

Special Analysis Units

Introduction

The term “Special Analysis Unit” spawned from a need to describe geographic areas that needed specific analysis performed because the area already had a management plan or guidance document but does not align with the Management Areas. These geographic areas all have a specific set of goals and objectives related to wildlife habitat or desired future forest conditions and were relevant to capture in the SFMP model. By specifically incorporating these areas into the model as attributes of stands, outputs can be generated for them, and in turn be used in model constraints and specific transition proportions can be applied to help guide management activities toward achieving those goals and objectives.

It is quite common that a certain management plan written for a particular species, like Kirtland’s warbler (KW), has specific goals for covertypes like planted and natural jack pine, but other covertypes, like aspen, that fall within those focused areas can be managed according to the broader management area that they are part of. This level of specificity allows for complementary management of both Management Area level cover type and habitat goals as well as the more focused goals related to the Special Analysis Units.

There are 5 types of Special Analysis Units across all three eco-regions of the State Forest (Figure 1), all with a specific set of management goals outlined in their respective guidance document or management plans:

1. **SAU: Pigeon River Country Forest Management Unit**
 - a. Guiding document: A Concept of Management for the Pigeon River Country (2007)
 - b. Purpose: Protect area from overuse and overdevelopment and to later provide desired future conditions of the forest.
2. **SAU: Elk Management Area**
 - a. Guiding document: Michigan Elk Management Plan (2012)
 - b. Purpose: Provides strategic guidance for the management of elk in Michigan.
3. **SAU: Grouse Enhanced Management System**
 - a. Guiding document: Grouse Enhanced Management Plans (2014-2016)
 - b. Purpose:
 - i. Provide unique hunting opportunities
 - ii. Promote hunter recruitment and retention
 - iii. Expand local economies
 - iv. Provide a destination point for the traveling wing-shooter
 - v. Accelerate timber harvest opportunities (shorter rotation length on aspen)
4. **SAU: Kirtland’s Warbler Habitat Management**
 - a. Guiding documents:
 - i. Kirtland’s Warbler Operational Plan (2022)
 - ii. Kirtland’s Warbler Breeding Range Conservation Plan (2015)
 - b. Purpose: Provides information and operational guidance to DNR staff, our conservation partners, and the public on how the DNR will manage state-administered lands for KW.

5. SAU: Deer Wintering Complexes

- a. Guiding documents: Deer Wintering Complex Plans (2016)
- b. Purpose: Provide information and strategies for managing lands to benefit deer wintering within the deer wintering complexes.

The specific goals or management strategies in each individual plan that were dependent on habitat management via commercial timber harvesting were selected and an effort was made to incorporate those goals into the modeling effort of this State Forest Management Plan. The incorporation of these SAU goals started by establishing relevant special analysis units and spatially joining those with overlapping stands. One of the 18 themes used in creating the area section of the model used that data which allowed for unique objective functions, outputs, constraints, goals, actions, and transitions to be specified in the model. These unique modeling elements impact the overall harvest schedule of the preferred solution and helped nest the SAU goals into the Management Area harvest targets, implemented each year through the compartment review process. The following sections will discuss the unique elements incorporated into the SFMP model for each Special Analysis Unit.

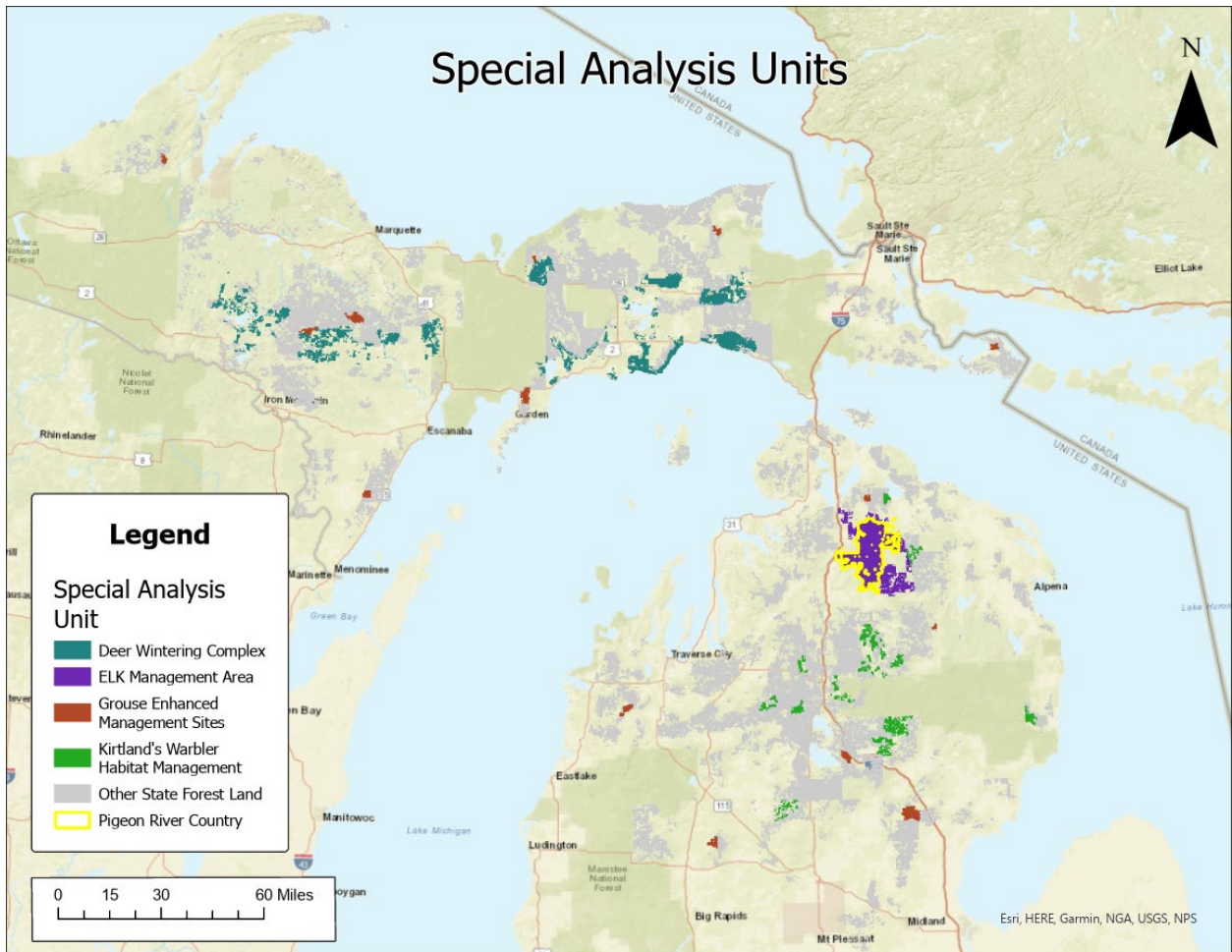
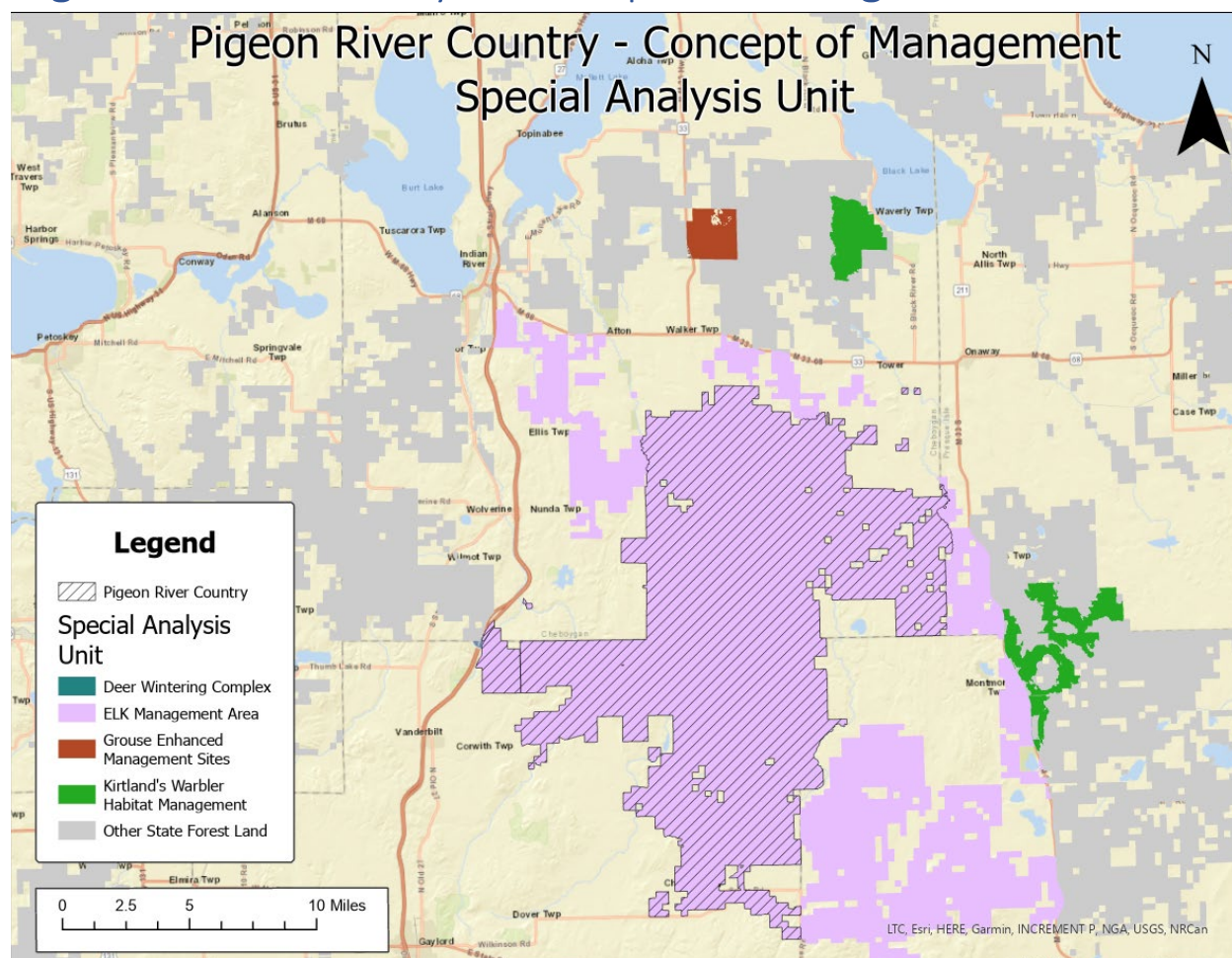


Figure 1. Map showing the 5 types of Special Analysis Units across the State Forest.

Pigeon River Country - Concept of Management



Description

The Pigeon River Country special analysis unit is synonymous with the Forest Management Unit and is located in Cheboygan, Montmorency, and Otsego counties in the northern lower peninsula. This forest management unit has been recognized as a special part of the State Forest since its beginning and has several unique features that make it special. The following is an expert from the Concept of Management regarding its uniqueness:

The Pigeon River Country (PRC) is indeed a special place held in trust for the people of Michigan. There are many fascinating sides to the story of this beautiful piece of our state – its rather unusual history, the way the elk herd began, the struggle for and against oil drilling, what's happened over the past quarter-century as a result, and what we might expect to happen in years to come. It's a rich story that has developed over more than a century of land use and abuse, a story that exposes human folly which appeared at the time to be wisdom, and human wisdom most thought folly at the time. When the Concept of Management for the Pigeon River Country (Concept) was first adopted by the Michigan Department of Natural Resources (DNR) in December 1973, it represented the collective wisdom of many individuals, representing many organizations

and interest groups, who all shared a common purpose – to protect the Lower Peninsula’s last “Big Wild” from overuse and overdevelopment. 19th and early 20th century attitudes about treating natural resources as commodities, to exploit without restraint, had changed with the hard-won recognition that resources must be managed wisely if they are to be there for future generations.

One purpose of this updated Concept of Management is to make sure that overuse doesn’t happen. P.S. Lovejoy, a conservation leader of national stature in the first half of the 20th century, had seen firsthand too much of what had taken place here. A once pristine forest that had become a landscape denuded of trees; its rivers choked with sand and silt, a place bereft of wildlife. “It was Lovejoy who first recognized the Pigeon River Country as special. He called it ‘the Big Wild’.... He led the charge to increase state holdings around the Pigeon River State Forest that started with 6,468 tax-reverted acres in 1919 and had expanded to over 19,200 by mid-1928, thanks to hunting license revenues.” (Pfeifer 1974) “He viewed ‘parked-up campsites’, widening of county roads and other development as a ‘poison’ to the Pigeon River. He wanted a wild area...” (Cutler 1976) To protect its wild character from overuse, development will be more limited and people’s activities will be more restricted than on most other state forest lands.

The Pigeon River Country Advisory Council (Council) is made up of eighteen citizen members, three ex-officio members from the Department of Natural Resources, and one ex-officio member from the Department of Environmental Quality who was added to the Council in 1997. Since 1973, the Council has worked tirelessly and with great resolve to keep the management of Pigeon River Country in line with the Concept, and responsive to the wishes of people who use it and who may be affected by its use and management. During the past three decades, forest, wildlife and fisheries management practices have evolved with advances in scientific knowledge. Several large private tracts have been acquired by the state and added to the Pigeon River Country. Some state lands that had been managed by other FOREST MANAGEMENT Units have been added to the PRC. The area around the PRC has experienced growth, and patterns of recreational use have changed bringing new pressures to bear on the effort to protect the “Big Wild.”

Special Analysis Unit Goals

The Concept of Management has 8 broad goals and 3 of those have more specific objectives that could be incorporated into the model and are underlined below:

1. Manage the elk population and elk habitat so the Pigeon River Country State Forest remains the nucleus of Michigan’s elk herd.
2. Provide needed habitat and seclusion for diverse fish and wildlife species.
3. Provide recreational opportunities for people in keeping with the wild character of the area and to provide peace and quiet through control of disruptive activities.
4. Manage game species such as woodcock, grouse, deer and others for hunting and viewing opportunities.
5. Protect water quality, stream habitat and manage the streams for a naturalized trout fishery, and the lakes for trout and game fish.
6. Manage forest resources in a sustainable manner for desired future habitat conditions.

7. Manage mineral resources in a manner consistent with existing legal requirements and these objectives
8. Protect Pigeon River Country from overuse and overdevelopment which could destroy its wild character.

Current and Desired Future Conditions

The first goal regarding managing the elk habitat is further described in the “Forest Cover and Wildlife Habitat Management” section and states:

“Adequate distribution and abundance of young, regenerating forest stands is critical to sustaining habitat for elk and many other species of wildlife requiring open or early successional habitats. Young forests are defined as being 0-9 years in age. Clearcuts, and to a lesser extent seed tree and shelterwood cuts, are the three primary silvicultural methods used that result in even-age young forests. The cover types where even-age management will be applied are aspen, jack pine, low quality northern hardwoods, oak, red pine, lowland poplar, swamp conifers, paper birch, spruce-fir and white pine. Current forest analysis suggests that just over 50% of the forest is in those cover types that may be managed for early successional habitat. To maintain adequate elk habitat, managing the entire PRC for 7 to 8 percent in early successional age classes is the recommended objective.”

This objective was incorporated into the model by first creating an aggregate of the current equivalent cover types listed above. An inventory area output was then created that used the aggregate covertype and the Pigeon River Country Forest Management Unit as mask values to that added up acres in the 0-9 age class. A separate set of theme based outputs summed acres across each Forest Management Unit and could also be used to represent this objective for the PRC specifically. Two goal statements were then created that stated that the area in the 0-9 age class of the specified covertypes should be greater than or equal to 7% and less than or equal to 8% of the total area of the Pigeon River forest management unit.

The current condition of the Aspen 0-9 age class is slightly above the target at 8.2 % of the Pigeon River Country. This is due to the management strategies used during the last planning period (compensatory approach) that resulted in an elevated amount of regeneration and a reduction in what was the 40-49 age class. The SFMP model, also incentivized by the age class goals of each covertype in each MA, maintains the minimum requirement of 7-8% with 7,730 acres in the 0-9 age class in each period moving forward as shown in table 1 and figure 2.

Table 1. Aspen 0-9 age class area and total aspen area across the Pigeon River Country special analysis unit.

Period	PRC Age 0-9 Acres	% in 0-9 age class	PRC Aspen Type Acres	PRC Aspen Type %	Total PRC Acres
Current	9,038	8.2%	25,149	23%	110,425
1	7,730	7.0%	26,031	24%	110,425
2	7,730	7.0%	26,162	24%	110,425
3	7,730	7.0%	26,169	24%	110,425
4	7,730	7.0%	26,197	24%	110,425
5	7,730	7.0%	26,204	24%	110,425
6	7,730	7.0%	26,283	24%	110,425
7	7,730	7.0%	26,338	24%	110,425
8	7,730	7.0%	26,123	24%	110,425
9	7,730	7.0%	25,803	23%	110,425
10	7,730	7.0%	25,581	23%	110,425

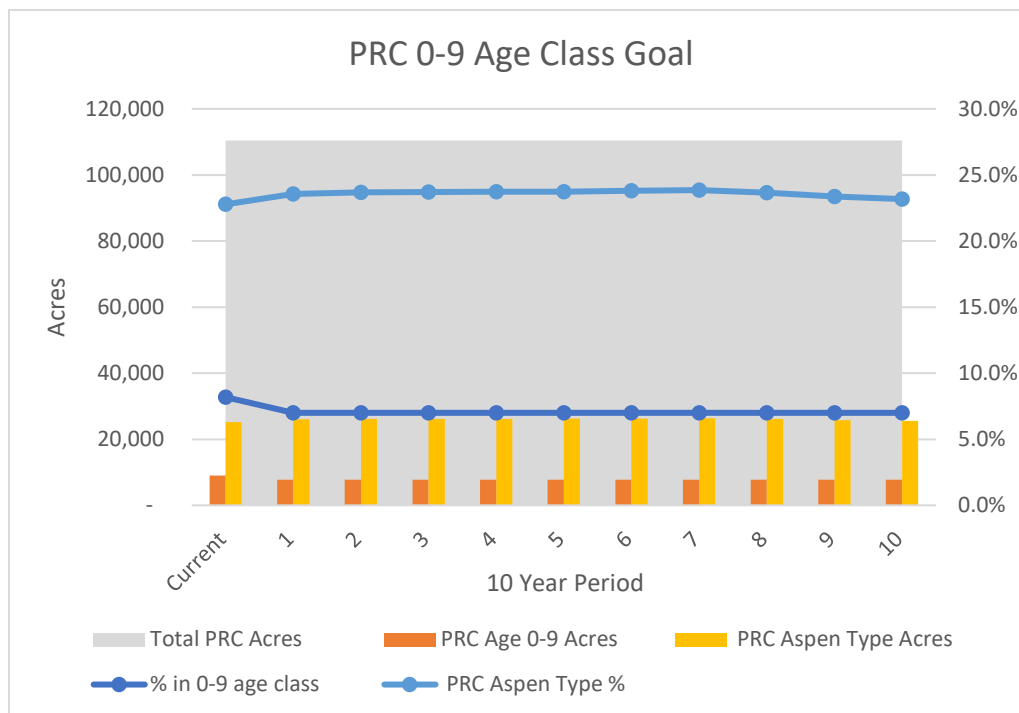


Figure 2. Graph showing the 0-9 age class in the Pigeon River Country special analysis unit.

The concept of management also states in this section that “The objective will be to maintain at least 27% of the PRC as aspen” as it is related to early successional stages of forest development and the benefits that has for many game species as stated in goal 4 above. This was incorporated into the model by generating another inventory area that adds up acres of aspen within the PRC FMU and then

referencing that output in a similar goal statement that states that the area of aspen in the PRC should be greater than or equal to 27% of the total area of the PRC in each period.

