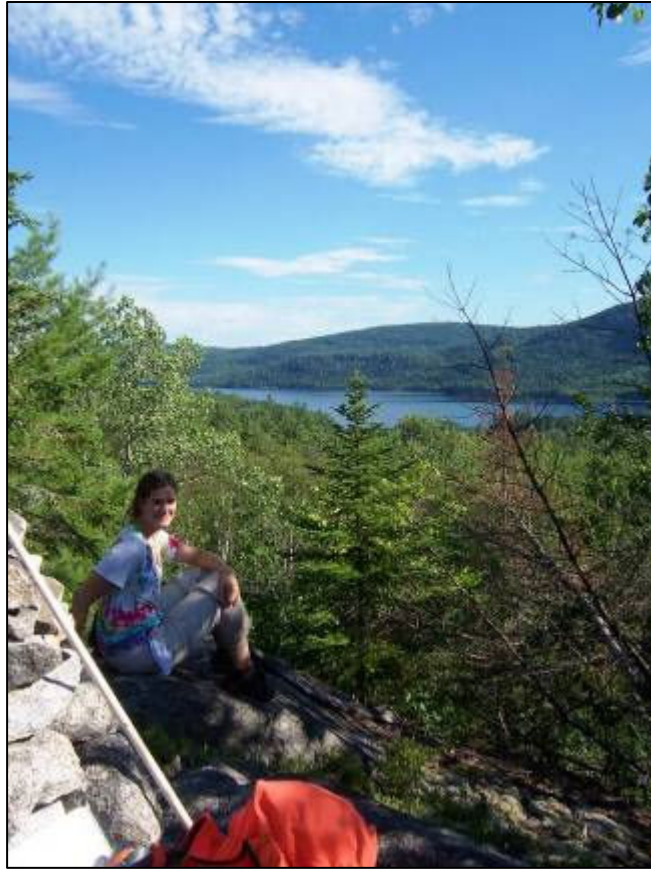


Natural Resource Inventory of the Central Penobscot Region: Nahmakanta



Overlooking Nahmakanta Lake from Nusuntabunt Mountain

**prepared by
Andy Cutko and Justin Schlawin
Maine Natural Areas Program**

**for the
Bureau of Parks and Lands
February 2012**

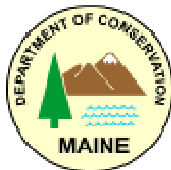


Table of Contents

Property Description	3
Geology and Soils	3
Hydrology and Water Quality	5
Land Use and Harvest History	7
Fisheries and Wildlife.....	11
Ecological Reserve.....	14
References	15
Appencices.....	16

Preface

This Natural Resource Inventory describes the geology, soils, vegetation, and hydrology of the Nahmakanta Unit, with particular emphasis on ecological features of statewide importance. It incorporates prior studies and reports, including information in the 1995 Nahmakanta Unit Management Plan and Ecological Reserve Inventory surveys from 1992 and 1995. In addition, field work was conducted by MNAP staff in 2010 and 2011 to revisit selected sites.

Property Description

The Nahmakanta Management Unit is a ~44,000 acre property in T1 R11 WELS, Rainbow Township (T2 R11 WELS) and T1 R12 WELS in Piscataquis County. Featuring remote ponds, the largest Ecological Reserve on state lands (11,802 acres) and part of the Appalachian Trail's 'hundred mile wilderness', the Nahmakanta Unit encompasses some of the finest remote terrain for hiking, fishing, and snowmobiling in Maine. Portions of the Unit not within the Ecological Reserve are managed for motorized and non motorized recreation, wildlife, and timber products.

The Unit's topography is diverse, characterized by many steep hills and narrow valleys and small headwater streams. Elevation on the unit gradually decreases from west to east and ranges from 2,524 feet at the top of Farrar Mountain to 590 feet where Nahmakanta Stream crosses into T1 R10 WELS. The average elevation on the unit is 1,300 feet. Nahmakanta Lake is a 3.5 mile long, largely undeveloped lake nestled between the Appalachian Trail corridor and the Nahmakanta Ecological Reserve. Nearby to the southeast, Fourth Debsconeag Lake abuts both state lands and The Nature Conservancy's Debsconeag Lakes Wilderness Area. Fifth through Eighth Debsconeag Lakes are entirely within the Nahmakanta Ecological Reserve. In fact, 24 "great ponds" (10 or more acres in size) lie within Nahmakanta's boundary, encompassing more than 50 miles of undeveloped lake shoreline. The Nahmakanta Unit also harbors a number of rare plants and animals, exemplary natural communities and significant wildlife habitats.

