Penobscot County Soil & Water Conservation District

2016 Annual Report

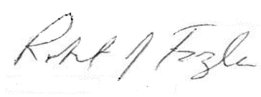
Message from our Chair

It has been another great year for the district and NRCS. This year's annual banquet was a big highlight on my list of accomplishments for the district. This event was missed last year due to our new employees transition. This year's banquet was forestry themed in honor of our conservation award winner, Hammond Ridge Development Corporation, LLC. We had such a wonderful turnout and everyone seemed to enjoy the presentations and one another's company. I was so pleased with the turn out and I look forward to next years' event.

Our plant and fish sales went very well this year. Both sales were up from the previous year. Thank you to all who utilize our sales. We see these sales not only as a way to bring money into the district but a way to provide a service to residents of Penobscot County. The district continues to sell rain barrels and composters. This past fall we even brought back our bulb sale which we hadn't had since 2011.

The district hosted a farm pond management workshop and a stream crossing workshop. Both workshops were well attended. Workshops are a great way to educate and spark an interest. We like to change our topics every year and love suggestions. If you have questions or are looking for information, please give the Penobscot County SWCD a call. We would like to assist you with your conservation needs.

I hope you enjoy our annual report.



Robert Fogler

Table of Contents

Meet the Board of Supervisors

Penobscot County Soil & Water Conservation District

Robert Fogler,
Chair

Mary Wilson,
Vice Chair

John Simon,
Supervisor

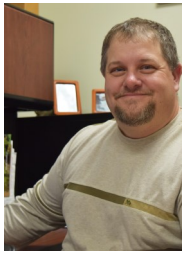
Ryan Crane,
Supervisor

Amy Polyot,
District Manager

Dan Kusnierz,
Treasurer

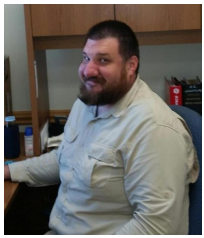
Meet Natural Recourses Conservation Service Staff

NRCS Natural Resources Conservation Service

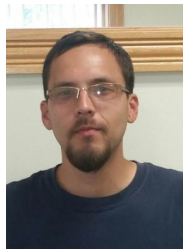


Charles Penney,
District
Conservationist

Misha Vargas,
Soil
Conservationist



Scott Carter
Ag Engineer



Jaime Sandoval,
Soil
Conservationist

2014 Financial Report

Statement of Financial Income and Expense

Income	
Contributed Support	
Federal Grants	$9,733.98
State Grants	$20,625.00
Total Contributed Support	$30,358.98
Earned Revenue	$15,552.57
Reimbursed Expenses	$5,561.89
Total Income	$51,473.44
Expenses	
Total Business Expenses	$25.00
Depreciation & Amortization Expenses	$12.14
Total Grant & Contract Expense	$471.38
Total Miscellaneous Expenses	$3,821.05
Total Non-personnel Expenses	$18,444.79
Total Salaries & Related Expenses	-$16,637.27
Total Travel & Meetings Expenses	$635.78
Total Expenses	$45,777.39
Net Income	$5,696.05

Statement of Financial Position

Assets	
Checking/Savings Accounts	$230,805.54
Restricted Checking/Savings	$78,283.10
Accounts Receivable	$94.59
Fixed Assets 0.00	
Total Assets	$309,373.35
Liabilities & Equity	
Current Liabilities	$79,757.85
Equity	
Opening Balance Equity	$0.00
Unrestricted (Retained Earnings)	$223,919.45
Net Income	$5,696.05
Total Equity	$229,615.50

2016 PCSWCD Annual Banquet.

Every year the Penobscot County Conservation District hosts an awards banquet. The banquet is a way to showcase the conservation projects that we have worked on in the past year. It is a great opportunity for conservationists to get together and catch up with one another. This year's banquet was a wonderful success. The banquet was held at the Penobscot County Conservation Association's club house in Brewer on November 9th. Walking into the banquet guests were greeted by Associate Supervisor Carol Weymouth's bright smile and were welcomed to find seats and enjoy some yummy horderves. As people walked in the dining room they were welcomed to a sea of color. Tables were decorated with brown and blue table cloths with bunches of sun flowers. Each guest had a chocolate shaped as a vegetable to honor our Conservation Award winner.

