Lake Trout and Shoreline Development on Bernard Lake

July 20, 2011

Outline

- Lake trout ecology
- Dissolved Oxygen Criterion
- Data for Bernard Lake
- Habitat Policy
- Criteria for Flexibility

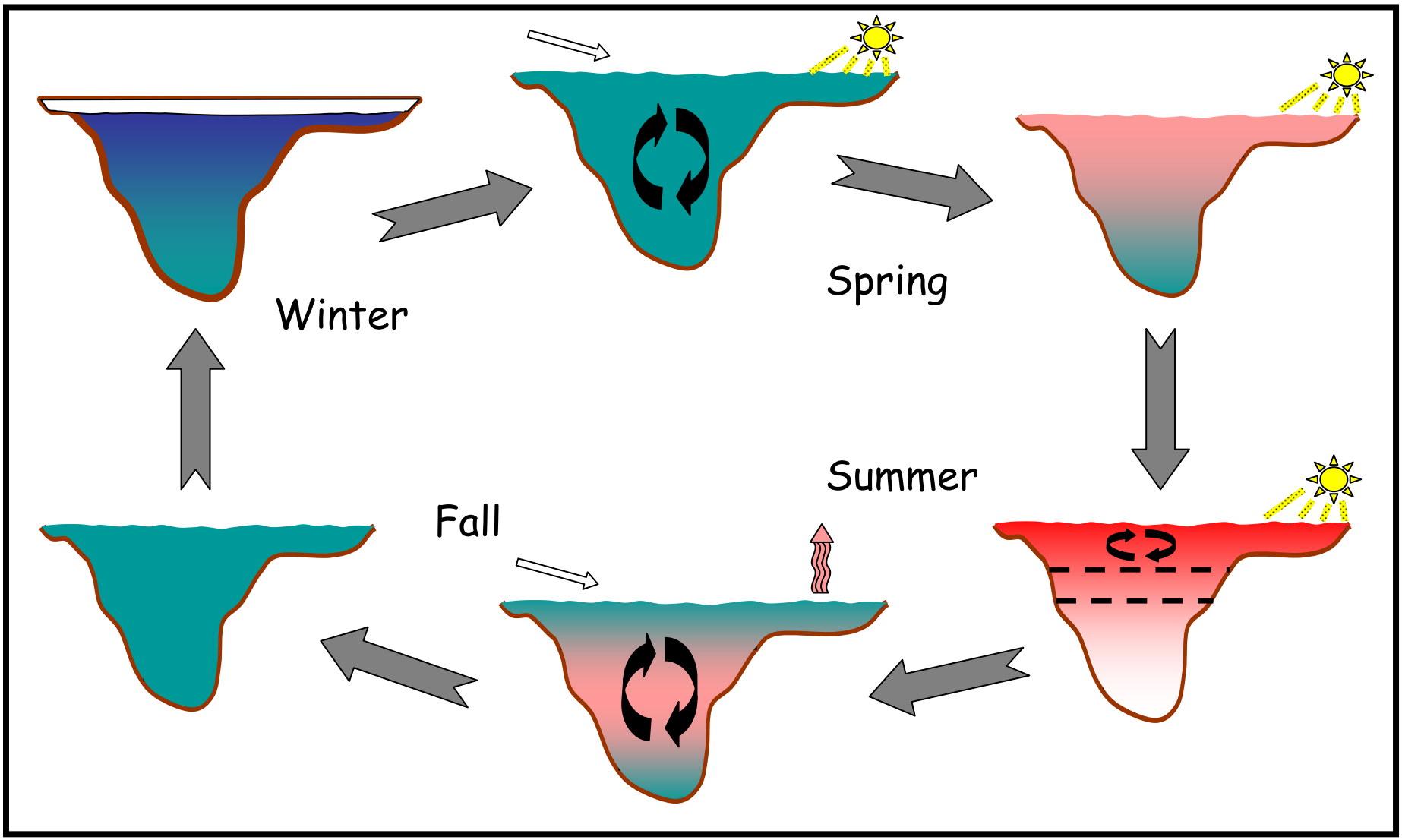
Why Lake Trout?

