Rural Drainage
An Initiative For Ohio

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ODNR Division of Soil and Water Conservation

&

The Ohio Federation of Soil and Water Conservation Districts

Overview of Presentation

I. Rural Drainage – An Initiative
II. Drainage History
III. Drainage Survey
IV. Link to Ohio Water Quality Standards

Advisory Committee Member Groups

- Allen SWCD
- Auglaize County Engineer
- County Commissioners Association of Ohio
- County Engineers Association of Ohio
- Darby Watershed Project
- Defiance SWCD
- Delaware SWCD
- Fairfield SWCD
- Madison County Engineer
- ODNR Division of Natural Areas and Preserves
- Ohio Association of Soil and Water Conservation District Employees
- Ohio Department of Agriculture
- ODNR Division of Soil and Water Conservation
- Ohio Environmental Council
- Ohio EPA Division of Surface Water
- Ohio Farm Bureau Federation
- Ohio Federation of Soil & Water Conservation Districts
- Ohio Land Improvement Contractors Association
- Ohio Soil and Water Conservation Commission
- OSU Dept. of Agricultural, Environmental, and Developmental Economics
- OSU Dept. of Food, Agricultural, and Biological Engineering
- Ottawa County Engineer
- Seneca SWCD
- The Nature Conservancy, Ohio Chapter
- USDA – Agricultural Research Service
- USDA-Natural Resources Conservation Service
- Wood County Engineer & Staff

Advisory Committee
OBJECTIVES

Document status of Ohio's deteriorating rural drainage system

Determine reasons for multiple year backlog for public drainage petition projects

Develop 1st ever Ohio Drainage Manual outlining standards for constructing and maintaining drainage improvements, including environmental stewardship standards

Determine applicability of state and federal water quality laws to project construction and maintenance

Recommend solutions for both drainage infrastructure and environmental challenges

ODNR-DSWC Rural Drainage Systems Report - 2008

Rural Drainage Defined

- Rural Landscape
- Typically Glaciated
- Historically Channelized
- Upland or Headwaters
- Often < 3 Sq. Miles

Impacts of Drainage

the Good

- Conservation practices require improved drainage
- Compaction and peak runoff reduced (cropland drained vs. undrained)
- Yields increase
- Environmental services and nutrient assimilation via alternative channel designs

the Bad & the Ugly

- Hydromodification is leading cause of water quality impairment
- Nutrient loading may be significantly increased with improved drainage features
- Habitat degradation is often the result of improper maintenance

Extent of Drainage in Ohio

- Approx. 2/3 of Ohio's cropland or over 7 million acres benefits from drainage practices
- Ohio ranks in top 5 states in the number of acres benefitting from subsurface drainage
- Ohio ranks 1st in the percentage of cropland drained
- Estimate indicates more than 500,000 rural homes/lots rely on group drainage projects
- Approximately 30,000 miles of group projects have been constructed in Ohio

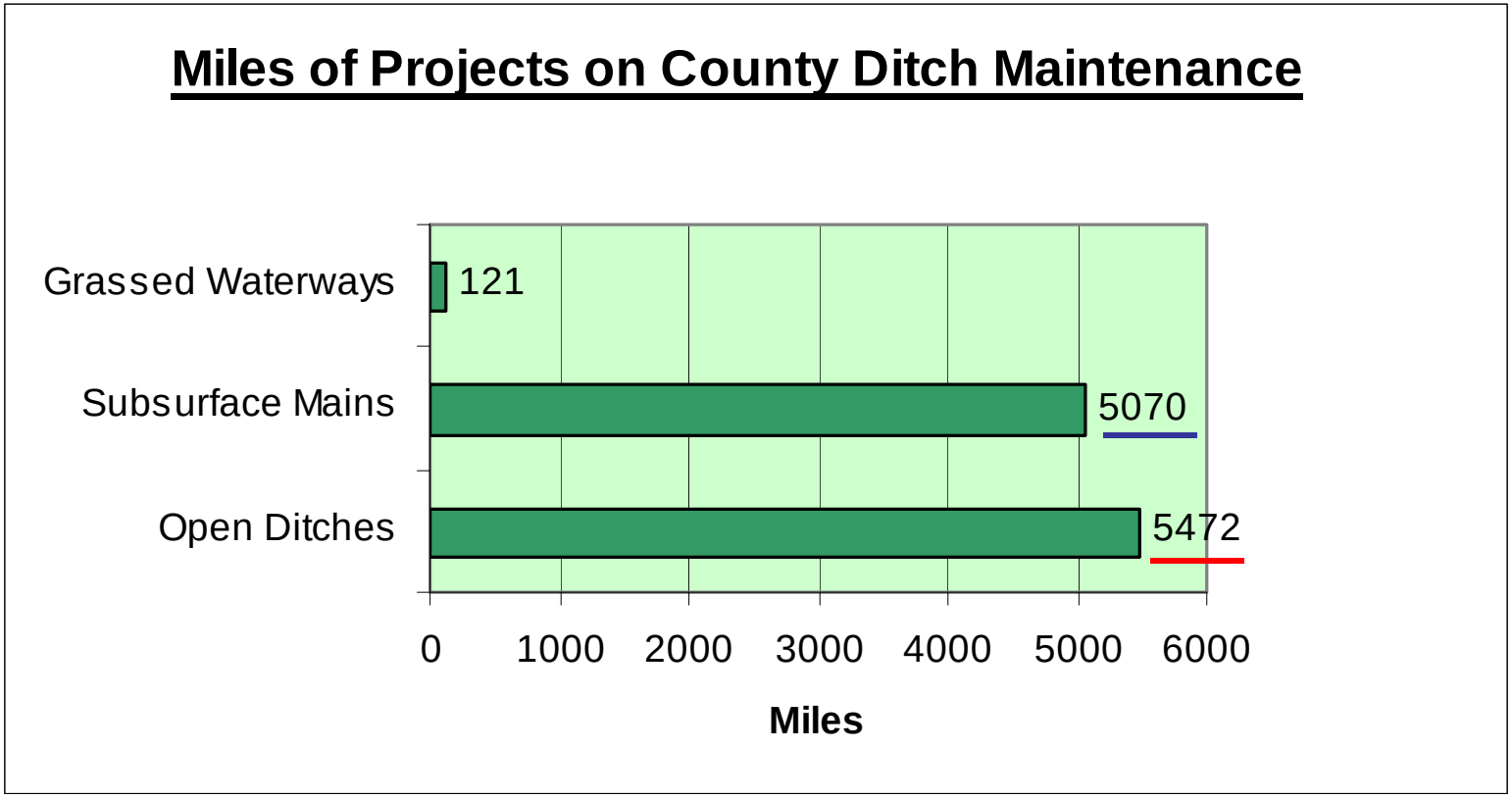
History of Drainage in Ohio

- 1800's - excessive wetness and disease primary obstruction in developing Ohio's economy
- 1840's - drainage laws were passed
- 1860's - petition ditch laws passed
- 1882 – 232 tile manufactures in Ohio
- 1884 - Ohio Society of Engineers and Surveyors report 20,000 miles of public ditches constructed – benefiting 11 million acres of land