The goal of 27% aspen was created when the older "Operations Inventory" forest inventory system was in place which used a different classification system for determining covertypes of stands. As stated in the Concept of Management "Forest stands, where aspen is the principal component, are considered an aspen type." This system allowed stand examiners to assign a covertype to stands based on management intent rather than actual species occupancy and often resulted in more acres of the aspen covertype than what was actually on the landscape when based on canopy species proportions. The current inventory system calculates the covertypes and the general rule is that stands must have $\geq 40\%$ of the canopy occupied by aspen species to be an Aspen covertype (which is the lowest threshold for all species / covertypes). One other consideration is that there were no upland mixed covertypes in the OI system of inventory, so many stands with small components of aspen tree species were captured in the aspen covertype, while currently they are captured as mixed upland deciduous or upland mixed forest if there is also a conifer component present. These factors have contributed to a current condition that falls below the stated goal of 27% with a current value of 23%. The SFMP model is able to show conversion from other types to the aspen covertype which results in an increase to 24%, but is unable to achieve a higher proportion.

The concept also includes objectives regarding the amount of upland open land there is in the PRC and that should be between 6% and 7% of the entire PRC. There were no conversions from forested types to non-forested types projected in the model as a result of management discussions, so there is no movement projected related to this objective. The capability does exist and an output was generated to track the amount of upland open lands, but the focus right now is to maintain existing open lands and prevent encroachment of tree species from converting them to a forested condition.

Increasing or maintaining mast production is also an objective listed in the Concept of Management, but it was determined that because mast can come from a variety of species and covertypes that it would be difficult to create a meaningful set of goals to inform the modeling effort. Instead, efforts to maintain or increase mast producing components of stands will be handled through implementation as specific prescriptions are made through the compartment review process. Conversion away from oak covertypes is discouraged but has also proven to be rather difficult on dry-mesic sites with shorter lived oak species when they are managed. Maintenance of oak components at the highest level possible will continue to be the object of such treatments.

Northern Hardwood management is also discussed and many of the objectives are better suited to achieve while writing individual prescriptions at the stand level. One objective of northern hardwood included managing a small proportion of the northern hardwood covertype with an even-aged stem, rather than the typical uneven-aged approach. This goal coincides with the overall Management Area goals of the Wolverine Moraines and the Presque Isle Lake and Till Plains and applies to the portions of those management areas that fall within the Pigeon River Country special analysis unit.

The 6th goal listed above is more broadly concerned with sustainable forest management for desired future habitat conditions. This was accomplished by adding specific PRC age class goals to each covertype managed with an even-aged system. This helps to regulate harvests and create a desirable age class distribution across the landscape ensuring an even flow of both timber harvest and diverse habitat conditions. This is accomplished through the creation of specific age class outputs for each

covertime then using those outputs in an expression that specifies a proportion to achieve relative to outputs representing all available acres across the PRC in that same covertype. These goal statements incentivize the model to achieve the desired age class distribution in each covertype as soon as possible and then maintain that distribution through strategic harvesting levels.

The age class goals for aspen in the PRC use a base rotation age of 50 years old (once balanced, most stands will be prescribed once they reach 50 years old as seen in figure 3) by intending to carry about 14% of the available aspen acres in 6 age classes from 0-9 through 50-59. There is also an age class tail that will hold an additional 14% of the population across three older age classes in the 60-69 (8%), 70-79 (4%), and 80-89 (2%). Stands to be held in these additional age classes should be chosen carefully ensuring that holding these stands a little longer will not result in loss of the covertype due to diminished tree vigor and coppice regeneration capabilities. Stands located on productive sites with a high proportion of bigtooth aspen are good candidates for these age class tails.

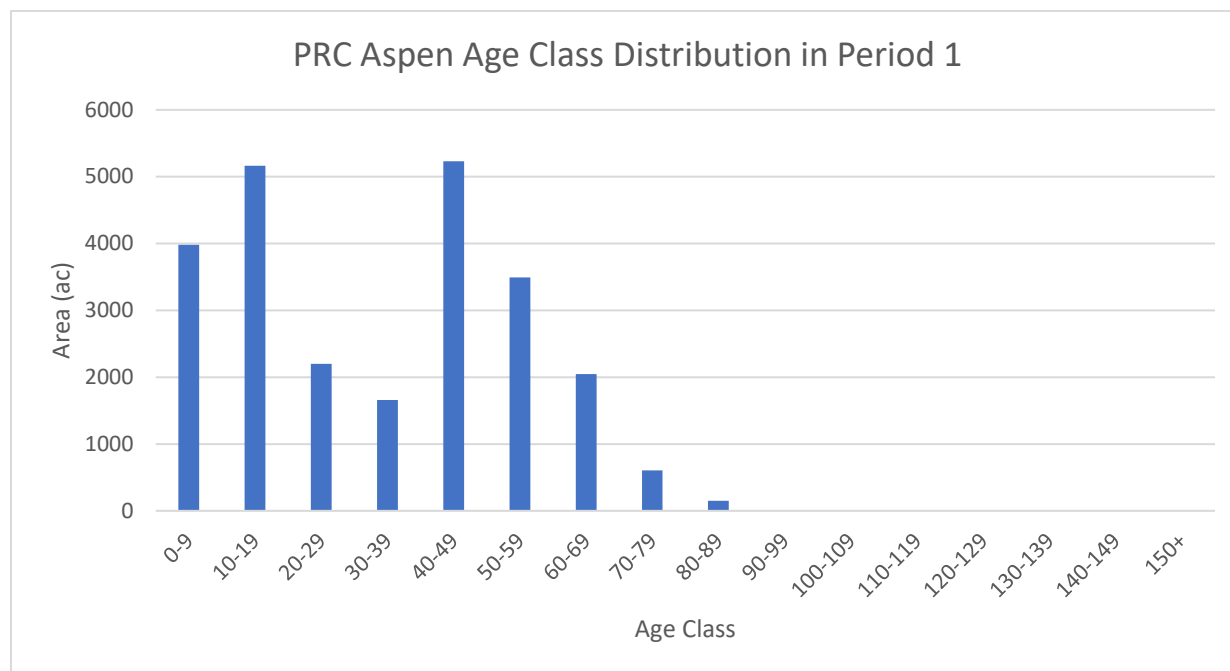


Figure 3. Aspen age class distribution after the planning period in the Pigeon River Country special analysis unit.

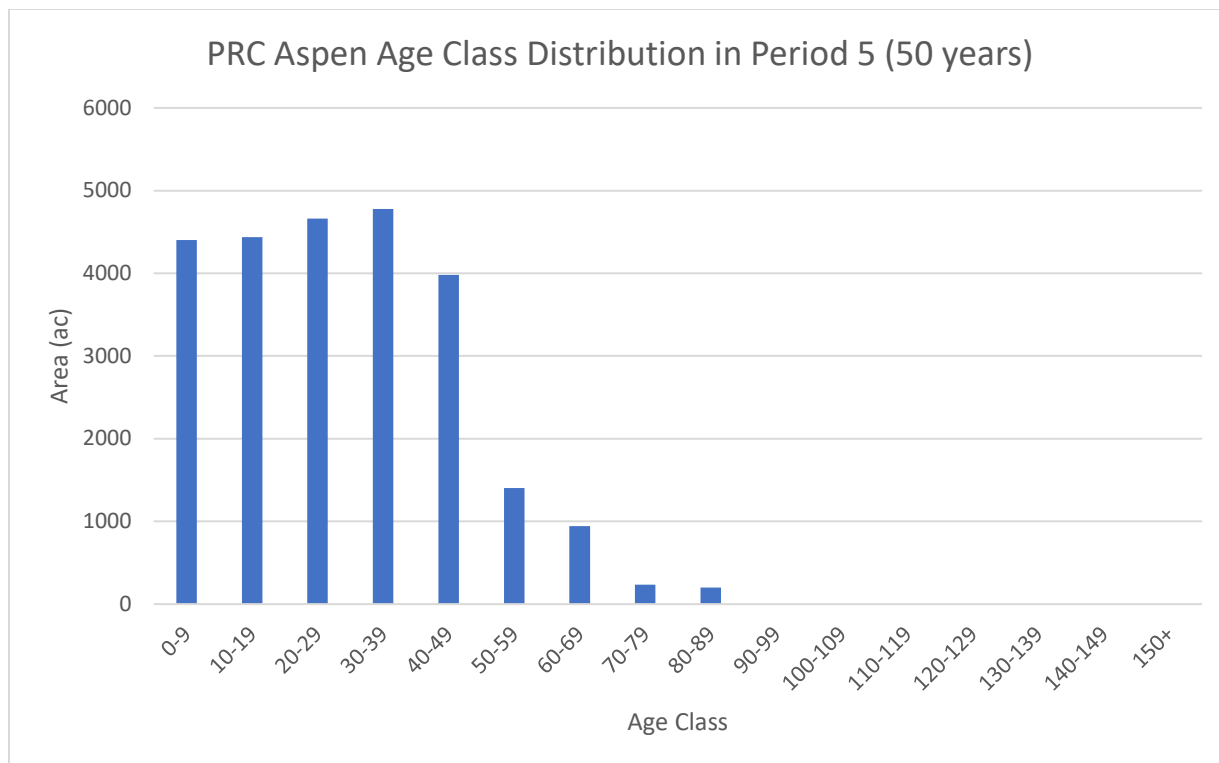


Figure 4. Aspen age class distribution in period 5 showing balanced condition.

Age class tails help provide both realistic harvesting options and beneficial habitat elements across numerous even aged covertypes. Planning for a small amount of additional area to be held beyond a single rotation age provides managers with opportunities to distribute treatments, both spatially and temporally, in landscapes that may not currently be in a desirable condition (i.e. large blocks of same age class). This practice has been in place for decades, but the planning has not accounted resulting in falling short of stated harvest objectives. The habitat related objective of age class tails is to encourage more mature forest habitat elements to develop at the stand level and be present across the landscape to include lands both available and unavailable for commercial timber harvest. Mature forest habitat elements often include, but are not limited to, a higher component of living trees with cavities for small mammal and avian nesting opportunities, standing dead snags, dead and downed material for coarse woody debris, diverse vertical and horizontal structure, more developed shrub species component, and large crowned canopy trees with raptor nesting opportunities.

Pine management in the concept of management encourages transitions away from plantation style management and more natural regeneration of more diverse deciduous, coniferous, and mixed stands. This was represented in the SFMP model through transitions when regeneration harvest actions occur on planted red pine the majority of those stands are projected to convert to mixed cover types and natural pine

Management Actions

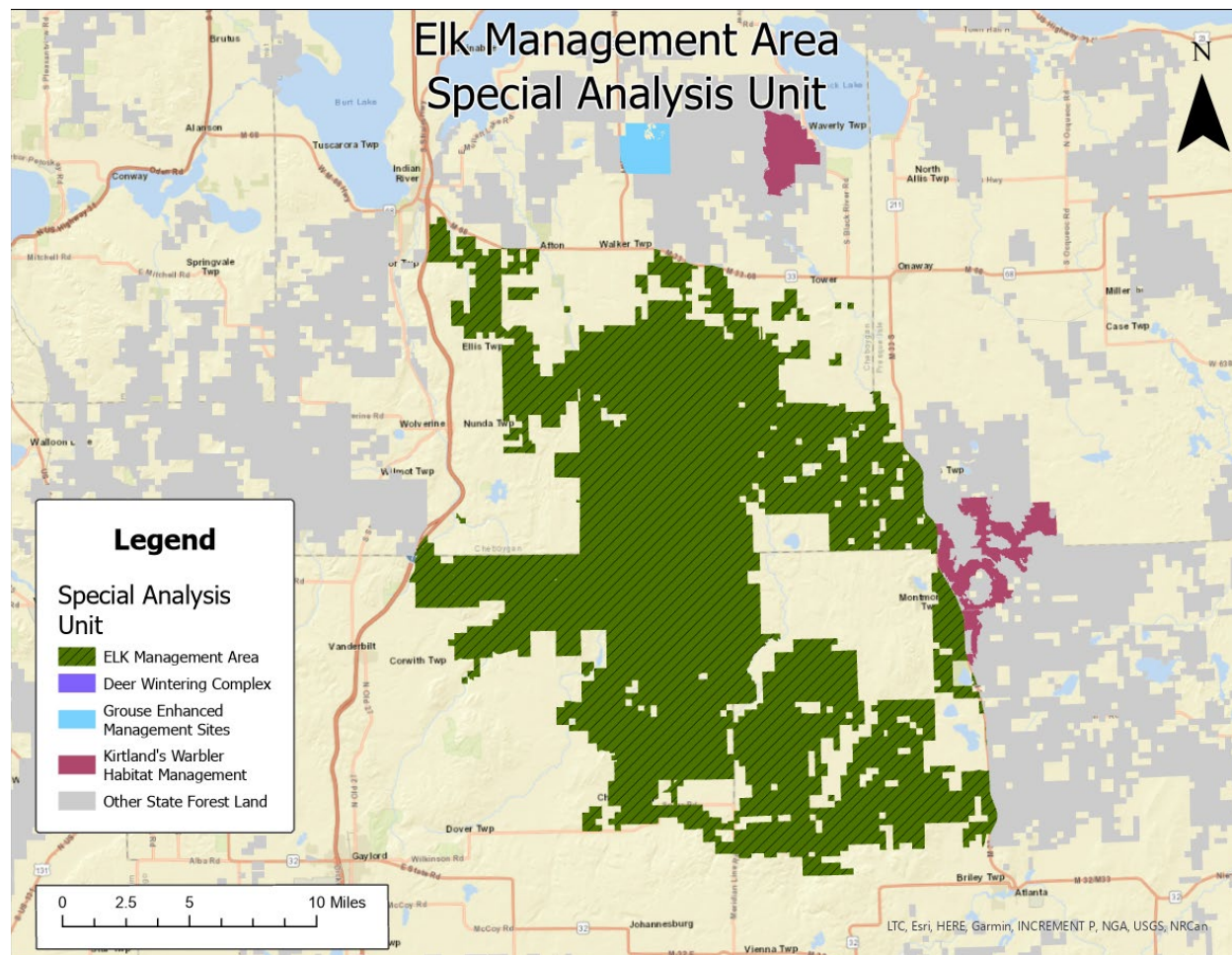
The period 1 projected harvest levels by silvicultural method provided in table 2 will help ensure the management in the Pigeon River Country aligns with the goals in the Concept of Management. Stand

selection will be up to the local land management and biologists but the overall harvest levels will help ensure a balance of long term sustainability and habitat creation is achieved.

Table 2. Projected period 1 harvests by silvicultural method for the Pigeon River Country SAU.

Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	413	5,792	-	-	25	6,230
Aspen	3,092	-	-	-	-	3,092
Planted Red Pine	1,599	-	1,339	-	-	2,938
Mixed Upland Deciduous	1,794	-	-	-	-	1,794
Natural Mixed Pines	-	-	283	-	224	506
Natural White Pine	-	-	176	-	151	327
Natural Red Pine	-	-	71	-	160	231
Natural Jack Pine	189	-	-	-	-	189
Upland Spruce/Fir	136	-	-	-	-	136
Lowland Aspen	125	-	-	-	-	125
Black/Red Hybrid Oak	119	-	-	-	-	119
Upland Mixed Forest	96	-	-	-	-	96
Planted Mixed Pine	-	-	88	-	-	88
Northern Red Oak	67	-	-	-	-	67
Planted Jack Pine	35	-	-	-	-	35
Planted White Pine	-	-	33	-	-	33
Totals	7,665	5,792	1,989	-	559	16,005

Elk Management Area



Description

The purpose of the Elk Management Area special analysis unit is to represent habitat goals derived from the Elk Management Plan through forest covertype management. The overall goals and objectives are similar to those in the concept of management but cover a slightly larger area extending North into the Gaylord Forest Management Unit and East into Atlanta Forest Management Units. The following is an excerpt from the Michigan Elk Management Plan:

"This plan provides strategic guidance for the management of elk in Michigan. This guidance will help: 1) manage for a sustainable elk population in balance with habitat; 2) use hunting as the primary method to control elk numbers, herd composition and distribution; 3) enhance public understanding of elk management in Michigan. This plan is appropriately aligned with the Wildlife Division strategic plan, "Guiding Principles and Strategies," or GPS."

Special Analysis Unit Goals

The following goals are represented in the Elk Management Plan:

1. Maintain 6-7% as grass and upland brush types
2. Manage the forest to maintain the proportion of aspen at the same level (no net loss of aspen)
3. Maintain mast production by red, white, northern pin oak and beech and increase production if silviculturally appropriate
4. Manage for mixed pine stands using natural regeneration that promotes both coniferous and deciduous species.
5. Managers must also be cognizant of the total amount of all early successional vegetation types and make efforts to provide a consistent amount of this feature over the decades.

These goals are very consistent with those of the PRC Concept of Management goals and are replicated throughout the model in the form of age class goals for each Management Area and the PRC, specific ELK SAU transitions, and a specific aspen covertype constraint providing for not net loss over time.

Current and Desired Future Conditions

The grass and upland brush types are not impacted by the SFMP model as there are no transitions to non-forested covertypes, resulting in no change over time. Small amounts of conversions are likely to occur and will be discussed locally through the compartment review process. Maintaining the current proportion of the aspen covertype was incorporated into the model by creating a specific output that sums the acreage of aspen with the Elk SAU, then referencing that output in a goal statement relative to the entire area covered by the Elk Management Plan. The goal statement incentivizes the SFMP model to maintain the same or greater amount of aspen in future periods throughout the 15-period planning horizon as compared to the current amount of aspen. This resulted in the following aspen abundance in each 10-year period for the next 150 years:

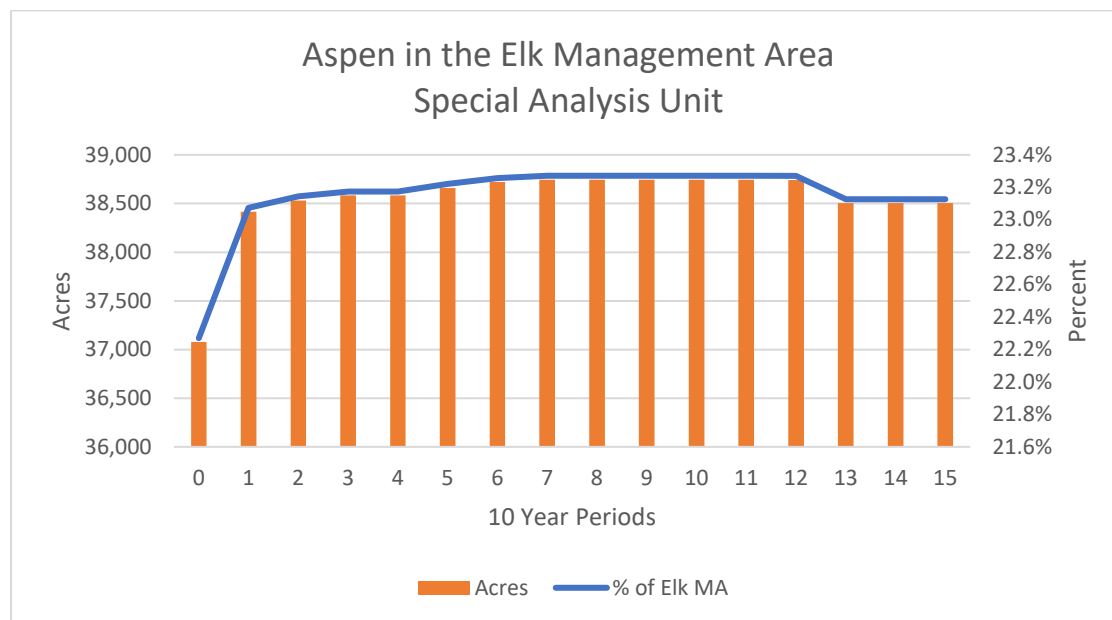


Figure 5. Aspen covertype acres in the Elk Management Area SAU.

