New Hampshire ENVIROTHON 2018

Increasing the Efficiency of New Hampshire Pasturelands

Introduction

Global population is expected to grow from around 7.3 billion today to almost 9.8 billion by 2050 (Roser and Ortiz-Ospina, 2017). Feeding humanity will require a 50 percent increase in the production of food and other agricultural products between 2012 and mid-century (FAO, 2017). Land management for food production is a fundamental human activity that supports the livelihood of everyone on the planet.

An important component of land management for food production is the role that pastures and rangeland play in livestock grazing and feeding. Pastures are lands that are mainly used for the production of domesticated forage plants for livestock and are normally managed using agronomy practices. Rangelands are typically lands on which native vegetation exists and are managed using ecological practices. Pasturelands usually have been seeded with non-native species, such as tall fescue, or in some cases native plants, such as switchgrass.

Pasture management requires understanding the interplay between sunlight, plants, soil, and animals. The pasture manager's goal is to optimize plants capturing sunlight and converting this energy into high quality forage, and then utilizing that forage to produce livestock that can generate income when taken to market (Rayburn, 2013). The challenge is to perform these tasks in a manner that is ***ecologically and economically sustainable***. Maintaining a productive plant community that can profitably feed livestock requires attention to soil fertility, proper forage species selection, and attentive grazing livestock management (Beetz and Rinehart, 2006).

Farmers in New Hampshire face particular challenges, such as a relatively short growing season and variable New England weather. In addition, climate change has impacted agriculture in our region, resulting in warmer average temperatures, greater rainfall intensity, drier summers and falls, greater heat stress for livestock, increased erosion and water quality issues, and increased flood and storm damage. Farmers have had to adapt their practices to help protect themselves from such weather extremes. Such practices include the use of cover crops and reduced tillage.

Access to agricultural land continues to be a challenge for New Hampshire farmers, as well. While land tenure and land use efficiency are different, there is a relationship between the two. A farm is able to invest in farm efficiency, if they also have land tenure. Many livestock farms lease parcels of land in order to meet the demands of their operation. However, leases do not guarantee perpetual use of the parcel. There are many instances where a landowner decides to sell out to development, rather than continue to lease it to a farmer. Our state has a limited supply of good agricultural land, and that same land also happens to make excellent house lots. As a consequence, producers find it difficult to access affordable land to maintain or expand their operation, as they find themselves competing with housing developments. Land conservation and agricultural easements not only helps to protect water resources, open space, and wildlife, but it also preserves working farms and forests. This in turn helps to create affordable access to farmland, which then allows farmers to make the investment in order to better utilize the farmland.

The Challenge

Your team has been hired by a local farm as consultants to increase the productivity and efficiency of the pastures that are used by livestock as both a supply of feedstock, and as an area for grazing. This farm can currently exist in your community or your team can create a fictitious location. If you choose to work with an existing farm, you must contact the farm owner or manager to establish what types of plants are growing in their pastureland and what types of livestock are utilizing the vegetation. If you choose to create a fictitious location, your selection must be based on data and information your team gained by researching the Soil Survey and Granite Mapper concerning land in your community that is not currently being used agriculturally and has good potential for an agriculture site.

The consultant report that your team produces must address the following issues:

1) An introduction to the abiotic and biotic factors affecting plant growth
2) A list of organism survival limiting resources (e.g., temperature, soil pH, nutrients, protection from predators and pest, ability to reproduce) applicable to New Hampshire/New England
3) A survey of the soil ecosystem that includes parent material, landscape position, and optimal mineral content
4) Optimized plant selections for the pasture ecosystem in your community
5) A summary of root development in relation to top removal
6) Efficient rotation of forage crops, including seasonal choices
7) Plant growth in relation to harvest or grazing frequency
8) Recommendations for distributing grazing animals based on their nutritional requirements
9) General recommendations to avoid pasture overgrazing
10) Potential impacts of climate change on the efficiency and productivity of the farm's pastures
11) Importance of pasture soil health in grazing management
12) Suggestions on how to extend the grazing season in NH

NH ENVIROTHON 2018 Current Issue Challenge Committee

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References

Beetz, A. and Rinehart, L. (2006), *Pastures: Sustainable Management*, https://attra.ncat.org/attra-pub/viewhtml.php?id=247#periodicals, accessed October 15, 2017.

