



Northeast MN Envirothon

In Area III of MN Soil & Water Conservation Districts

TO: High School Teachers

FROM: Becca Reiss, Area III Envirothon Coordinator

DATE: February 1st, 2019

RE: 2019 ENVIROTHON RESOURCE PACKET

The 2019 Area III Envirothon will be held on **Monday, May 6, 2019** at the Cloquet Forestry Center in Cloquet, MN. Please send in your registration forms, found in the 2019 ENVIROTHON REGISTRATION PACKET, by **Wednesday, March 20th, 2019**.

Included in this packet:

1. Tentative schedule for the day
2. List of things students should bring
3. Map of the event location
4. 2019 Envirothon Rules (Area III will follow the State rules)
5. 2019 Scenario – Agriculture and the Environment
6. Study resources for students

There are **five stations** to compete at: Water Quality, Soils, Forestry, Wildlife, and Current Events (this year, *Agriculture and the Environment: Knowledge and Technology to Feed the World*). Please keep in mind that there will be a test at each station. If you need assistance obtaining the study resources listed in this packet, please contact your local Soil and Water Conservation District. Teams will also be required to give a **10-minute oral presentation** on the 2019 scenario contained in this packet.

The top four teams will advance to the Minnesota State Envirothon, held on Monday, May 20, 2019 at the Oliver Kelley Farm in Elk River, MN. The winner of the Minnesota State Envirothon will represent Minnesota at the North American Envirothon, which is being held in Raleigh, NC from July 28-August 2nd, 2019.

The Area III Envirothon registration will begin promptly at 8:45 am on Monday, May 6, 2019, so please be on time! If you have any questions or concerns, please contact me as soon as possible at:

becca@nslswcd.org or 218-471-7288.

Want more Envirothon information?

Check out the Minnesota Envirothon website at www.maswcd.org/envirothon.htm and the North American Envirothon website at <http://www.envirothon.org>

*Sponsored by
the Soil and
Water
Conservation
Districts in NE
MN Area III*

Aitkin SWCD

*130 Southgate Drive
Aitkin, MN 56431*

Carlton SWCD

*808 3rd Street
Carlton, MN 55718*

Cook SWCD

*411 West 2nd Street
Grand Marais, MN 55604*

Kanabec SWCD

*2008 Mahogany St.
Mora, MN 55051*

Lake County SWCD

*616 Third Avenue
Two Harbors, MN 55616*

Mille Lacs SWCD

*635 2nd St SE
Milaca, MN 56353*

North St. Louis SWCD

*307 1st St S, Ste. 114
Virginia, MN 55792*

Pine SWCD

*1602 Hwy 23 N
Sandstone, MN 55072*

South St. Louis SWCD

*215 N 1st Ave. E, #301
Duluth, MN 55802*

Monday, May 6, 2019

Cloquet Forestry Center

175 University Road

Cloquet, MN 55720

<http://cfc.cfans.umn.edu>



Area III Minnesota Envirothon

Tentative Schedule for the Day

8:45 - 9:15..... Registration*
9:15 - 9:25..... Orientation
9:25 - 9:30..... Pass Time to First Station
9:30 - 9:55..... First Station
10:00 - 10:25..... Second Station
10:30 - 10:55..... Third Station
11:00 - 11:25..... Fourth Station
11:30 - 11:55..... Fifth Station
12:00 - 12:25..... Sixth Station
12:25 - 1:30..... Lunch and Awards

