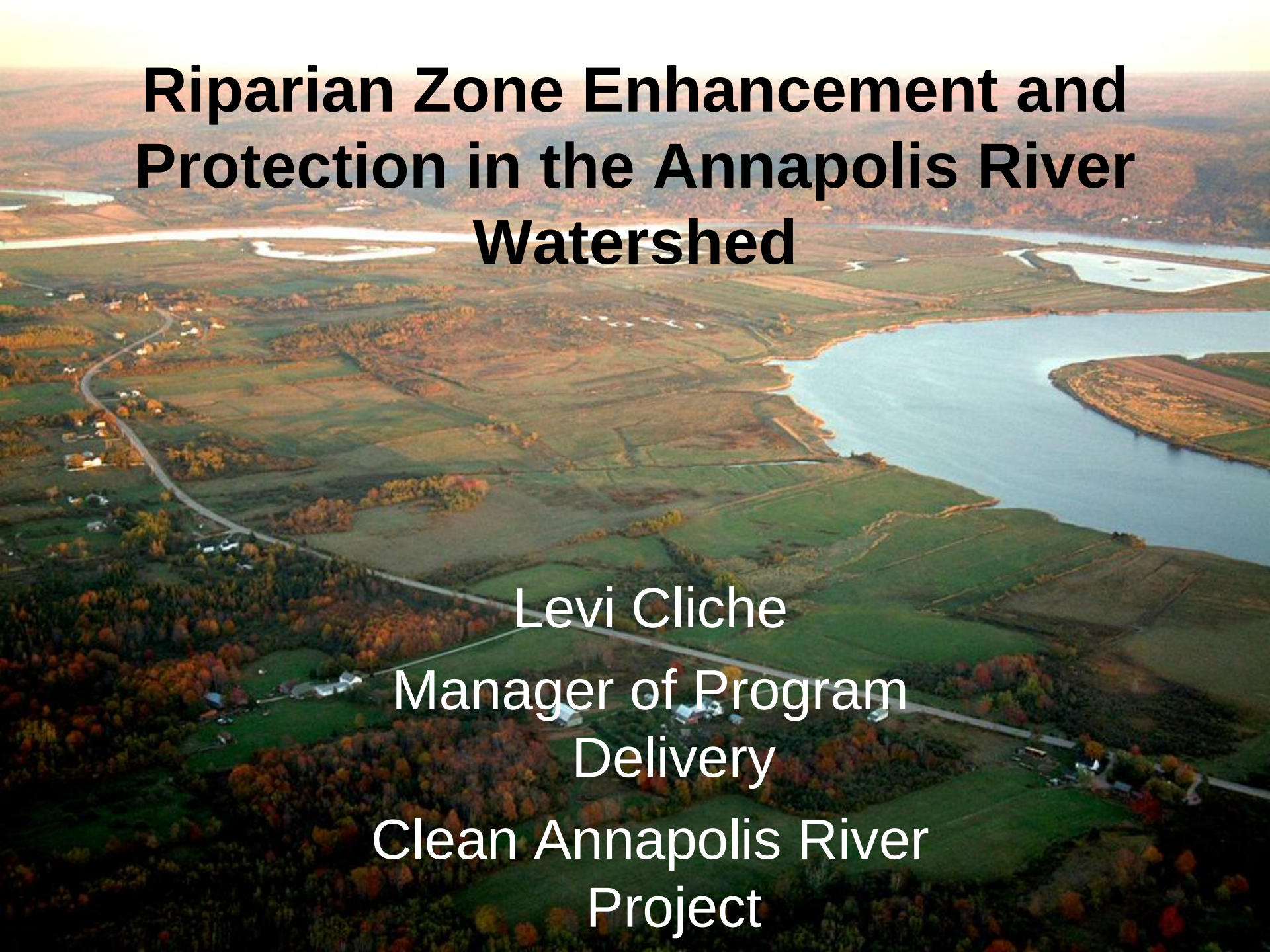
Riparian Zone Enhancement and Protection in the Annapolis River Watershed