The slight decrease from period 12 to period 13 is likely a result of aspen located on lands unavailable for commercial timber management senescing to more mid or late successional cover types.

The mast production goals in the Elk Management plan will be challenging to achieve because of a couple of factors:

1. The loss of American beech trees, due to beech bark disease, as a component of the northern hardwoods coverteype will result in a significant reduction in hard mast across the landscape.
2. Regeneration and recruitment of oak species at densities prior to harvest has proven to be difficult to achieve. This is likely due to a couple of key factors including:
 - a. Our resistance to replicate the rather harsh disturbance of the “logging era” (large scale repeated harvests, first pine- then hardwood, and subsequent wildfires of logging slash) that occurred around 1890 to 1930 resulting in the significant oak component we see today in mature stands on dry mesic and xeric sites.
 - b. Significantly more herbivory occurring on regenerating stands when compared to the time period when these stands got established.

The SFMP model indicates a decline in oak types because of these factors, while more acres of mixed upland deciduous can be expected, containing a substantial oak component. Efforts to both retain and regenerate oak will be specified in nearly all prescriptions on stands containing oak species (Figure 5).

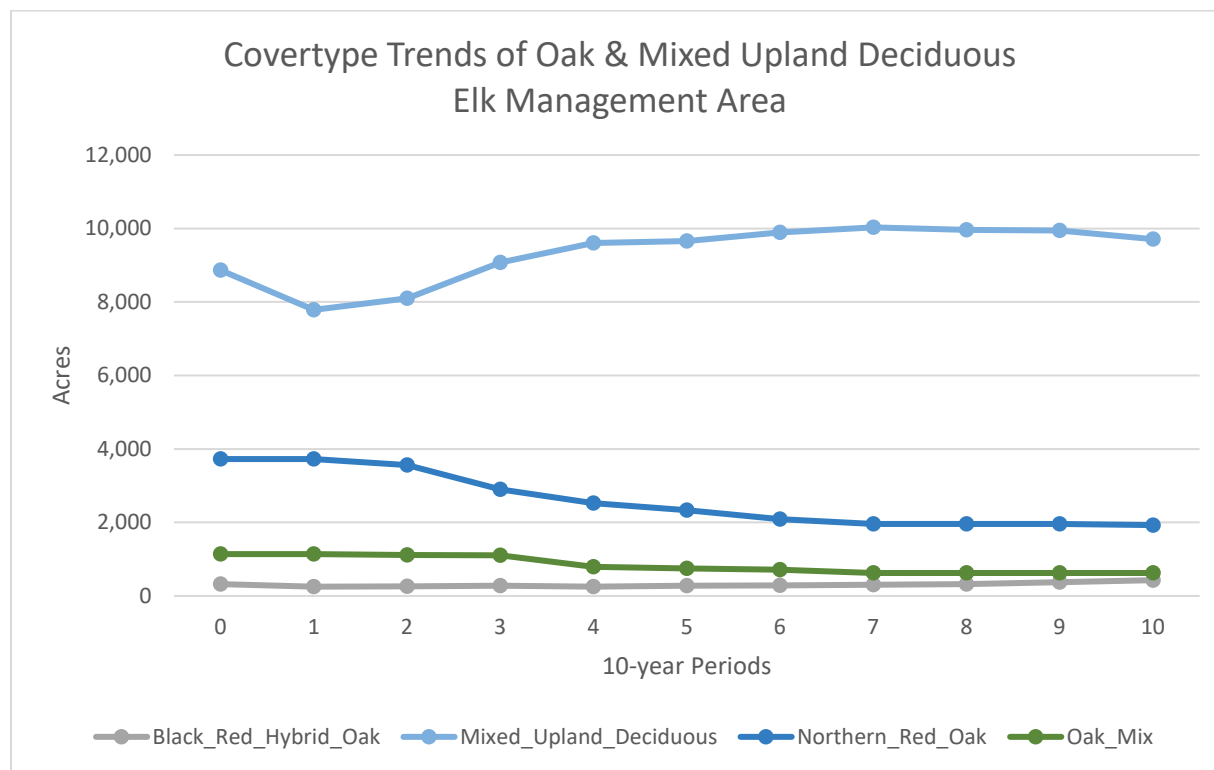


Figure 6. Covertypes trends for oak coverteypes in the Elk Management Area.

Pine management in the elk management area encourages transitions away from plantation style management and more natural regeneration of more diverse deciduous, coniferous, and mixed stands. This was represented in the SFMP model through transitions when regeneration harvest actions occur.

The code shows the source stands being diverted to other mixed and natural cover type targets after a regeneration harvest occurs. These transitions result in a projected decrease in the planted pine types and a subsequent increase in all 3 natural pine types as well as upland mixed forest, which contains a mix of both coniferous and deciduous tree species (Figure 6).

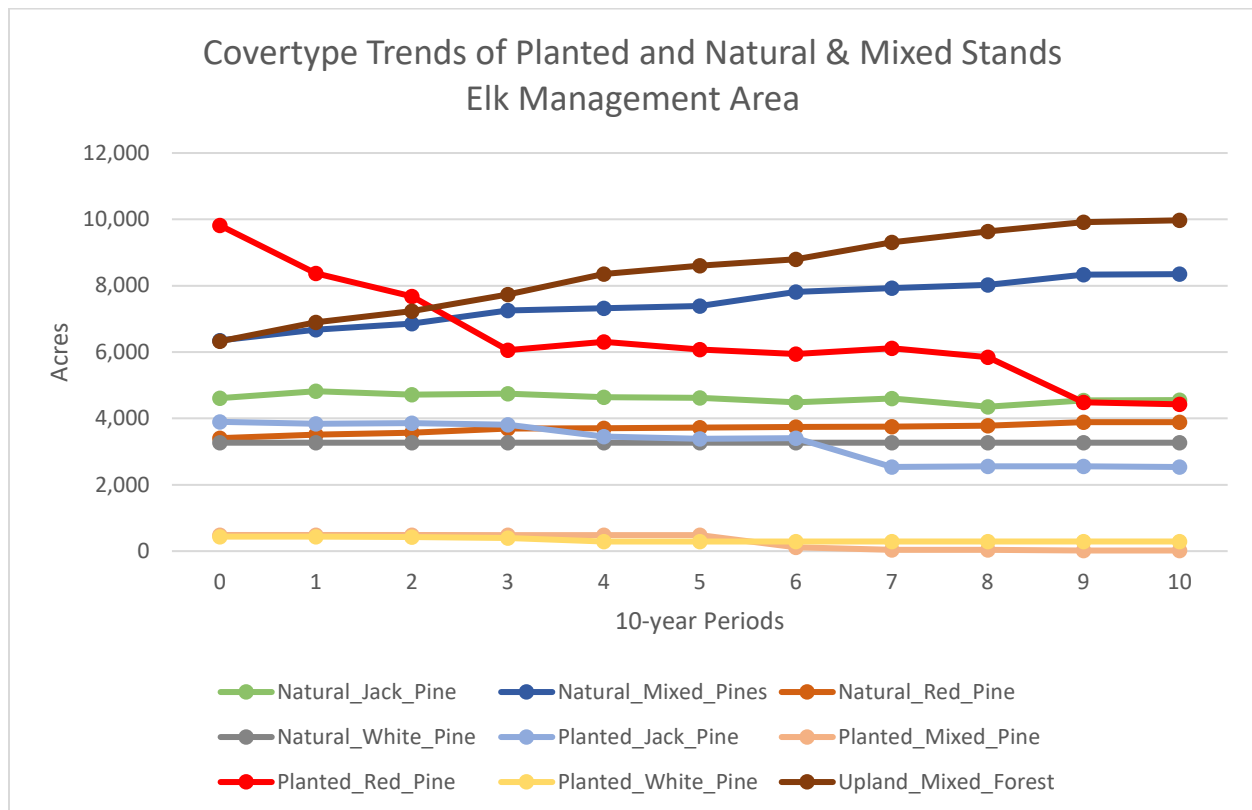


Figure 7. Covertypes trends of planted and natural pine types in the Elk Management Area.

Early successional covertypes will be maintained across the Elk Management Area through specific age class goals for the Pigeon River Country FMU, the wolverine moraines management area, and the Presque Isle lake and till plain. The resulting age class distribution of important even aged covertypes like aspen is projected to remain relatively well balanced for the Elk Management Area (Figure 7).

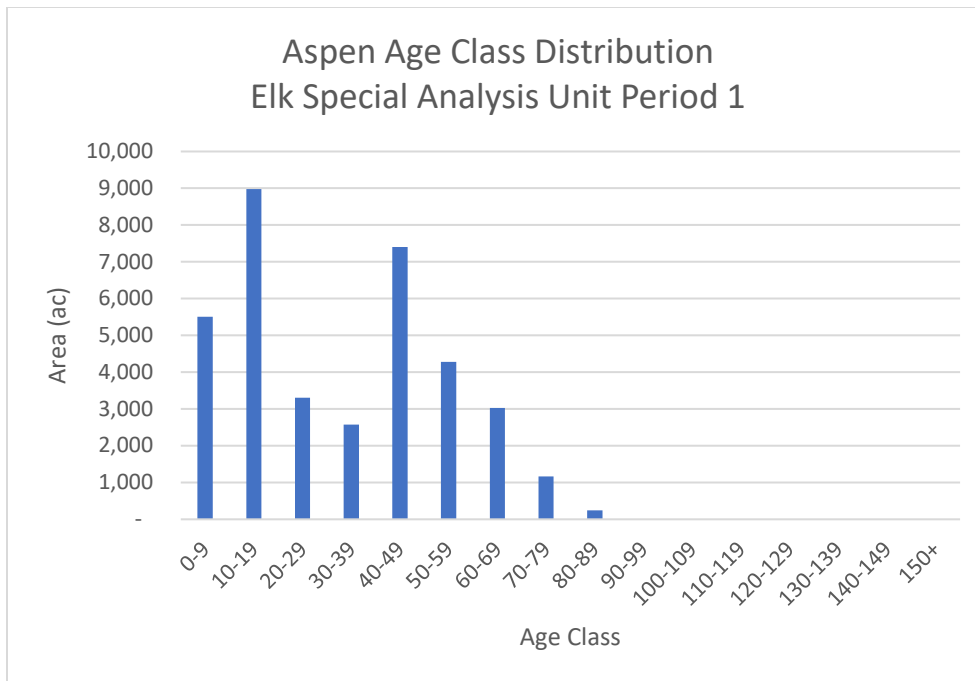


Figure 8. Aspen age class distribution in the Elk Management Area special analysis unit after this 10 year planning period.

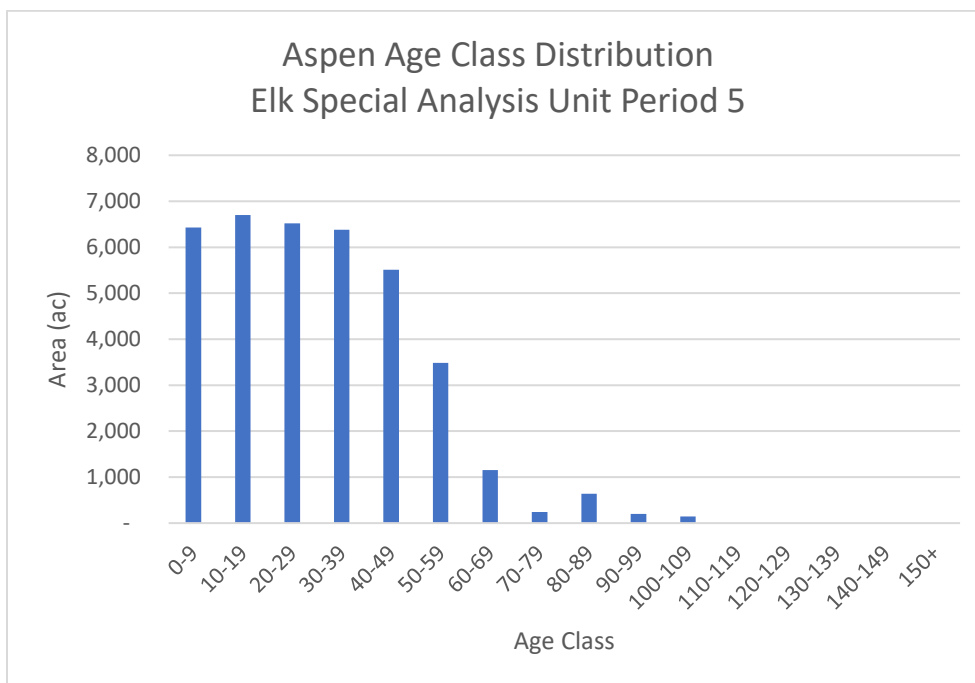


Figure 9. Aspen age class distribution in the Elk Management Area special analysis unit after 50 years of management.

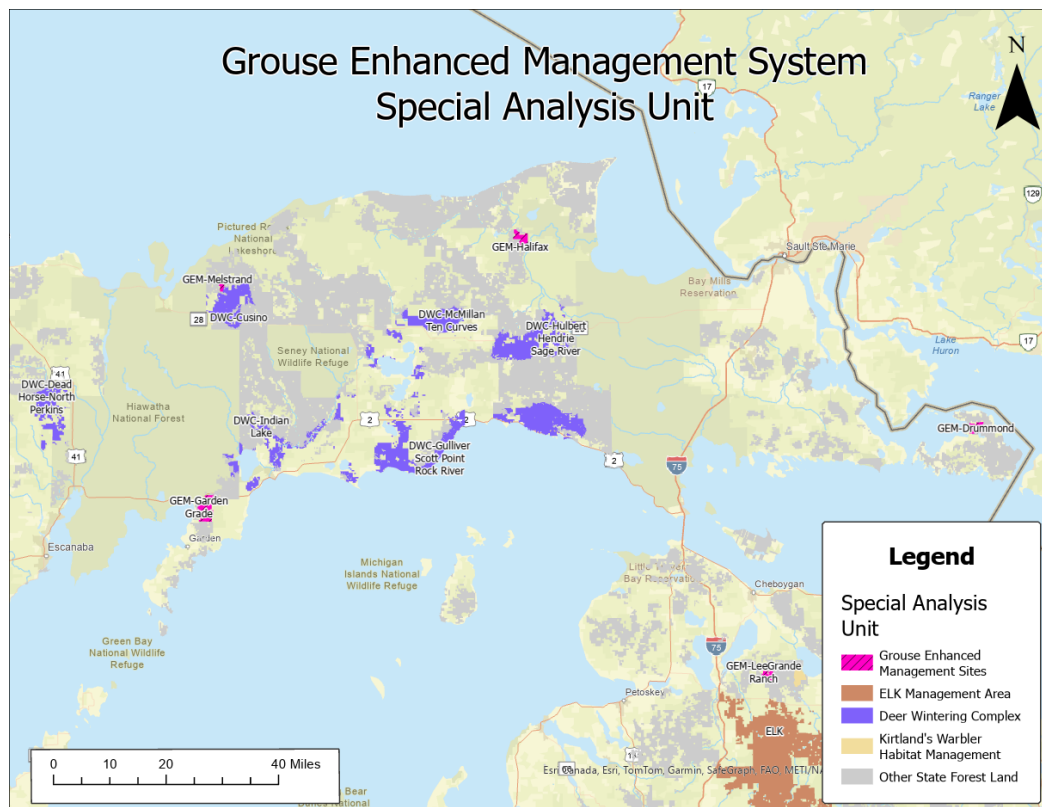
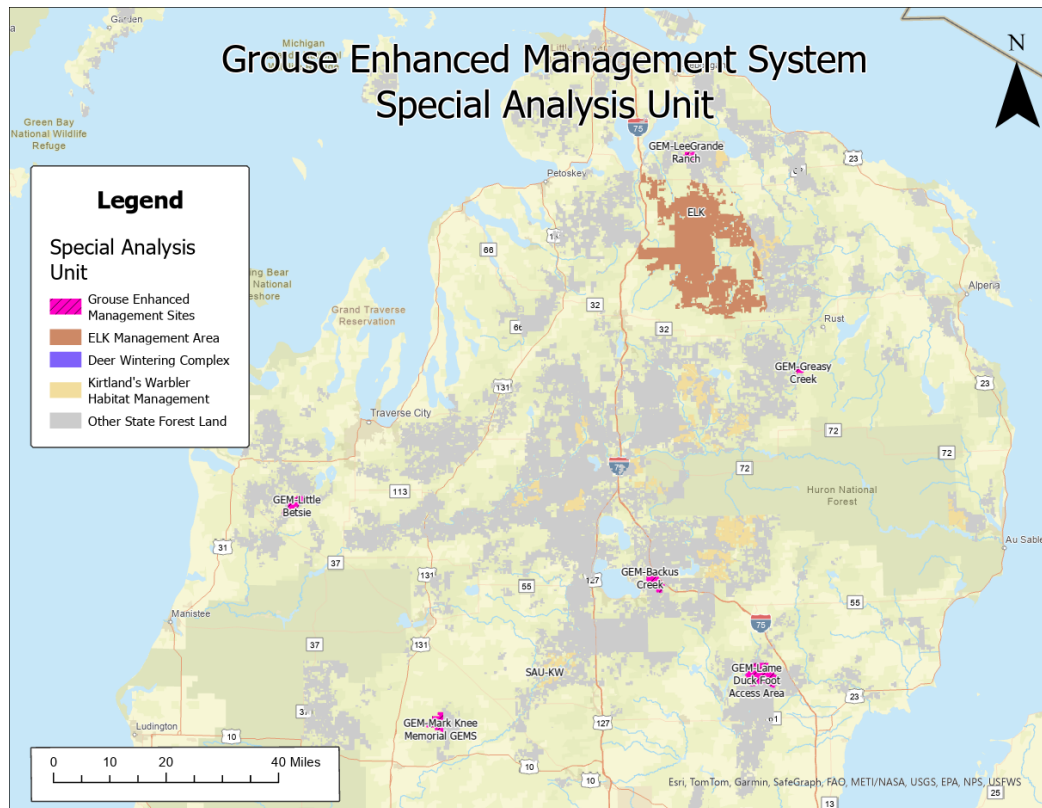
Management Actions

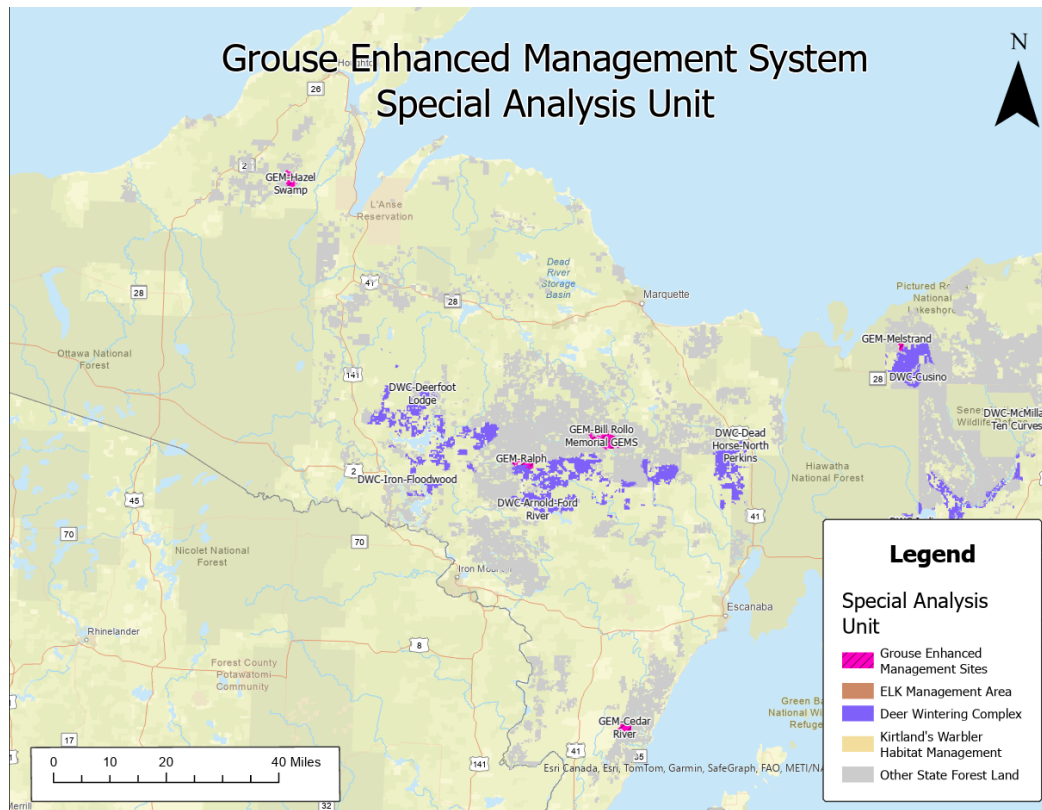
The period 1 projected harvest levels by silvicultural method provided in table 3 will help ensure the management in the Elk Management Area aligns with the goals in the Michigan Elk Management Plan. Stand selection will be up to the local land management and biologists but the overall harvest levels will help ensure a balance of long-term sustainability and habitat creation is achieved.