Susan Arrants from the NRCS STO and PCSWCD Associate Supervisor Carol Weymouth enjoying the banquet.

Our honored guest County Commissioner Tom Davis and his wife Muriel. We also had the honor of having County Commissioner Laura Sanborn and her husband attend the banquet.

Guests enjoyed a feast of turkey and lasagna with all sorts of tasty fixings and a mix of pies for dessert. All the wonderful food was provided by Stage Coach Catering of Brewer. After the dinner, guests enjoyed a power point showcasing all the activities and projects that the district and NRCS have done over the past year. After the slide show, we honored Brittany Hopkins of Wise Acre Farm with the 2016 Conservation Award. NRCS Soil Conservationist Misha Vargas gave a presentation covering all of the different projects Brittany has done to support and educate people about conservation.

John and Linda Dorman

This year was the first year for holding our Penobscot County Big Tree Contest. The contest winners were invited to the banquet and were honored with a certificate and a copy of the book, "Trees of Maine".

Banquet continued...

NRCS District Conservationist Charles Penney and guest speaker George Matula.

Our guest speaker was George Matula. George is a retired Associate Professor of Wildlife Biology at Unity College and worked as a Wild Life Bear Biologist for Maine Department of Inland Fisheries and Wildlife. While at Unity, George was the Project Coordinator for the 3 year Unity Bear Study. The bear study involved both faculty and students and included trapping, tracking, collecting and analyzing biological and DNA data of central Maines bear population.

At the conclusion of the evening we had door prize drawings. We had several lovely prizes to hand out such as bird food and feeders, fresh vegetables, gift cards to area businesses, crafts, and maple syrup! Thank you to all businesses and individuals that donated to our banquet. Your continued support is greatly appreciated. We were so pleased with the turn out. So many people came out to support the district and it was an awesome evening!

We have a new face!

A native of Aroostook County, Stephanie began a career in government service with the USDA/NRCS in December 2001 as an Administrative Assistant with the St. John Aroostook Resource, Conservation and Development office in Presque Isle. After relocating to the Bangor area in 2008, she held administrative positions with various Federal agencies, including the US Fish and Wildlife Service, NRCS and the Veterans Health Administration. Stephanie has a BS degree in Environmental Studies with a concentration in Geology from the University of Maine Presque Isle and after recognizing a desire to work with landowners and partners to improve our natural resources, in December 2016 returned, once again, to NRCS and began a new career as a Soil Conservationist with the Bangor Field Office. Stephanie and her husband Alan reside in Winterport and have 2 grown children who both live in the area.

2016 Conservation Award Winner

2016 Conservation Award Winner—Brittany Hopkins owner of Wise Acres Farm

Pictured: Misha Vargas, NRCS Soil Conservationist, Brittany Hopkins of Wise Acres Farm, and Chuck Penney, District Conservationist.

It is a warm summer afternoon at Wise Acres Farm a certified organic vegetable farm. The farm is located in Kenduskeag, Maine and is run by Brittany Hopkins. On a visit to the farm you can see that it is a farm that is a labor of love. Small vegetable gardens cover the property with veggies like carrots, egg plants, squashes of all kinds of varieties and so many other veggies. The farm has a washing station and storage on the back side of the house and a high tunnel full of peppers and tomatoes. The farm has been working with NRCS since 2013 implementing practices like cover crops, a High Tunnel System, Nutrient Management Plan, Forestry Practices, micro irrigation and others. Wise Acres Farm participates at the Bangor and Ellsworth Farmer's Market and also CSA during summer. Brittany and her wife Joy have owned and operated Wise Acres Fam since 2011. Brittany, the Wise Acres' chief farmer started learning how to grow and market vegetables as an apprentice in 2009 at Piecemeal Farm, Parker Family Farm, and Fisher Farm in Central Maine. She finds farming to be a source of endless challenge and interest and tries to remember that, as Wendell Berry wrote, "The mind that is not baffle is not employed".