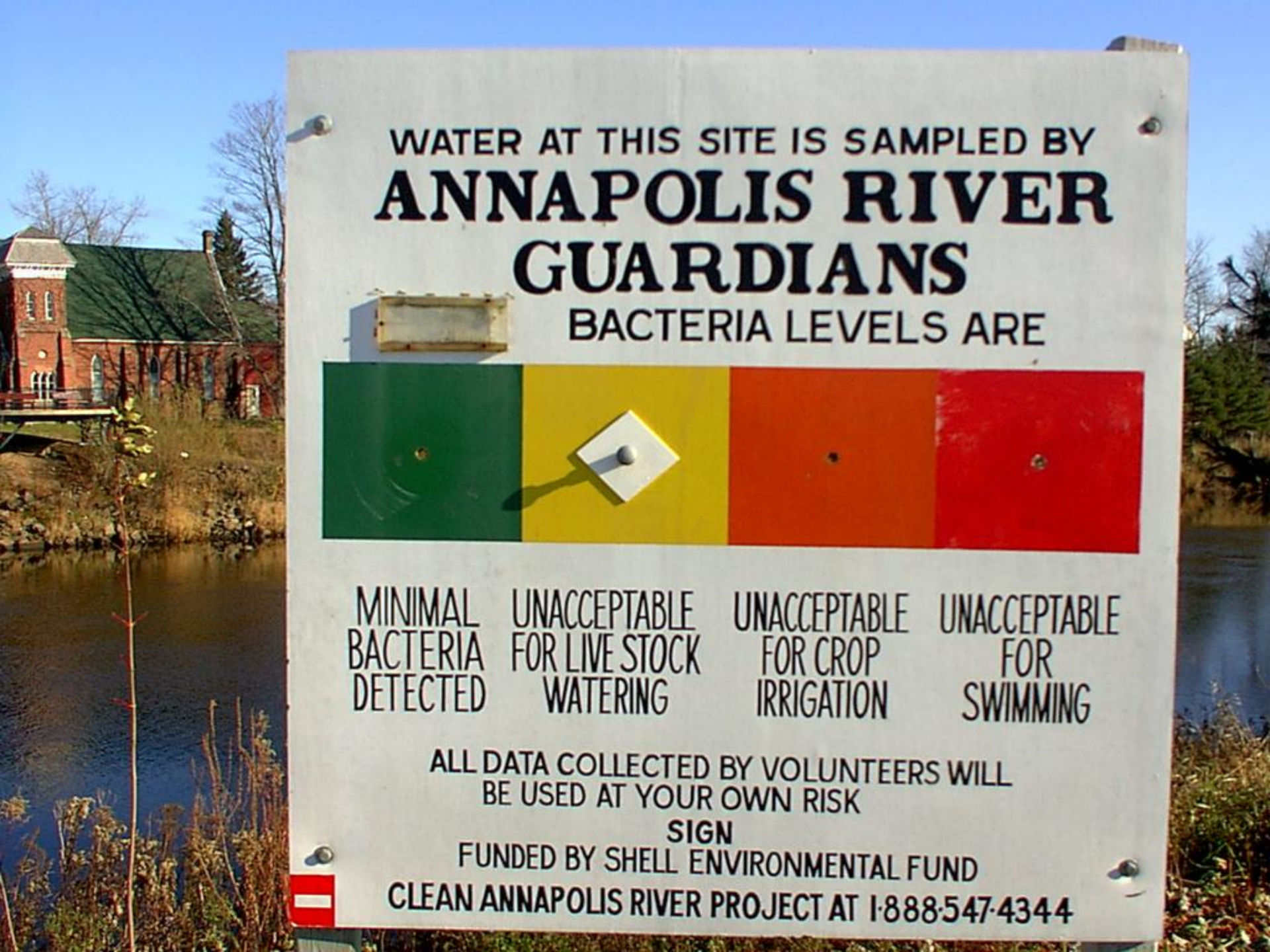
Levi Cliche

Manager of Program Delivery

Clean Annapolis River Project

Clean Annapolis River Project

Not for profit organization established in 1990 to restore and protect the ecological health of the Annapolis River watershed through science, leadership and


WATER AT THIS SITE IS SAMPLED BY
ANNAPOLIS RIVER GUARDIANS
BACTERIA LEVELS ARE
MINIMAL BACTERIA DETECTED
UNACCEPTABLE FOR LIVE STOCK WATERING
UNACCEPTABLE FOR CROP IRRIGATION
UNACCEPTABLE FOR SWIMMING
ALL DATA COLLECTED BY VOLUNTEERS WILL BE USED AT YOUR OWN RISK
SIGN
FUNDED BY SHELL ENVIRONMENTAL FUND
CLEAN ANNAPOLIS RIVER PROJECT AT 1-888-547-4344

Annapolis River Guardians

- Samples collected every second Sunday, April – November
- 8 volunteers; 8 locations
- >3600 samples have been collected
- Program operating

What do we measure?

Parameter	Reason	Goal
E.coli bacteria	Indicator of fecal contamination and disease causing organisms	Less than 100 *E.coli* / 100 ml
Dissolved oxygen	Critical for the health of aquatic life	Greater than 60% saturation
Temperature	Necessary for cold-water fish	Summer temps. less than 20 º C
pH	Measure of water's acidity	Between 6.5 and 9.0
Nitrogen and Phosphorus	Indicators of pollution	N - Less than 0.9 mg/L P - Less than 0.03 mg/L
Turbidity	Too much sediment hinders growth of plants and animals	Median levels less than 10 NTU
Benthic Invertebrates	Types of invertebrates in stream-bed help gauge water quality	Family Biotic Index should be less than 5

