WHOLE FARM CONSERVATION BEST PRACTICES MANUAL

Addendum: Decision Tools for Conservation Professionals

This addendum is a joint publication of Iowa State University and USDA-Natural Resources Conservation Service.
Development of this Whole Farm Conservation Best Practices Manual was led by the Conservation Learning Group at Iowa State University Extension and Outreach.

The Conservation Learning Group is a collaborative team that strives to advance training, outreach, and research across land uses and production systems to increase overall sustainability of agricultural and natural systems for multiple generations to come.

Conservation systems summit participants:

Iowa State University Extension and Outreach
United States Department of Agriculture—Natural Resources Conservation Service
United States Department of Agriculture—Agricultural Research Service
Practical Farmers of Iowa
Iowa Soybean Association
Iowa Agriculture Water Alliance

Special thanks to:

David Kwah-Mensah
Tina Kirstukas

This material is based on work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under number 6000004181. USDA is an equal opportunity provider, employer, and lender.

In accordance with Federal law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, disability, and reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.) Program information may be made available in languages other than English. Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, and American Sign Language) should contact the responsible State or local Agency that administers the program or USDA's TARGET Center at 202-720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at 800-877-8339. To file a program discrimination complaint, a complainant should complete a Form AD-3027, USDA Program Discrimination Complaint Form, which can be obtained online at https://www.ocio.usda.gov/document/ad-3027, from any USDA office, by calling 866-632-9992, or by writing a letter addressed to USDA. The letter must contain the complainant’s name, address, telephone number, and a written description of the alleged discriminatory action in sufficient detail to inform the Assistant Secretary for Civil Rights (ASCR) about the nature and date of an alleged civil rights violation. The completed AD-3027 form or letter must be submitted to USDA by: (1) Mail: U.S. Department of Agriculture Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW Washington, D.C. 20250-9410; or (2) Fax: 833-256-1665 or 202-690-7442; or (3) Email: program.intake@usda.gov. This institution is an equal opportunity provider. For the full non-discrimination statement or accommodation inquiries, go to www.extension.iastate.edu/diversity/ext.
Decision Tools for Conservation Professionals

Decision tools are important step-by-step guides in the process of decision making and risk analysis. Being visual in nature, decision tools are readily comprehensible and applicable.

The decision tools that follow clearly illustrate the choices, risks, objectives, and information needs involved in the implementation of conservation practices. Further, these decision tools visually illustrate possible alternatives, probabilities and outcomes, providing clarity to the decision making process.

The conservation decision tools that follow are based on research and experience to help conservation professionals guide clients in implementing a variety of practices on their farms.

This icon represents nitrogen reduction edge-of-field practices.

This icon represents phosphorus reduction edge-of-field practices.
Helpful information for edge-of-field decision tools

It is helpful to work with the decision maker (farmer or landowner) to gather background information prior to using the following edge-of-field decision tools, but collecting all the information suggested is not essential for using the tool.

Desirable background information includes aerial photos/imagery, drainage maps (with surface inlets if present), topographic maps, soil survey information, a conservation plan, awareness of the decision maker’s goals, long-term site plans, profitability maps, knowledge of existing utilities, a watershed plan, any Agricultural Conservation Planning Framework (ACPF) information for the watershed, LiDAR maps, land-use and land-cover information for the surrounding watershed, and stream and river water quality monitoring data.
What is the primary goal for using an edge-of-field practice?

+ Water quality improvement

Habitat

Additional water management ability and potential yield benefit

Choose from:

- Wetland
  - Page 7
- Multipurpose oxbow
  - Page 8
- Saturated buffer
  - Page 9
- Bioreactor
  - Page 10

Choose from:

- Wetland
  - Page 7
- Multipurpose oxbow
  - Page 8
- Saturated buffer
  - Page 9

Choose from:

- Controlled drainage
  - Page 11

Attend a conservation field day to learn more!

Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Do you have access to the Agricultural Conservation Planning Framework?

- **NO**

- **YES**
  
  Are you working in an area with a watershed plan?