Table 3. Harvest projections for the Elk Management Area

Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	413	8,287	-	357	25	9,081
Planted Red Pine	2,157	-	2,550	-	-	4,707
Aspen	4,159	-	-	-	-	4,159
Mixed Upland Deciduous	2,808	-	-	-	24	2,832
Natural Mixed Pines	-	-	292	-	281	573
Natural Jack Pine	551	-	-	-	-	551
Northern Red Oak	381	-	-	101	-	482
Natural White Pine	-	-	176	-	194	370
Natural Red Pine	-	-	82	-	160	242
Planted Jack Pine	168	-	-	-	-	168
Black/Red Hybrid Oak	144	-	-	-	20	164
Lowland Aspen	152	-	-	-	-	152
Upland Mixed Forest	139	-	-	-	-	139
Upland Spruce/Fir	136	-	-	-	-	136
Planted Mixed Pine	-	-	88	-	-	88
Planted White Pine	-	-	88	-	-	88
Lowland Conifers	43	-	-	-	-	43
Hemlock	-	35	-	-	-	35
Lowland Mixed Forest	34	-	-	-	-	34
Lowland Deciduous	22	-	-	-	-	22
Tamarack	20	-	-	-	-	20
Cedar	-	-	-	4	-	4
Lowland Spruce/Fir	1	-	-	-	-	1
Totals	11,329	8,321	3,275	462	703	24,089

Grouse Enhanced Management System





Description

As part of a statewide grouse hunting improvement initiative, the Michigan DNR is creating Grouse Enhanced Management System (GEMS) throughout the northern Lower Peninsula and the Upper Peninsula. These GEMS vary in size and configuration, but they all are intended to meet the following goals:

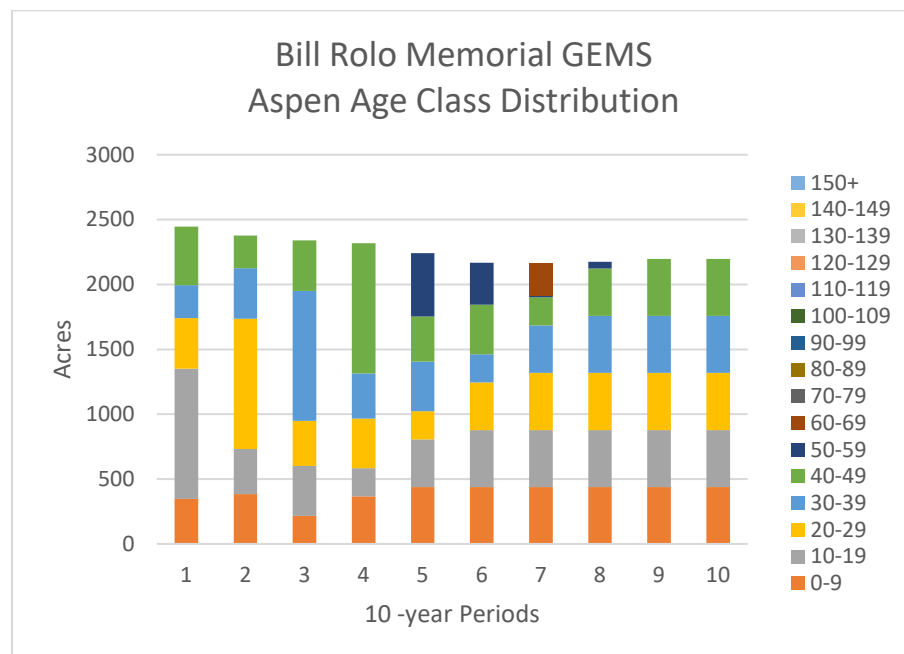
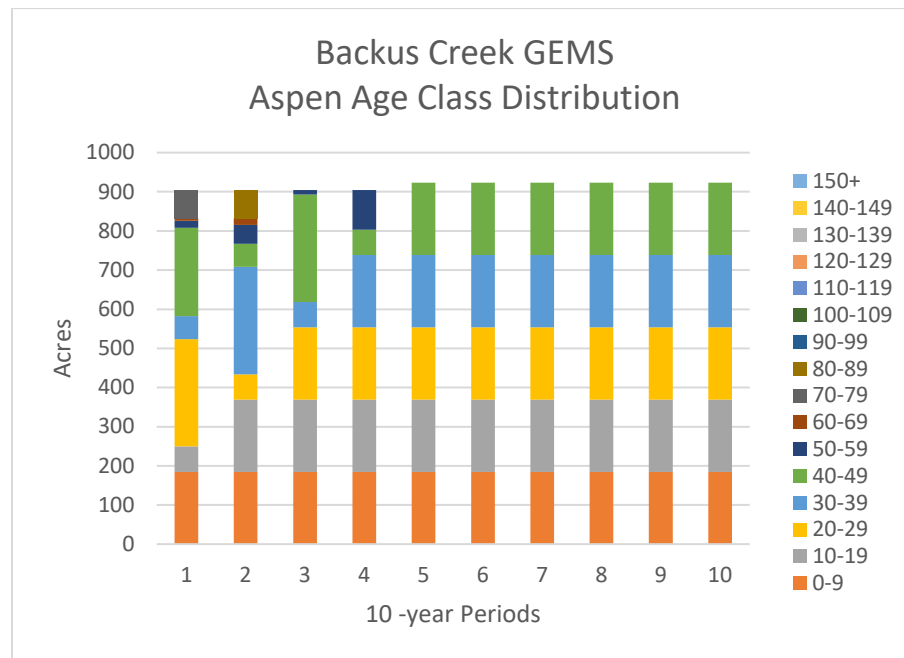
- Provide unique, walk-in hunting opportunities
- Promote hunter recruitment and retention
- Expand local economies
- Provide a destination point for the traveling wing-shooter
- Accelerate timber harvest opportunities

To date, there are 16 established GEMS utilizing intensive forest management to enhance grouse habitat and established trail systems for hunter walk-in access. These areas are destination sites for the novice or travelling wing-hunter, as well as wildlife viewers, and hiking enthusiasts. Though primarily a benefit to grouse, these intensively managed sites will benefit other species including woodcock, turkey, and white-tailed deer.

Special Analysis Unit Goals

The primary goal of maximizing early successional habitat through “accelerated timber harvests” is represented in the SFMP model through a series of age class goals that incentivize the model to create and maintain an age class distribution designed with a relatively strict 40 to 50-year-old rotation age.

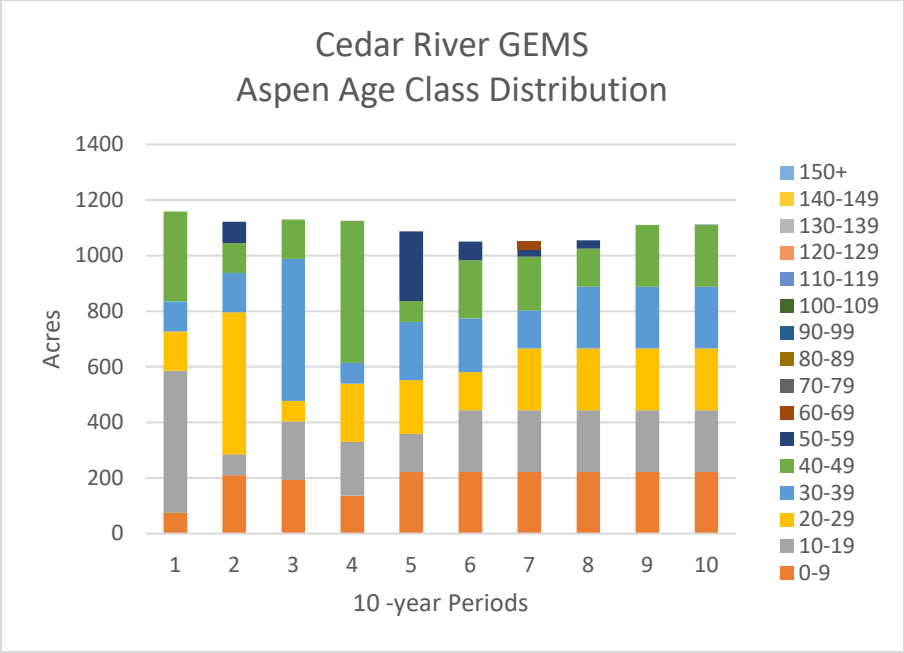
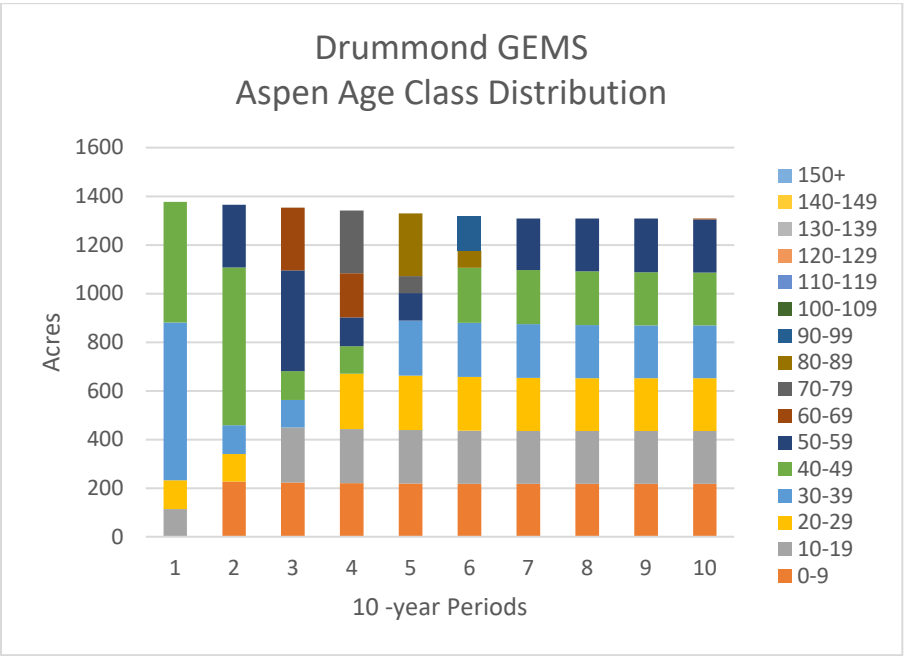
Aspen stands will be harvested and regenerated shortly after they become commercially viable at a level that creates a relatively balanced condition of the aspen covertime across each GEMS site and maximizes the number of acres 0-9 and 10-19 age classes that are ideal for both ruffed grouse and American woodcock. The following graphs represent projected future age classes and over all aspen abundance in each GEMS from the SFMP model:



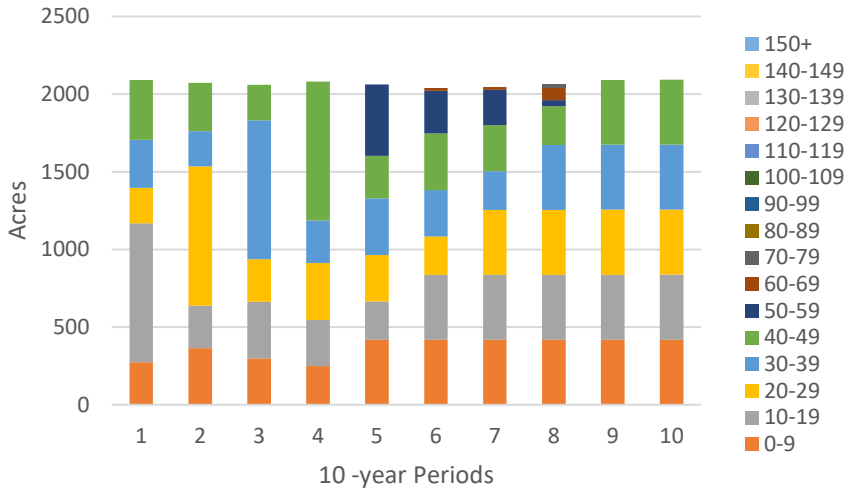
**Cedar River GEMS
Aspen Age Class Distribution**

The chart displays the distribution of aspen age classes across 10 10-year periods. The Y-axis represents Acres (0 to 1400). The X-axis represents 10-year Periods (1 to 10). The legend lists age classes from 0-9 to 150+.

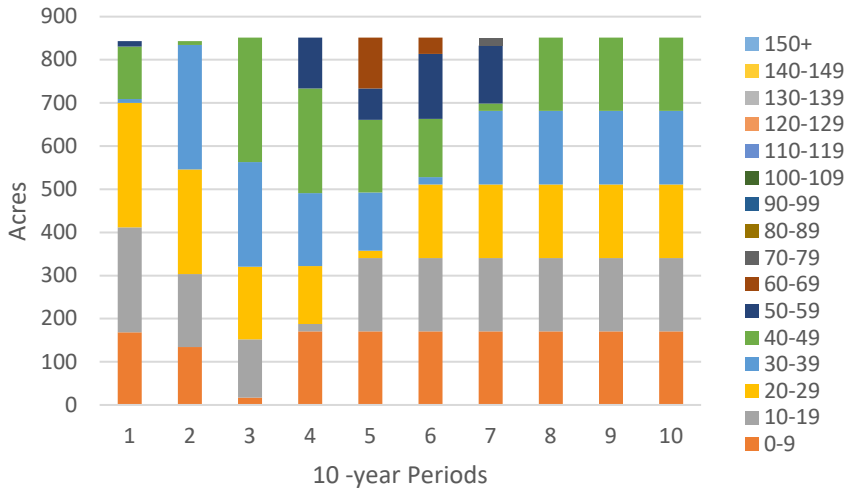
10-year Period	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150+
1	70	520	140	120	310	0	0	0	0	0	340	120	0	0	0	0
2	210	80	490	0	0	120	0	0	0	120	0	140	0	0	0	0
3	190	210	80	0	250	0	0	0	0	0	450	510	0	0	0	0
4	130	200	0	0	510	0	0	0	0	0	0	100	0	0	0	0
5	220	140	190	0	50	250	0	0	0	0	0	120	0	0	0	0
6	220	220	140	0	200	0	0	0	0	0	0	180	0	0	0	0
7	220	220	220	0	160	20	0	0	0	0	0	120	0	0	0	0
8	220	220	220	0	160	20	0	0	0	0	0	120	0	0	0	0
9	220	220	220	0	240	0	0	0	0	0	0	120	0	0	0	0
10	220	220	220	0	240	0	0	0	0	0	0	120	0	0	0	0

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Garden Grade GEMS Aspen Age Class Distribution



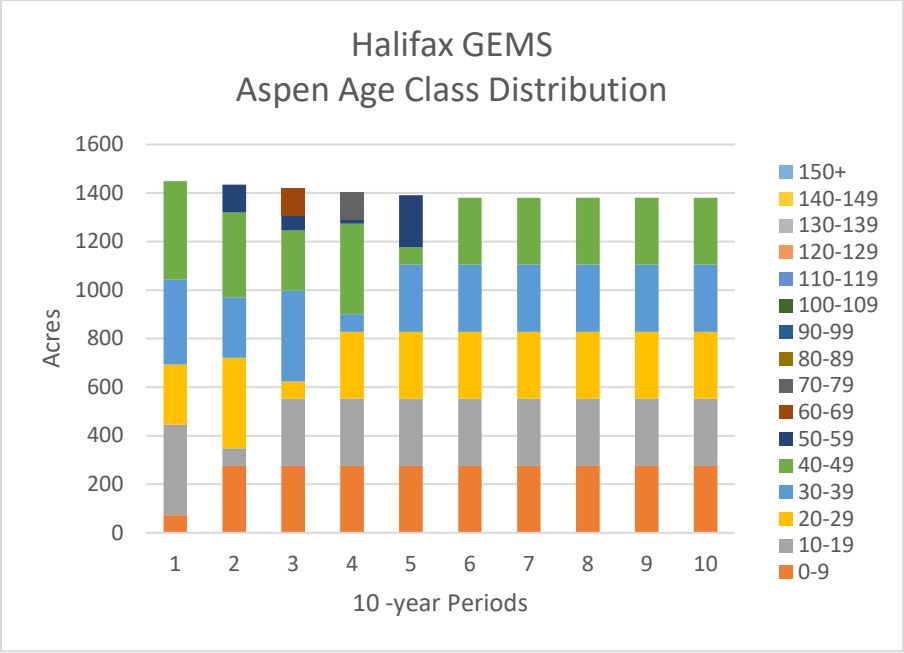
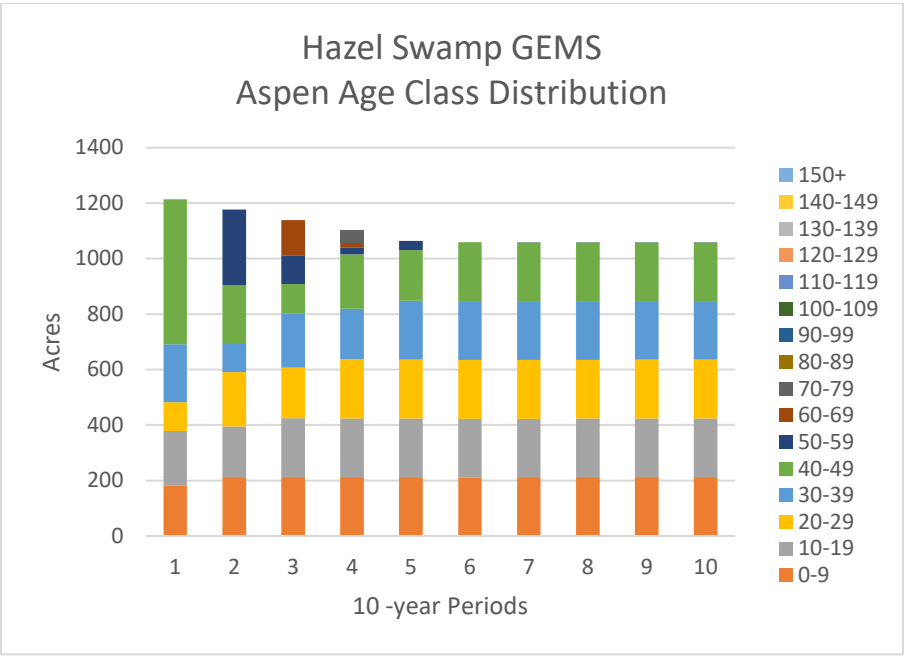
Greasy Creek GEMS Aspen Age Class Distribution