After meeting Brittany, you can tell right away that when it comes to her farm she is very conservation oriented and wants to show how important is it to protect our natural resources. She feels that organizations like the PCSWCD and NRCS are vital in helping spread the knowledge and technical services to our counties residents. Congratulations to Brittany Hopkins on being our 2016 Conservation Award Winner! Brittany was presented a metal sign that she can display at the farm.

Penobscot County Big Tree Contest Winners!

At the banquet we honored owners of the winning trees from the 1st annual Big Tree Contest. There were 66 species of native trees that people could nominate for the contest. The contest ran from May 15th to September 15th. Once a tree was nominated our District Forester, Terri Coolong took measurements of the tree and recorded its measurements. These winners own the largest trees in their category at the end of the contest.

The winners were The Carmel Union Congregational Church with a White Ash, Jim and Darlene Philbrick with a Trembling Aspen and a Red Pine, Dan Williams and Emily Cain with a American Basswood, James Bunn with a Butternut and a Shagbark Hickory, Charles Boothby and his Atlantic White Cedar, John Dupuis with a Black Cherry, Michael Bourgon with a Eastern Cottonwood, Mary Humphrey and her American Elm, University of Maine and their Balsam Fir, Terry Walsh with a Silver Maple, Terry White with a Sugar Maple, Frank and Alice Higgins with their Northern Red Oak, Greg Rollins and his Eastern White Pine, Treeline Inc. with their Allegheny Serviceberry, and Brian Emery with his beautiful Red Spruce.

The measurements were as follows:

Common Name	Circumference (")	Height (feet)	Crown Spread	Total Points	Current Big Tree
Ash, White	166	90	57	313	Carmel
Aspen, Trembling	70	99	36	205	Alton
Basswood, American	120	79	49	248	Orono
Butternut	47	39	22	108	Garland
Cedar, Atlantic White	52	61	15	128	Bangor
Cherry, Black	49	62	43	154	Carmel
Cottonwood, Eastern	155	117	63	288	Brewer
Elm, American	107	90	62	259	Lowell
Fir, Balsam	58	98	18	174	Old Town
Hickory, Shagbark	77	66	40	183	Garland
Maple, Silver	249	102	85	436	Milford
Maple, Sugar	132	76	65	273	Hermon
Oak, Northern Red	156	76	98	329	Eddington
Pine, Eastern White	163	120	63	347	Lakeville
Pine, Red	63	88	30	181	Alton
Serviceberry, Allegheny	71	46	33	150	Springfield
Spruce, Red	95	89	30	214	Medway

Congratulations to the winners! The 2nd year kick off for the Big Tree Contest will start on May 15th. We still have so many varieties that we haven't received a nomination for and maybe after seeing these measurements you can think of a tree that can beat the title holders. It will be exciting to see if these trees have some competition. For more information or nomination forms please email us at amy.polyot@penobscotswcd.org or give us a call at 947-6622 Ext.3.

District Highlights

Sales

The sales were the largest we have had in years! It was so exciting to see that residents are supporting our district. This years plant sale had a large amount of pre-orders and we met so many new people who just stopped in for our cash and carry plant options. In the past the district has offered bare root trees and shrubs, edibles, garden seedlings, and perennials. For the 2017 sale we will be offering annuals as well. We still had our Kids Crafting Corner. Kids got to decorate flower pots or bird houses. The kids had a great time!

The fish sale had the highest sales since 2008. We had many new customers that are trying to reclaim a pond, like to fish in their own back yard all summer long, and people who love to sit and watch the fish pump. If you are interested in stocking your pond, give the district a call. We have provide you with the paperwork needed to obtain a stocking permit with the state.