Together with adjacent Nature Conservancy lands around Rainbow Lake, the Nahmakanta Ecological Reserve forms ~55,000 acres of contiguous wild forest between Nahmakanta Lake and the Golden Road. On a broader scale, the Nahmakanta Unit is part of a landscape of nearly a half million acres of conserved forestland that extends along the 'Hundred Mile Wilderness' of the Appalachian Trail and up to Baxter State Park.

Geology and Soils

Many of Nahmakanta's noteworthy ecological features can be attributed to its geologic history and exposed granitic bedrock. The rock's resistance to weathering, combined with its fire history, account for the region's rugged outcrops and bald summits. The rugged mountains of Farrar, Female, and Wadleigh resulted from geologic uplift and metamorphism, and talus slopes east of Turtle Ridge formed when freshly carved vertical cliff faces were exposed to weathering over thousands of years. Without vegetation to stabilize the slopes as glaciers retreated, the steepest areas crumbled to form boulder fields. Other areas of exposed bedrock, such as those east of Nahmakanta Lake, occur on gentler slopes but still remain sparsely vegetated because of past fires.

The bedrock underlying approximately 80% of the unit (essentially all of T1 R11 WELS and Rainbow Township) is the Katahdin pluton. A pluton is a large body of igneous rock

(derived from molten magma) intruded into the earth's crust. This large body of granitic rock extends northeastward to Baxter Peak and the surrounding mountains. On the Nahmakanta Unit, portions of this granitic pluton are exposed at the surface as a result of the erosion of surficial materials. Its mineral composition contributes to the formation of acidic soils that are comparatively low in productivity. The relative resistance of this formation to weathering controls the topography of T1 R11 WELS and Rainbow Township. The terrain is rugged; ledge outcrops are common, and there are many cliffs, talus slopes, granite slides and balds.

The bedrock geology of the western half of Nahmakanta (T1 R12 WELS) is more complex. In the southern portion of the Unit in T1 R12 WELS, the bedrock is a fine-grained, dark gray sedimentary slate with lighter brown sandy layers, and a thin layer of limy sandstone. The weathering of these rocks results in better quality, finer textured soils compared to granites. Because sedimentary rocks are a mixture of rock types with different mineral compositions, they provide a greater nutrient supply than granites; which results in better plant growth and a greater annual addition of organic matter to the soil – typically producing soils that favor northern hardwoods rather than spruce-fir types. In the vicinity of Black and Female Ponds the bedrock is unnamed, metamorphosed sedimentary rocks. In addition, the Ripogenus pluton, composed primarily of gabbro (a dark igneous rock), borders the western shores of Pollywog and Wadleigh Ponds. The weathering of this rock results in soils higher in clay content and less acidic and sandy than granite-derived soils.



Large glacial 'erratic' boulder in the Turtle Ridge area

Bedrock has the most significant effect on drainage and soil types where the soil cover is thin. This is the case on Wadleigh Mountain, where the largest area of bedrock on the unit is near the surface or exposed; soils are droughty and generally low in fertility.

After glaciers retreated 13,000-14,000 years ago, they left a blanket of ice-transported boulders and sediments across the landscape. T1 R11 WELS is covered by a thin layer of till (generally less than 10 feet thick), while the layer of till is thicker in T1 R12 WELS. Tills are composed of an unsorted mass of rocks, sand, silt and clay. In some places, however, stratified sediments including sand and gravel form the uppermost surficial layer. Stratified features within the unit include esker and some ribbed moraine deposits. Eskers are linear deposits of sand and gravel that were deposited by sub-glacial streams.

Ribbed moraines are poorly understood sub-glacial formations that are defined by small ridges of glacial deposits—usually till, but sometimes sand and gravel. Ribbed moraine deposits are found around the Turtle Ridge area and around Nahmakanta Lake (see Figure 3 for locations of surficial features).

Soils in Nahmakanta are dominated by the following types, in descending order of importance:

- Soils in the eastern two-thirds of the Unit are of the Colonel-Dixfield-Lyman group. These loamy soils are formed in glacial till derived mainly from schist, granite, phyllite and gneiss, and they typically occur on mid and lower slopes. Surface stones are common, and the soils may range from poorly drained (Colonel) to somewhat excessively drained (Lyman).
- Soils in T1 R12 are of the Telos-Monarda-Monson group, characterized by more coarse-textured material of mid and upper slopes developed from slate, schist, and metamorphosed sandstone. Telos and Monarda soils are often on compact basal till, restricting drainage. Monson soils are better drained soils, often on knolls and ridges with bedrock nearer the surface.
- Farrar Mountain and Wadleigh Mountain are covered with soils of the Monson-Elliottsville-Ricker group. These are well to excessively drained loamy soils, relatively shallow to bedrock, characteristic of knolls, ridges, and mountains.