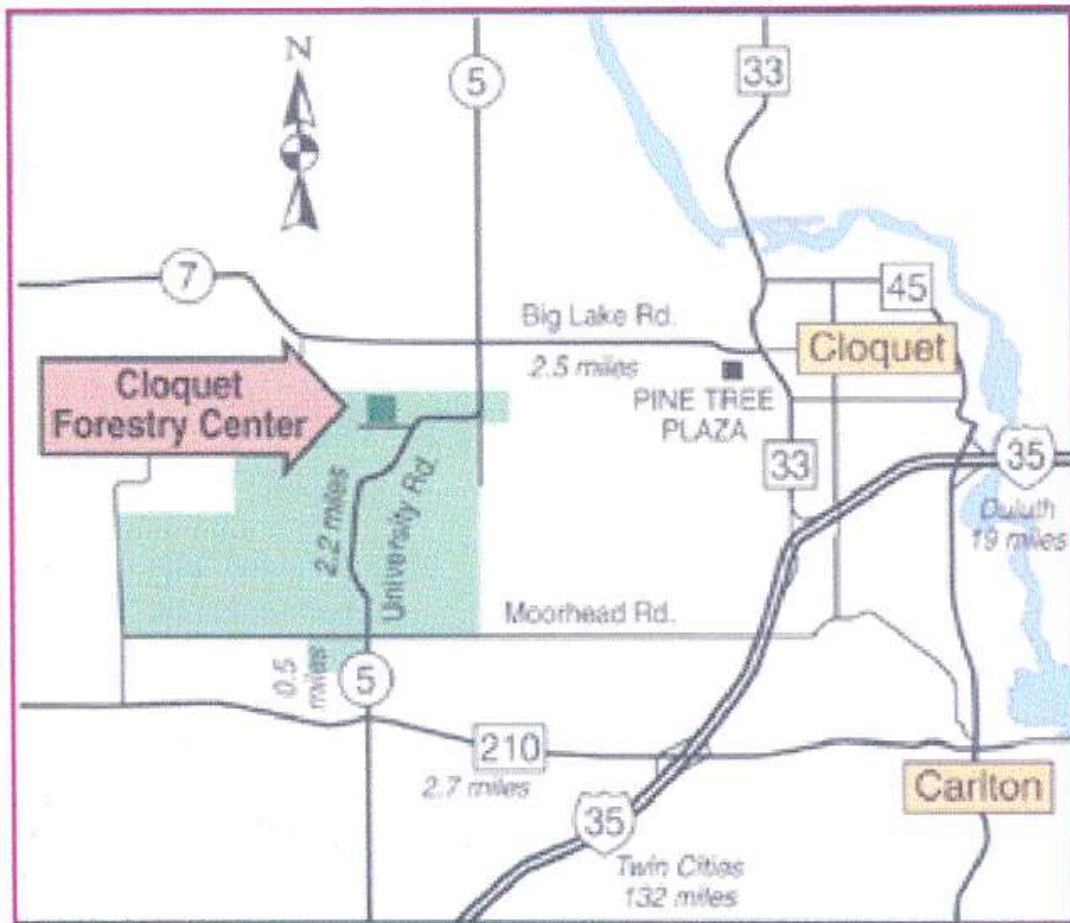
* You can arrive before 8:45 to register early.

What Students Should Bring

- 1. Lunch** Students and teachers should bring their own lunch. It is not provided.
- 2. Pencils or Pens**
- 3. Clipboard and Writing Paper** (one clipboard per team)
- 4. WARM OUTDOOR CLOTHING** and/or **RAIN GEAR** if appropriate.
PLEASE do not take this lightly! Students have suffered from frostbite at the event because they were not dressed properly.

Monday, May 6, 2019

Cloquet Forestry Center
175 University Road
Cloquet, MN 55720





MINNESOTA STATE ENVIROTHON

2019 Rules



1. All students must be enrolled in grade levels 9-12 (or equivalent home school ranking). Top age for participation is 19 (based on Minnesota State High School League rules for participation).
2. Each team will consist of 5 students from the same school, non-traditional schools, or youth organization. In the event of an emergency that would prevent a registered 5-member team from competing at the MSE, the MSE Coordinators *may allow* a team to compete with fewer than 5 members.
3. The top **3 teams** from each Area (regional) compete at the MSE. Area competitions that have 25 teams (or more) participating at their local event may send 4 teams to the MSE.
4. All teams must be accompanied to the event by a teacher/advisor. Teams will not be allowed to register or compete without an advisor. Advisors may leave the event site only in cases of emergency, or as part of an Envirothon sponsored training session.
5. Teacher/advisors shall not accompany their teams during and after the exam rounds. Teachers/advisors may watch their own team during oral presentations, provided the team wants their teacher/advisor to watch. However, teachers/advisors are NOT to interact or converse with their students in any way before or during the MSE competition.
6. Advisors will be responsible to ensure that teams display proper conduct during the competition.
7. If sickness or emergency prevents a registered team member from attending the MSE, an alternate may be sent. Alternate students listed MUST have competed at the Area event. Teams may list up to 7 total students on the registration form – 5 team members, and up to 2 alternates.