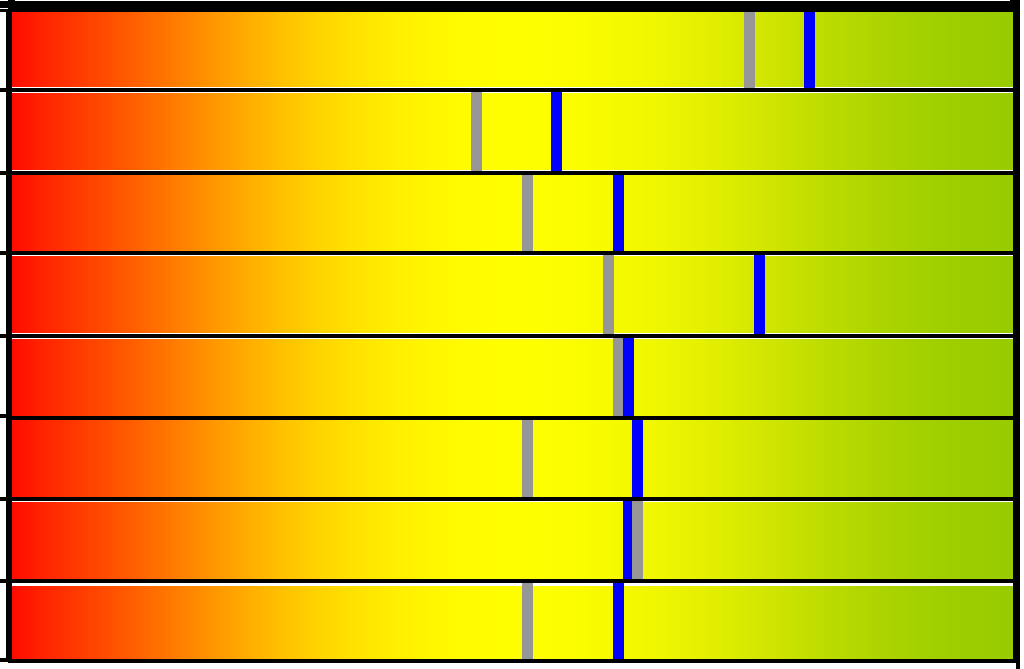
Water Quality Summary 2010

The Health of the Annapolis River in 2010

Variable	Status (2010)	Comment	Trend (1992 to 2010)
E. coli Bacteria	Poor	41% of the 111 samples fell outside the objective for water contact recreation (e.g. swimming). Like 2009, high rainfall amounts contributed to high *E. Coli* levels.	↑ at 2 locations ↓ at 1 location ↔ at 5 locations
Dissolved Oxygen	Good	All samples were above 60% saturation. DO levels lower than 60% saturation cause stress to aquatic life.	↑ at 1 location ↓ at 2 locations ↔ at 5 locations
Water Temp.	Fair	40% of the 48 samples collected during the summer months (July, August, September) had temperatures greater than 20 °C.	↑ at 2 locations ↔ at 6 locations
pH	Good	All 111 pH samples were in the objective of 6.5 to 9.	↑ at 2 locations ↔ at 6 locations
Nitrogen	Fair	1 out of the 8 samples (13%) were above the objective of 0.9 mg/L.	↔ at one location*
Phosphorus	Poor	4 out of the 8 samples (50%) were above the objective of 0.03 mg/L.	↔ at one location*
Turbidity	Fair	17% of 111 routine samples were above the 10 NTU objective.	Insufficient Information
Trend Legend		↑ Improving ↓ Declining ↔ No trend detected	

Water Quality Index Scores for 2010

SITE	WQI 2010	WATER QUALITY INDEX (WQI) SCORES (0 – 100)
Aylesford Rd	81	
Aylesford	56	
Kingston	62	
Wilmot	76	
Middleton	63	
Lawrencetown	64	
Paradise	63	
Bridgetown	62	