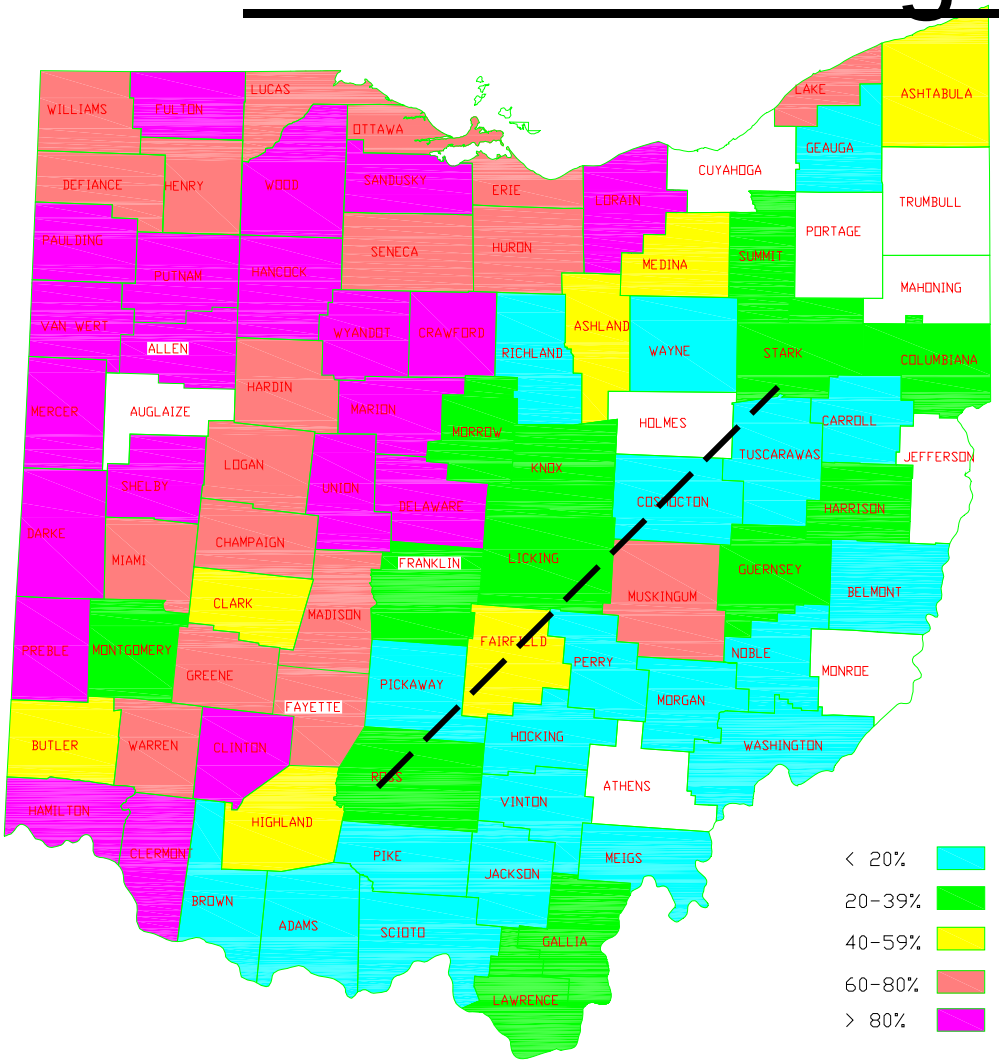
Drainage in Ohio

- 1957 - All new petition projects were required to be put on public maintenance
- 1967 – First installation of CPT in Ohio
- 1972 study by Byron Nolte reported
  - 16,845 miles of constructed channels in 67 counties
  - 11,248 miles of enclosed drains in 59 counties
  - 4,353 miles of constructed or reconstructed channels under maintenance in 67 counties
  - 65% of Ohio's cropland needed drainage improvements
- 2006 ODNR-DSWC Survey

ODNR-DSWC Survey – 2006:

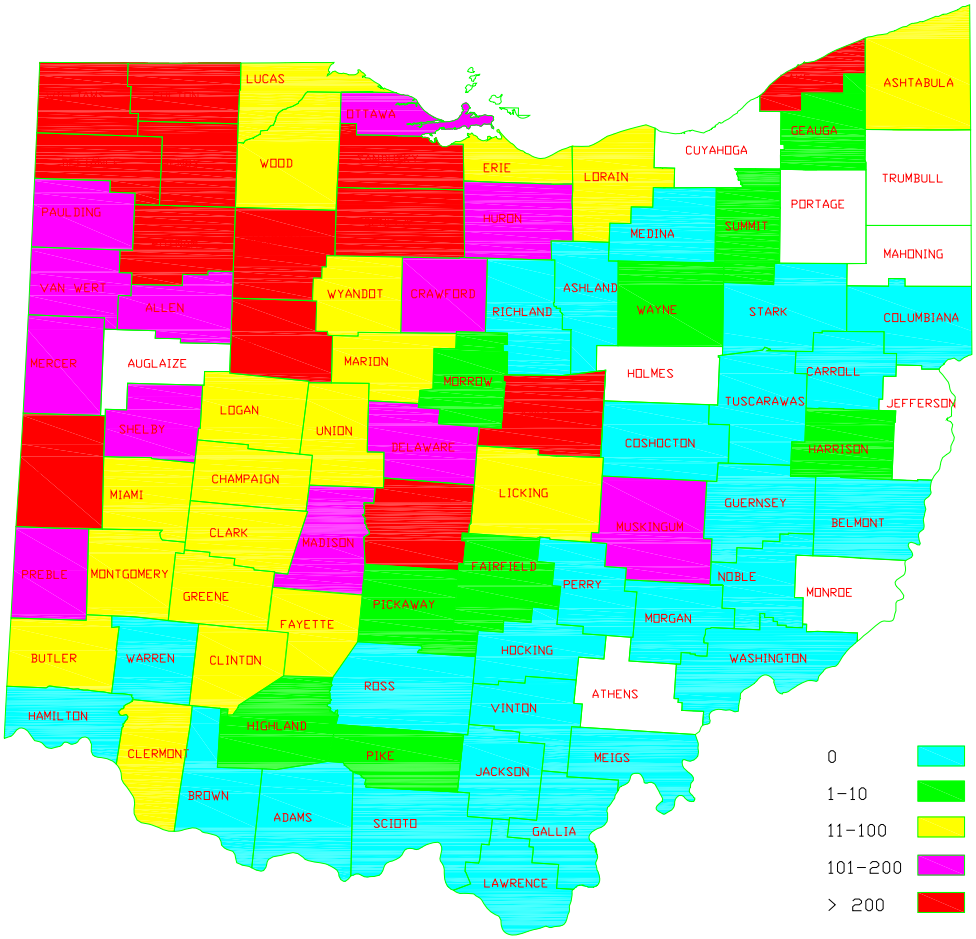


Percentage of Land Benefiting From Drainage



ODNR-DSWC 2006 Survey

Total Miles of Petition Projects Under Maintenance

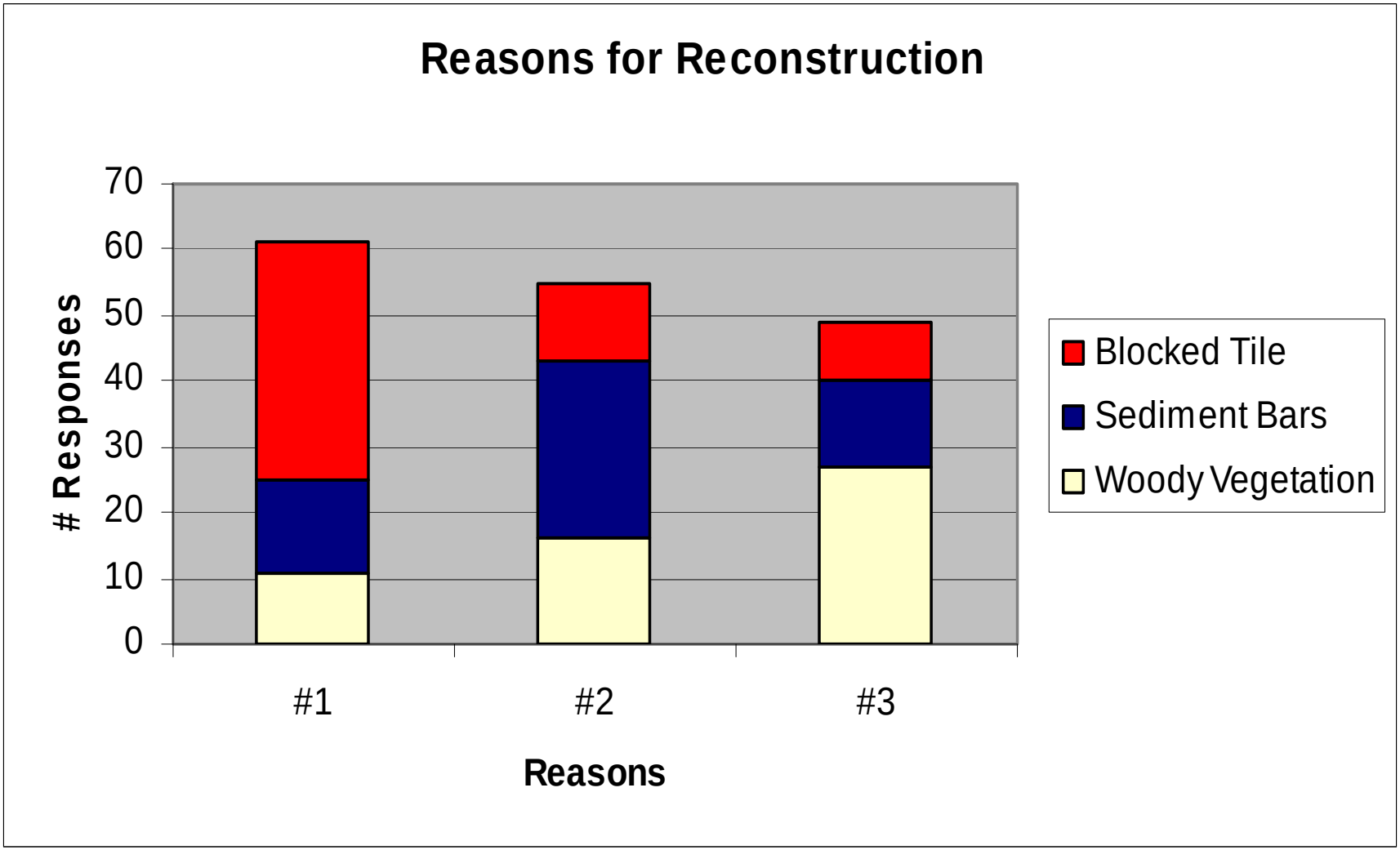


ODNR-DSWC 2006 Survey

Condition of Subsurface Mains and Ditches in the State **Not** on Maintenance

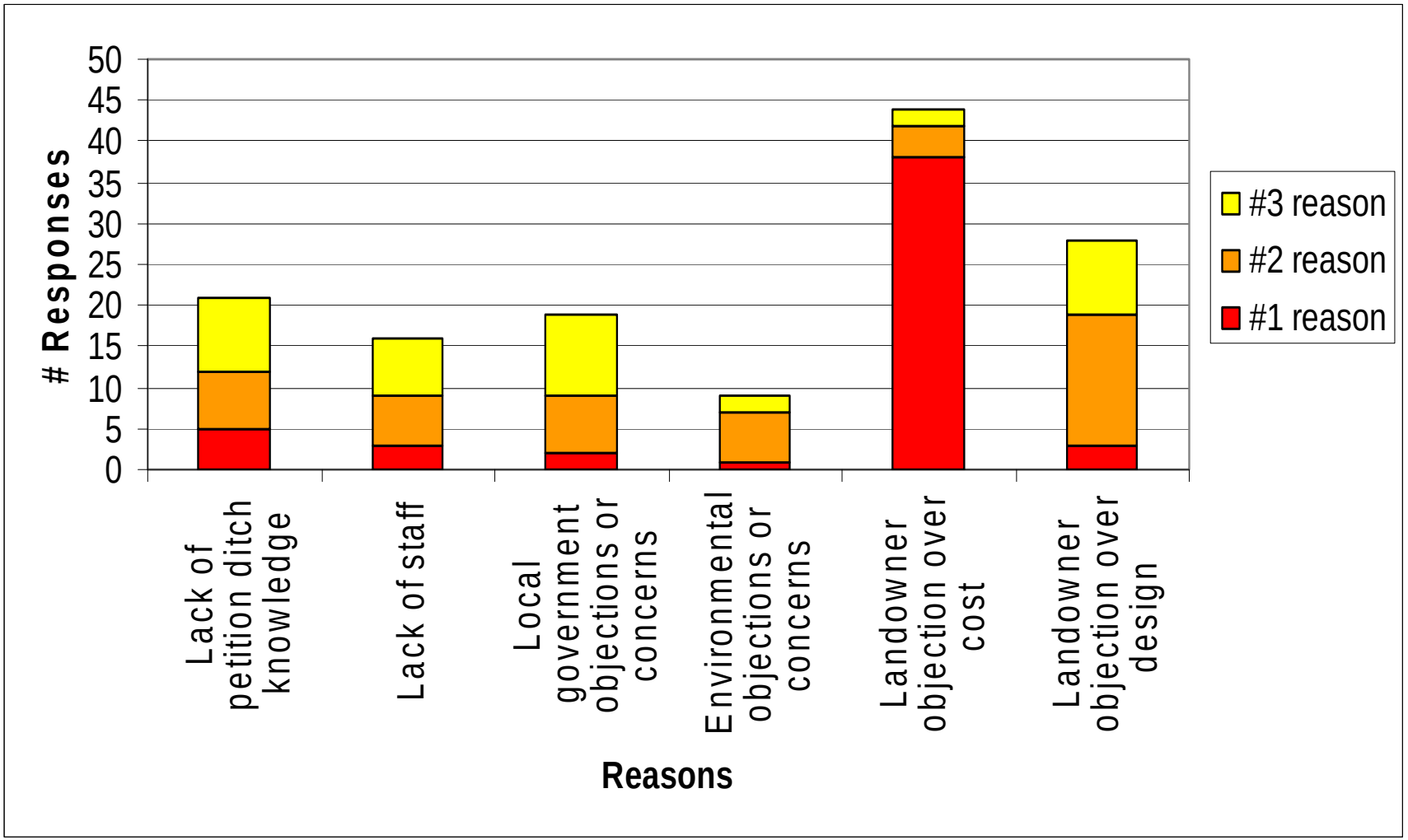
ODNR-DSWC 2006 Survey