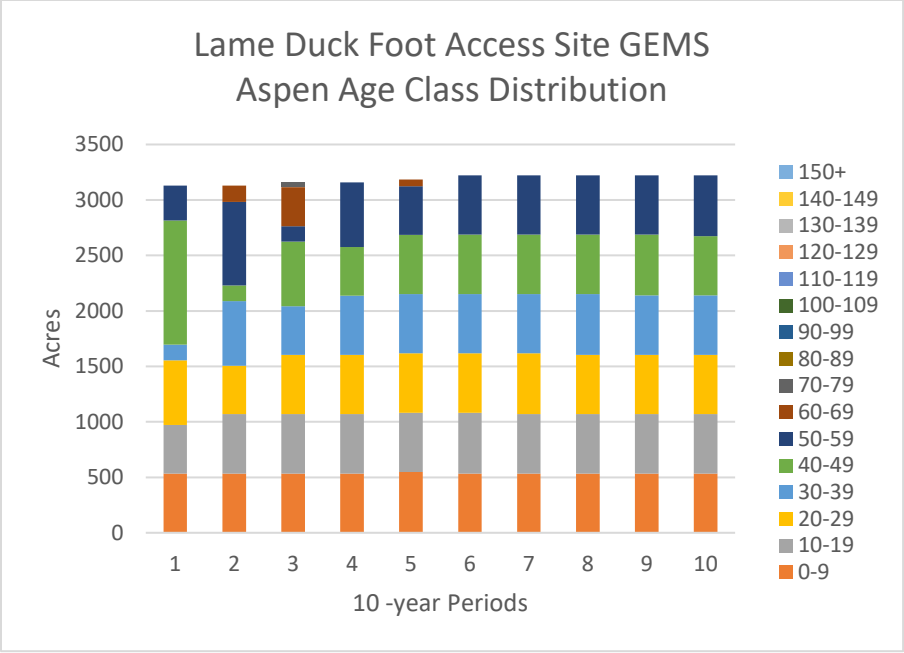


Halifax GEMS Aspen Age Class Distribution

The chart displays the distribution of aspen age classes in acres over ten 10-year periods. The total area under the bars is approximately 1400 acres. The distribution is dominated by the 0-9, 10-19, and 20-29 age classes, which together account for about 800-900 acres in each period. The 30-39 age class is also significant, contributing about 200-300 acres. The 40-49 age class is present in the first five periods, and the 50-59 age class is present in the first three periods. The 60-69 age class is present in the first two periods. The 70-79 age class is present in the first period. The 80-89 age class is present in the first period. The 90-99 age class is present in the first period. The 100-109 age class is present in the first period. The 110-119 age class is present in the first period. The 120-129 age class is present in the first period. The 130-139 age class is present in the first period. The 140-149 age class is present in the first period. The 150+ age class is present in the first period.

10-year Period	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150+
1	50	350	250	250	350	0	0	0	0	0	0	350	0	0	0	400
2	250	50	350	350	350	0	0	0	0	0	0	250	0	0	0	500
3	250	350	50	350	250	0	100	0	0	0	0	350	0	0	0	100
4	250	350	0	350	350	0	0	100	0	0	0	100	0	0	0	0
5	250	350	0	350	50	250	0	0	0	0	0	250	0	0	0	0
6	250	350	250	350	350	0	0	0	0	0	0	250	0	0	0	0
7	250	350	250	350	350	0	0	0	0	0	0	250	0	0	0	0
8	250	350	250	350	350	0	0	0	0	0	0	250	0	0	0	0
9	250	350	250	350	350	0	0	0	0	0	0	250	0	0	0	0
10	250	350	250	350	350	0	0	0	0	0	0	250	0	0	0	0

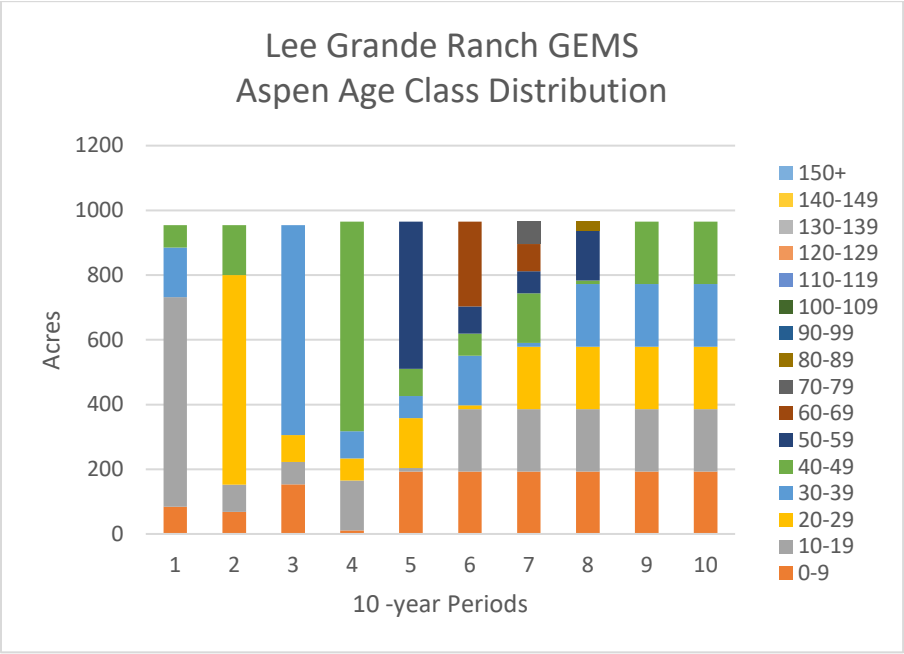
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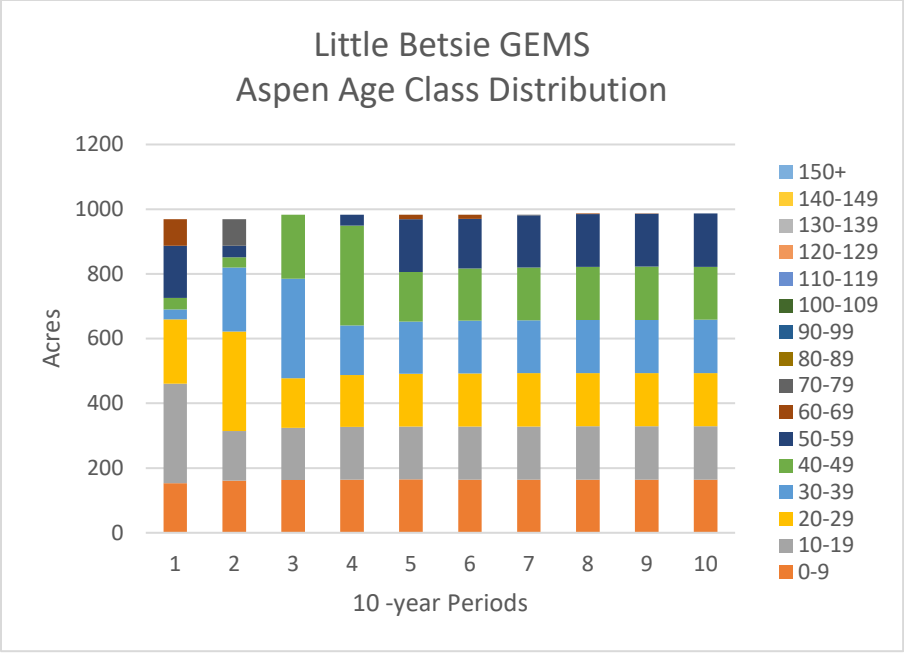
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Lee Grande Ranch GEMS Aspen Age Class Distribution

The chart displays the distribution of aspen age classes across ten 10-year periods. The total area under the bars is approximately 9,500 acres. The distribution is highly variable, with Period 1 dominated by the 130-139 age class, Period 2 by 140-149, Period 3 by 110-119, Period 4 by 100-109, Period 5 by 90-99, Period 6 by 60-69, Period 7 by 50-59, Period 8 by 30-39, Period 9 by 40-49, and Period 10 by 30-39. The 0-9 age class is consistently present in all periods, while the 150+ age class is only present in Period 1.

10-year Period	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150+
1	80	0	0	0	0	0	0	0	0	0	0	150	0	650	0	100
2	70	0	40	0	0	0	0	0	0	0	0	0	0	100	630	150
3	150	0	0	0	0	0	0	0	0	0	0	180	0	100	520	0
4	10	0	10	0	0	0	0	0	0	0	190	100	0	0	610	0
5	190	0	0	0	0	320	0	0	0	0	0	70	0	0	0	0
6	190	0	0	0	50	100	250	0	0	0	0	150	0	200	0	0
7	190	0	0	0	0	100	0	0	0	0	0	0	0	200	100	0
8	190	0	0	0	0	0	0	0	0	0	0	180	0	200	100	50
9	190	0	0	0	0	0	0	0	0	0	0	180	0	200	190	0
10	190	0	0	0	0	0	0	0	0	0	0	180	0	200	190	0

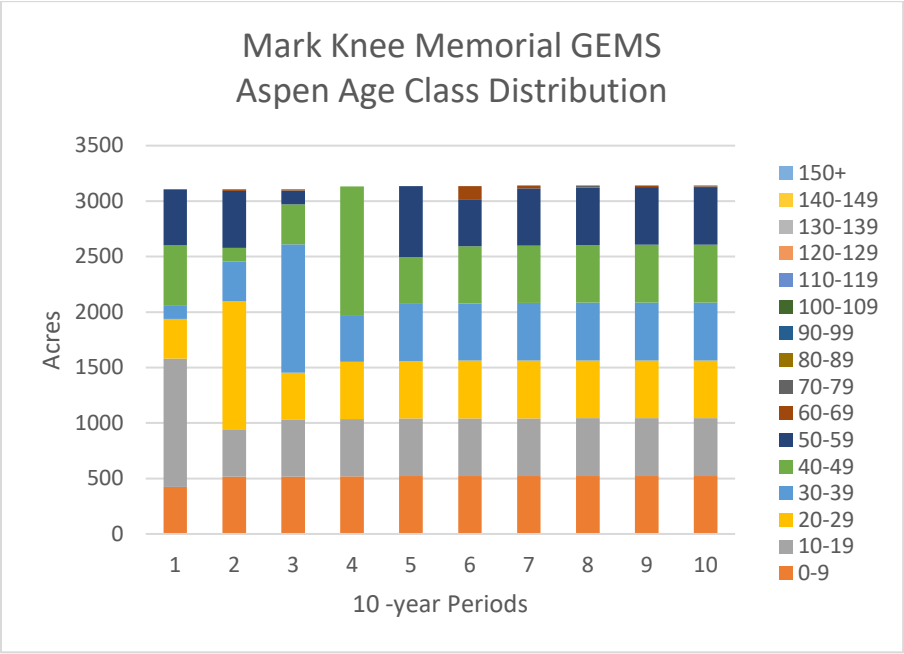


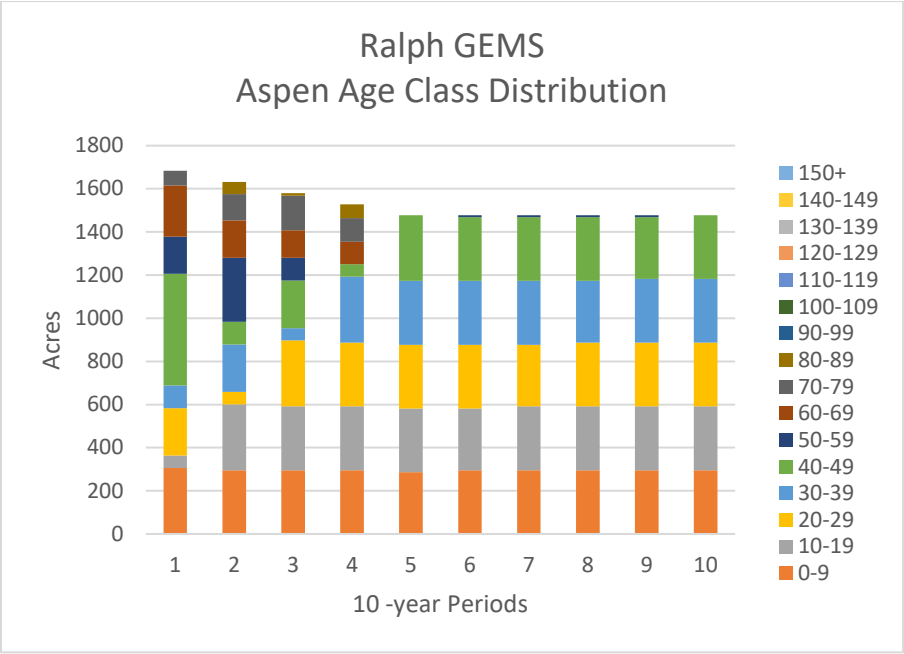
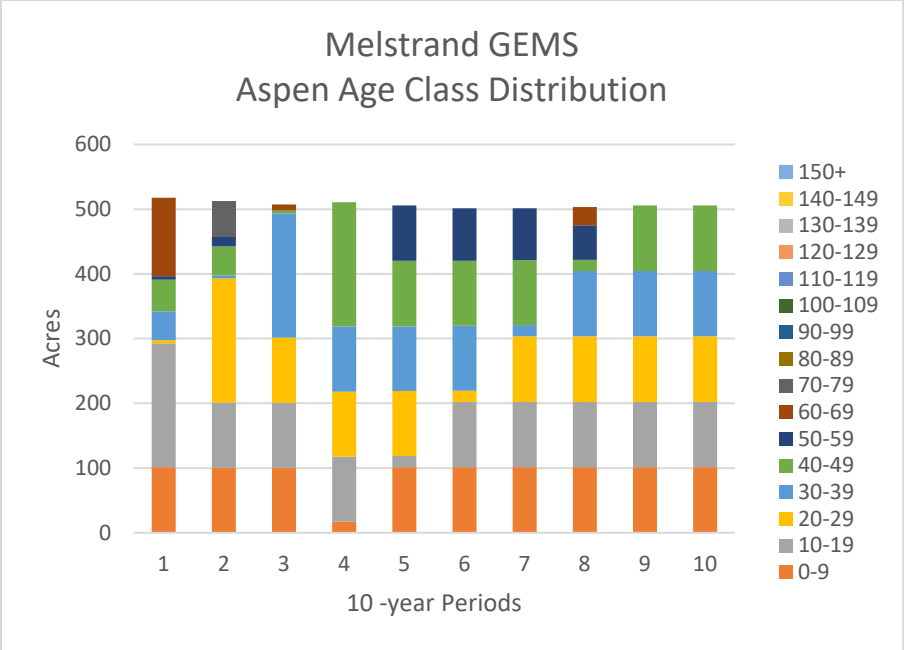
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Mark Knee Memorial GEMS Aspen Age Class Distribution

This stacked bar chart illustrates the distribution of aspen age classes over ten 10-year periods. The y-axis measures the area in acres, ranging from 0 to 3500. The x-axis lists the 10-year periods from 1 to 10. Each bar is composed of segments representing different age classes, color-coded according to the legend. The total acreage remains relatively stable around 3000-3100 acres per period. Period 4 shows a notable increase in the 40-49 age class, while Period 6 shows a small peak in the 60-69 age class.

10 -year Period	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150+
1	400	1100	350	0	550	500	0	0	0	0	0	100	0	0	400	0
2	500	450	550	0	1100	500	0	0	0	0	0	400	0	0	100	0
3	500	550	450	0	450	1100	0	0	0	0	400	0	0	0	0	0
4	500	550	550	0	1100	0	0	0	0	0	0	0	0	0	0	0
5	500	550	500	0	450	500	0	0	0	0	0	500	0	0	0	0
6	500	550	500	0	550	500	100	0	0	0	0	400	0	0	0	0
7	500	550	500	0	550	500	0	0	0	0	0	500	0	0	0	0
8	500	550	500	0	550	500	0	0	0	0	0	500	0	0	0	0
9	500	550	500	0	550	500	0	0	0	0	0	500	0	0	0	0
10	500	550	500	0	550	500	0	0	0	0	0	500	0	0	0	0





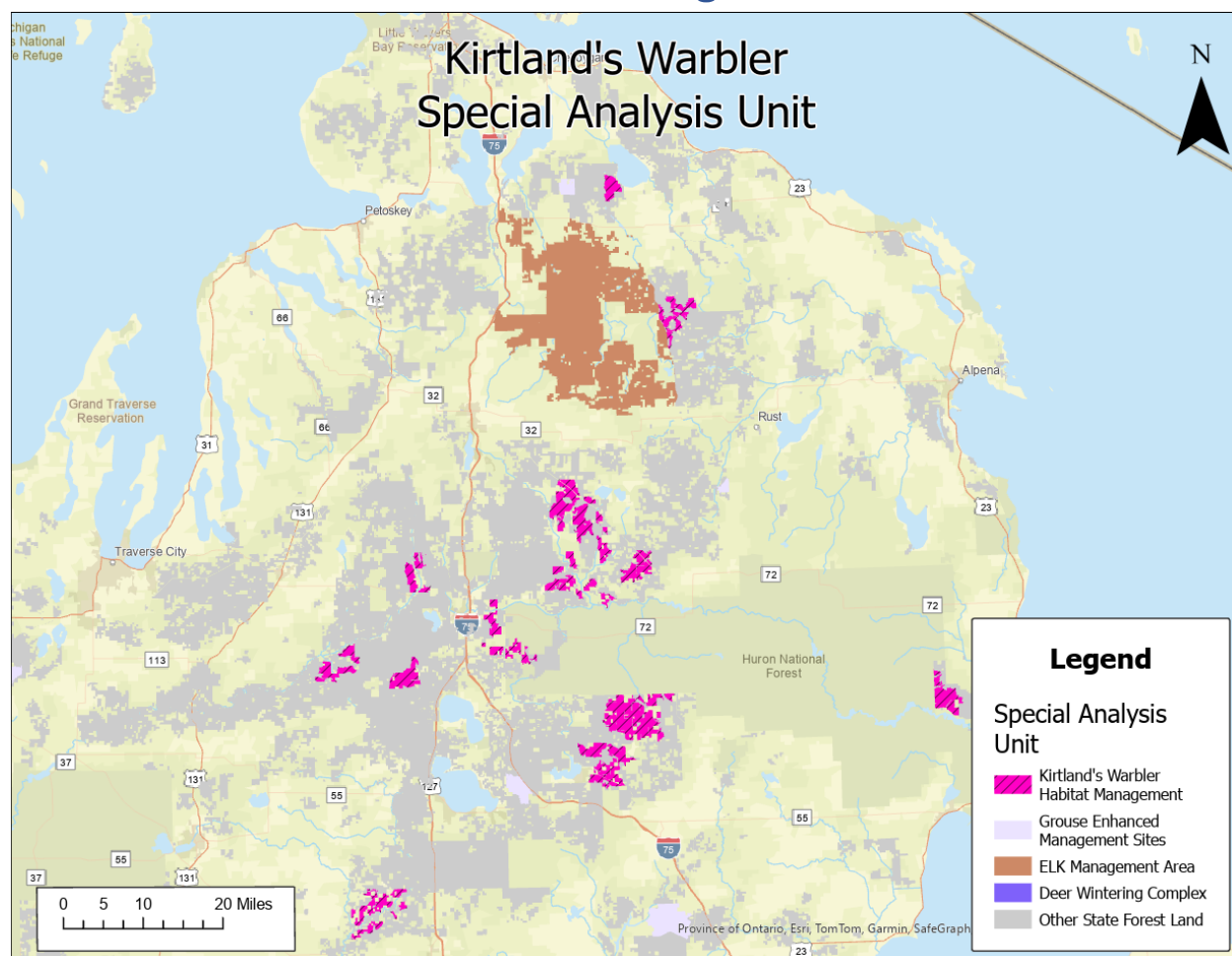
Management Actions

The aspen age class distributions shown in the above graphs can be achieved over time by carefully regenerating the desired amount of aspen in each 10-year period. Projected aspen harvest levels for each GEMS for the next 10 years are shown table 4 below:

Table 4. Projected 10- year aspen harvests in each GEMS site.