Education Highlights

This year the Penobscot County Soil & Water District partnered up with the Natural Resources Conservation Service and the Maine Audubon put on a Stream Smart Workshop in Orono, Maine. The Stream Smart program is to train contractors, landowners, and other professionals that are responsible for road crossings. The training taught participants how to construct stream crossings that would protect and maintain fish and wildlife habitat while protecting roads and public safety at the same time.

The district had the opportunity to help organize the Northern Maine Children's Water Festival. The festival promotes hands on learning about water issues. This was a one day event that brought over 600 students, teachers, and water resource professionals together to learn about water, wetlands, human health, and aquatic life. The festival was held at the University of Maine. The festivals goals are to teach students about the value of healthy habitats and clean water.

District Highlights continued.

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DownEast Envirothon

2016 Downeast Envirothon was held at Craig Brook Fish Hatchery in Orland, Maine on May 20, 2016. Nineteen teams from Penobscot, Piscataquis, Hancock, and Washington counties came to participated. Envirothon is an environmental competition where high school students test their knowledge of natural resources and current environmental issues. Teams consisting of 3-5 students competing at the regional level, answering questions, and solving hands-on problems at five stations: Wildlife, Water/Aquatics, Forestry, Soils, and a Current Natural Resource. We had 35 volunteers who gave their time to make the event possible. The district appreciates these people taking the time to help out with Envirothon.

Invasive Forest Pest Outreach Program

The district is very involved in informing the public about the Invasive Forest Pest Outreach Program. Over the course of the year the district has held workshops or presented information to the public at various events about the program. This program has become a staple for not just the Penobscot district but, Maine districts as a whole. Through this program we hope to inform the public on how to identify current and potential invasive forest pests and their host species, to understand the threats to our forests and woodlands posed by these pests, and learn how to report suspected pest sightings or damage to trees that may be a result of pest infestations.

2016 Conservation Highlights

Bryce Levasseur High Tunnel

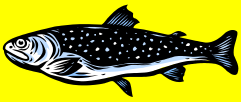
By Misha Vargas

Providing fresh, local food in the middle of winter can be really challenging. Extending the growing season in Maine isn't cheap! But when we talk about implementing the best management practices, might it still be possible for local growers to compete?

Bryce Levasseur, a local farmer in Greenbush, ME owner of Small Town Farm and Feed had an interest in applying for EQIP (Environmental Quality Incentive Program) and AMA (Agricultural Management Assistance) program with the goal of getting funded for a High Tunnel with NRCS. When we gave Bryce the good news it only took him a month to have the structure up after signing his contract. "I'm really excited to start planting and get to experiment with the High Tunnel". After leaving the farm from my inspection visit I had a smile on my face knowing that Bryce will be a creative and determinate farmer because of his unique management of approaching common problems. For growers wanting to improve their success rate is always a challenge to itself. Bryce now has a 30' x 72' NRCS High Tunnel in which he will be growing different kinds of vegetables selling them on his farm stand where he also sells farm supplies, seeds, meet and birds.

Bryce will be working along with NRCS in the future by building a long term relationship with us continuing with a CNMP (Comprehensive Nutrient Management Plan) followed by AgWaste practices for his livestock.

Keep a Look Out For Our Spring Newsletter. Order Forms for Our Plant and Trout Sales Will Be In The Newsletter!



2016 Conservation Highlights

Forestry in NRCS

By Misha Vargas

When you look at your property and wonder, how can I take some action to help make the best of my woodlot? I may want more timber in the future or perhaps greater mast crops for wildlife. With Forest Stand Improvement known better as TSI or Timber Stand Improvement you can have healthier trees on your land.

Ricky Holt from Dixmont, ME owner of a 670 acres of forestland has implemented Forest Stand Improvement along with other practices to improve the growth of his best trees by removing any tree that are in their way. The Forest Stand Improvement can be completely adapted to the site conditions and owners objectives. Working in partnership with your forester or even doing it yourself! Stand Improvement involves cutting trees, maybe herbicide application, prescribed burning, or girdling.