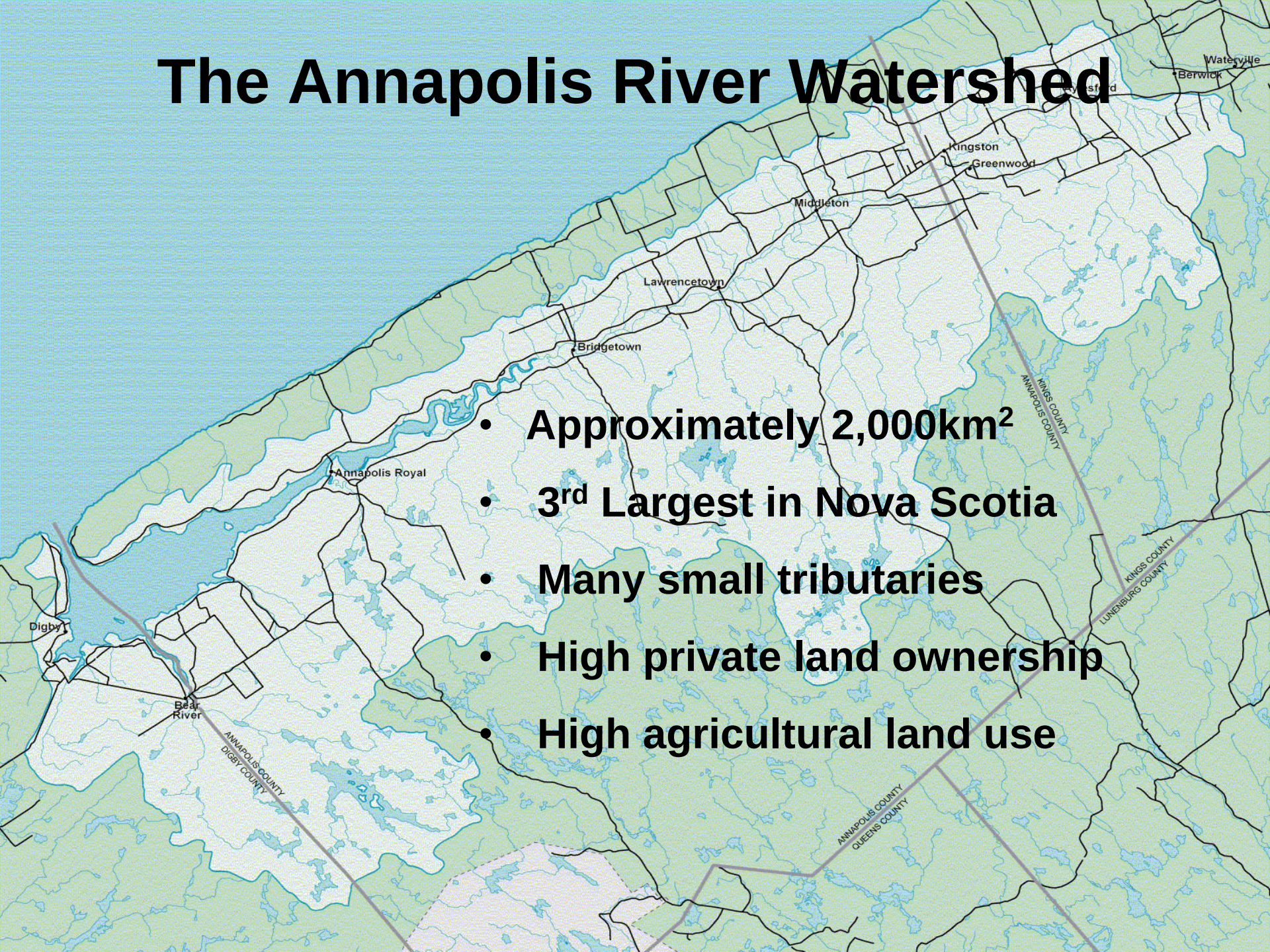


WQI	Water Condition
95-100	EXCELLENT • Absence of threat • Almost pristine
80-94	GOOD • Minor degree of threat • Usually at desirable levels
65-79	FAIR • Occasional threat • Not always at desirable levels
45-64	MARGINAL • Frequent threat • Often not at desirable levels
0-44	POOR • Almost constant threat • Usually not at desirable levels

The Water Quality Index is a value calculated using several water quality parameters. The parameters used in this calculation were *E.coli* bacteria count, Dissolved Oxygen, Temperature, pH and Turbidity. See http://annapolisriver.ca/riverguardians.php for methodology.

- The WQI scores were calculated using the DO, temperature, pH, *E. coli* and turbidity data.

The Annapolis River Watershed



- Approximately 2,000km^2
- 3rd Largest in Nova Scotia
- Many small tributaries
- High private land ownership
- High agricultural land use

Riparian Zones in the Watershed

The alteration of riparian zones in the Annapolis Watershed by European settlers began over 350 years ago.

Since that time, land development and use have caused large scale alteration, and decreased functioning of riparian zones in the area.