GEMS Aspen Harvest Table	Silvicultural Method
GEM / CVT	Clearcut
GEM-Backus Creek	168
Aspen	148
Lowland Aspen/Balsam Poplar	20
GEM-Bill Rollo Memorial GEMS	409
Aspen	409
GEM-Cedar River	87
Aspen	87
GEM-Drummond	38
Lowland Aspen/Balsam Poplar	38
GEM-Garden Grade	287
Aspen	287
GEM-Greasy Creek	170
Aspen	170
GEM-Halifax	72
Aspen	72
GEM-Hazel Swamp	223
Aspen	214
Lowland Aspen/Balsam Poplar	8
GEM-Lame Duck Foot Access Area	1,070
Aspen	535
Lowland Aspen/Balsam Poplar	535
GEM-LeeGrande Ranch	88
Aspen	84
Lowland Aspen/Balsam Poplar	5
GEM-Little Betsie	153
Aspen	153
GEM-Mark Knee Memorial GEMS	410
Aspen	410
GEM-Melstrand	111
Aspen	111
GEM-Ralph	397
Aspen	358
Lowland Aspen/Balsam Poplar	39
Grand Total	3,683

Kirtland's Warbler Habitat Management



Description

The Kirtland's Warbler (KW) Habitat Management Special Analysis Unit (SAU) is comprised of 96,263 acres spread across the northern lower peninsula on xeric outwash plains where jack pine is commonly found growing naturally and aligns with the Kirtland's Warbler Essential Habitat Special Conservation area.

Special Analysis Unit Goals

The Kirtland's Warbler Operational Plan has one primary habitat creation goal that calls for the creation of 15,600 acres of habitat each decade to support 800 breeding pairs of Kirtland's Warbler across the State Forest Land in Michigan. This is accomplished through timber harvests and subsequent regeneration of jack pine through both natural and artificial means. This level of habitat creation is sufficient to support the 800 (750 in the NLP, 50 in the UP) breeding pairs at past expected bird densities on existing patch sizes ranging from 80 to 300 acres, with a few patches reaching 500-600 acres in size.

Current and Desired Future Conditions

This current management design uses 6 age classes and is likely not going to produce commercially viable jack pine stems at 50-59 years old given the planting densities of 1452 stems per acre. Extensive analysis of the current condition and desired future condition of the KW SAU revealed that a more sustainable level of commercial harvest could be achieved using an age class distribution containing 7 age classes (standard 60-year rotation age). This will eventually result in around 12,800 acres in age class, producing and sustaining that same amount of nesting and breeding habitat across the essential habitat area. The reduction in habitat creation is expected to be offset by the gradual increase in patch size, creating habitat that will support higher bird densities. 12,800 acres of habitat organized in larger patches (minimum of 300 and maximum of 1200 acres) across the landscape is expected to result in bird densities nearing 15 acres per breeding pair, sustaining around 800 breeding pairs on state forest land.

The SFMP modeling work and prior analysis also revealed that there was a current deficit in commercially viable jack pine and red pine to support harvesting and regeneration needs to create the desirable level of habitat for KW breeding and nesting requirements. The challenge for the modeling team was to figure out how many supplemental acres of younger age classes could be harvested commercially and marketed for biomass, as well as how many acres needed to be cleared using mastication in order to prepare sites for planting. The modeling team evaluated the current condition of the stands that were eligible to receive one of three treatments based on their age and relative average stem diameter:

1. Commercial roundwood production (50+ years old)
2. Biomass (30-39 years old)
3. Mastication (20-29 years old)

A separate model scenario was developed using an objective function to minimize mastication and fill in with as little biomass as possible for the first period, also supplementing with the areas that were commercially viable for roundwood production, all while trying to always maintain enough habitat to support 750 breeding pairs in the northern lower peninsula. Transitions were also specified to convert eligible stands to planted jack pine whenever possible in order to maximize the amount of area available for habitat creation. The SFMP model solution for projected harvest levels by type and period are shown below in Figure 8.

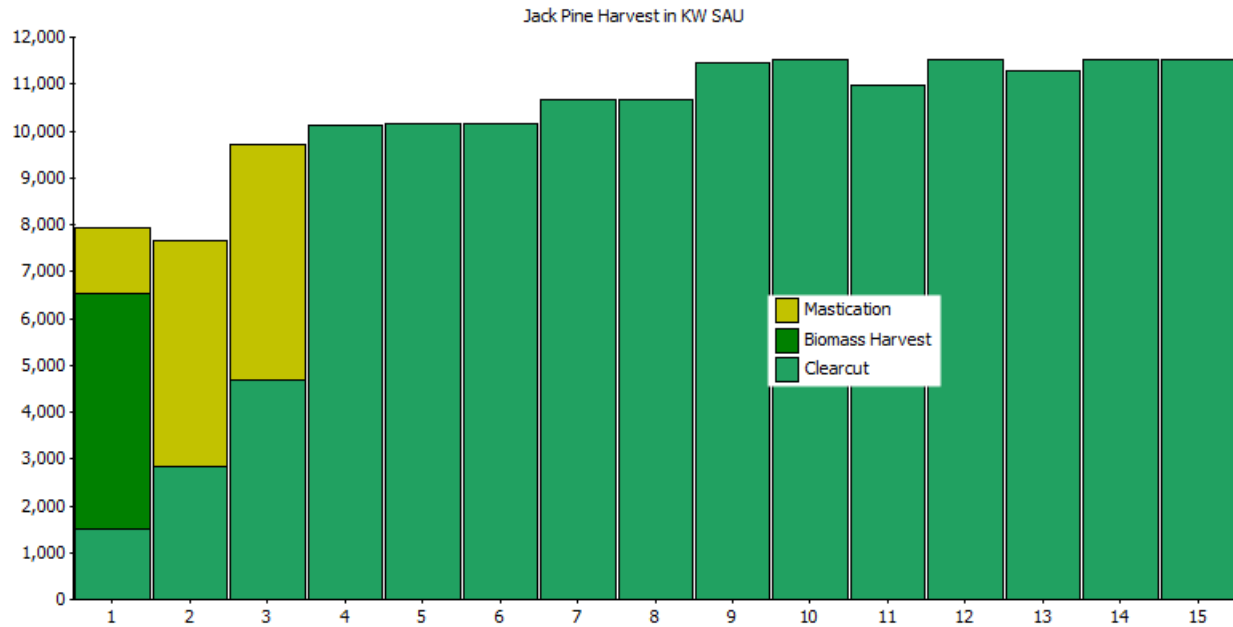


Figure 10. Acres of jack pine harvest / site clearing by method in the KW SAU.

The harvests (and mastication) levels above for each period provided a plausible solution to minimize mastication treatments and supplement with commercial harvests in order to return to a long term sustainable solution that uses only traditional clearcut harvests producing a viable pulpwood / roundwood product. Additional acres of harvest from other covertypes like planted red pine are also forecasted and will be converted to jack pine in each period resulting in a gradual increase in jack Pine across the KW SAU (Figure 9).

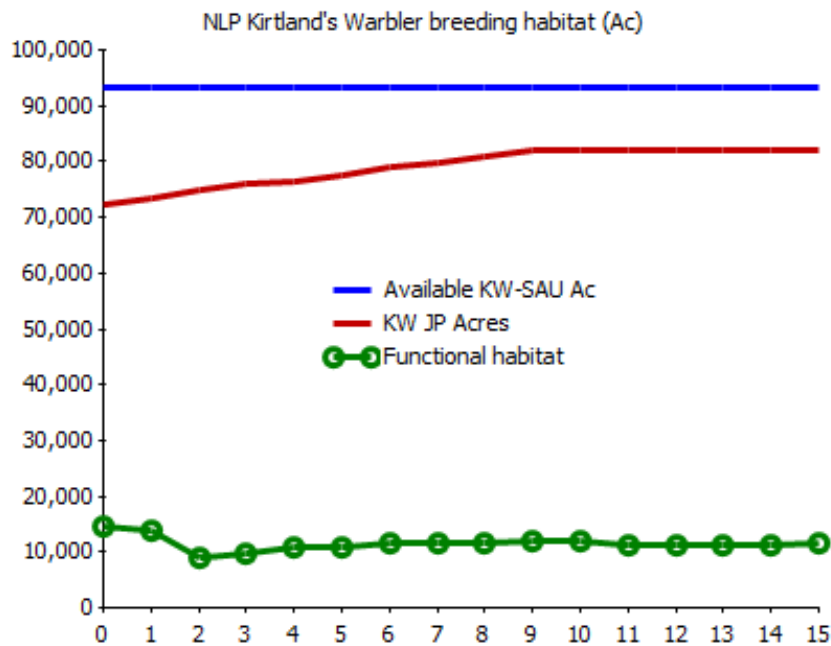


Figure 11. KW jack pine and functional habitat acres in the KW SAU.

The projected age class distribution of both planted and natural jack pine with a 60 year rotation age is shown below in figure 10.

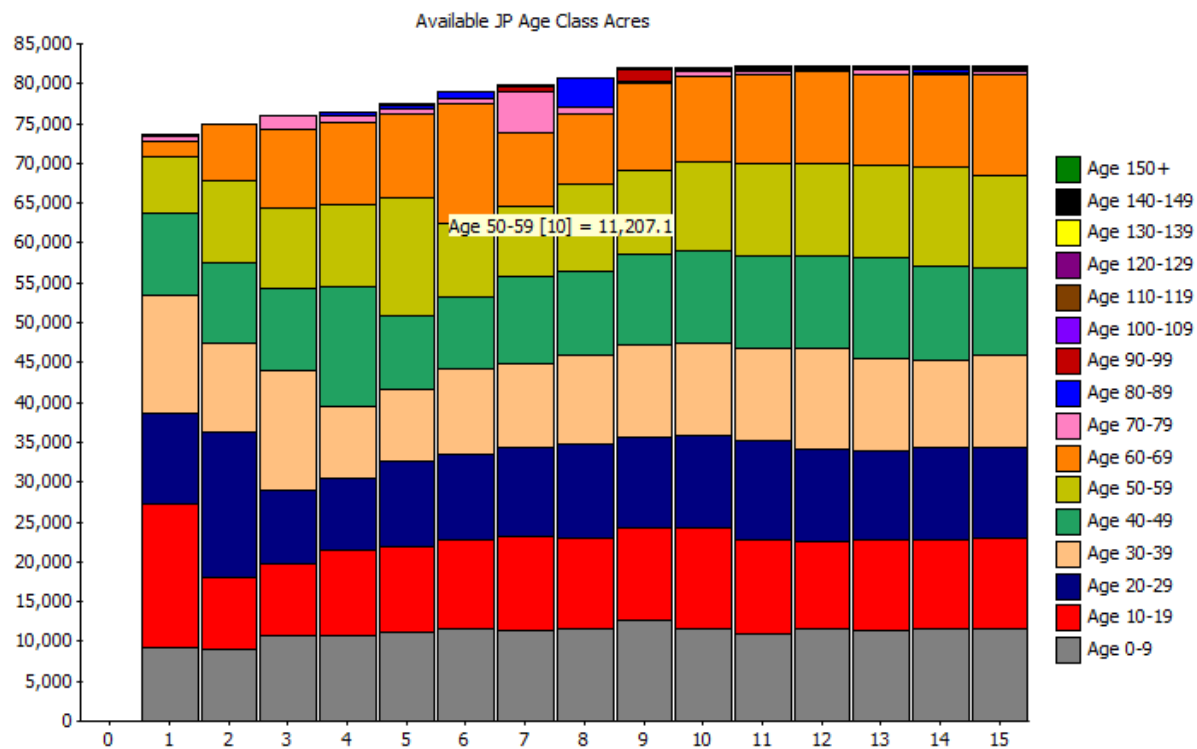


Figure 12. Projected jack pine age class distribution across the KW SAU in each 10-year period.

The projected number of breeding pairs able to be achieved across the State Forest land KW essential habitat is expected to decline from current numbers over the next 20 years, but then rebound and level off as a more sustainable level of harvest is achieved (figure 11).

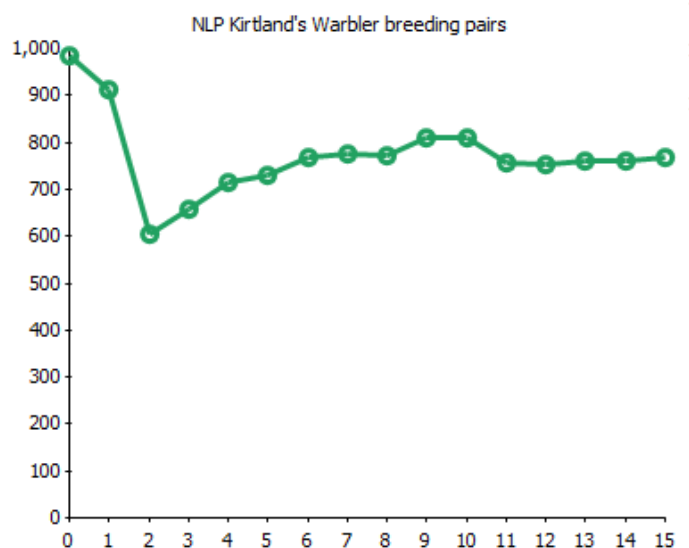


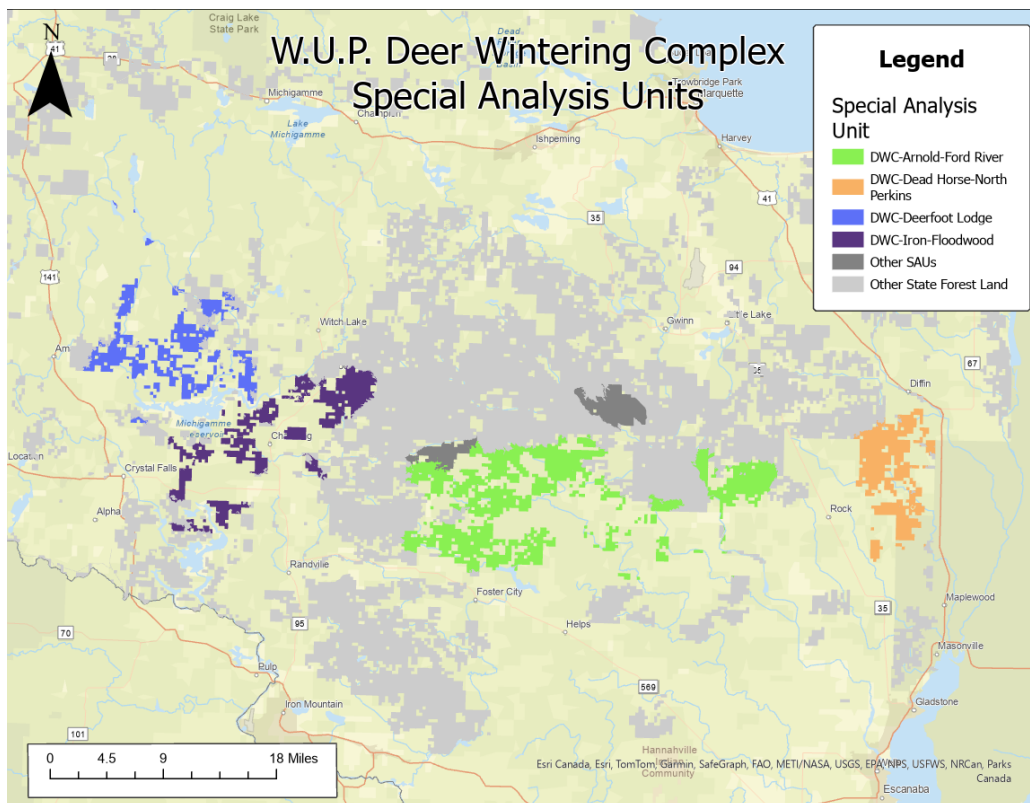
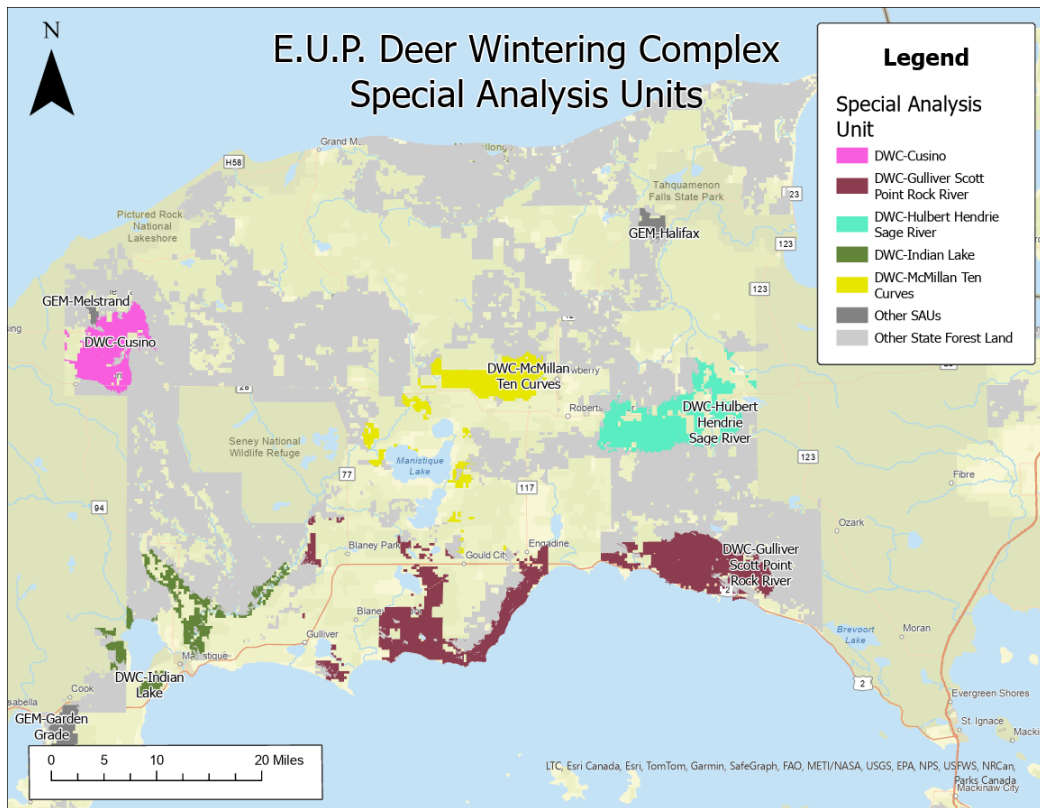
Figure 13. Projected number of breeding pairs of Kirtland's Warbler on State Forest Land in the northern lower peninsula.

Management Actions

The following 10-year management actions will help to provide as much Kirtland's Warbler breeding habitat as possible given the current condition of the forested landscape.

