

Stacy Dehne, P.E.
State of Wisconsin DATCP



CAUSES OF EROSION

- ▣ Geologic (i.e. soils, landscape, glaciation)
- ▣ Climatic (i.e. weather conditions)
- ▣ Vegetative (i.e. capability of growth, root structure, wind susceptible)
- ▣ Hydraulic (i.e. movement of water, runoff)
- ▣ Human Activity (i.e. alterations, access, use, dams, etc)

EROSION FACTORS

▣ ACTIVE

- Rainsplash & Runoff
- Waves (wind and boating)
- Currents (long shore currents or flows in streams)
- Ground Water (seeps)
- Frost thaw/ice impact
- Livestock or human access
- ▣ Removal/loss of bank vegetation
- ▣ Removal/loss of shallow water aquatic plants
 - Wind

EROSION FACTORS CONT'D

▣ PASSIVE

■ Bank or Shoreline Characteristics

- ▣ engineering properties
- ▣ geology
- ▣ geometry
- ▣ vegetative cover

■ Adjacent Features/Character

- ▣ land use/development
- ▣ watershed patterns

Visual Cues to Problems

- ▣ Large area of bare soils on steep, high bank
- ▣ Recession of shoreline
- ▣ Leaning or downed trees or exposed roots
- ▣ Patches of muddy water
- ▣ Deposits of sand or sediment on bed of lake
- ▣ Undercut banks
- ▣ Buckled or ice-shoved banks

Some Photos Showing Causes and Cues Follow...



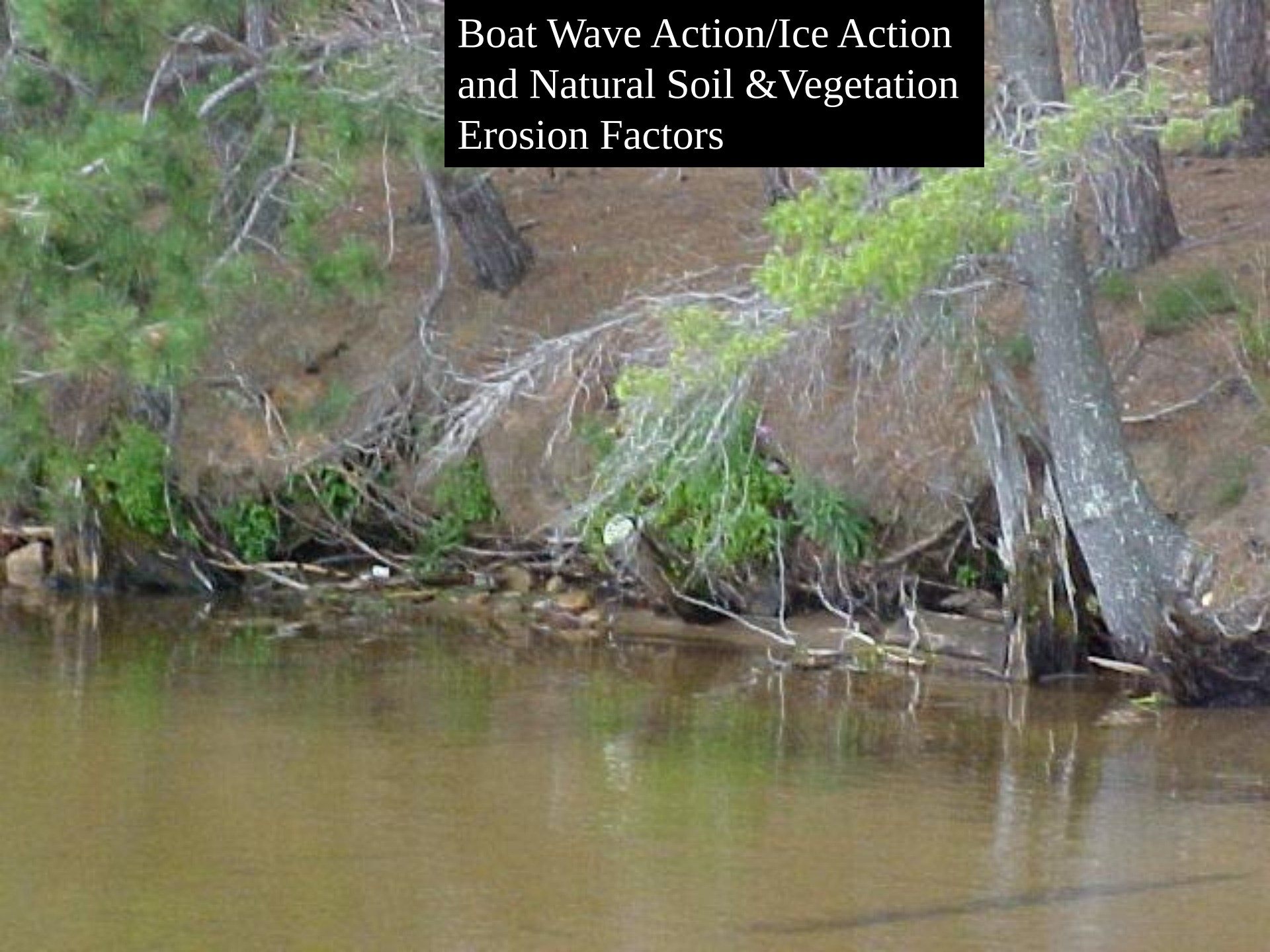
Human Factor -
Development increasing
impervious areas

Runoff Gully
Erosion Factor
Note Sediment
Plume In Lake



10/6/00

Boat Wave Action/Ice Action
and Natural Soil & Vegetation
Erosion Factors



Shear Stresses on river bend



steep Bank with
Fluctuating Water
Unstable Soils
keeps



Seepage



Low water levels
Allowed seeps to
Erode lakebed



Water Level Fluctuations
Seawall overtopping and
splash impacts



Human Factors And Natural...



Unstable Soils
on a steep bank





Runoff Erosion
Foot Traffic

8/21/99

A photograph of a stream in a forest. The stream is filled with numerous ice dams of various sizes, creating a turbulent flow of water. The water is a deep blue color. In the background, there is a dense forest of tall, thin trees, mostly without leaves, suggesting a winter or early spring setting. The sky is a pale blue with some light clouds. The overall scene is a natural, somewhat harsh landscape.

Ice Dams on Streams



Ice Push Action —
Note vertical tree



Recession due to ice shoves – compare to neighbors

Slump in Bank
due to over-saturation





Isolated area of bare soil
due to tree fall



Exposed tree roots from
wave action and soil loss

Runoff from above and toe erosion downstream of a dam (plunge pool scour)



Excessive sediments
deposited on streambed

08.16.2006 11:32





Foot traffic at campsite
caused a gully to river

Runoff travelling along
road depositing gravel



Soils, Foot traffic, tree removal, wave action, runoff



Muddy water from
sediments!