We could say that the most limiting factor in our region is access to sunlight, this means that every tree will be competing against each other to get that food! How can Ricky improve this? NRCS provides technical and financial assistance for the completion of this practice. This trees that have the greatest potential to provide the values desired by the owner are the ones that should be retained.

If you would like to place an ad in our future annual report or newsletters, please give Amy a call at the district (207)-947-6622 ext. 3. We have reasonable prices and our mailings are sent to over 1,600 residents throughout the county. All advertising dollars go toward our education programs.

2016 Conservation Highlights

Waste Storage Facility

By: Scott Carter, Ag Engineer

Starting the ground work.

Bonnie Lea Dairy in Hermon, operated by the Murphy family was in need of a new Waste Storage Facility. The dairy is a large operation milking several hundred dairy cows. All of these ladies produce a vital nutrient product that is key to a self-sustaining dairy operation. The manure generated on the farm is stored year round to be spread on crop fields during the growing season.

Mid construction

Current condition prior to NRCS project. Bonnie Lea Dairy had two primary waste storage structures, an old liquid pit that was quickly becoming too small for the current operations. Also the size and shape of the old liquid pit made cleanout difficult.. Expansion or a redesign of the old liquid pit would have been problematic because of its location with barns on three sides. The second waste storage structure was a three-sided dry stack facility. Both of these structures are vital to the dairy operations.

Project completed

Due to these conditions, the dairy needed a third storage structure to handle the volume of liquid manure generated during the year. A new storage structure was sized and designed to double the existing the capacity of manure storage for the Murphy's dairy. The site, located in the back of the dairy, was surveyed in December of 2015. A design was developed during the winter and spring. Construction started in May and completed in early August.

The structure is over 100 ft. wide and 230 ft. long, and 10 ft. deep. The new liquid pit can contain over 180,000 gallons of dairy manure. The Murphy's are pleased with their new structure and will utilize the storage space over the winter.

Projects in Maine Improve Lake and Stream Habitat for Fish

Article provided by: NOAA

Before picture of the South Branch project.

We have completed two landmark fish passage projects in the Penobscot River Habitat Focus Area. The benefits to migratory alewife fish are expected to be substantial due to the large amount of spawning habitat restored—a total of more than 3,100 acres—and 30 miles of stream habitat opened.

The projects, at South Branch Lake and East Branch Lake, are located on land owned by the Penobscot Indian Nation. Working with the Tribe and other partners, we removed decrepit dams that historically had been used when the Penobscot River watershed was used for lumber production.

The Penobscot River is home to eleven migratory fish species, including three listed under the Endangered Species Act. The river also hosts the largest run of Atlantic salmon left in the United States. But dams, barriers like road crossings, and water pollution have severely reduced numbers of many migratory fish in the watershed.

The dams were replaced with nature-like fishways. Removing the dams restored passage for sea-run fish including alewife, American eel, and Atlantic salmon (a NOAA Species in the Spotlight). At South Branch Lake, juvenile alewives have already been seen leaving the lake through the restored channel. The Maine Department of Marine Resources calculates we might see a return of more than 735,000 alewives each year to South Branch Lake and East Branch Lake combined.

Both dams were located upstream of other major dams removed as part of our ongoing efforts to restore the Penobscot River. Other partners in the South Branch Lake and East Branch Lake projects include the U.S. Fish & Wildlife Service and Natural Resources Conservation Service, the Atlantic Salmon Federation, and The Nature Conservancy. Both sites are expected to become venues for tribal cultural events.

After picture of the South Branch project.

