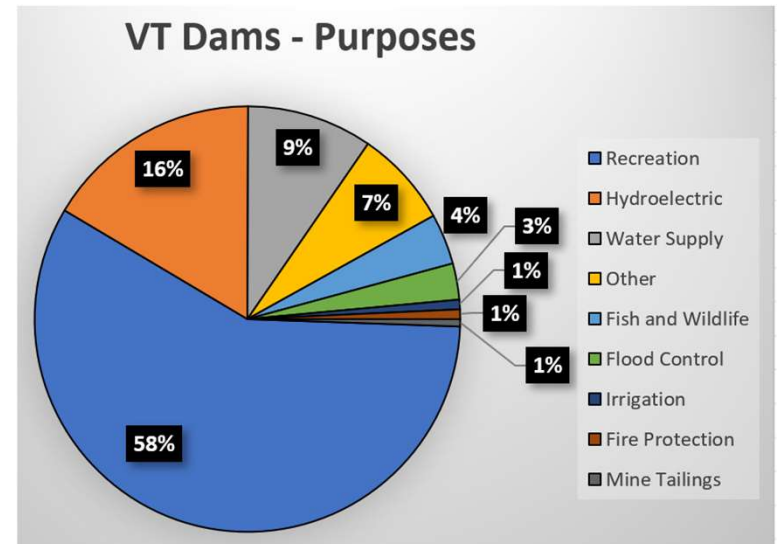
Pre-event Drawdown Potential Pros and Cons

- Pros:

- Reduce flood risk and flood loads on dams. Dam failure by flood overtopping is the most common dam failure mode.
- Use existing dam infrastructure to reduce downstream flooding/attenuate floods.
- Reduce flooding and damages to shoreline property.

- Cons:

- Dependent on dam configuration and drainage basin. Most dams not designed/configured for flood protection. May not be effective in all cases.
- Drawdown rates that are too rapid can damage dams.
- High outflows can cause undue erosion, or downstream channel/property damages.
- Outlet works used for drawdowns could fail (open/closed) resulting in unintended consequences.
- Requires diligent, active management, introduces additional human factors.
- Can have negative impacts to aquatic ecosystem in reservoir and downstream channel from unnatural levels and flows.



General Considerations

- Dam owners hold all the risk and liability of dam safety and dam performance.
- Measures that give dam owners tools to make their dams safer and reduce flooding should be explored.
- Success of pre-event drawdowns for dam and public safety is nuanced:
 - Pre-event drawdowns are already occurring in a controlled and regulated way at many hydropower dams with Water Quality Certifications. It is also occurring outside of regulations in some cases.
 - To have a meaningful impact, several days of prior notice is needed to perform operations and allow time for controlled drawdown that balances the safety of the dam and the safe, available capacity of downstream water ways.
 - Lack of pre-planning could result in inefficiencies or unintended consequences.
- Controls should be considered to balance public safety and environmental impacts.
- Should only be considered at dams that are in satisfactory condition with reliable operable works at which pre-event drawdown can provide measurable benefits.

Proposed Planning Considerations

- If a Dam Owner would like to perform pre-event drawdowns through waiver of environmental permits and regulations, they should be required to develop and have approved a pre-event drawdown plan that includes measures such as:
 - Hydrologic and hydraulic modeling of the dam, reservoir, and downstream channel that proves the public safety benefit of pre-event drawdown.
 - General pre-event drawdown guidelines, such as:
 - ☐ Regulator and downstream community notifications during pre-flood, in-flood, and post-flood.
 - ☐ Maximum reservoir drawdown rates and outflows with ramping rates.
 - ☐ Target drawdown elevation
 - ☐ Post-flood once dam/public safety risk has passed:
 - Meet/restore environmental flow requirements
 - If flood does not re-fill reservoir, meet environmental refill requirements.
 - ☐ Observations and reporting

Thank you!

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Wrightsville Reservoir