- Important
  - Top predator
  - Economic/social value
- Specific habitat requirements
  - Cold water/high oxygen
  - Only major species that **requires** well-oxygenated hypolimnion to support healthy population
  - Vulnerable to change in water quality

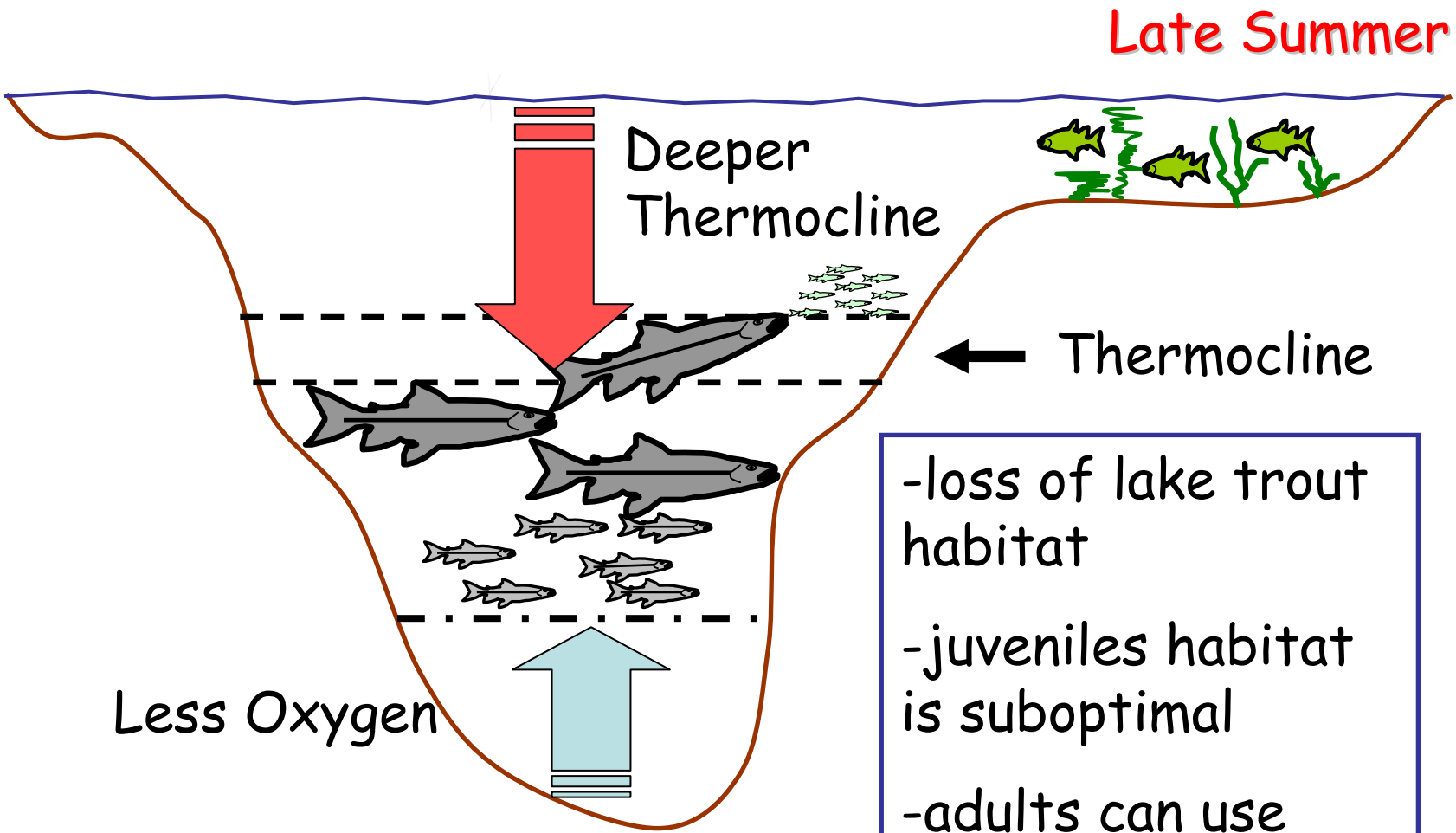
What is a Lake Trout Lake?