We encourage you to list 2 alternate students. HOWEVER, in an attempt to reduce overall costs, we will only allow each team to bring **1 alternate to the MSE**. Alternates are only supposed to participate at the state event (with their team) in the event of an emergency [*i.e. family or medical emergency happens to an original team member*].

8. Teams may not bring a student that is not listed on the state registration form to the MSE. All alternates attending, but not participating with their team, will be placed into groups of alternates, and work through the stations as an “Alternate team.” Although these alternate teams will be scored, they will not be ranked with the other teams and will not be eligible for any of the prizes or awards.
9. Team members cannot carry notes, books, cell phones, iPads/iPods, or any other electronic devices with them during the competition; UNLESS such equipment is necessary and requested for the student(s) to participate [*i.e. to reasonably accommodate those students covered under the Americans with Disabilities Act (ADA)*]; and has been approved by the MSE Committee prior to the event. Exception: standard

calculators (not scientific calculators) can be used. Teams using any other devices without prior approval will be **penalized/disqualified**.

10. Students may ask presenters for clarification of a question.
11. All exams are worth a possible 25 points total, with the exception of the oral presentation station (30 points). In case of a tie for the first through third place teams, the winners will be determined by category scores in the following order: Oral Presentation, Current Issue, Aquatics, Forestry, Soils, Wildlife.
12. Teams may use up to 3 visual aids for the oral presentation portion of the event. Students may not use electronic media (PowerPoint presentations) for their oral presentation. Oral presentations will be 7-10 minutes in length. A score reduction will be assessed for less than 7 minutes or over 10 minutes. Teams are allowed a maximum of 12 minutes with the judges. Teams that come from the same school must have different oral presentations. The team with the highest oral presentation score *may* be asked to give their presentation in front of all the teams at the end of the event, prior to the award announcements.
13. All judges and presenters decisions are final.
14. Use of tobacco, drugs, and alcohol is prohibited.
15. Teachers and students may not visit the site of the MSE the day before the event.
16. Rules and regulations of the MSE are subject to change. Rules are final as per MSE Committee.

NATIONAL Conservation Foundation (NCF) Envirothon Information:

A travel stipend may be provided to the first place team from the MSE competition traveling to the NCF Envirothon, depending on the Envirothon budget for the year. It is the expectation that the winning team will cover their travel costs to the North American Envirothon.

Teams must have 5 members to compete at the North American Envirothon. In the event of an emergency that would prevent a registered 5-member team from competing in the Annual Competition, the NCF Envirothon operating committee may allow a team to compete with fewer than 5 members. The NCF operating committee will determine if a penalty shall be assessed to a team in the oral presentation for the absence of a complete 5-member team.

FOOD ALLERGY NOTICE:

The Minnesota State Envirothon (MSE) committee recognizes that students may be severely allergic to certain foods. We do provide a continental breakfast, as well as lunch for all attendees of the MSE. If you have a student that has certain food allergies, we strongly recommend that you bring your own breakfast/lunch to the event.



MINNESOTA STATE ENVIROTHON

2019 MN State Envirothon Scenario

Agriculture and the Environment – Knowledge & Technology to Feed the World

The Oliver Kelley Farm (OKF) is a Minnesota Historical Society site that was home to Oliver Kelley, the founder of the national farming organization, the Grange. OKF maintains historic buildings, livestock, and several acres of gardens and cropland. The site is open to the public and sees roughly 40,000 visitors a year, including school groups, families, and individuals. Three years ago, OKF opened a new program space - Farm Lab - that tells the story of modern Minnesota Agriculture. As part of Farm Lab, OKF created living exhibits, including turning over ten acres of new cropland.

This new cropland will be planted with corn, soybeans, wheat, and sugar beets. Growing these crops will enable OKF to showcase the crops vital to modern Minnesota agriculture. Visitors to the Oliver Kelley Farm will explore the crops and get a closer look at the plants that produce their food and other products. Staff, who are tasked with educating visitors about the story of agriculture in Minnesota, will use the crops as living artifacts to help communicate this story.