- **NO**

- **YES**

  Do you have access to the Agricultural Conservation Planning Framework?

- **NO**

  Use a conservation planning scenario map to determine potential locations for saturated buffers, wetlands, bioreactors, or controlled drainage.

- **YES**

  Use the Saturated Buffer Viewer at https://acpfdata.gis.iastate.edu/ACPF/satbuff/ to determine suitable locations for saturated buffers.

---

**Attend a conservation field day to learn more!**

Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is a Wetland Right for the Site?

- Does your wetland footprint area have sandy soils, gravel, or shallow limestone?
  - Yes → Consider alternative edge-of-field, management, or land-use practices.
  - No → Do you have subsurface drainage that can be captured and directed to the treatment wetland?
    - No → Would the wetland cause obvious negative impacts to others’ drainage rights?
      - Yes → NO
      - No or not sure → Create wetland habitat or plant perennials in wet areas of the site.
    - Yes → Create a treatment wetland.

Attend a conservation field day to learn more!
Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is there a stream or river on or at the edge of the property? NO → Consider alternative edge-of-field, management, or land-use practices.

Is there subsurface drainage that can be captured and directed to the multipurpose oxbow? NO

YES → Create a multipurpose oxbow.

Does inspection of historic aerial photos and/or recent elevation maps indicate a depression near the stream that may have been part of the stream channel in the past? NO

YES → Does the streambank near the potential oxbow show any signs of potential for excessive erosion, such as steep banks, sloughing, outside bends or undercutts? NO

YES → Attend a conservation field day to learn more!

Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is a Saturated Buffer Right for the Site?

- Is the saturated buffer footprint adjacent to a stream?
  - NO → Consider alternative edge-of-field, management, or land-use practices.
  - YES →
    - Is there room for a ≥30 ft buffer near the stream edge?
      - NO →
      - YES →
        - Is there visible bank sloughing or indication of an unstable stream bank?
          - NO →
          - YES →
            - Does the footprint have sandy soil or gravel in the top 4 ft of the soil profile?
              - NO →
              - YES →
                - Does the soil in the buffer zone have ≥1.2% organic matter content to a depth of 2.5 ft?
                  - NO →
                  - YES →
                    - Are there open surface intakes or interfering drains in or near the saturated buffer footprint?
                      - NO →
                      - YES →
                        - Tile drainage systems without surface intakes are preferred. Sediment reduction or cleanout structures may be necessary when surface intakes are present.

- Are trees present within the saturated buffer footprint?
  - NO →
  - YES →
    - Are trees and shrubs within the riparian area desirable to the landowner?
      - NO →
      - YES →
        - Create a saturated riparian forest buffer.
          - STILL INTERESTED

- Create a traditional saturated buffer (without trees).
  - STILL INTERESTED
Is a Bioreactor Right for the Site?

Is the available area at least 100 ft long, 25 ft wide, and 4.5 ft deep? (Final size depends on drainage area)
- NO → Consider alternative edge-of-field, management, or land-use practices.
- YES → Is the area protected from surface flow?
  - NO → YES → Will the bioreactor have consistent flow?
    - NO → NO
    - YES → Create a bioreactor.
  - YES → YES → YES → Attend a conservation field day to learn more!

Attend a conservation field day to learn more!
Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is Controlled Drainage Right for the Site?

Is there a point of drainage control on a private tile line (not located on a drainage district main, sub-main, or lateral)?

- NO ➔ Consider alternative edge-of-field, management, or land-use practices.

  YES ➔

  Is the land slope ≥3%?

  - YES ➔

  YES ➔

  Does the drainage system have laterals along the contour?

  - NO ➔

  NO ➔

  Is the decision maker willing to raise or lower the outlet level multiple times a year?

  - NO ➔

  NO ➔

  YES ➔

  Implement controlled drainage.

- YES ➔

Attend a conservation field day to learn more!

Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
What is the primary goal for using an edge-of-field practice?