- Designated list – 2005
  - Natural
  - Put-grow-take
- Managed for lake trout
  - Habitat protection
    - dissolved oxygen criterion applied
  - Harvest control
  - Stocking
  - Assessment

Lake Stratification & Mixing



Lake Trout Ecology



- -loss of lake trout habitat
- -juveniles habitat is suboptimal
- -adults can use warmer O_2 waters

Link between Dissolved Oxygen and Shoreline Development

- Amount (and rate of depletion) of oxygen determined by:
  - size/shape of lake basin
  - nutrients (phosphorus)
- Shoreline development increases phosphorus loading to lake =
- Less oxygen

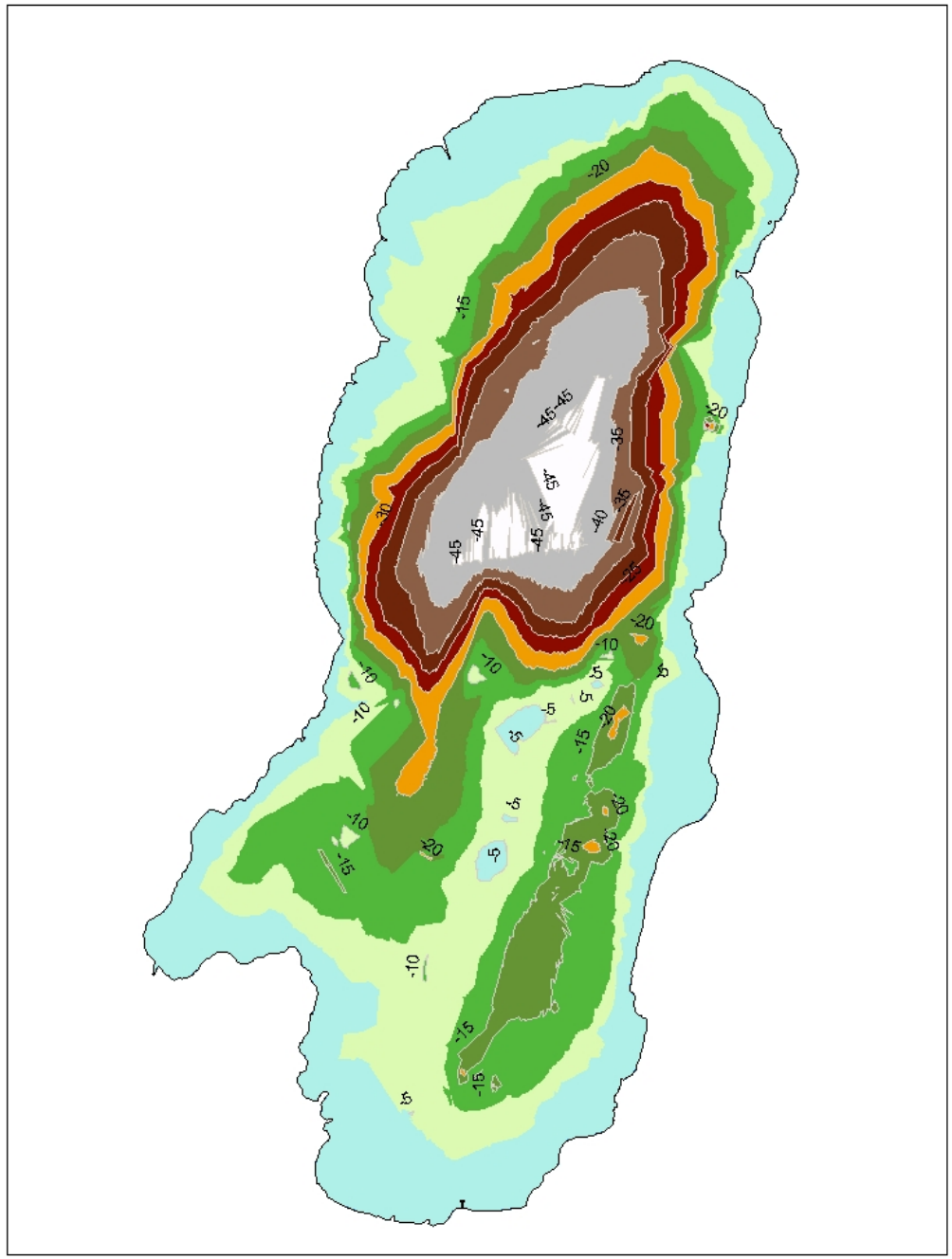
Provincial Policy Statement

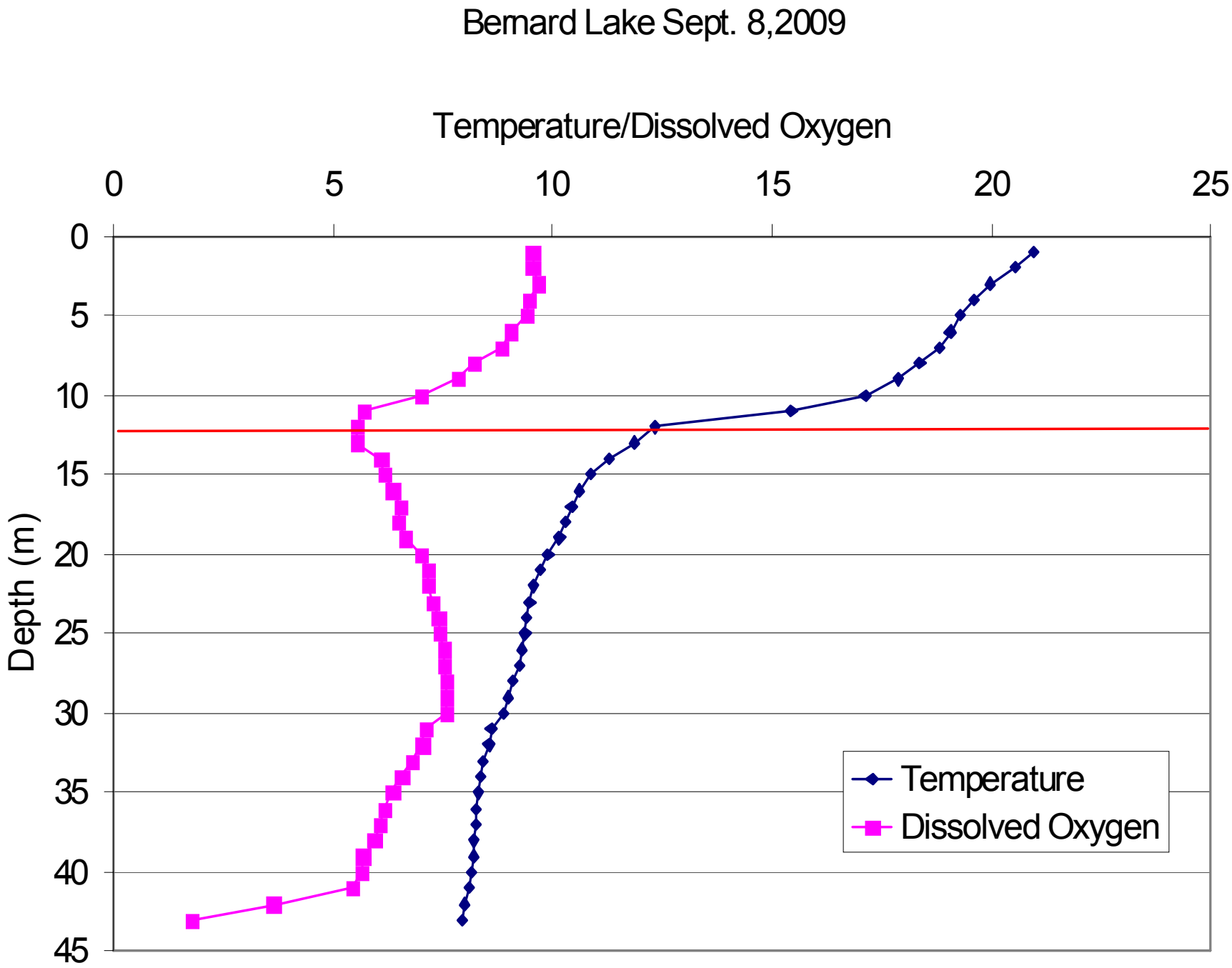
- “Development and site alteration shall not be permitted on adjacent lands…unless…it has been demonstrated that there will be no negative impacts”
- MOE advice to MNR: no technology proven to retain phosphorus for long term, therefore,
- Shoreline development will have negative impact on dissolved oxygen and lake trout habitat