The soil type and climate at OKF require that, to maintain high yields, most crops be grown with irrigation. Many types of irrigation options are available Minnesota's farmers. OKF wishes to select irrigation types best suited to its needs and property. This irrigation method must be economically sound, feasible, environmentally responsible, and compatible with the cultivation of corn, soybeans, wheat, and sugar beets. The water for this irrigation system will come from a well on the property.

Because the Farm Lab cropland is also an exhibit, it must be representative of how crops are raised in the rest of Minnesota now, and in years to come. At the same time, as a public and historic site, OKF must adhere to guidelines that do not confine other Minnesota farms.

The Oliver Kelley Farm is designated as a National Historic Landmark. As such, it is subject to state and federal standards regulating land management. These include:

- A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
- The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

- New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
- New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

OKF is also guided by the values included in its mission statement:

The Oliver Kelley Farm tells the story of the Kelley Family and Minnesota's agriculture---past, present and future---to nurture an understanding of where our food comes from and agriculture's impact on our world. We accomplish this by providing engaging experiences that enable visitors to understand and learn in ways that enrich their present lives and help them shape a better future.

Excellence

- We are an authentic working farm
- We create well-researched and non-biased programs
- We strive to attain consistently high levels of customer satisfaction

Engagement

- We provide hands-on activities for all visitors
- We encourage thought provoking discussion
- We seek to assist people in discovering their history

Community

- We actively and purposefully participate in our community
- We value diverse audiences and seek to meet their needs
- We value genetic diversity in plants and animals and strive to preserve it

Personal

- We value individuals and the sharing of their stories
- We are a place to be your family farm, where families work and play together
- We connect people to the story of the food they eat

Once an irrigation system is installed at the Oliver Kelley Farm, it will become a part of programming for both casual visitors and school groups.

One of OKF's school programs for middle and high school students is called "Minnesota Feeding the World." In this program, students examine topics such as changing farming methods, food waste reduction, concerns related to raising animals, and the careers that can solve our food shortage dilemma. By examining these issues, students look for answers to the question "how can Minnesota help feed the 9 billion people expected to live on this planet in 2050?" With a changing climate and more expected droughts in Minnesota, irrigation will continue to be a critical component to producing food here. OKF's irrigation system will act as a program element to discuss how irrigation may help produce food to "feed the world."

Expectations

The Oliver Kelley Farm has contracted you put together an irrigation plan for their Farm Lab cropland. As a part of this plan you will need to:

- Decide on the best type of irrigation system for this land
- Discuss the potential and expected impacts of this system on the environment surrounding the Kelley Farm
- Discuss pros and cons for this system, with suggestions for mitigating potential negatives
- With the intention of using this information to educate visitors, provide ideas on the how use of irrigation systems can help Minnesota contribute to "feeding the world." Also consider how this use will impact Minnesota's citizens/consumers (think natural resources, food availability, food cost, Minnesota's economy, etc.)

Resources

Types of Irrigation Systems - Centers for Disease Control and Prevention

<https://www.cdc.gov/healthywater/other/agricultural/types.html>

The Secretary of the Interior's Standards for the Treatment of Historic Properties + Guidelines for the Treatment of Cultural Landscapes

<https://www.nps.gov/tps/standards/four-treatments/landscape-guidelines/index.htm>

Soil type influences irrigation strategy - Michigan State University

http://www.canr.msu.edu/news/soil_type_influences_irrigation_strategy

Soil survey of Sherburne County, MN

https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/minnesota/MN141/0/sherb_MN.pdf

“Getting water to crops when they're thirstiest pays off” - MPR News

<https://www.mprnews.org/story/2014/10/02/ground-level-beneath-the-surface-otter-tail-irrigation>

Beneath the Surface: Minnesota’s Pending Groundwater Challenge - MPR News

<http://minnesota.publicradio.org/projects/2014/01/ground-level-beneath-the-surface/>