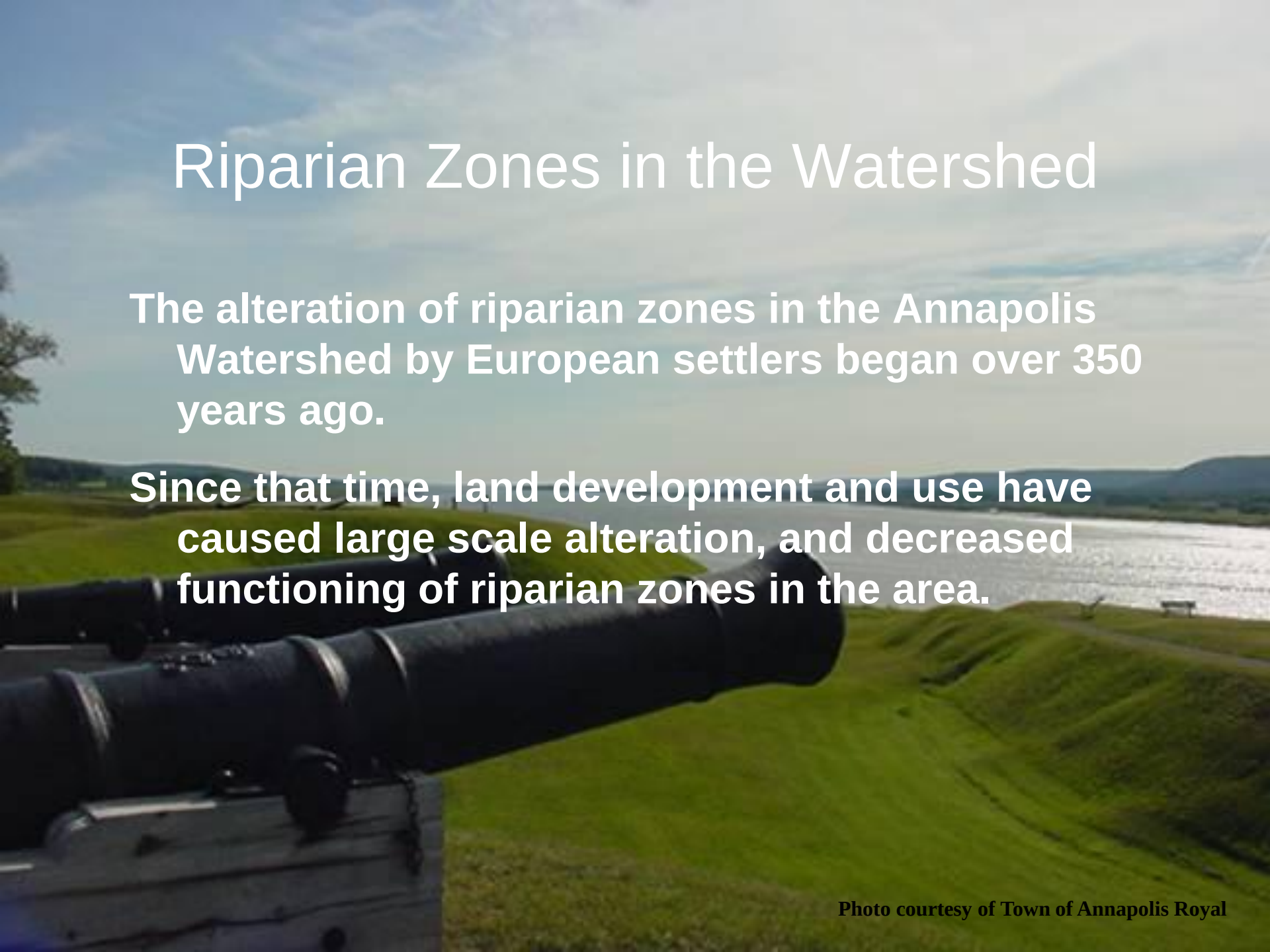
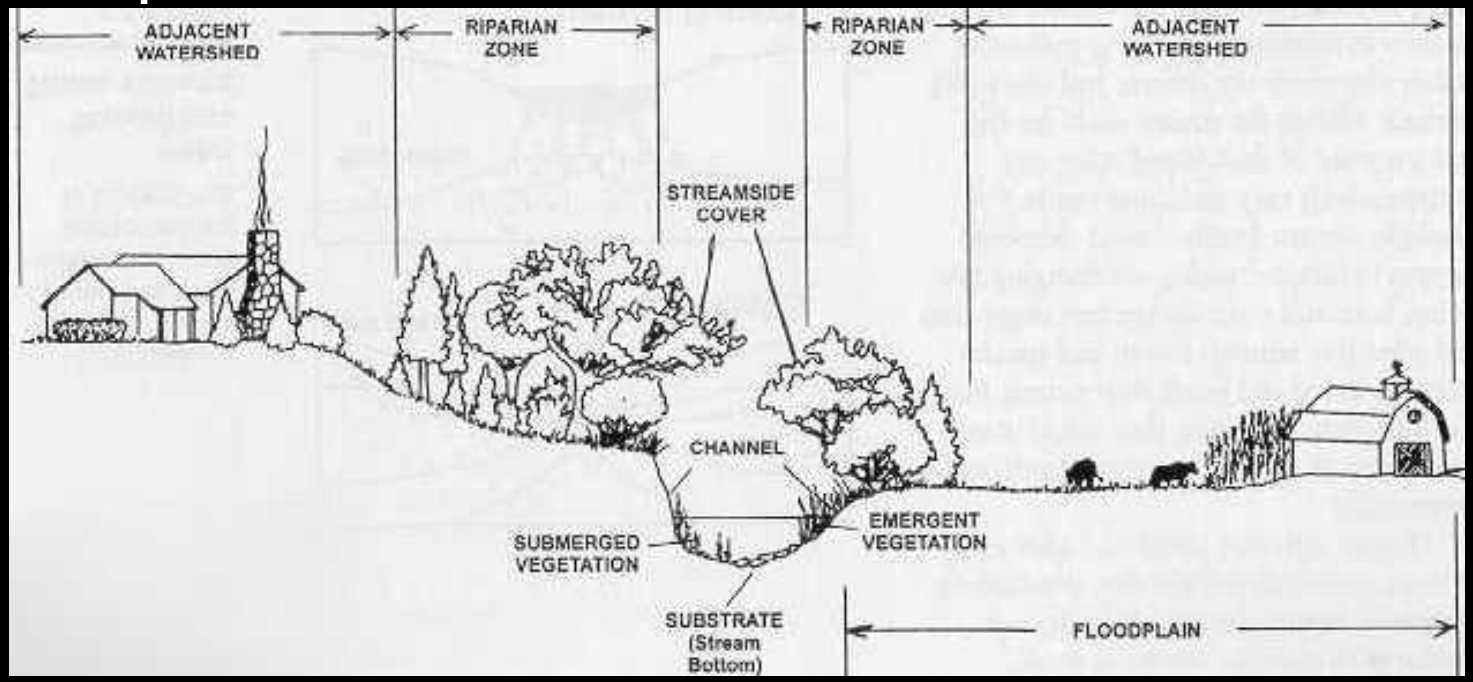


Photo courtesy of Town of Annapolis Royal

Riparian Zones

The transitional area between aquatic and terrestrial ecosystems adjacent to rivers

– Improve water quality, water absorption and protect streambanks from erosion



Riparian Land Use

- **Predominantly agricultural on valley floor**
- **Increasing development, especially in eastern portion of watershed**
- **Intensive forestry along North and South Mountains**