Reasons Projects Are Petitioned



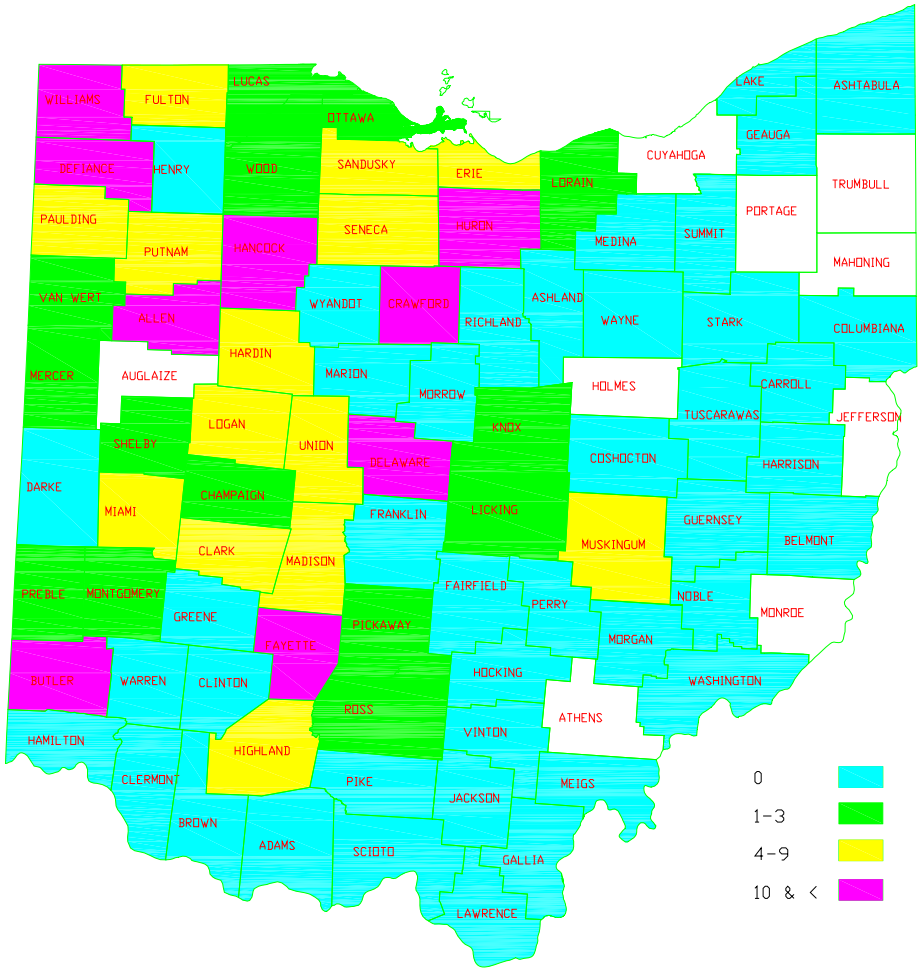
ODNR-DSWC 2006 Survey

Why Projects Fail To Get Constructed



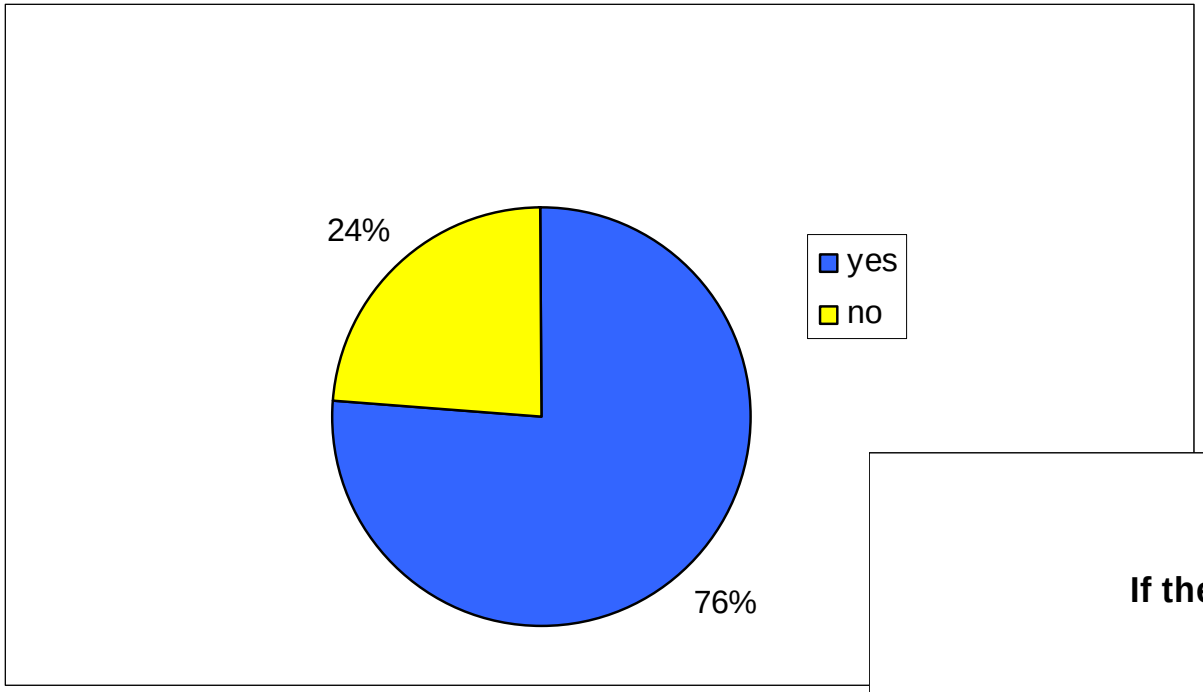
ODNR-DSWC 2006 Survey

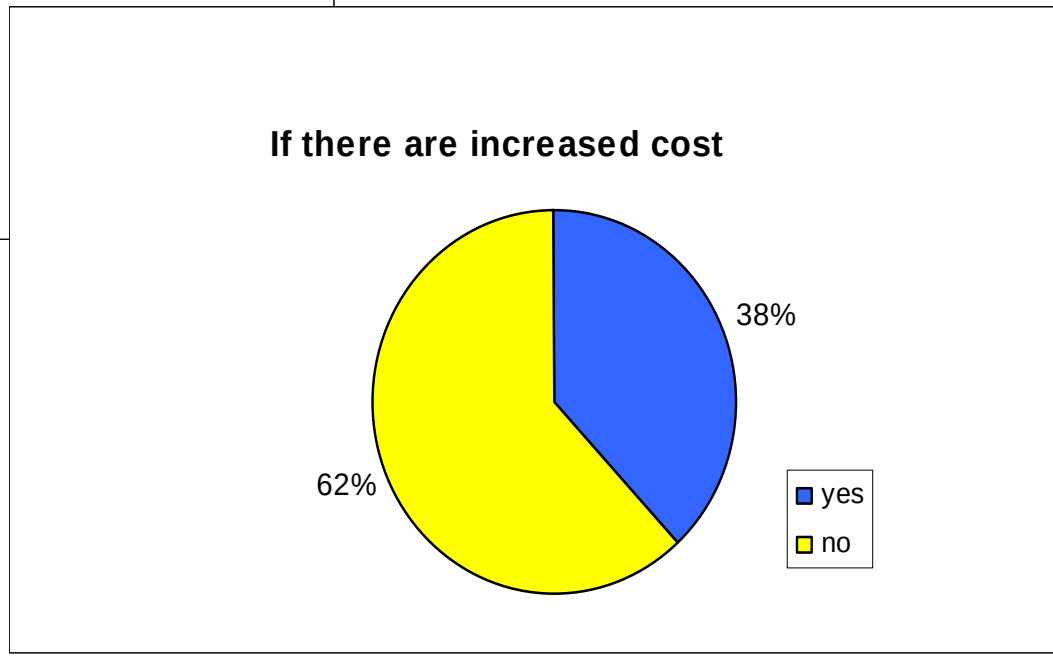
Backlog of Petition Projects



ODNR-DSWC 2006 Survey

Willingness to offer alternative designs that provide more environmental protection.





