

MEMO

Appendix H.4.C.1

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Subject: **Georgian Bay (Ontario) Pumped Storage – Open AI Query on Value of Nottawasaga Bay Sport Fishery to Meaford and Thornbury Using Google Gemini 3 AI**

1. What is the value of the Nottawasaga Bay Sport Fishery to Meaford and Thornbury?

The sport fishery of Nottawasaga Bay (the southern portion of Georgian Bay) is a critical economic and cultural pillar for Meaford and Thornbury. While a single total dollar figure for these two specific towns is rarely isolated in provincial reports, the value can be broken down into economic impact, infrastructure, and ecological importance.

1. Economic Impact & Tourism

Recreational fishing in Ontario is a **\$2.2 billion annual industry**, and the southern Georgian Bay region is one of its most active hubs.

- **Direct Spending:** Anglers traveling to Meaford and Thornbury contribute significantly to the local economy through "trip expenditures." Provincial data suggests that over **80% of angler spending** goes toward non-fishing items like food, lodging, and transportation.
- **Boater Revenue:** The **Thornbury Municipal Harbour** and **Meaford Harbour** serve as primary launch points. In Thornbury, transient boaters (many of whom are anglers) spend an average of **\$192.10 per overnight stay**.
- **Four-Season Tourism:** The fishery helps sustain these towns as "four-season" destinations. When summer beach tourism slows down, the fall salmon run and spring rainbow trout run bring a wave of visitors to local hotels, restaurants, and bait shops.

2. The "River Effect": Bighead and Beaver Rivers

The value to these towns is uniquely tied to the rivers that flow through them, which serve as world-class spawning grounds.

- **Thornbury (Beaver River):** Known for its "naturally reproducing" populations of Chinook salmon and Rainbow trout (Steelhead). The **Thornbury Fish Ladder** is a major tourist attraction in itself, drawing thousands of non-anglers who spend money in town while watching the migration.

- **Meaford (Bighead River):** One of the most famous Steelhead rivers in Ontario. The proximity of the river mouth to the downtown core means that fishing activity translates directly into foot traffic for local businesses.

3. Employment and Business Ecosystem

The fishery supports a specialized local "value chain":

- **Charter Services:** Numerous professional fishing charters operate out of Meaford and Thornbury, charging between **\$400–\$800 per excursion**, bringing high-yield tourists to the area.
- **Local Jobs:** According to census data for the Blue Mountains (which includes Thornbury), agriculture, forestry, and fishing-related sectors account for over **340 local jobs** and are a top economic driver for the region.

4. Ecosystem Service Value

The **Grey Sauble Conservation Authority (GSCA)** has valued the natural areas that support this fishery to quantify their worth:

- **Coastal Wetlands:** Valued at approximately **\$14,761 per hectare per year** for the services they provide, including supporting fish nurseries.
- **River Habitat:** Open water river habitat is valued at over **\$4,400 per hectare per year** in terms of its contribution to the regional "conservation economy."

Summary Table: Value Drivers

Category	Impact on Meaford & Thornbury
Regional Fishery Value	Part of a \$2.2B Ontario industry.
Tourism Timing	Extends the tourist season into Spring and Fall .
Harbour Revenue	Significant income from slip fees and fuel sales .
Key Species	Chinook Salmon, Rainbow Trout (Steelhead), Smallmouth Bass.
Natural Assets	Beaver River (Thornbury) and Bighead River (Meaford).

In short, the Nottawasaga Bay sport fishery is not just a hobby for locals; it is a multi-million dollar "natural infrastructure" that sustains the hospitality, marine, and retail sectors of both Meaford and Thornbury.

2. How will Pumped Storage with 500 m³/s daily cyclical flow impact the Wild Salmon and Rainbow Trout Steelhead fishery of the Bighead and Beaver Rivers, and Warren Hill Creek?

The introduction of a large-scale open-loop Pumped Storage Project (such as the 1,000 MW facility proposed near Meaford) featuring a **500 cubic meters per second (500 m³/s)** daily cyclical flow represents a massive mechanical and hydrological shift for the southern portion of Georgian Bay.