Development

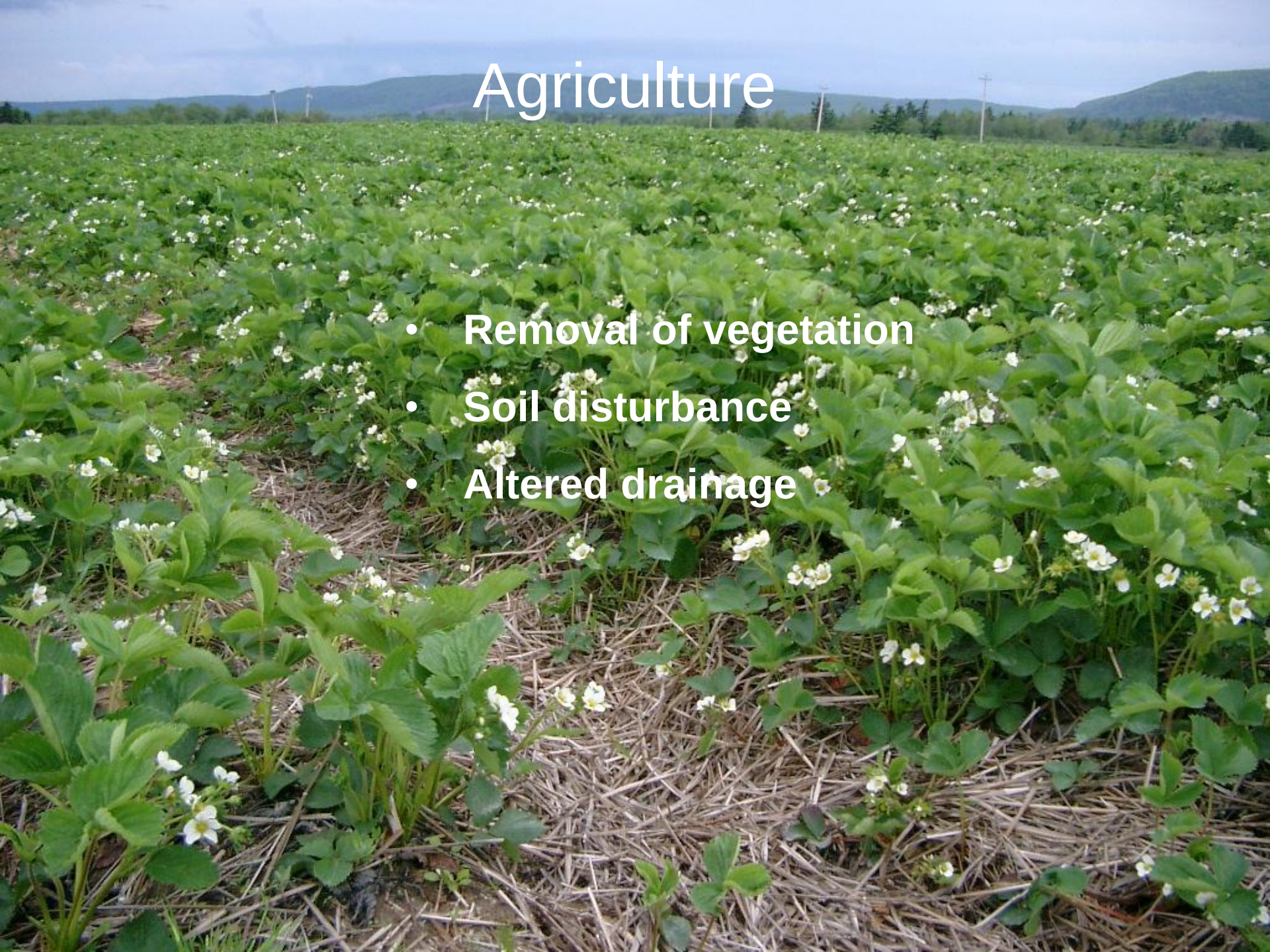
- **Surface hardening**
- **Land forming**
- **Bank alteration**

Photo courtesy of Town of Annapolis Royal

Forestry

- **Removal of overstory**
- **Understory disturbance**
- **Roads and crossings**