ODNR-DSWC 2006 Survey

Public (petition) vs. Private Projects

- Permanent Maintenance
- Professional Design Standards Met
- Environmental Standards Adhered To

Environmental Challenges

- Cost of implementing alternative designs
- Changing mindset for maintenance & construction of drainageways
- Lack of statewide consistency in implementing standardized BMP guidelines

Recommendations

- Outreach
- Infrastructure
- Funding
- Drainage Manual & Environmental Protocols

DRAFT

Ohio Drainage Manual

Table of Contents

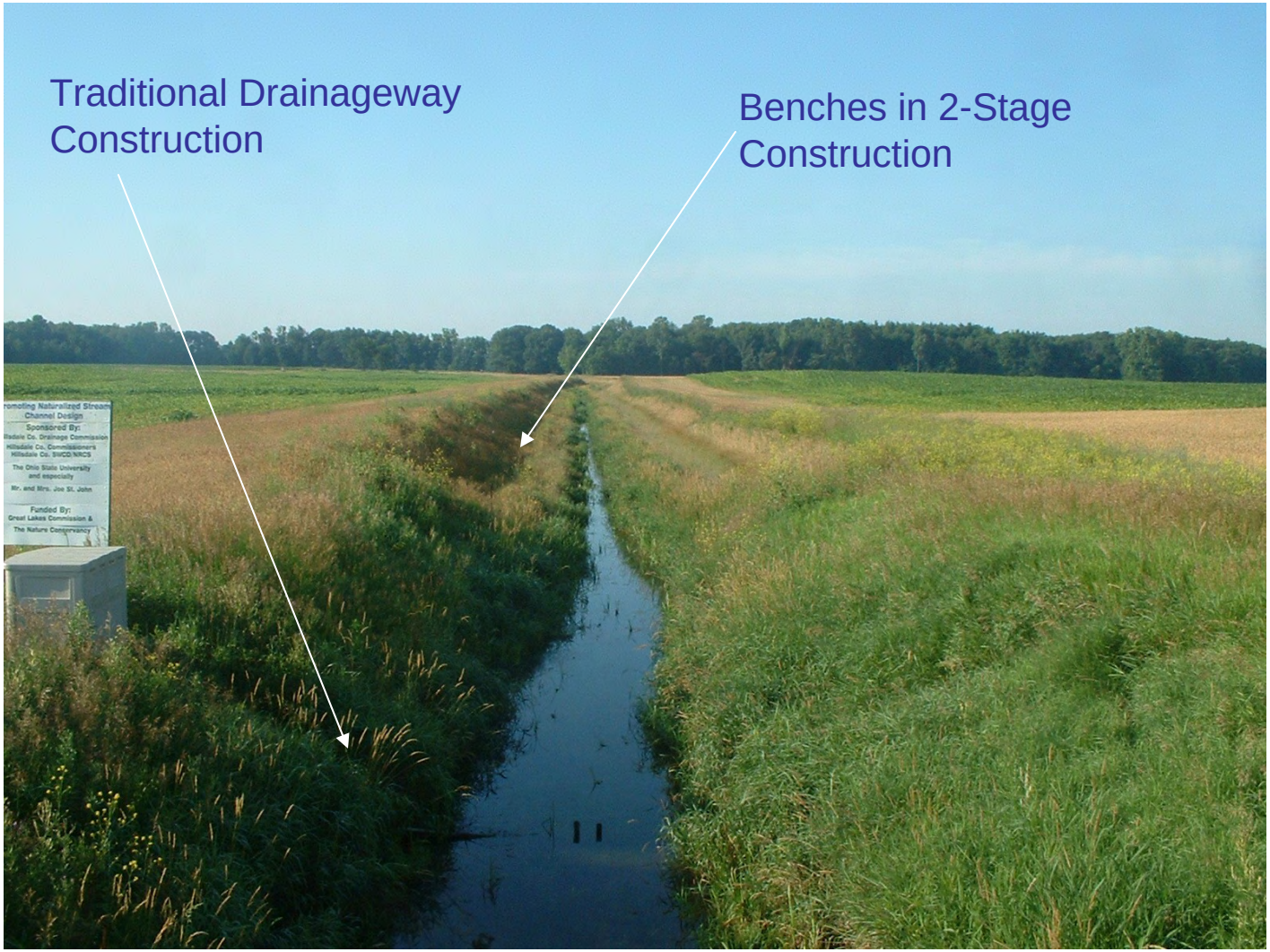
Manual: Needs Evaluation/Assesment

Project Calculations

Stream Measurements

Document Field Observations

Manual: Alternative Drainageway Designs



Others…

- One-sided
- Overwide
- Self-forming
- Natural
- Snag & Clear

Manual: Maintenance Guidelines

- Mowing height
- Other forms of vegetation control
- Time of year for performing maintenance
- Limited dipping (waterline to waterline)

Table 1

No "existing use" complications

Framework and decision making matrix for drainage projects (part 1 of 3). Pertains to situations where there is no scientific biological field data to assign a sub-category of aquatic life use as an "existing use" which requires protection.

Position on Agricultural Landscape	Defined by watershed area (acres)	Primary Water Quality Concerns	Primary Socio – Economic Concerns	Preferred WQS Use Designations	Criteria Types Applied	Minimum Drainage Design for New Project
Upland Areas (often ephemeral)	< 2,000	Protect downstream uses; Public health	Cropland Drainage, Flooded Roads & Cropland	Drainage; General Aquatic Life	Chemical Only	Traditional Design
Transition Zone (often intermittent, sometimes ephemeral)	2,000 to 6,400	As above, plus: Increase pollutant assimilation; Feeder streams with some aquatic life	Water Conveyance Flooded Roads & Cropland	Drainage; Modified Warmwater Habitat	Chemical and Biological	One-sided Design
Lowlands	> 6,400	As above, plus: Pollutant loads; Year round aquatic habitats	Flooded Roads & Cropland	Warmwater Habitat	Chemical and Biological	Limited Snag & Clear; Natural Channel

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Table 2

addressing "existing use" protection

Framework and decision making matrix for drainage projects (part 2 of 3). Pertains to typical in-field situations that do have scientific biological field data indicating a sub-category of aquatic life use (General Aquatic Life; Modified Warmwater or Exceptional) exists and requires protection.

Position on Agricultural Landscape	Defined by watershed area (acres)	Primary Water Quality Concerns	Primary Socio – Economic Concerns	Uses Attained	Existing Uses Protected	Minimum Drainage Design for New Project
Upland Areas (often ephemeral)	< 2,000	Protect downstream uses; Public health	Cropland Drainage Flooded Roads & Cropland	Drainage; General Aquatic Life	Drainage; General Aquatic Life	Traditional Design
Transition Zone (often intermittent, sometimes ephemeral)	2,000 to 6,400	As above, plus: Increase pollutant assimilation Feeder streams with some aquatic life	Water Conveyance Flooded Roads & Cropland	Drainage; Modified Warmwater	Drainage; Modified Warmwater	One-sided Design
	2,000 to 6,400		Water Conveyance Flooded Roads & Cropland	Drainage; Warmwater	Drainage; Warmwater	Over wide channel Design
Lowlands (perennial water)	> 6,400	As above, plus: Pollutant loads; Year round aquatic habitats	Flooded Roads & Cropland	Warmwater; Modified Warmwater w/ higher potential	Warmwater	Limited Snag & Clear; Natural Channel
	> 6,400		Flooded Roads & Cropland	Modified Warmwater (w/o higher potential)	Modified Warmwater	One-sided Design

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Table 3

mid to longer range objectives

Framework and decision making matrix for drainage projects (part 3 of 3). A framework to develop incentives and an economic "trading market-driven" approach to drainage ditch design in the upland and transition landscapes of agricultural watersheds. Research and development of new nutrient WQS criteria and TMDL modeling approaches are underway and may influence this effort.