Grazing Management- The Averaging Science

By: Jaime Sandoval, Soil Conservationist

Coming from Southern Iowa where the pastures are usually bigger and the soils are blessed with inches upon inches of dark black mollisols from vast years of rolling prairie, I was interested to see Maine pasture management in action. Iowa Management intensive grazing (MIG) encouraged 2.5-3.0 acres for cow/calf pair typically involved working with grasses such as smooth brome grass, tall fescue, bluegrass, and legumes like birds foot trefoil, red and white clover. MIG was preached but a good example of it working in practice was seldom seen. I heard of MOB grazing being more prevalent in the northern part of the state. (See table 1 for differences between MOB and MIG system)

Working with Maine producers, I met a couple who tried the MIG system with a beef herd and dairy herd operating separately on the same 90 plus grazing acres. Using a rule of thumb of grazing to around 3 inches, letting the paddock (subdivided pasture) rest for around 30 days before allowing the cows to re-graze the area. However, through the years the producers found certain weeds were becoming more prevalent, areas with more sensitive soils (such as ledge pockets) were coming devegetated each grazing season, and the cattle were not putting on weight as anticipated. The producers switched to a MOB grazing system by separating the pasture ground into 29 paddocks averaging 3.0 acres in size and further subdivided the paddocks into 0.5 acre sub-paddocks for the Holsteins and 0.2-0.3 acres for the beef herd. On average there are 134,400 lbs Holsteins/0.5 acre and 47600 lbs beef/0.3 acre. The forages are allowed to reach seed head maturity before the cattle are turned out into the area; resulting in the cattle stomping the majority of the forages creating a thatch layer. The producers keep an eye on the forages and usually move the cattle twice or more a day; have an app to keep records such as track cattle-pasture rotation and pre and post paddock conditions (even taking pictures). During the grazing season the cattle may only utilize the sub-divided paddock once or twice, resulting in a rest period around 90 days. The perimeter fence consists of several strands of high tensile electrified fence, the paddocks are divided by 2 strands of electric tape and step-in posts. The producers use above ground livestock pipeline connected to a portable plastic drum with a float as the watering tank, which they dump over and easily move to the next subdivided paddock along with the electric tape.

Utilizing the MOB grazing system the producers have noticed the desirable species are choking out the weeds. They have seen the yearly devegetated areas starting to heal and stay vegetated during the grazing season, and the livestock are increasing body weight at rates that are more desirable. The producers have invested a lot of time and energy into researching, experimenting, and keeping records to improve their grazing system. MOB grazing is not for everyone, requires intensive management, the right infrastructure, and good record keeping. Contact your local USDA-NRCS office for more information and resources including grants to support and implement a MIG or MOB grazing system.

Table 1. Management Intensive Grazing (MIG) vs. MOB Grazing:

	MIG	MOB
Stocking Density (Livestock weight in given area)	Less	Greater
Time in Paddock	Greater	Shorter
Rest Period (Amount of time the paddock has no grazing pressure)	Around 30	Around 90
Maturity of Forages	Vegetative State	Around Seed head stage, greater than 8 inches

Forestry Management Terminology- A Head Scratcher

Walking in the Maine woods is a real treat. I met with a producer whose conservation plan called for crop tree release and the check-out notes kept using the verbiage thinning, **thinning**, *thinning*. "Oh boy", I thought to myself, "This could be a nightmare to get it off the books." After viewing the site with Jerry Barnes, USDA-Natural Resources Conservation Service (NRCS) State Forester, and completing an ocular survey turns out everything was OKAY, phewww.

Pre-Commercial Thinning, Crop/Mast Tree Release, Mast/Apple Tree Release, Competition Control, Early Successional Cut, Patch Clearcut…are they all the same? Is the government just making up a much of confusing terms? I remember one time over-hearing a forester say, "You can call it whatever you want, it is all the same to me." Well, how is the landowner supposed to understand?

Below is an aerial glance at the intent and purpose behind these different practices. Almost all those mentioned above actually fall under an umbrella of a practice, they are what NRCS calls scenarios or options under the umbrella.