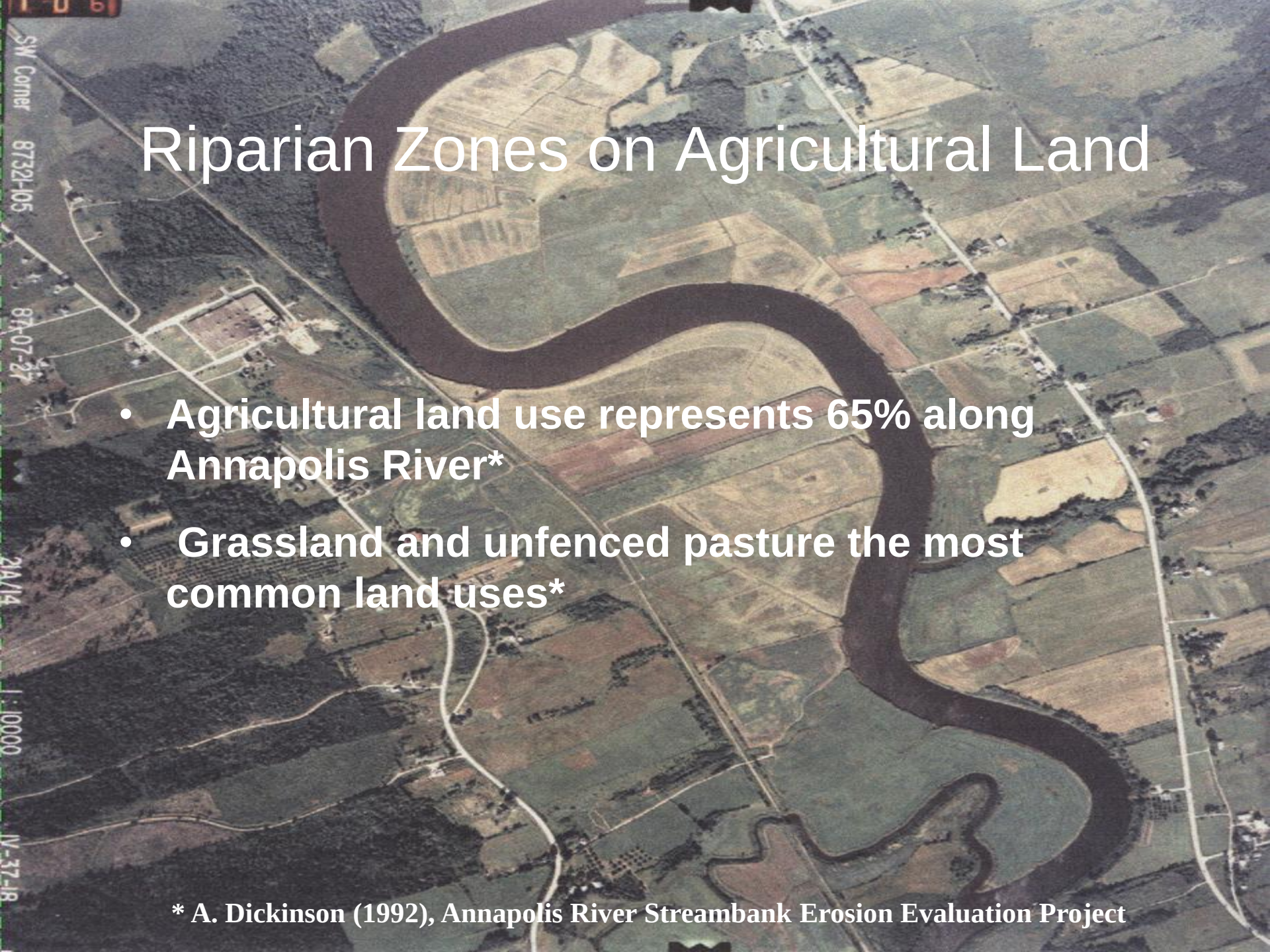
Agriculture



- **Removal of vegetation**
- **Soil disturbance**
- **Altered drainage**

A Focus on Agricultural Land Use

- **Large portion of disturbed riparian zones**
- **Significant source of disturbance**
- **Simple solutions**



Riparian Zones on Agricultural Land

- **Agricultural land use represents 65% along Annapolis River***
- **Grassland and unfenced pasture the most common land uses***

*** A. Dickinson (1992), Annapolis River Streambank Erosion Evaluation Project**

Disturbance by Agricultural Activities

- **Removal of riparian vegetation**
- **Ditching and draining**
- **Continuous disturbance**
- **Source of contaminants**

Solutions

- **Limit or eliminate disturbances**
- **Re-establish vegetation**
- **Stabilize bank soils**
- **Encourage stewardship**

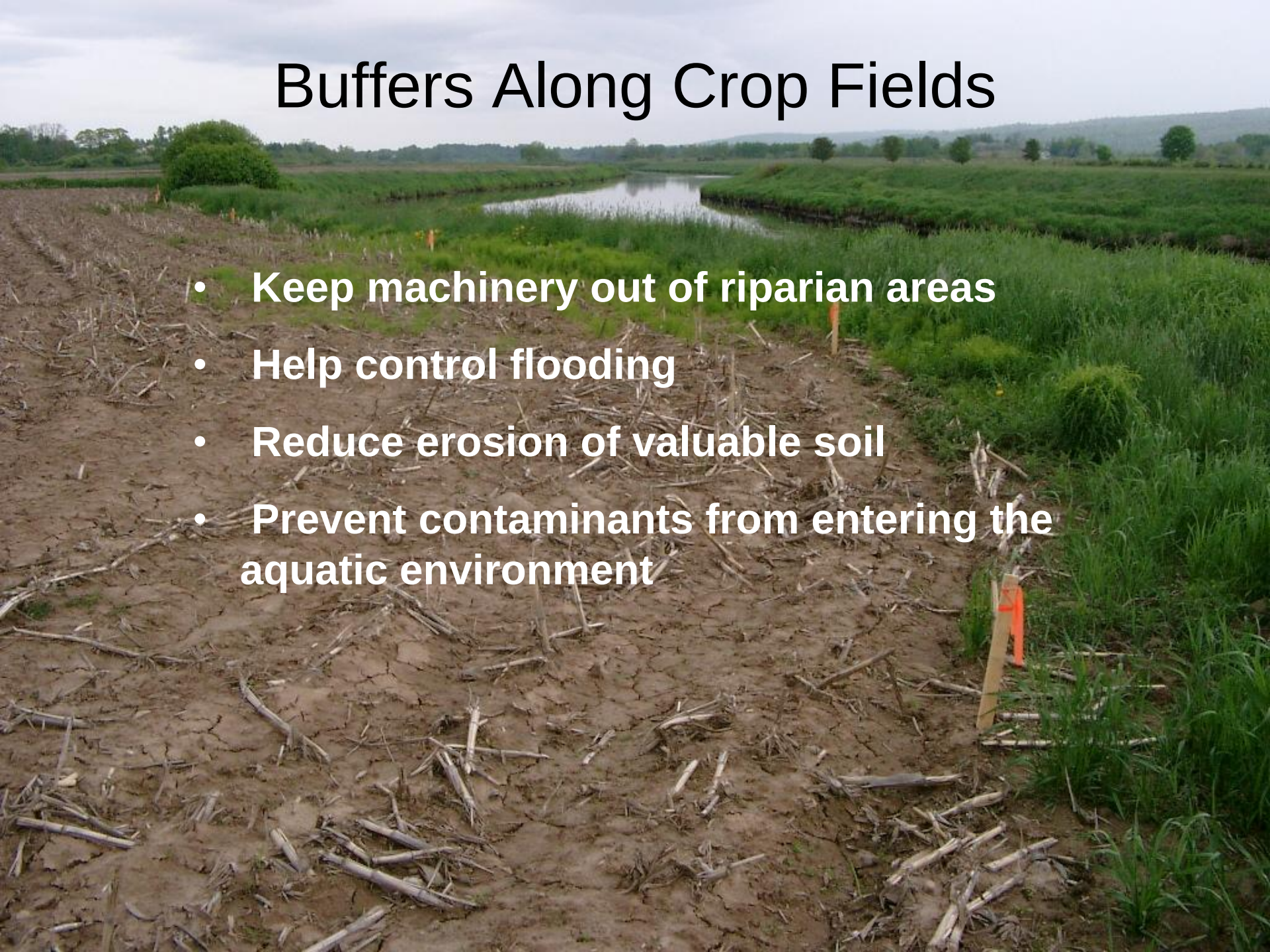
The Process

- **Landowner recruitment**
- **Evaluation for potential project**
- **Consultation and Project Planning**
- **Sharing of effort and cost**