Position on Agricultural Landscape	Defined by watershed area (acres)	Primary Water Quality Concerns	Primary Socio – Economic Concerns	Preferred Use Designations	Nutrient Criteria / TMDL Applied	**Marketed Drainage Design**
Upland Areas (often ephemeral)	< 2,000	Protect downstream uses; Public health **Increase pollutant assimilation**	Cropland Drainage Flooded Roads & Cropland	Drainage; General Aquatic Life	New nutrient criteria apply at outlet of upland catchments; **TMDL "credits"** for in-channel processing and trading with other downstream sources	**Water Quality Trading; other incentives** **2-stage or self-forming over wide channel** *Natural Channel*
Transition Zone (often intermittent, sometimes ephemeral)	≥2,000 to 6,400	Feeder streams with some aquatic life	Water Conveyance Flooded Roads & Cropland	Drainage; Modified Warmwater Habitat	Chemical and Biological	
Lowlands (perennial water)	> 6,400	As above, plus: Pollutant loads; aquatic habitats	Flooded Roads & Cropland	Warmwater Habitat	Chemical and Biological	*Limited Snag & Clear; Natural Channel*

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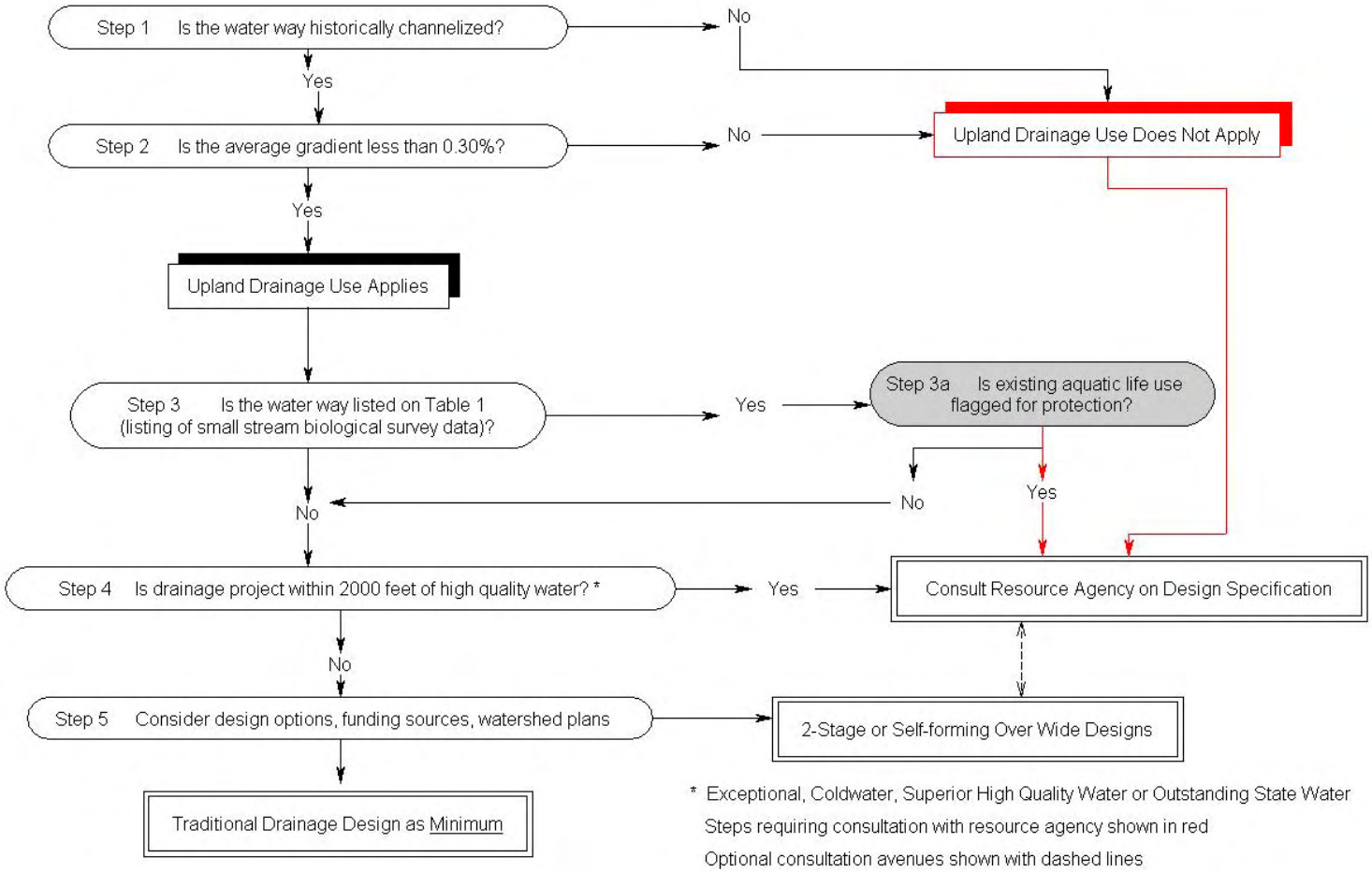
Watersheds < 2000 Ac.

For open water courses less than 3.1 square miles in drainage area.