While the physical pumped-storage infrastructure (the reservoir, underground turbines, and deep-water intake/outflow structures) is typically situated on the shoreline—distinct from the actual river channels of the **Bighead River, Beaver River, and Warren Hill Creek**—the massive daily intake and discharge of water directly affects the Nottawasaga Bay ecosystem. Because the wild Chinook Salmon and Rainbow Trout (Steelhead) fisheries rely seamlessly on both open-bay staging areas and river-spawning habitats, the project introduces several critical impacts.

1. Disruption of Nearshore Staging & Migration Cues

Before salmon and trout run up the Bighead and Beaver Rivers to spawn, they spend weeks "staging" in the nearshore waters of Nottawasaga Bay, navigating via precise thermal cues, currents, and chemical signatures from their natal rivers.

- **Disruption of Plume Signatures:** A daily cyclical flow of 500 m³/s—alternating between sucking bay water in during the night and blasting it out during the day—creates massive localized artificial currents. This can shear or dilute the natural freshwater "plumes" flowing out of the Bighead and Beaver Rivers, disorienting migrating fish and disrupting their ability to find the river mouths.
- **Thermal Shock and Destratification:** Georgian Bay is a deeply stratified cold-water ecosystem. Cyclical pumping acts like a giant blender, mixing warm surface water with deep cold water. Sudden temperature fluctuations near the shoreline can shock salmonids, which are highly sensitive to thermal barriers, potentially delaying runs or forcing fish to dump their eggs in the bay rather than entering the rivers.

2. Entrainment, Impingement, and Biomass Loss

The most direct biological threat to the fishery is the physical movement of water.

- **Entrainment (Sucked In):** During the night-time pumping cycle, baitfish (like alewife and rainbow smelt) and juvenile trout/salmon migrating out of the rivers into the bay can be sucked into the intake tunnels. Passing through high-pressure pumps up a 150-meter elevation to an upper reservoir causes severe mortality due to blade strikes and **barotrauma** (sudden pressure changes).
- **Impingement (Trapped on Screens):** Even with mitigation designs like fixed, low-velocity mesh screens over the intake structures, weak-swimming juvenile fish and fry emerging from Warren Hill Creek or the Bighead River can become pinned against the screens by the sheer force of the suction, leading to suffocation or exhaustion.
- **The Food Web Collapse:** If millions of small forage fish are destroyed daily by the turbines, the apex predators—the adult Salmon and Steelhead that local charter boats target—will lose their primary food source, causing a collapse in fish size and population density in the area.

3. Localized Impacts on Warren Hill Creek

Unlike the larger Bighead and Beaver Rivers which sit further away, smaller tributaries like **Warren Hill Creek** are located in immediate geographic proximity to the proposed Department of National Defence (DND) facility site.

- **Turbidity and Sedimentation:** The daily "flush" cycle of 500 m³/s can disturb the lakebed, kicking up heavy plumes of sediment. If these sediment plumes drift over the shallow, nearshore areas surrounding the mouth of Warren Hill Creek, they can coat gravel beds, suffocating wild trout eggs or making the creek mouth impassable for spawning adults due to low visibility and gill irritation.

4. Engineering Mitigations vs. Biological Reality

Recognizing these catastrophic risks to a multi-million dollar regional sport fishery, the project's design has evolved under public pressure to include major mitigations:

Mitigation Strategy	Proposed Benefit	Remaining Risk to Fishery
Deep-Water Sub-Lakebed Tunnels	Moves intake/outflow structures away from shallow, sensitive nearshore fish nurseries.	Still alters deep-water thermal layers and creates powerful offshore current vortexes.
Raised Intake Velocity Caps	Lifts structures off the lakebed to avoid bottom-dwellers and reduce sediment disruption.	Pelagic (open-water) staging Salmon and Steelhead still cross these intake paths.
Ultra-Low Approach Velocity Screens	Keeps water intake speeds low enough (≤ 0.15 m/s) for fish to swim away.	Micro-organisms, fish larvae, and small wild fry lack the swimming strength to fight even low velocities.

Summary of the Fishery Threat

While a pumped storage facility does not physically block or dam the Bighead or Beaver Rivers, its **500 m³/s daily cycle acts as a hydrological gatekeeper** right at the doorstep of these rivers. If the artificial currents, temperature changes, and turbine mortality disrupt the bay-to-river migration corridor, the world-class wild reproduction that sustains Meaford and Thornbury's eco-tourism economy could face a steep, irreversible decline.