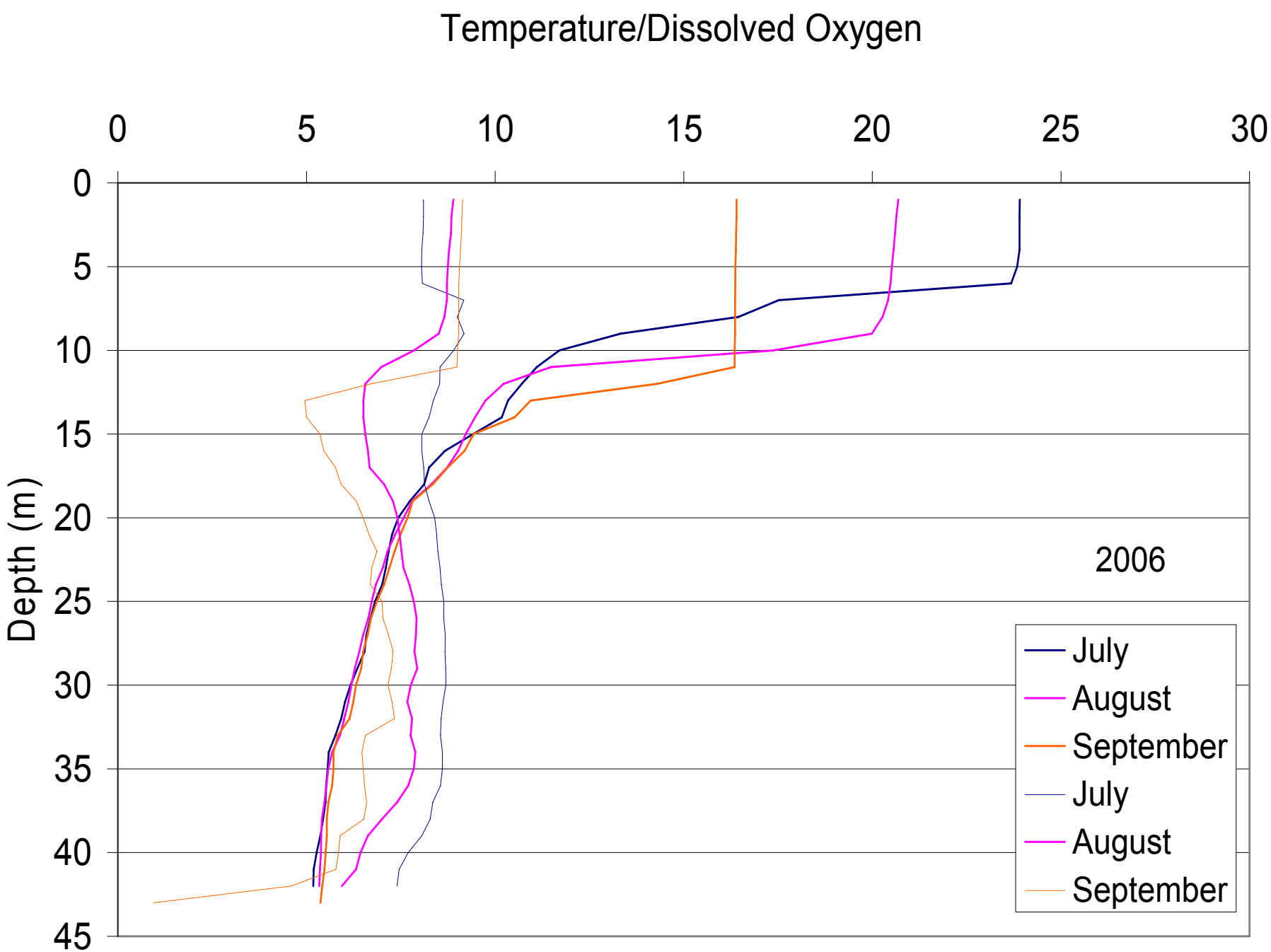
Dissolved Oxygen Criterion

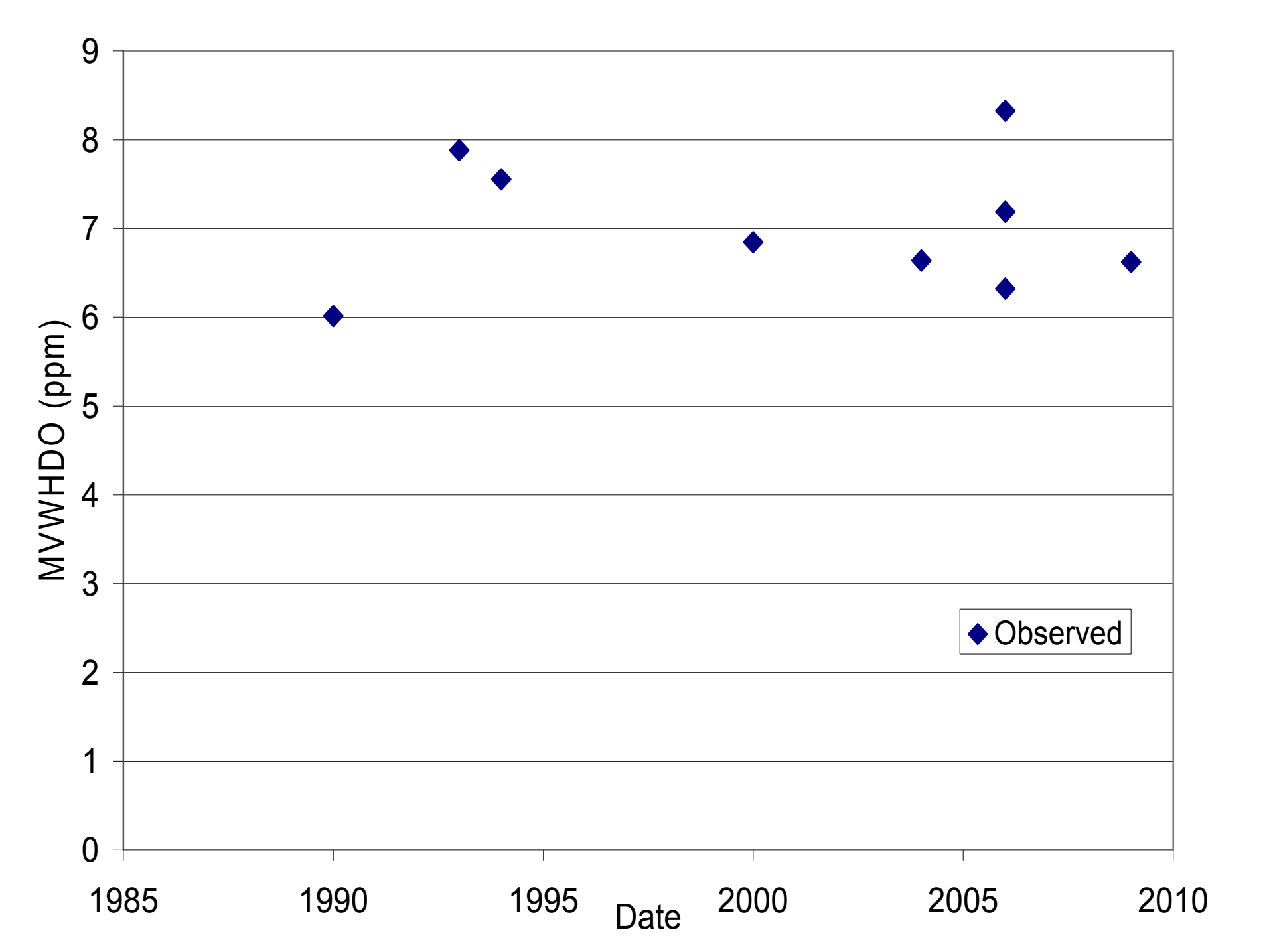
- Point at which habitat is affected
- Based on threshold of effect on:
  - Feeding, growth, reproduction
- 7 ppm, calculated as “mean volume-weighted hypolimnetic dissolved oxygen” (MVWHDO)
- EBR posting: accepted as MNR policy