* Exceptional, Coldwater, Superior High Quality Water or Outstanding State Water

Steps requiring consultation with resource agency shown in red

Optional consultation avenues shown with dashed lines

Ohio EPA DRAFT - 09/10/08 for review with Rural Drainage Manual

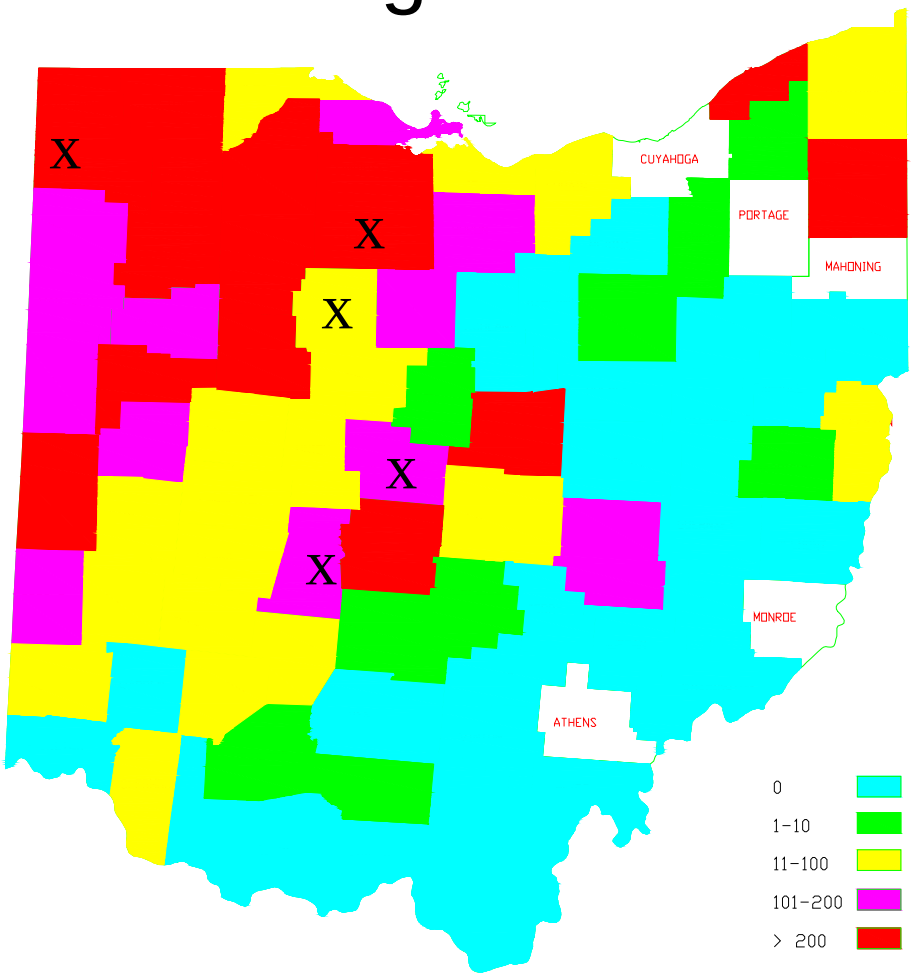
Drainage Review

- To gage the effect of proposed rule DSWC conducted a review of drainage projects in five counties involved in drainage projects

County	# of Projects Reviewed
Defiance	62
Delaware	23
Madison	47
Seneca	37
Wyandot	34

ODNR-DSWC Drainage Review Report - 2009

Drainage Reviews



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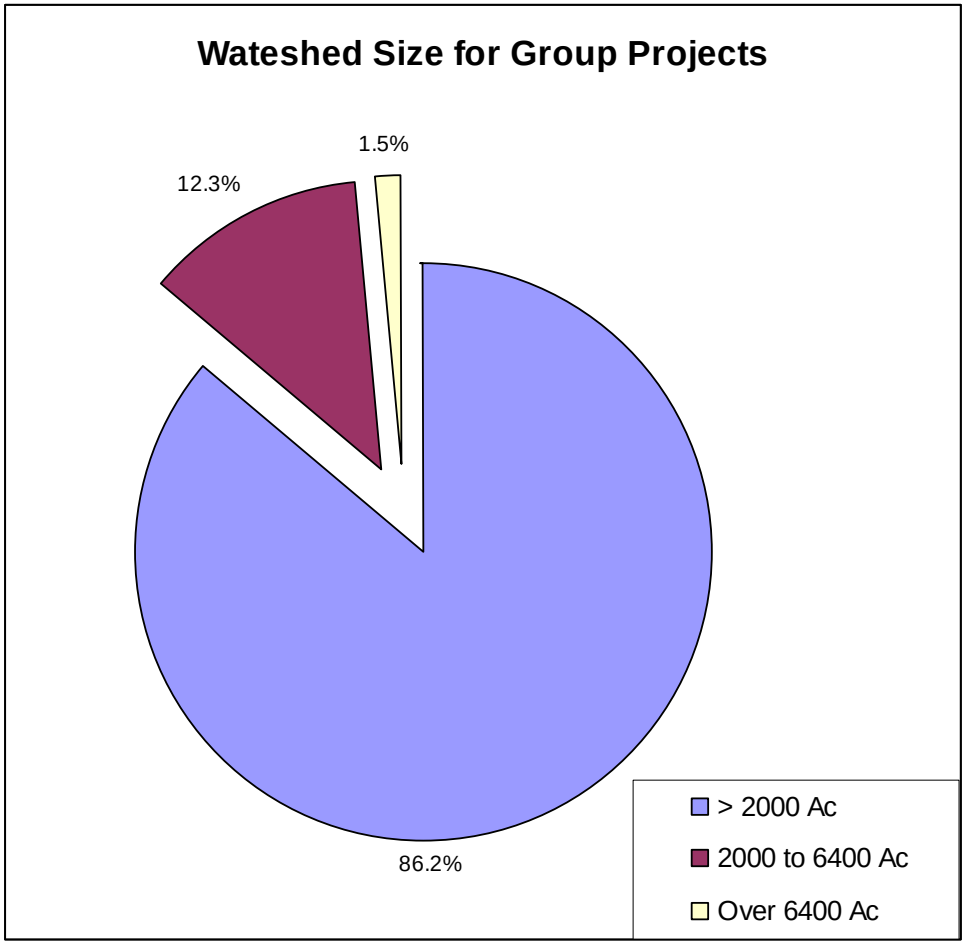
Results – Watershed Acres



- 175 projects drained less than 2,000 acres
- 25 projects drained between 2,000 and 6,400 acres
- 3 projects drained over 6,400 acres

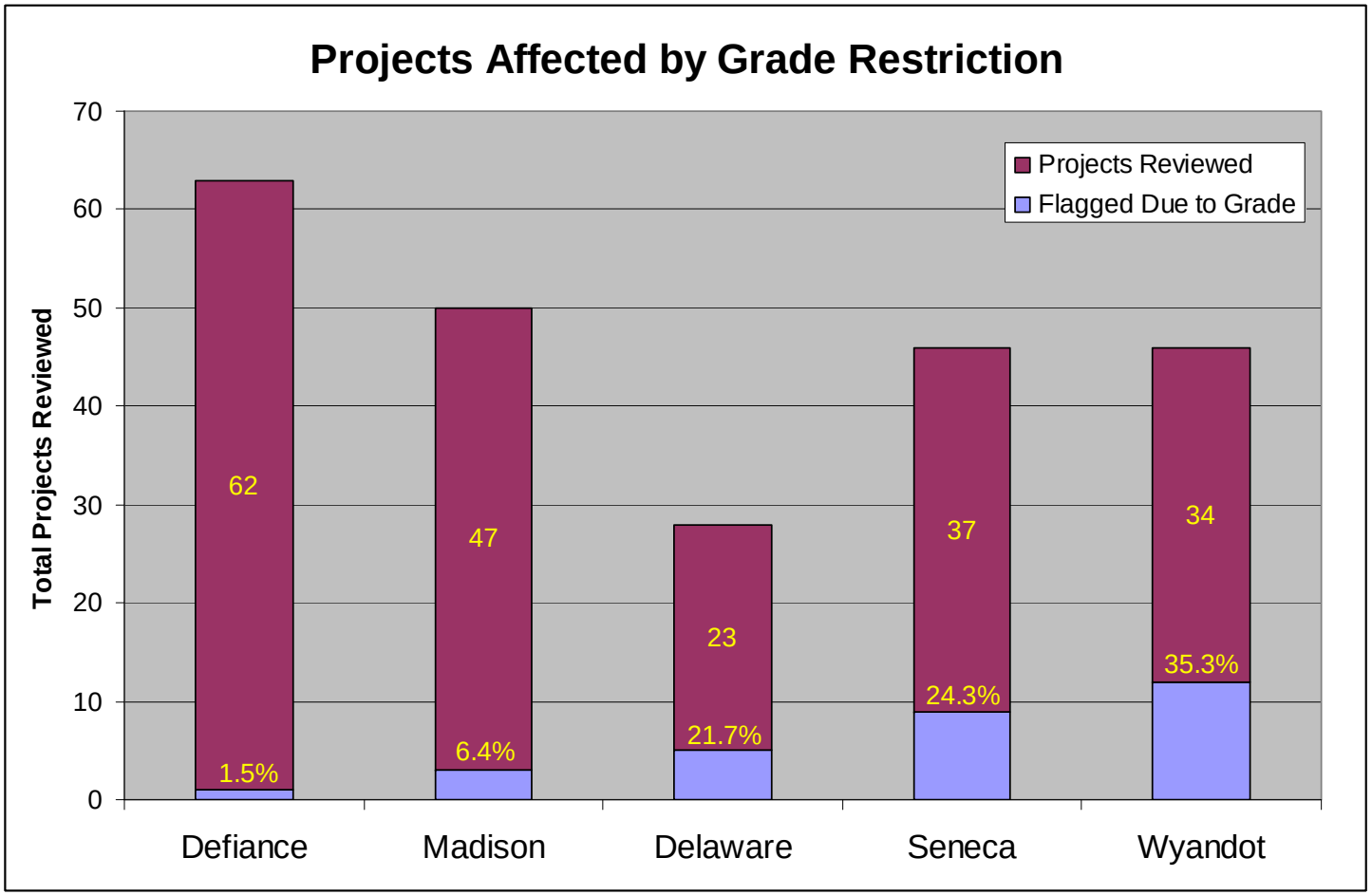
Watersheds < 2000 Ac.