“A better way to water crops” - Farm Horizons

<http://www.herald-journal.com/farmhorizons/2016-farm/better-irrigation.html>

“Technology developments improve irrigation efficiency” - The Land

https://www.thelandonline.com/news/technology-developments-improve-irrigation-efficiency/article_ccb113c2-f74f-11e5-849a-cfd007b0df.html

Lightning round talk from Josh Stamper, from the Department of Soil, Water, and Climate at the University of Minnesota

<https://www.youtube.com/watch?v=l8VFgye89xs>

National Climate Assessment

<https://nca2014.globalchange.gov/report>

THE OLIVER KELLY FARM 2018





MINNESOTA STATE ENVIROTHON

2019 MN State Envirothon

Wetlands/Aquatics Study Guide

Hydrology

- The water cycle: <https://water.usgs.gov/edu/watercyclesummary.html>
- Climatology website: <https://www.swac.umn.edu/spring-2018> Watch the Recording of Kenny Blumenfeld's January 24 Lecture "Managing Minnesota's Changing Climatology and the Case for Myopia."
- <https://www.pca.state.mn.us/sites/default/files/wq-ws4-13b.pdf>

Land use/land cover

- Ratios/land use: <http://onlinelibrary.wiley.com/doi/10.1002/2015WR017637/full>
- Crops, land cover, timing and connections to hydrology
<http://www.dnr.state.mn.us/whaf/about/scores/hydrology/perennial.html>

Functions

- Wetlands:
<http://www.dnr.state.mn.us/wetlands/index.html>
https://www.aswm.org/pdf/lib/14_mapping_6_26_06.pdf
<https://www.nature.com/scitable/knowledge/library/ecology-of-wetland-ecosystems-water-substrate-and-17059765>
- Lakes:
<https://www.pca.state.mn.us/sites/default/files/lakes-guidetoprotection-2.pdf>
- Groundwater: <https://www.pca.state.mn.us/water/state-groundwater>

Actions/Adaptations

- Restoration and Protections Strategies:
<https://www.pca.state.mn.us/sites/default/files/lakes-guidetoprotection-2.pdf>
- Climate Adaptions: <https://www.pca.state.mn.us/sites/default/files/p-gen4-07.pdf>



2019 Current Events Station (Agriculture and the Environment: Knowledge and Technology to Feed the World) Resource Materials

Current Events Learning Goals:

- **Sustainable Agriculture:** Understanding sustainable agriculture on large and small farm operations, as well as the indicators of sustainable farming.
 - a. Define sustainable agriculture, including comparing and contrasting sustainable practices on large and small farm operations

USDA: Sustainable Agriculture: Definitions & Terms

<https://www.nal.usda.gov/afsic/sustainable-agriculture-definitions-and-terms#toc2>

UC Davis: What is Sustainable Agriculture?

<http://asi.ucdavis.edu/programs/sarep/about/what-is-sustainable-agriculture>

- **Best Management Practices and Conservation:** Understanding how sustainable and best management farming practices enhance and protect soil health, water quality and quantity, and biodiversity.
 - a. Understand the importance of moving towards sustainable farming systems to conserve natural resources, reduce erosion, and protect water quality and quantity; as well as look at pollution.
 - b. Understand farm management practices to build soil organic matter, such as: composting, crop rotations, cover crops, conservation tillage, and management intensive grazing systems to improve soil health.
 - c. Understand best management practices that improve water quality and reduce water use such as conservation tillage, cover crops, plant selection, precision agriculture, water re-use, and sub-surface drip irrigation.
 - d. Knowledge of the role pollinators play in farming and ways to attract them

Minnesota Department of Agriculture Best Management Practices

<https://www.mda.state.mn.us/pesticide-fertilizer/best-management-practices-bmps>

Conservation Agriculture: What Is It & Why Is It Important for Future Sustainable Food Production?

https://www.researchgate.net/publication/305397361_Conservation_agriculture_what_is_it_and_why_is_it_important_for_future_sustainable_food_production

Pollinators-Minnesota Department of Agriculture

<https://www.mda.state.mn.us/sites/default/files/inline-files/pollinatorsagland.pdf>

- **Food Systems and World Population:** The difference of local, regional, and national foods systems that are vital to grow food for an ever-increasing world population; and the importance of each food system.
 - a. Describe the economic, social, and environmental benefits of sustainable agriculture to local communities, as well as to regional and global food systems.