Covertypes	Clearcut	Biomass	Mastication	Shelterwood	Thinning	Grand Total
Natural Jack Pine	1,545	2,001	1,244			4,790
Planted Jack Pine		3,002	162			3,164
Planted Red Pine	1,065				1,073	2,138
Mixed Upland Deciduous	155					155
Aspen	148					148
Natural Red Pine				127		127
Upland Conifers	124					124
Natural Mixed Pines					71	71
Black/Red Hybrid Oak	33					33
Planted Mixed Pine					32	32
Lowland Conifers	17					17
Oak Mix	11					11
Grand Total	3,097	5,002	1,406	127	1,176	10,808

Deer Wintering Complexes



Description

Deer wintering complexes (DWCs) included in this planning effort as a special analysis unit contained greater than 15,000 acres of state forest land and have a DWC Management Plan already in place. Guidance for the modeling work specific to the DWCs was pulled from these plans and incorporated into the model in various ways. A brief summary of the important components of DWCs can be found in each DWC plan. An example from the Hulbert-Sage River DWC Management plan states that:

In most of Upper Michigan, deer begin migrating to wintering complexes when snow accumulates between 12-18 inches, typically in mid-late December. Deer remain on their winter ranges until snow melts in spring and their mobility is restored. This confinement period on winter range can vary from 60 days to well over 100 days during an especially long winter. Significant winter-related deer deaths plus reduced physical condition and high newborn fawn mortality occur with durations of 90-100 days with greater than 12 inches of snow covering the ground. The UP winters of 1996 and 2014 had winter durations greater than 100 days and are remembered as especially severe for deer. To survive these long confinement periods on winter range, deer seek locations that provide both shelter and food suitably interspersed across the landscape.

Conifer stands with high canopy closure provide deer with shelter by reducing snow depths beneath the canopy and facilitating movement via extensive connected packed trails. Trail systems provide easier access to food and also assist deer in evading predators. These shelter stands also reduce wind chill and perhaps radiant heat loss. Shelter is defined by several categories:

- *Functional Shelter: Conifer stands with at least 70% canopy closure and tree heights greater than 30 feet. These thresholds for canopy closure and height ensure the stand is effective at intercepting snow, resulting in decreased snow depths and increased mobility for deer to access food and avoid predators.*
- *Primary Shelter Species: Cedar and hemlock trees provide the best functional shelter as they intercept larger amounts of snow than other conifers. These species also are a favored winter food source which makes them difficult to regenerate and recruit back into the stand canopy. These species are long lived, however, and on some sites may survive 400 years or more. Most stands in the UP are 100-200 years old.*
- *Secondary Shelter Species: White spruce, balsam fir and white pine intercept less snow than cedar and hemlock but contribute to functional shelter especially when mixed with cedar and hemlock trees. These trees also provide feeding corridors through hardwood stands and shelter during periods of lower snow depth. Often these species occur as a component of mixed stands in the transitions between upland and lowland, such as in red maple stands.*

Food is an integral habitat component for deer in winter. While adult deer can enter winter with sizeable fat reserves, fawns have not yet completed skeletal growth and therefore carry smaller percentages of fat. Thus, fawns must have dependable access to food to survive the winter. Some key sources of winter food are:

- *Cedar and hemlock fronds where accessible.*
- *Litter fall – cedar and hemlock fronds, hardwood stems, and lichens dropped due to wind and snow action.*

- *Hardwood browse – most of the browse is available in aspen, red maple and northern hardwood stands, either as felled tops from winter timber harvest activity or as regenerating stems of trees and shrubs such as red-osier dogwood in years following timber harvests or natural disturbances such as windfall.*
- *Oak acorns –deer are able to access acorns early and late in the winter as snow depths allow.*
- *Spring herbaceous foods – forest openings inside and adjacent to DWC's often provide protein-rich food for several weeks in spring and fall before deer enter or vacate the complexes.*

Seven individual outputs were created for the SFMP model that helped add up acres of each component that was at the covertype level:

1. **All Shelter** – All acres in the shelter covertypes regardless of age and stocking:
 - a. Hemlock
 - b. Cedar
 - c. Lowland Conifers
 - d. Upland Conifers
 - e. Upland Spruce Fir
 - f. Lowland Spruce Fir
 - g. Planted Red Pine
 - h. Planted White Pine
 - i. Natural Red Pine
 - j. Natural White Pine
 - k. Natural Mixed Pine
2. **Primary Shelter**- Acres of the following covertypes:
 - a. Hemlock
 - b. Cedar
3. **Secondary Shelter**- Acres of the following covertypes:
 - a. Lowland Conifers
 - b. Upland Conifers
 - c. Upland Spruce Fir
 - d. Lowland Spruce Fir
 - e. Planted Red Pine
 - f. Planted White Pine
 - g. Natural Red Pine
 - h. Natural White Pine
 - i. Natural Mixed Pine
4. **Functional Shelter** – A subset of acres in the covertypes that is:
 - a. Age \geq 40 years old
 - b. Diameter \geq 4"
 - c. Canopy Cover \geq 51%
5. **All Food** - All acres in the food covertype regardless of age and stocking
 - a. Aspen
 - b. Lowland Aspen
 - c. Northern Hardwoods
 - d. Lowland Deciduous
 - e. Upland Mixed Forest
 - f. Lowland Mixed Forest

- g. Oak Mix
- 6. **Functional Food** – A subset of acres in the covertypes dependent on age:
 - a. Age classes 0-9 and 10-19 (browse)
- 7. **Functional Food** - Northern Hardwood Selection Harvest
 - a. Food created as tops are left from the harvest

These thematic outputs generated acres of each component specific to each DWC so that they could be used in the goal statements as well graphics displaying scenario results.

Special Analysis Unit Goals

The following goals were extracted from the Hulbert – Sage River Deer Wintering Complex Management Plan but remain consistent across the other DWCs.

Deer Winter Range Goal:

- 1. Sustainably manage shelter and food resources on deer winter range to reduce overwinter deer population fluctuations by:
 - a. Maintaining or enhancing conifer shelter thereby facilitating deer movement to obtain food and avoid predation
 - b. Providing high quality food adjacent to shelter

DWC objectives:

- 2. Move toward 50% of the complex in shelter species
 - a. Maintain primary shelter (cedar and hemlock)
 - b. Increase secondary shelter (white spruce, balsam fir and white pine) when below 50%
- 3. Move toward 50% of complex in sustainable food stands (primarily aspen and hardwoods) to enhance available browse

Sustainable management of both food and secondary shelter covertypes was incorporated into the SFMP model using specific age class goals for each relevant covertype in each DWC. This incentivizes the model to only harvest at a level that would generate a balanced age class distribution over time in each covertype specific to each DWC. These goals help address concerns from the previous planning period where age class goals were only set at the Management Area level and not specific to each DWC.

The DWC specific age class goals essentially perform area regulation strategies specific to each food and shelter covertype in each DWC bringing confidence to a sustainable flow of habitat components over time. Goal 1.b. from above will have to be accomplished during the implementation phase at the local unit level during the compartment review process. The SFMP model does not have spatial relationships built in to ensure proximity requirements are met between food and shelter stands.

The DWC objective 2.a. was incorporated into the SFMP model by relying on site conditions making those stands unavailable for management and no age class goals were created for Cedar and Hemlock covertypes.

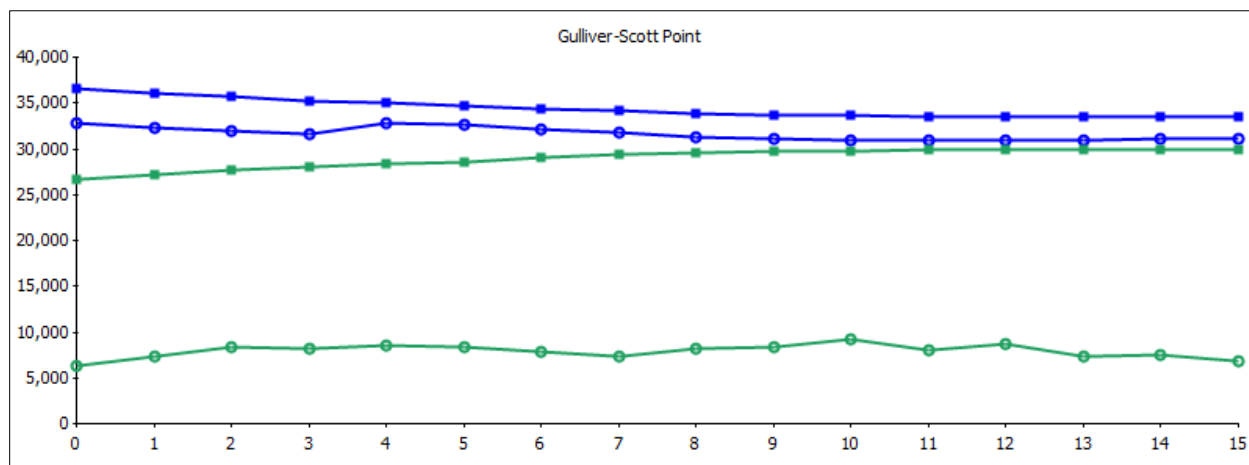
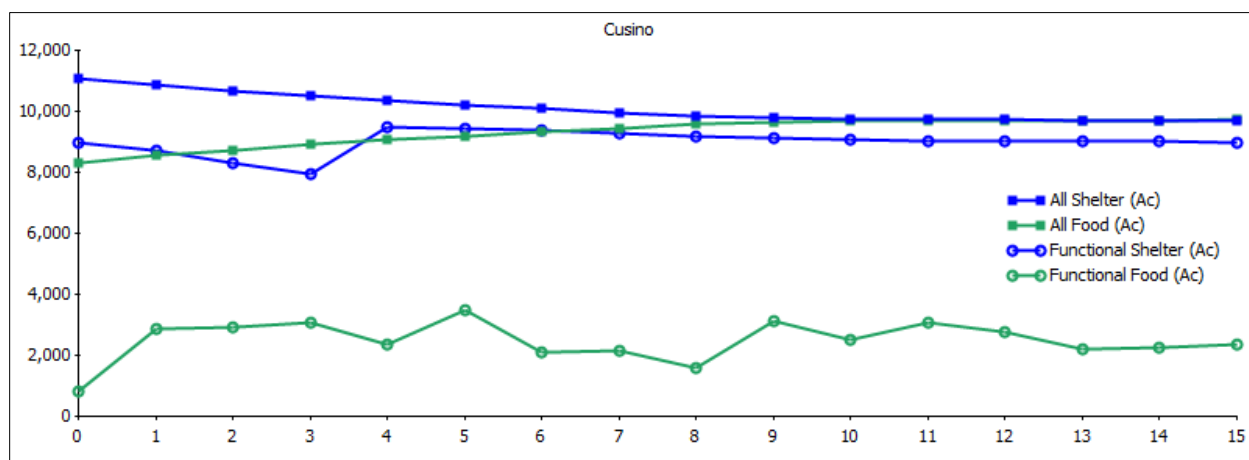
Objectives 2.b. and 3 are accomplished through a specific set of transitions in the SFMP model that shows a gradual covertype conversion on a subset of stands harvested over time. The actual selection

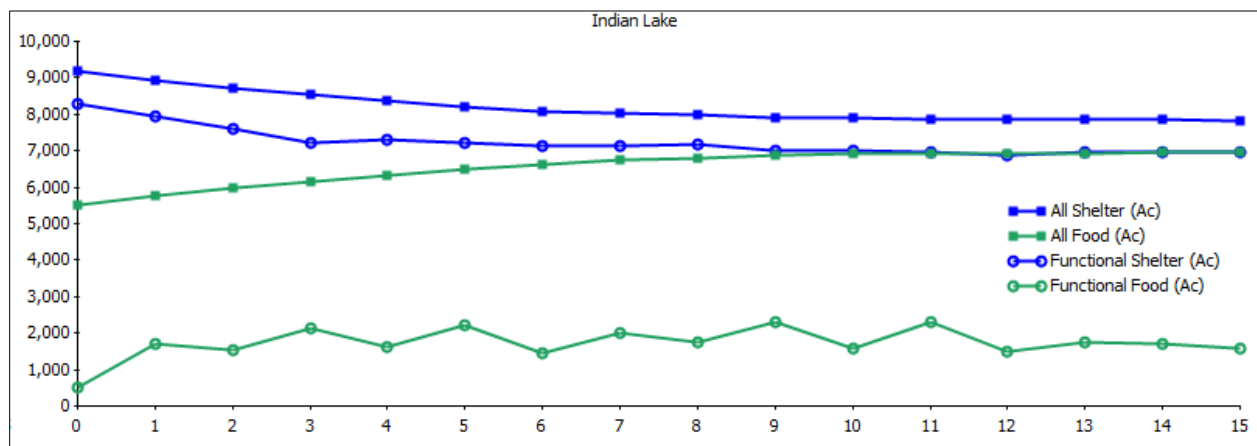
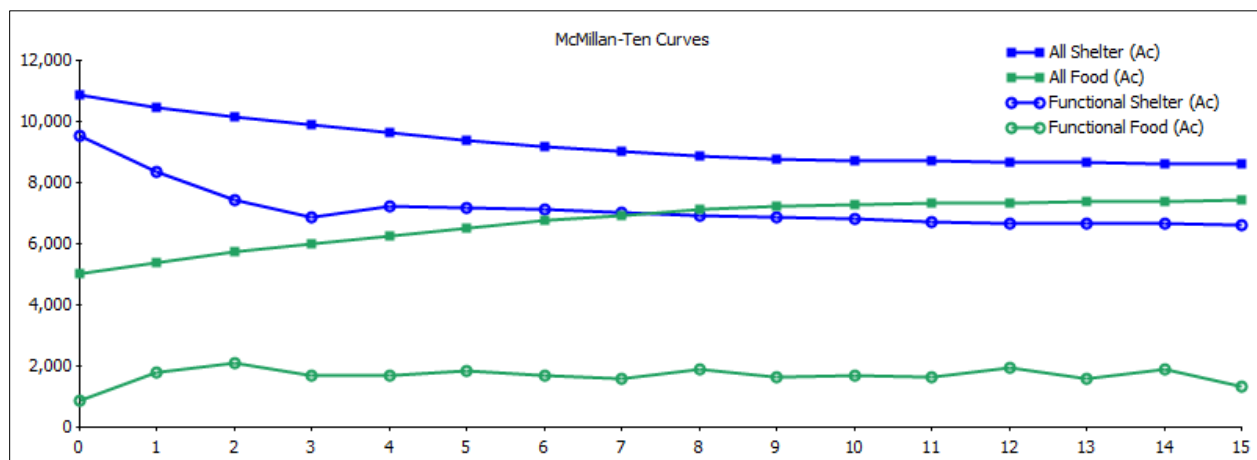
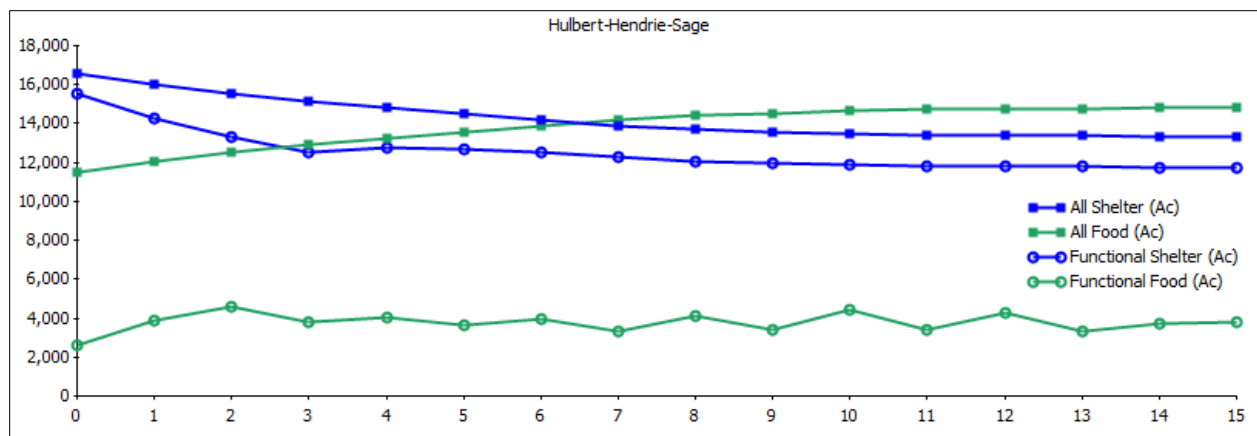
of stands to convert from food to shelter and visa versa must be done in the field and informed by species composition and prescription specifications resulting in desirable conversions.

Current and Desired Future Conditions

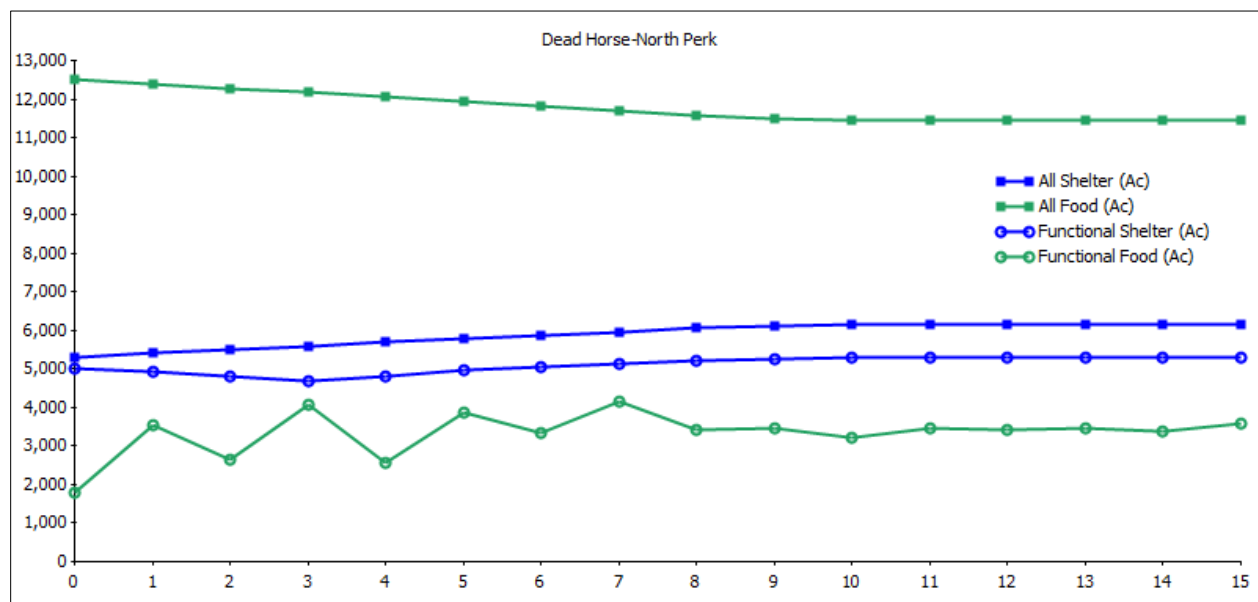
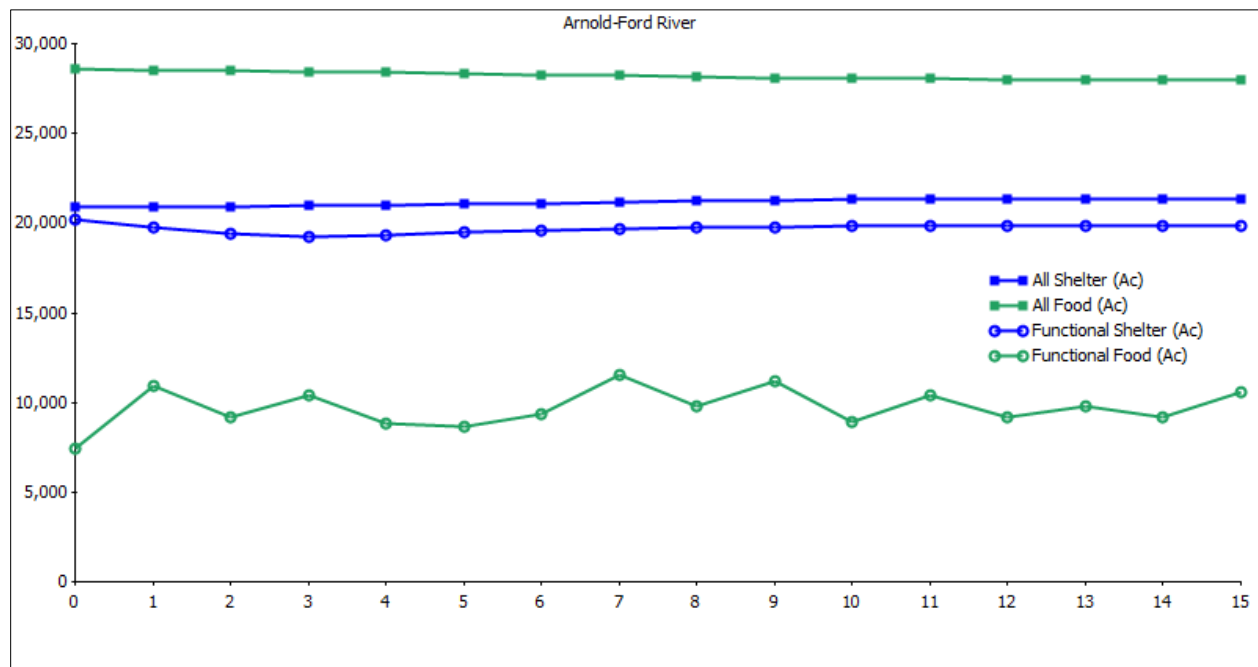
All DWCs in the EUP have a higher component of shelter than food and conversions are relatively straight forward as mixed coniferous / deciduous stands currently providing secondary shelter can be converted to food stands by expanding the deciduous species component. WUP DWCs are in the opposite condition and accomplishing these objectives requires a bit more effort in regenerating a higher conifer component both through artificial and natural means converting food covertypes to those providing shelter. The following series of graphs illustrates these current conditions and projected improvements through transitions in each period for the “All food” and “All shelter” outputs, as well as the subset of those covertypes as functional components that are actually providing those elements in each period.