- Step 1 – Is the channel historically channelized?
  - Gather public records to document the channelization
    - Assessment records
    - Engineering Plans
    - Recorded Plats
  - On-site evidence of channelization
    - Side cast spoil
    - Aerial photography
    - *Physical evidence*

Watersheds < 2000 Ac.

- Step 2 – Is the average channel gradient less than 0.30%?
  - This step considers the ability of the channel to develop habitat and natural channel processes on its own

Results – Grade > 0.3%



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Watersheds < 2000 Ac.

- Step 3 – Is the channel listed in Table 1? This is a listing of Small Stream Survey Data?
  - This step is to confirm that there is no biological data available in the project area

Confirmed TALU and Data Points

- Confirmed designations have implications on the final design when data has been collected in project reach
  - This consultation may result in the use of alternative channel designs

County	Projects w/ < 2000 Acres w/ Biological Data	% of Projects w/ < 2000 Acres w/ Biological Data	Projects w/ > 2000 Acres w/ Biological Data	% of Projects w/ > 2000 Acres w/ Biological Data
Defiance	1	2%	3	43%
Delaware	2	13%	6	86%
Madison	2	9%	3	43%
Seneca	2	6%	0	0%
Wyandot	1	3%	0	0%
Total for 5 counties	8	5%	12	43%

Watersheds < 2000 Ac.

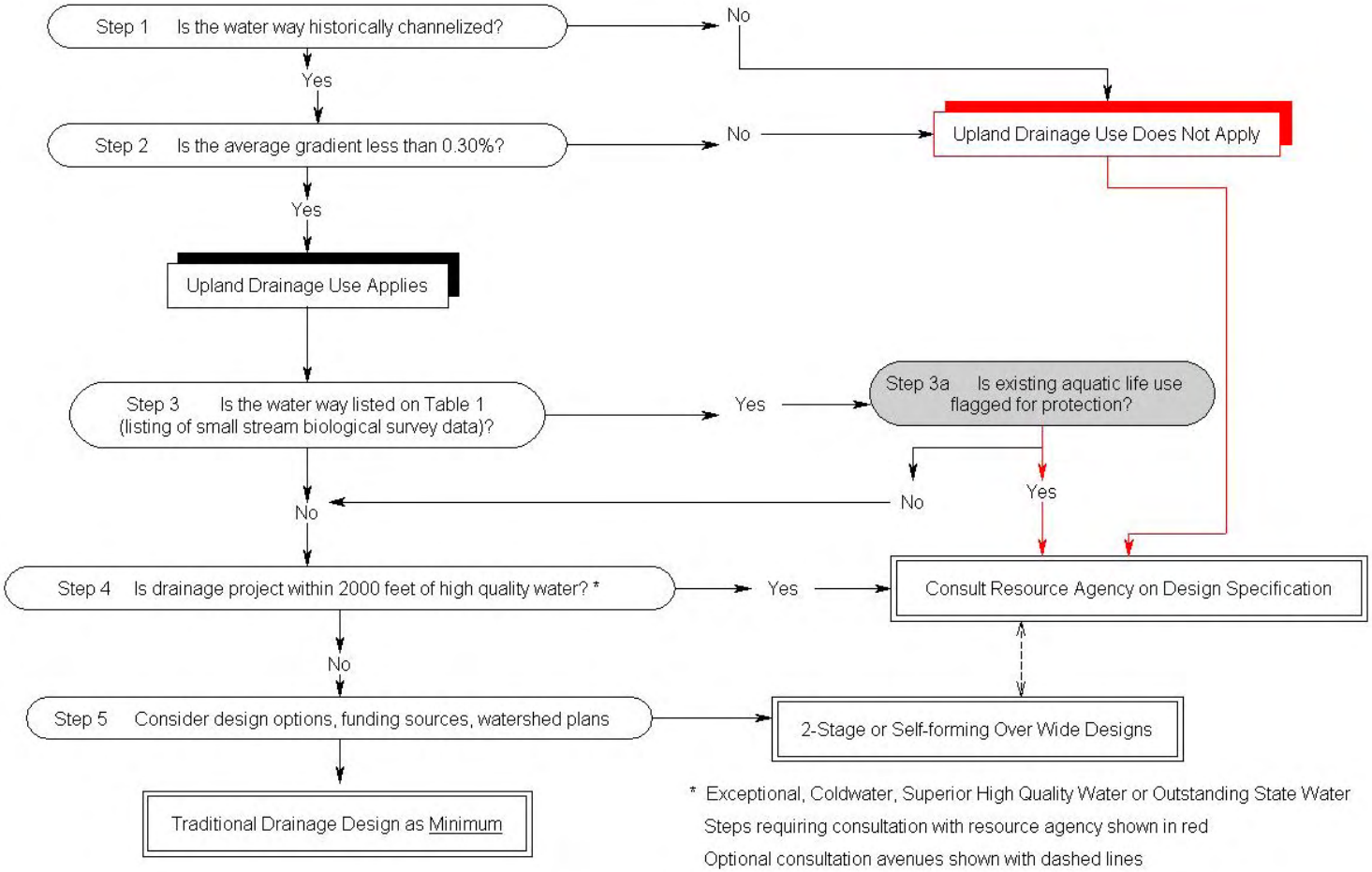
- Step 4 – Is the project less than 2,000 feet from a High Quality Water?
  - High quality waters include:
    - Exception Warmwater Habitat
    - Coldwater Habitat
    - Superior High Quality Water
    - Outstanding State Water
  - 6 of the 145 (4%) projects with less than 2,000 acres drainage reviewed were flagged by this requirement

Watersheds < 2000 Ac.

- Step 5 – Consider design options, funding sources, and watershed plans
  - At this point, if funds are available, designers are encouraged to implement ecological designs, but a traditional trapezoidal design can be used as the channel design

Watersheds < 2000 Ac.

For open water courses less than 3.1 square miles in drainage area.



770 Acres, Legacy WWH, 0.42%, Resource Agency Consultation

Jones Lateral

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1300 Acres, Confirmed WWH, 0.07%, Resource Agency Consultation

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Jose Wamp

4700 Acres, Confirmed WWH, Resource Agency Consultation

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Primmer

Summary

- 60 of the 203 (approx. 30%) projects reviewed required an agency consultation or modification to the channel design approach