Restoration Goals

- **Elimination of disturbance**
- **Bank stabilization**
- **Re-establishing vegetation**

Buffers Along Crop Fields

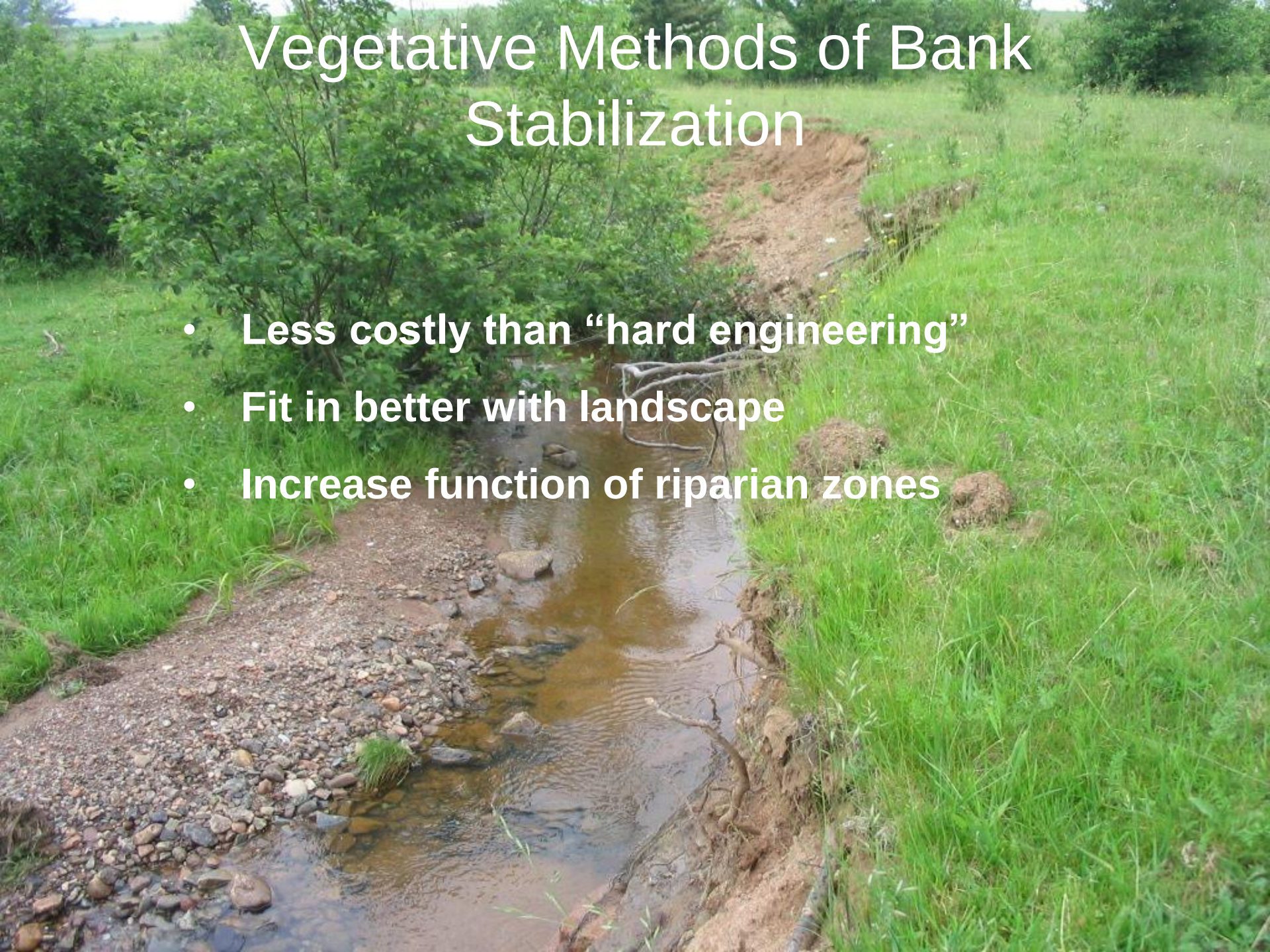


- **Keep machinery out of riparian areas**
- **Help control flooding**
- **Reduce erosion of valuable soil**
- **Prevent contaminants from entering the aquatic environment**

Keeping Livestock Out

- **Prevents trampling of riparian vegetation**
- **Prevents soil compaction**
- **Prevents erosion**
- **Allows riparian zone to act as a buffer between land use and the aquatic environment**

Vegetative Methods of Bank Stabilization



- **Less costly than “hard engineering”**
- **Fit in better with landscape**
- **Increase function of riparian zones**

Achievements

- 37 Landowners in 7 years
- Over 16,000m fencing along watercourses
- Over 170,000m^2 riparian habitat protected
- Over 21,000 trees and shrubs planted
- Nearly 10,000 willow stakes planted