Hydrology and Water Quality

The Nahmakanta Unit lies within the Penobscot River drainage, and all of the streams on the Unit are tributaries of the West Branch of the Penobscot River. There are four separate drainage systems:

- Black Pond and Black Brook flow northward into Caribou Lake;
- Rabbit and Leavitt Ponds drain into Mud Pond via Pratt Brook;
- the Debsconeag Lakes eventually drain into the Debsconeag Deadwater on the West Branch of the Penobscot River; and
- Rainbow Stream, Penobscot Pond, the Musquashes, Wadleigh Pond and Pollywog Pond drain through Bean Brook eastward into the 1,000-acre Nahmakanta Lake, which exits the Unit through Nahmakanta Stream.

Most of the streams flow swiftly through deep, narrow, boulder strewn channels, with many riffles, pools, and scenic waterfalls. Brooks are fed by numerous dispersed mountain seeps, and there are many unmapped headwater streams. Pollywog and Tumbledown Dick Streams have cut deep gorges through the granite bedrock. Pollywog Gorge stretches for more than a mile with cliffs rising as high as 180 feet above the valley floor. Approximately one-third of the gorge is on State-owned land, and the

remainder is within the National Park Service AT Corridor. Tumbledown Dick is a much narrower gorge with nearly vertical granite walls.

There are 56 lakes and ponds over 1/4 acre on the unit, with a combined frontage of 45 miles and nearly 2,500 surface acres. Twenty-four of these water bodies are great ponds (10 acres or greater in size). Nearly all the frontage on the 1,000 acre Nahmakanta Lake is owned by the National Park Service. Several of the larger ponds on the unit had small dams at their outlets to raise water levels to drive logs.

In a statewide assessment, Nahmakanta was identified as 'class 1A' lake (the highest ranking) for possessing multiple resources of statewide significance, and Fourth Debsconeag Lake, Penobscot Pond, and Wadleigh Pond were ranked '1B'. Monitoring data for Nahmakanta Lake, collected since 1974, indicates that the lake's water quality is above average, based on measures of water transparency, total phosphorus, and chlorophyll-a. The potential for nuisance alga blooms on Nahmakanta Lake is low. Recent dissolved oxygen (DO) profiles show low DO depletion near the bottom of the 110' deep lake. Water quality data also exists for Fifth and Sixth Debsconeag Lakes but not for the other lakes within the Unit. (<http://www.minelakedata.org>.)

Wetlands

The rugged topography of the Nahmakanta Unit does not lend itself to wetland formation. The Unit includes 2,152 acres of wetlands (just ~5% of the Unit's area). Most wetland acreage is concentrated along streams and basins where beavers are active. The largest wetlands are forested swamps and open streamshores along Farrar Brook (roughly 300 acres) and ~150 acres of wetlands associated with Second Musquash Pond. Most are open wetlands (2,057 acres), including beaver origin Mixed-Graminoid Shrub marsh, Sweetgale- Mixed Shrub Fen, Alder Thicket and Sedge- Leatherleaf Fen Lawn communities, among others. Forested wetlands are very sparse (only 95 acres) and include Cedar-Spruce Seepage Forest and Northern White Cedar Swamp.



Shrub fen with stunted cedar along Farrar Brook

Ecological Processes

Based on historical records, Nahmakanta and the surrounding region were dominated by stands of large, old spruce in pre-settlement times (Lortie et al. 1992). Historically, hardwood stands occurred primarily in small pockets.

Today, as a result of forest disturbances during the early 1900s including logging, insect outbreaks, and fire, mid-successional hardwood and mixed-wood stands are dominant and only scattered small patches of forest retain an “old-growth” character.

Logging of softwood forests, abnormally dry weather, and spruce budworm epidemics between 1913 and 1922 likely made the region especially vulnerable to fire. A series of intense fires between 1903 and 1924 burned thousands of acres, including much of the east side of T1 R11 WELS and Rainbow Township, scorching the landscape and scouring soils. These fires have resulted in mature even-aged stands of aspen, birch, and red maple (60-90 years); red pine stands on drier ledges east of Nahmakanta lake; and even-aged spruce stands growing on rockier, poorly drained soils (Jay Hall, personal communication).