Practice	Scenario	Intent	Key Specifications
Early Successional Habitat (ESH)- Practice Code 647	Cut-varies depending on the equipment used and terrain	Develop/Enhance habitat for species dependent on early successional habitat, management areas typically in old fields or young forests	ESH must be identified as a concern in the Forest Management Plan, completed a wildlife habitat evaluation procedure Cutting and removing trees resulting in a residual stand of less than 30 square feet per acre and the individual patches minimum are 5 acres
Forest Stand Improvement (FSI)- Practice Code 666	Crop/Mast Release	Reduce competition around trees that produce or can produce desired resource benefits: wildlife food like nuts, berries, fruit or high-value commercial trees or aesthetically pleasing trees	Least 20 trees/ac., release 3-4 sides of target tree's crown by killing trees with crown's within 5ft of target tree
FSI- Practice Code 666	Pre-commercial Thinning	Thinning overstocked stands with average DBH less than 5, carried out by chainsaws or brushsaws	Residual Stand spacing: Sapling Trees—8'x8' or 681 trees/ac, 10'x10' or 436 trees/ac
FSI- Practice Code 666	Small Patch Cuts	Regenerate shade-intolerant tree species or control forest insects and pathogens	Cutting and removing trees resulting in a residual stand of less than 30 square feet per acre and individual patches will not exceed 5 acres refer to Maine Forest Practices Act: Forest Regeneration and Clearcutting Standards.
FSI- Practice Code 666	Competition Control	Remove competition from undesirable trees or overstocked, carried out by light mechanical equipment like a forwarder or cut to length processor	Residual Stand spacing: Sapling Trees -8'x8' or 681 trees/ac, 10'x10' or 436 trees/ac Polesize Trees - 12'x12' or 303 trees/ac, 15'x15' or 194 trees/ac Sawtimber - 19'x19' or 121 trees/ac, 25'x25' or 70 trees/ac
Upland Wildlife Habitat Management- Practice Code 645	Mast/Apple Tree Release	Reduce competition around apple trees, or wildlife food trees that produce nuts, berries, fruit in large enough numbers to provide a reliable annual food source	Must be identified as a concern in the Forest Management Plan, completed a wildlife habitat evaluation procedure, practice is considered completed by the number of specified trees (no minimum acreage amount) needed to meet the wildlife objective

This is by no means an end all to the alternative practices available to woodlot owners through NRCS. A great source of information is the Electronic Field Office Technical Guide (eFOTG) section 4: https://efotg.sc.egov.usda.gov/

Please contact your local USDA-NRCS office with any questions or concerns, each woodlot's resource concerns and landowner's objectives are unique, your local NRCS staff is here to help.

Mini-Split Heat Pumps – Update

Article by John Simon, associate supervisor

Hi Everyone, I thought that an update of my experience on my third anniversary of owning and running my heat pump for heating and cooling would be of interest to some of you. On Jan 13, 2014 the unit was installed and started up and has been going since.

Because the M-S unit is on the second floor of a raised ranch it has little heating effect on the first floor. The house has three zones on the baseboard hot water oil system. Two upstairs (bedroom zone set at 64 and the lv. room, din., room, and kitchen zone set at 68), and the downstairs zone set at 71 degrees. The upstairs heat pump is set at 70 degrees.

The unit very efficiently cools and dehumidifies the total 2,000 sf of living area for about 1 $/ day and will not be discussed. I have been keeping extensive records on a spreadsheet for the three years and have done numerous calculations trying to determine the economic benefit of running the upstairs unit.

Several months ago I came up with the scheme (which I should have tried much earlier) of shutting the heat pump off for several weeks and comparing the difference in oil heat required with days with the exact Heating degree day (HDD) values.

In summary: Between the values of 40 and 60 HDD { 25 and 5 deg ave daily temperature } the heat pump show a savings which maximizes at about 50 HDD. At about a 60 HDD value the savings drops below a breakeven value. A 60 HDD day with a ave temp of 5 degrees normally has an overnight low of about minus 5 degrees, and a high of about 15 degrees. Not many days that cold in the Bangor area.