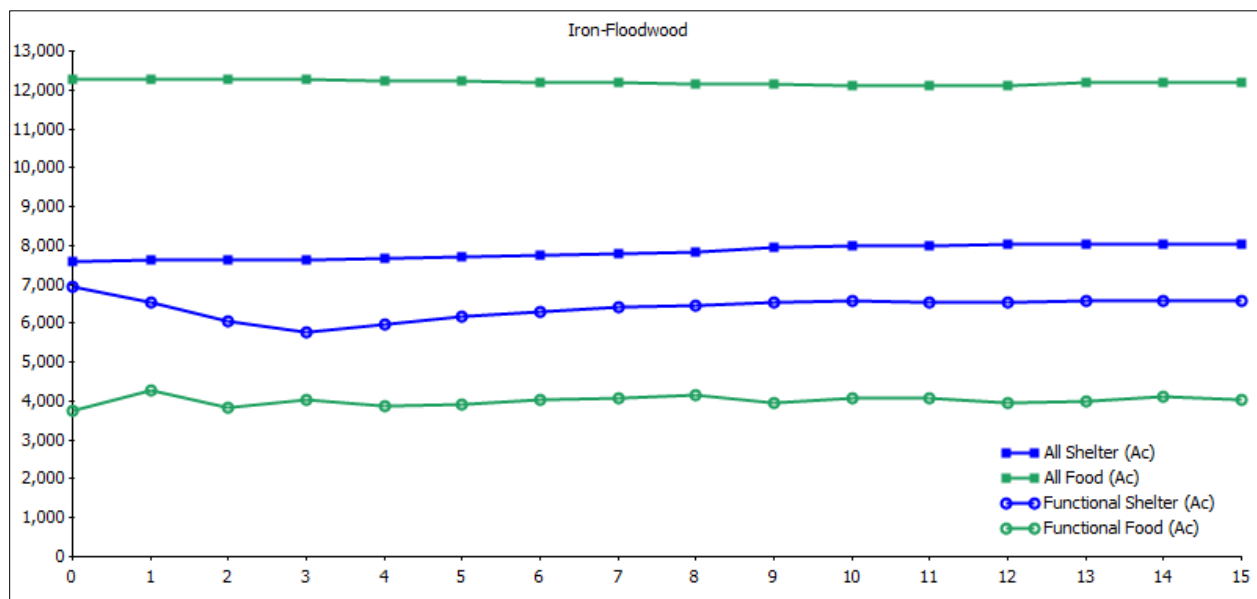
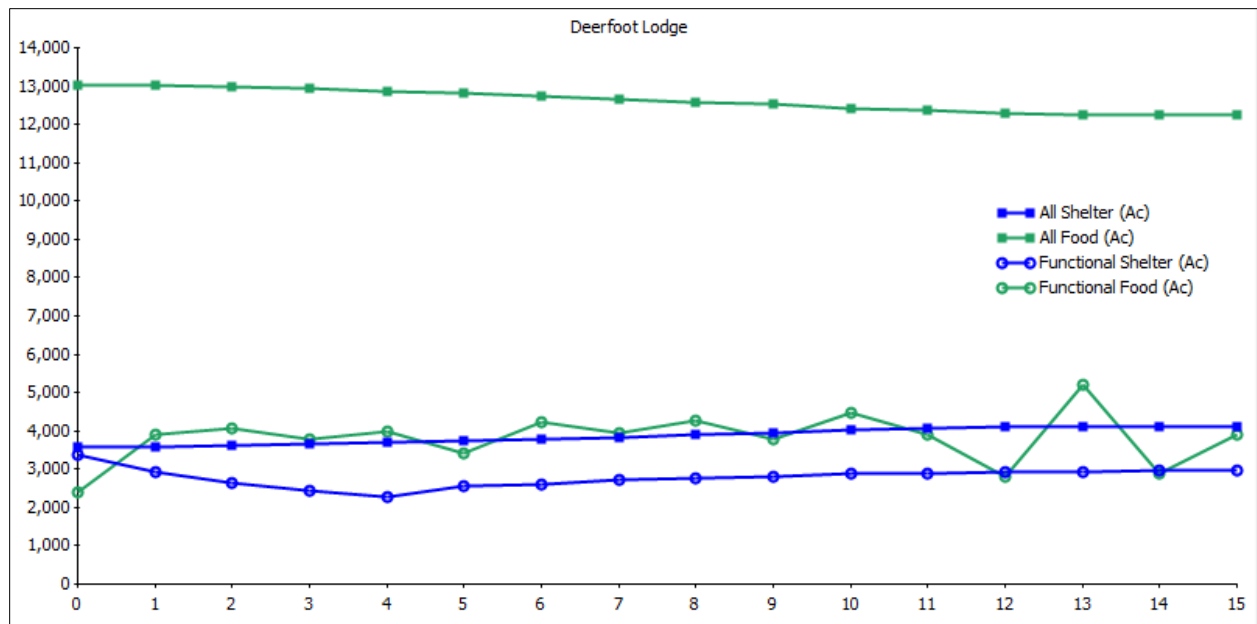
EUP DWCs:





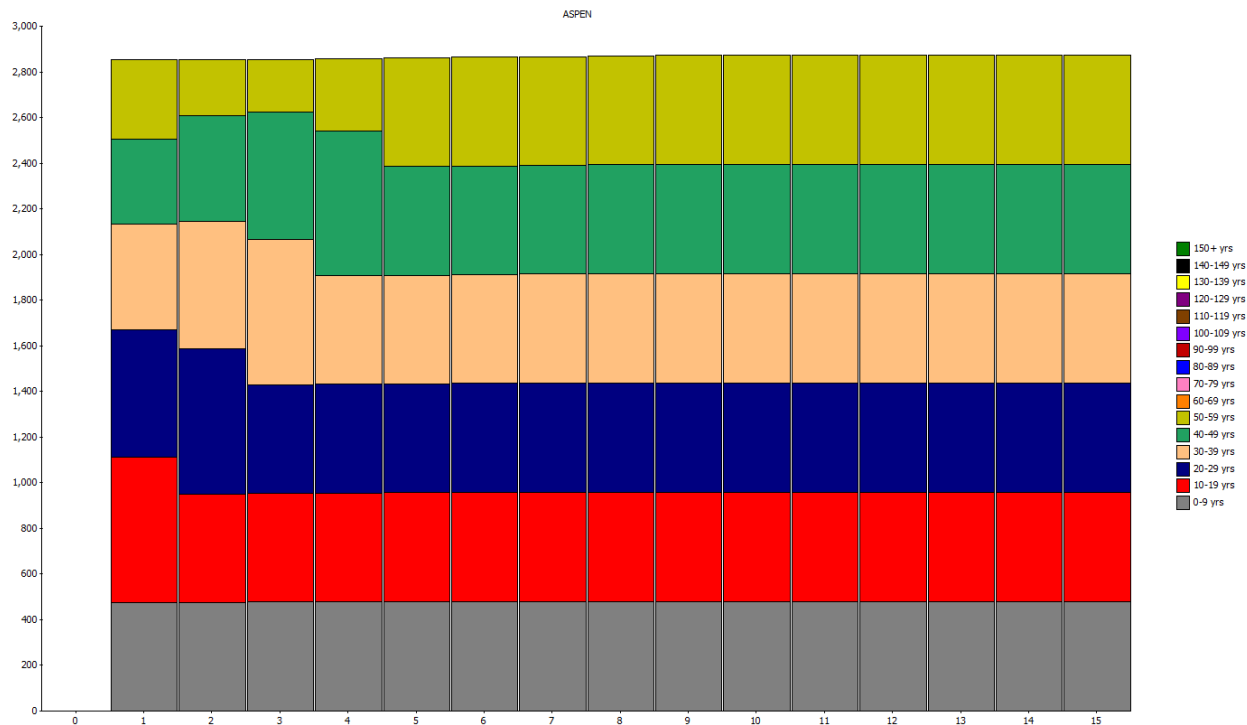
WUP DWCs:



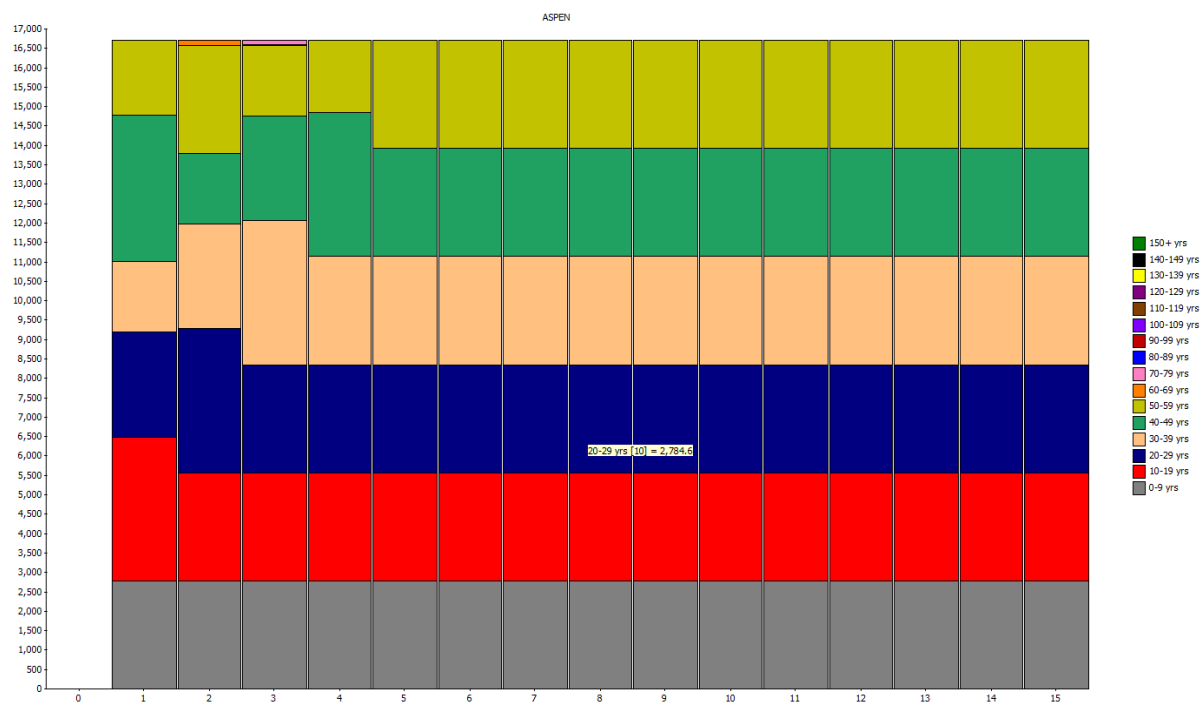


Examples of the age class goals incentivizing the SFMP model to create a balanced condition and maintain that condition through period 15 for food covertypes within the DWCs are shown below for both the EUP and the WUP:

Hulbert – Sage River:



Arnold- Ford River



Management Actions

The following projected harvest levels will help inform local decisions during compartment review process to ensure sustainable harvest levels and habitat creation are achieved in the planning period and contribute to the longer range goals. Efforts to refine these harvest projections should be made to work out spatial considerations, timing of harvests within the decade, access concerns, and timber sale marketability.

DWC-Cusino						
Covertime	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	253	1,563	-	39	-	1,856
Lowland Deciduous	181	-	-	-	-	181
Lowland Conifers	132	-	-	-	-	132
Aspen	70	-	-	-	-	70
Lowland Mixed Forest	62	-	-	-	-	62
Lowland Aspen/Balsam Poplar	34	-	-	-	-	34
Mixed Upland Deciduous	21	-	-	-	-	21
Lowland Spruce/Fir	18	-	-	-	-	18
Upland Conifers	11	-	-	-	-	11
Planted Red Pine	-	-	9	-	-	9
Totals	784	1,563	9	39	-	2,395

DWC-Gulliver Scott Point Rock River						
Covertime	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Aspen	1,821	-	-	-	-	1,821
Northern Hardwood	-	1,275	-	161	-	1,436
Lowland Conifers	509	-	-	-	-	509
Planted Red Pine	268	-	60	-	-	328
Lowland Aspen/Balsam Poplar	229	-	-	-	-	229
Upland Conifers	177	-	-	-	10	187
Upland Spruce/Fir	165	-	-	-	-	165
Lowland Spruce/Fir	103	-	-	-	-	103
Lowland Mixed Forest	83	-	-	-	-	83
Lowland Deciduous	72	-	-	-	-	72
Mixed Upland Deciduous	57	-	-	-	-	57
Natural White Pine	-	-	10	-	14	24
Upland Mixed Forest	19	-	-	-	-	19
Natural Red Pine	-	-	15	-	-	15
Planted Mixed Pine	12	-	-	-	-	12
Totals	3,515	1,275	86	161	24	5,059

**DWC-Hulbert Hendrie
Sage River**

Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Lowland Conifers	943	-	-	-	-	943
Northern Hardwood	-	545	-	103	44	692
Aspen	476	-	-	-	-	476
Lowland Mixed Forest	269	-	-	-	-	269
Lowland Aspen/Balsam Poplar	222	-	-	-	-	222
Upland Conifers	113	-	-	-	61	174
Lowland Spruce/Fir	114	-	-	-	-	114
Lowland Deciduous	17	70	-	-	-	87
Upland Mixed Forest	76	-	-	-	-	76
Mixed Upland Deciduous	38	-	-	-	-	38
Upland Spruce/Fir	22	-	-	-	-	22
Planted Red Pine	4	-	-	-	-	4
Totals	2,295	614	-	103	105	3,117

DWC-Indian Lake

Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	-	660	-	11	-	671
Lowland Conifers	362	-	-	-	-	362
Planted Red Pine	159	-	182	-	-	341
Aspen	223	-	-	-	-	223
Mixed Upland Deciduous	96	-	-	-	-	96
Northern Red Oak	-	-	-	68	-	68
Upland Conifers	52	-	-	-	12	64
Lowland Spruce/Fir	52	-	-	-	-	52
Upland Spruce/Fir	27	-	-	-	-	27
Lowland Aspen/Balsam Poplar	23	-	-	-	-	23
Natural White Pine	-	-	22	-	-	22
Upland Mixed Forest	8	-	-	-	-	8
Totals	1,016	660	209	80	12	1,977

DWC-McMillan Ten Curves						
Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Lowland Conifers	781	-	-	-	-	781
Northern Hardwood	-	231	-	12	-	243
Aspen	176	-	-	-	-	176
Lowland Aspen/Balsam Poplar	160	-	-	-	-	160
Lowland Spruce/Fir	148	-	-	-	-	148
Lowland Mixed Forest	85	-	-	-	-	85
Lowland Deciduous	79	-	-	-	-	79
Mixed Upland Deciduous	25	-	-	-	-	25
Upland Conifers	23	-	-	-	-	23
Upland Mixed Forest	17	-	-	-	-	17
Totals	1,494	231	-	12	-	1,736

WUP DWCs:

DWC-Arnold-Ford River						
Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	25	3,424	-	-	-	3,449
Aspen	2,784	-	-	-	-	2,784
Lowland Conifers	242	-	-	-	-	242
Mixed Upland Deciduous	92	19	-	-	-	111
Upland Conifers	72	-	-	-	-	72
Lowland Aspen/Balsam Poplar	49	-	-	-	-	49
Lowland Deciduous	39	-	-	-	-	39
Lowland Spruce/Fir	34	-	-	-	-	34
Upland Spruce/Fir	32	-	-	-	-	32
Upland Mixed Forest	24	-	-	-	-	24
Planted Red Pine	-	-	23	-	-	23
Lowland Mixed Forest	1	-	-	-	-	1
Totals	3,393	3,443	23	-	-	6,859

DWC-Dead Horse-North Perkins

Coverttype	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	84	1,176	-	-	-	1,259
Aspen	555	-	-	-	-	555
Lowland Mixed Forest	384	-	-	-	-	384
Lowland Conifers	136	-	-	-	-	136
Lowland Aspen/Balsam Poplar	81	-	-	-	-	81
Mixed Upland Deciduous	77	-	-	-	-	77
Upland Mixed Forest	57	-	-	-	-	57
Lowland Deciduous	21	11	-	-	-	32
Totals	1,394	1,187	-	-	-	2,581

DWC-Deerfoot Lodge

Coverttype	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Northern Hardwood	-	1,164	-	-	-	1,164
Aspen	1,066	-	-	-	-	1,066
Lowland Conifers	221	-	-	-	-	221
Lowland Spruce/Fir	195	-	-	-	-	195
Lowland Mixed Forest	76	-	-	-	-	76
Mixed Upland Deciduous	64	-	-	-	-	64
Upland Spruce/Fir	19	-	-	-	-	19
Natural White Pine	-	-	-	-	15	15
Totals	1,641	1,164	-	-	15	2,820

DWC-Iron-Floodwood						
Covertypes	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Aspen	1,600	-	-	-	-	1,600
Northern Hardwood	102	436	-	-	-	538
Lowland Spruce/Fir	238	-	-	-	-	238
Planted Red Pine	-	-	179	-	-	179
Lowland Conifers	53	-	-	-	-	53
Upland Mixed Forest	24	-	-	-	-	24
Natural White Pine	-	-	-	-	17	17
Natural Mixed Pines	-	-	-	-	16	16
Lowland Mixed Forest	15	-	-	-	-	15
Upland Spruce/Fir	14	-	-	-	-	14
Mixed Upland Deciduous	13	-	-	-	-	13
Planted Jack Pine	12	-	-	-	-	12
Natural Jack Pine	8	-	-	-	-	8
Lowland Aspen/Balsam Poplar	7	-	-	-	-	7
Lowland Deciduous	-	2	-	-	-	2
Totals	2,086	439	179	-	32	2,736