Agricultural Statistics for Minnesota

<https://minnesota.agclassroom.org/educator/materials/profile.pdf>

National Geographic: Feed the World

<https://www.nationalgeographic.com/foodfeatures/feeding-9-billion/>

Growing today for Tomorrow-Ag in the Classroom. Video from BASF.

<https://minnesota.agclassroom.org/matrix/resources.cfm?rid=411>

University of Minnesota Institute on the Environment. Environmental Reports—Food Matters

<http://www.environmentreports.com/foodmatters/#section8>

Responsible Acre from Winfield

<http://www.responsibleacre.com/>

- **New Technologies:** New technologies that help provide more efficient agriculture production.
 - a. Understand the role of new technology: agricultural biotechnology; precision agriculture; using UAV (drones, GIS, etc.) to increase farm efficiency for food production.
 - b. Understand the risks and benefits of agricultural biotechnology

Agronomy Technical Note 3—Precision Nutrient Management Planning

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_021594.pdf

MN NRCS Profiles of Soil Health

<https://www.nrcs.usda.gov/wps/portal/nrcs/mn/soils/health/stelprdb1246017/>

Forbes Magazine: Take a Look at How Technology Makes Smart and Sustainable Farming

<https://www.forbes.com/sites/jenniferhicks/2016/12/31/take-a-look-at-how-technology-makes-smart-and-sustainable-farming/#5d2dc71c3deb>

Precision Agriculture and Sustainability

<https://link.springer.com/content/pdf/10.1023%2FB%3APRAG.0000040806.39604.aa.pdf>



2019 MN State Envirothon Study Resources Forestry

<https://hennepinforeset.weebly.com>

MINNESOTA STATE ENVIOTHON

2019 Soils Station Resource Materials

Soils Learning Goals

1. Learn the basics of soil formation and composition
2. Learn how to properly identify soil texture
3. Learn to use the Web Soil Survey and associated information
4. Learn the principles of soil health
5. Learn the basics of soil horizons
6. Learn how to properly use a Munsell color chart
7. Learn the basics of soil chemistry

Website Resources:

Soil Science Society of America - Basics

<https://www.soils.org/discover-soils/soil-basics>

USDA Web Soil Survey

<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

NRCS Soil Health Key Points

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1082147.pdf

Soil Biology Primer

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/nd/soils/health/?cid=nrcseprd1300631>

USDA Soils 101

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/7thru12/?cid=nrcseprd885606>

Soil Science Society of America – Soil Chemistry

<http://www.soils4teachers.org/chemistry>

U of M Extension – Soils and landscapes of Minnesota

<https://www.extension.umn.edu/agriculture/soils/soil-properties/soils-and-landscapes-of-minnesota/>

YouTube Resources:

https://www.youtube.com/watch?v=ZlyDyQT6_WE

<https://www.youtube.com/watch?v=CEEiXcpCZjY>

<https://www.youtube.com/watch?v=9uMPuF5oCPA>



MINNESOTA STATE ENVIROTHON

2019 Wildlife Study Guide

Wildlife Station Topics

Minnesota/ Migratory Wildlife identification

- Mammals
- Reptiles
- Waterfowl
- Insects
- Migratory birds
- State & Federally threatened and endangered species

<https://ecos.fws.gov/ecp0/reports/species-listed-by-state-report?state=MN&status=listed>

<http://www.dnr.state.mn.us/invasives/index.html>

<https://www.dnr.state.mn.us/ets/index.html>

<https://www.dnr.state.mn.us/rsg/whyrare.html>

Mammal ID guide book

Bird ID guide books

Reptile ID guide books

Habitat types of Minnesota

- Ecological biomes
- Native vs. non-native species
- Effects of climate change
- Wetlands

<http://www.dnr.state.mn.us/invasives/index.html>

<https://www.dnr.state.mn.us/>

US Fish and Wildlife History

- Policy and Regulations
 - Endangered Species Act
 - National Environmental Policy Act

<https://www.fws.gov/policy/hbindex.cfm>