- Water quality improvement
- Erosion control

Choose from:

- Riparian forest buffers
- Bottomland timber establishment
- Grassed waterways*
- Prairie strips*
- Water and sediment control basins*
- Ponds*

Choose from:

- Terraces*
- Windbreaks
- Bottomland timber establishment
- Grassed waterways*
- Prairie strips*
- Ponds*

Could Phosphorus Reduction Edge-of-Field Practices Work for the Site?

(Pages 14, 15, 16)
What is the primary goal for using an edge-of-field practice?

Choose from:

- Water quality improvement
- Erosion control

Choose from:

- Riparian forest buffers
- Grassed waterways
- Prairie strips
- Water and sediment control basins
- Terraces
- Ponds
- Bottomland timber establishment
- Windbreaks

Is a Windbreak Right for the Site?

Is the windbreak footprint ≥60 ft in width to allow for at least 3 rows with 20 ft row spacing?

YES → Will the windbreak footprint’s size, location, and orientation protect the area of interest and achieve objectives?

YES → Do soil conditions in the windbreak footprint match tree and/or shrub species composition needed to achieve objectives?

YES → Create a windbreak. Use the Prairie & Tree Planting Tool at https://pt2.nrem.iastate.edu/ for windbreak design guidance.

NO → Consider alternative management practices.

NO → NO → NO → NO

Attend a conservation field day to learn more!
Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is a Riparian Forest Buffer Right for the Site?

- Is the buffer footprint adjacent to a stream, lake, or wetland? **NO** → Consider alternative management practices.
- Is there room for a >40 ft buffer near the water’s edge? **NO** → **NO**
- Is the buffer footprint >180 ft wide? **YES**
- Is the buffer footprint within the 100-year floodplain? **YES** → Consider bottomland timber establishment.
- Is sheet flow maintained through the buffer footprint? **NO**
- Does the buffer footprint contain subsurface drainage or a tile outlet? **NO**
- Is there visible bank sloughing or indication of an unstable streambank? **YES**
- Create a riparian forest buffer.

Attend a conservation field day to learn more!
Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Is Bottomland Timber Establishment Right for the Site?

Is the area of interest within the 100-year floodplain?

- **NO** → Consider alternative management practices.
- **YES** →

  Does the area of interest extend >180ft from the stream?

  - **NO** →
  - **YES** →

  Are there existing stands of trees and/or shrubs within the area?

  - **YES** → Implement bottomland timber establishment.
  - **NO** →

Attend a conservation field day to learn more!

Contact Iowa Learning Farms, Practical Farmers of Iowa, Iowa State University Extension and Outreach, or USDA-NRCS for field days near you.
Edge-of-Field Practices


Directory of Professional Foresters and Forestry Contractors https://naturalresources.extension.iastate.edu/contacts/forestry


Iowa State University Prairie & Tree Planting Tool https://pt2.nrem.iastate.edu/


USDA-ACPF Watershed Database Saturated Buffer Viewing: https://acpfdata.gis.iastate.edu/ACPF/satbuff/


Iowa Nutrient Reduction Strategy


Tracking the Iowa Nutrient Reduction Strategy https://nrstracking.cals.iastate.edu/

Map Resources

Iowa Geographic Map Server
https://ortho.gis.iastate.edu

- LiDAR Maps
  - Open a Map Layer in ArcGIS Web App -> Elevation Maps -> Shaded Relief

- US Topographic Maps
  - Open a Map Layer in ArcGIS Web App -> Elevation Maps -> USGS Topographic

- Summer Aerial Photos
  - Open a Map Layer in ArcGIS Web App -> Summer Orthophotos 2004-2017

- Spring Aerial Photos
  - Open a Map Layer in ArcGIS Web App -> Spring Orthophotos 2004-2018

- Land Use Land Cover
  - Open a Map Layer in ArcGIS Web App -> 2002 IDNR Landcover

USDA-NRCS Web Soil Survey (Soil Survey information):

Multi-Resolution Land Characteristics Consortium (National Land Cover Database):
https://mrlc.gov/data