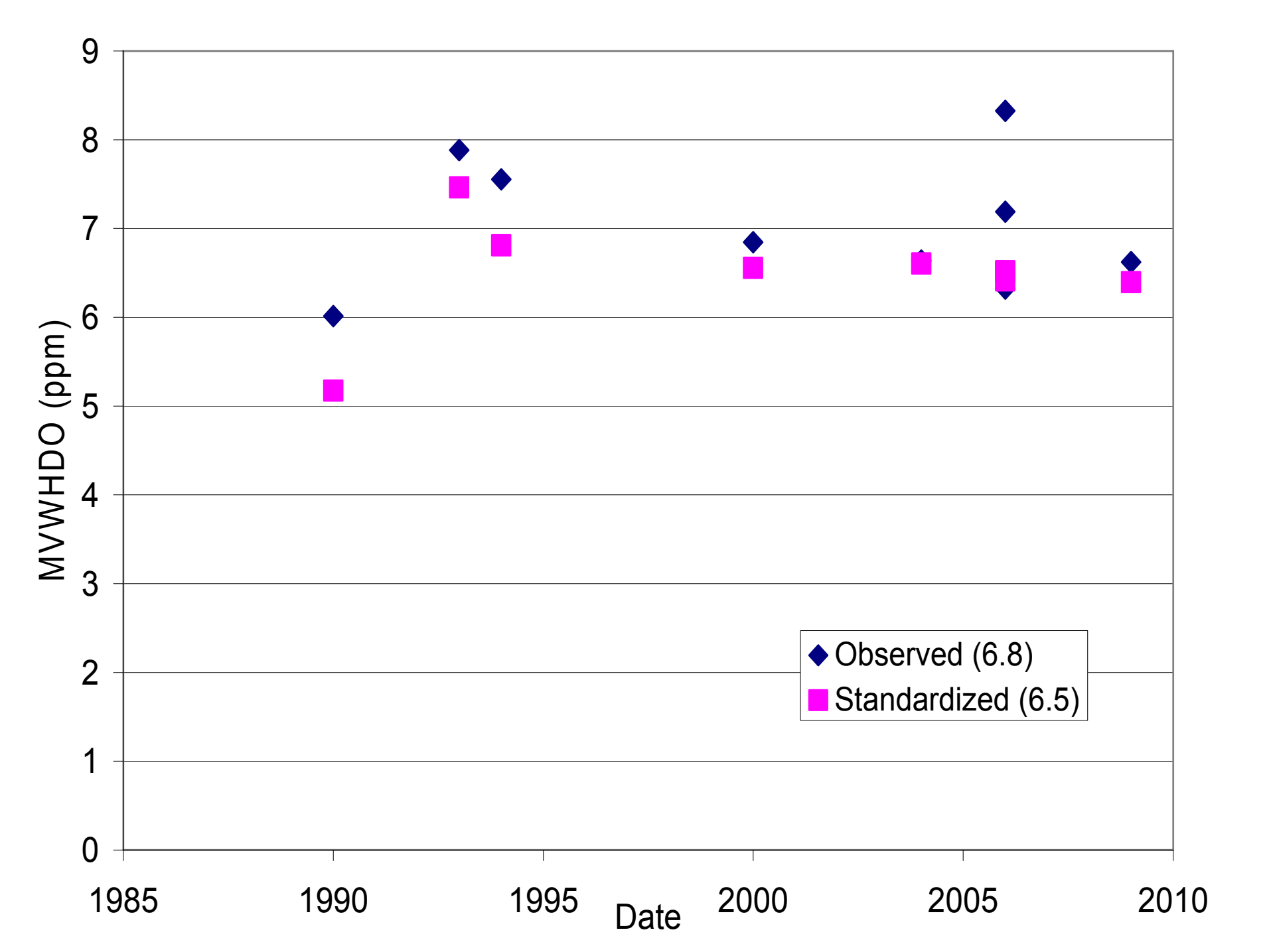
Application of Dissolved Oxygen Criterion to Bernard Lake




Bernard Lake Sept. 8,2009
Temperature/Dissolved Oxygen
0
5
10
15
20
25
Depth (m)
0
5
10
15
20
25
30
35
40
45
Temperature
Dissolved Oxygen


Temperature/Dissolved Oxygen
0
5
10
15
20
25
30
Depth (m)
0
5
10
15
20
25
30
35
40
45
2006
July
August
September
July
August
September

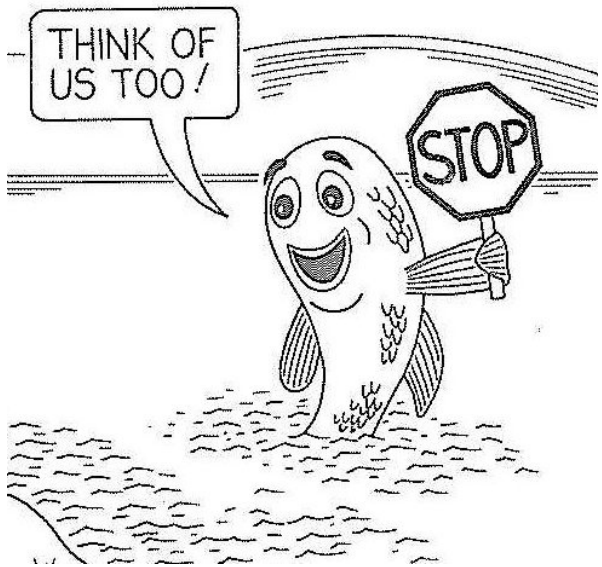

9
8
7
6
5
4
3
2
1
0
MVWHDO (ppm)
1985
1990
1995
2000
2005
2010
Date
Observed


9
8
7
6
5
4
3
2
1
0
MVWHDO (ppm)
1985
1990
1995
2000
2005
2010
Date
Observed (6.8)
Standardized (6.5)

Lake Trout Lakes at capacity if:

a) Sampling determines: MVWHDO ≤ 7.0 mg/L;

b) MVWHDO > 7 mg/L, but modelling determines:
   - dev't of existing, undeveloped lots with dev't rights would reduce MVWHDO ≤ 7.0 mg/L;
   - new dev't would decrease MVWHDO on downstream "at capacity" lake.