What apparently happens is that at a 60 HDD level the upstairs areas lose heat at a level requiring both the upstairs zones to kick in when the heat pump can no longer keep the upstairs areas above the 64 and 68-degree level. The heat pump is rated at 12,000 BTU / hour max. The oil furnace is rated well above 100,000 BTU / hour. This situation is not a bad thing as the oil zones have remote piping and the use of oil during bitter cold nights is desirable to prevent freeze ups.

The bottom line seems to be that because there are so few days in the winter below the 60 HDD value, it is not practical to keep shutting the mini-split off and on. The M-S does work quite well at those low numbers but does pause every hour or so to "defrost" itself. The defrosting cycle happens more often during cold days when the relative humidity is high and more icing occurs.

If the cost of heating oil were to drop below around 1.00 $/gal or so, then little savings would be experienced. However, my last delivery went up to 2.279 $/gal from 2.079 $/ gal. Last fall it was at 1.679 $/gal. So the future use of the M-S looks promising.

Let me give you one example from my spreadsheet and discuss some issues it raises.

Continued on page 17

Mini-Split Heat Pumps Update - continued

The values shown below assume 0.17355 $/kWh for electricity and 2.079 $/Gal for oil.

	HDD	kWh for M-S	Oil heat used Gal.	inc oil used Gal	ave day temp	cost $ for kWh	cost $ for oil	savings $/day	
12/19/16 w/o M-S	51	na	4.525	2.055	14	na	4.27	2.38	sunny
2/6/16 with M-S	51	10.87	2.470	na	14	1.89	na	na	cloudy

For the value of HDD (51) the use of 10.87 kWh by the heat pump resulted in a savings of 2.055 gallons of heating oil.

Here are some values to make note of in analyzing the above for energy use:

The standard table values for 1.0 kWh of electricity is equivalent to 3,413 Btus of heat energy. The standard table values for 1.0 gallons of oil is equivalent to 138,800 Btus of heat energy.

However, note above that consuming 10.87 kWh of electricity (which equals 37,099 Btu, saved 2.055 gallons of oil equaling 285,234 Btus). Thus 1.0 Btu of electricity equivalent used saved 7.688 Btus of heating oil for this day with 51 heating degree days (HDD). This is not a typical value to be sure.

The literature on mini-split heat pumps rates them with a capacity ratio of from 3.5 to 4.0 Btus produced to each 1.0 Btus of energy consumed. Explaining the difference between an expected multiplier of say 3.5 with the actual multiplier of 7.688 may be because of the significant input of solar energy upstairs through 2 large windows, one facing east and the other south. Some days my wife does cooking so the stove is another item I do not journalize that may have an effect upstairs. Journalizing the average daily wind speed and relative humidity would help explain some of the variation that occurs for days with the exact values of heating degree days (HDD).

I have noticed that the upstairs area, during sunny days, will heat up about 3 degrees above the thermostats settings. This effectively shuts of the mini-split and/or upstairs oil for most of the daytime. This may be most of the reason for the disparity. Lack of wind speed and outside relative humidity may also be a factor. This is not an easy situation to get a good handle on. If one was to have a one story house with a mini-split the analysis would be much easier. If anyone has a comment they want to share you may contact me at: BALNENGR@tds.net.

Some benefits of having a M-S include: 1 - a heat pump is a lot like a wood stove in that it constantly circulates the warmer air making it more comfortable in the rooms than the oil heat system. Oil heat thermostats which produce a range of several degrees in room temperature, 2 - The heat pump unit is very quiet in its operation (both the inside unit and outside unit), 3 - The maintenance is minimal for the average person.

The one drawback to the units it that they will not function in the heating and cooling mode throughout the house if the room doors are kept shut, so not everyone will appreciate that requirement.

Enjoy your unit!

Penobscot County Soil & Water Conservation District

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