FAO (2017), *The State of Food and Agriculture 2017*, http://www.fao.org/fsnforum/news/state-food-and-agriculture-2017, accessed October 10, 2017.

Rayburn, E. (2013), *Introduction to Pasture Ecology*, West Virginia University, Extension Service, Agriculture and Natural Resources, December, 2013.

Roser, M and Ortiz-Ospina, E. (2017), *World Population Growth*, https://ourworldindata.org/world-population-growth/, accessed October 10, 2017.

Resources

General

New Hampshire Department of Agriculture, Manual of Best Management Practices for Agriculture in New Hampshire

http://www.agriculture.nh.gov/publications-forms/documents/bmp-manual.pdf

US Department of Agriculture, Natural Resources Conservation Service, Field Office Technical Guides

https://efotg.sc.egov.usda.gov/efotg_locator.aspx?map=US

New Hampshire Department of Agriculture

http://agriculture.nh.gov/index.htm

New Hampshire Association of Conservation Districts

http://www.nhacd.net/

Manual discussing environmental and agricultural issues related to biosolids use, with related best management practices.

https://extension.unh.edu/resources/resource/5011/Biosolids_BMP_Manual

Grazing and Pastures in New England

Pastureland research and experiences

www.onpasture.com

Granite State Graziers

www.grazenh.com

Mapping Wildlife

NH Fish and Game Wildlife Habitat Land Cover Map

http://www.wildlife.state.nh.us/maps/wap.html

Mapping Soils

Web Soil Survey

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Mapping Land Use

Granite View II (University of New Hampshire)

http://granitviewii.unh.edu/

Soils

Soils Heath from Cornell University

http://soilhealth.cals.cornell.edu/

Building Better Soils for Better Crops

http://www.sare.org/Learning-Center/Books/Building-Soils-for-Better-Crops-3rd-Edition

Watersheds & Agriculture

United State Department of Agriculture, Natural Resources Conservation Service

http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/

Sustainable Agriculture

Sustainable Agriculture Research & Education

http://www.sare.org/

National Sustainable Agriculture Coalition

http://sustainableagriculture.net/

Leopold Center for Sustainable Agriculture

http://www.leopold.iastate.edu/

Center for Sustaining Agriculture and Natural Resources at Washington State University

http://csanr.wsu.edu/

ATTRA, Sustainable Agriculture

www.attra.ncat.org

NH ENVIROTHON 2018 Oral Presentation Guide

1) Students have the option of presenting their solution to the Current Issue Challenge using a PowerPoint presentation.

2) If using a PowerPoint presentation, teams must bring their own laptop computer. The NH ENVIROTHON will supply a projector and screen in each presentation room.

3) Any embedded videos in the presentation must be produced by the NH ENVIROTHON team making the presentation. In other words, no videos downloaded or streamed from the Web can be used in your presentation. **Videos should be no longer than two minutes.**

4) Because a reliable internet cannot be guaranteed, your presentation should not contain any embedded links to web sites or videos.

5) All five team members must participate in the presentation. Your team will have exactly 15 minutes to make your presentation, followed by 5 minutes of questions by the judges. Plan and rehearse your presentation accordingly.

6) Work on the challenge is restricted to the five team members and two alternates. You may seek additional information from any source, but you are not permitted to get help on your solution to the challenge (your analysis, proposed project, the proposal itself, or any handouts or displays) from parents, teachers, advisors, consultants, professionals or anyone else. You may, and should, get help and guidance in rehearsing your presentation.