If Lake Trout Lake at Capacity:

- MNR recommends generally no new planning approvals … no new lot creation, or rezoning or minor variances that would enable more development on property.



- At capacity:
  - Lake Bernard,
  - Horn (Sollman) Lake
  - Loxton Lake …

Dev't of Existing Lots :

- To date, Ministries generally accept dev't of **existing** vacant lots to existing dev't rights & standards; also redev't.
- OMB has questioned why no controls to lessen impacts from development of existing lots…



Flexibility if lake trout lake at capacity:

New planning approvals recommended generally only:

1. To separate existing habitable dwellings, with each lot capable of separate septic system, if no change in land use;
2. If tile fields for new approvals ≥ 300m from shoreline, or hydro-g. study identifies drainage from tile fields would flow ≥ 300m to lake; or
3. If tile fields for new approvals would drain into lake not at capacity.

Rec'ns if criteria for flexibility met:

- Restrict removal of natural vegetation ≤ 30m of lake, except removal of hazardous trees & for limited narrow paths, waterlines, docking facilities etc.
- Minimum 30 m setback for all new buildings & structures (except docking facilities).
- Best mgmt practices to minimize additional P (e.g. discourage use of fertilizers on lawns & gardens ≤ 300m of lake).
- Concern for open-ended provision for views…

4th criterion for flexibility:

- MOE advises new science supports 4th criterion to allow new approvals on “at capacity” lake trout lakes:
  - Where soils meet specific parameters (undisturbed; >3m depth; <1% $CaCO_3$; >1% Al & Fe; etc).
  - Requires site-specific soils investigation.
  - Requires long-term monitoring.
  - Planning tools necessary to implement still under discussion by 3 ministries (used in Lake of Bays with dev’t permitting system).

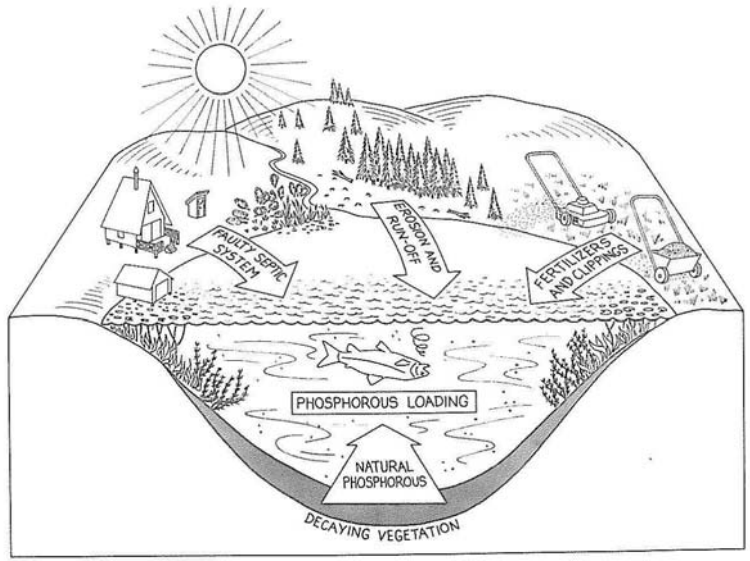
New technology to remove P:



- MOE advises no technology for individual septic systems yet demonstrates complete retention of P over long-term.
- Importance of precautionary approach on lake trout lakes: new technology should not be used as rationale for new dev't on "at capacity" lake trout lakes.

Impact of Upstream Development:

- Upstream development can increase P levels on lakes.
- Need for modelling of impacts of dev't upstream of at capacity lake trout lakes – not yet carried out for most lakes…
- Example: Pool Lake (Strong)



Sources of Phosphorus

Provincial Policy Statement:

- S. 2.1.5: protection of fish habitat …
- Definition of “provincial & federal requirements” as per S. 2.1.5 includes “scientifically established standards such as water quality criteria for protecting lake trout populations.”
- S. 2.1.6: protection of lands **adjacent to** fish habitat … only the identified 4 criteria for flexibility are considered acceptable from a technical perspective.