Early budworm epidemics were historically devastating, with 45% spruce mortality and 93% fir mortality by 1922 (Penobscot Development Company, 1922). Following the most recent spruce-budworm epidemic in the 1980s, there was moderate to heavy salvage harvesting of softwood stands within the Nahmakanta Unit. Budworm disturbance was greatest along the higher ridges of Wadleigh, Farrar, and Female Mountains, where wind and weather effects caused trees to be more stressed and created frequent gaps and a patchy canopy. Today, spruce and fir are regenerating in mid-successional mixed forests and in pure softwood stands on the higher ridges, steep northerly slopes, and in stream valleys. Mixed conifer woodlands have become established on pockets of poor soil and bedrock on granite balds swept bare by fire.

The forested communities on the unit also show evidence of typical small gap disturbances from ice, wind, and natural tree mortality. At some higher elevation spruce-fir forests in the Nahmakantas, larger patches (a few acres) of blowdowns occur. Trees on steep slopes and exposed ridges are especially susceptible to this type of disturbance. These gaps increase the complexity of forest structure and add to the diversity of microhabitats in the forest for plants and animals.

Land Use and Harvest History

Most of the forests around Nahmakanta have been harvested several times, including just prior to the State's acquisition in 1990. Lands were managed primarily for forest products prior to state acquisition, with softwood stands presumably harvested more heavily than hardwood stands, in light of the historically higher demand for softwood lumber and pulp. In a few inaccessible areas, old forests remain that have not been harvested in many years.

At the turn of the century, early surveyors called T1 R11 WELS and T2 R11 WELS “good spruce towns” and considered the soils too poor to support extensive northern hardwoods. By 1913 the majority of Nahmakanta forests were already second growth, with remnants of old forest restricted to steep slopes and boulder-strewn or inaccessible terrain. In the late 1960s and 1970s, after a fifty year hiatus, harvesting resumed on the

unit. A new budworm outbreak was controlled with insecticides (extensive spraying occurred in T1 R12 WELS, and the western halves of T1 R11 WELS and T2 R11 WELS). Harvesting in this era was heaviest in T1 R12 WELS, in the Wadleigh Valley area, and around the Musquash Ponds. In recent years, BPL has harvested many of the burn-origin aspen stands in the southeast corner of the Unit, as well as mature mixed stands in T1 R12 WELS.

Because of past harvesting throughout the broader region, very little ‘old growth’ remains, and what is left is primarily on conservation lands such as The Nature Conservancy’s Debsconeags Lakes parcel. According to the forest inventory data, only about 10% of the forest in Piscataquis County is over 100 years old, and roughly 1% of the forest has a stand age over 140 years old (US Forest Service 2012).

Natural Communities

The forests of Nahmakanta, which cover 96% of the Unit, are a product of the geomorphology, soils, cutting history, fires and spruce budworm episodes. BPL currently manages portions of the Nahmakanta forests for the sustainable production of timber and the targeted wildlife benefits that derive from certain forest management practices. Revenues from timber sales help support the ongoing costs of managing Maine's Public Lands. However, 40% of the Nahmakanta Unit is ‘unmanaged’ – either designated as Ecological Reserve, inoperable due to steep slopes or wet terrain, or otherwise unavailable for timber harvest due to inaccessibility or recreational or visual sensitivities.

Nahmakanta’s forested natural communities are characteristic of the rugged terrain along Maine’s spine of central mountains. BPL forest stand types show a similar breakdown of forest types:

- Mixed wood (43%)
- Northern hardwood (29%)
- Spruce/fir (19%)
- Aspen/Birch (8%)

In general, after years of recovery from the historical influences of fire, budworm, and harvesting, most of the forests are now silviculturally mature (e.g., moderately to well stocked with trees >50 years old), and relatively little forested acreage at the Nahmakantas is early successional. In fact, according to BPL stand type data, only 3.7% of the Unit is in the seedling/sapling class. This proportion contrasts significantly with the composition of the broader region: in Piscataquis County as a whole, 36% of the forest is in the seedling/sapling class (US Forest Service 2012).

The **Spruce- Fir- Northern Hardwoods Ecosystem** type is a broad scale classification that describes nearly all of Nahmakanta’s forest. This ecosystem type is comprised of numerous upland hardwood and softwood natural communities that are typical to

northern Maine and the central mountains. Spruce typically occupies about 20-30%, with sugar maple, beech and scattered white ash and northern white cedar sharing dominance. Patches of softwood are more common on drier knolls and steep slopes, while sugar maple, white ash, and cedar dominate colluvial basins with more soil and moisture.

Examples of this ecosystem are deemed exceptional and are tracked by the Maine Natural Areas Program when numerous, large, undisturbed examples of its constituent natural communities co-occur. At Nahmakanta, an outstanding Spruce- Fir- Northern Hardwoods Ecosystem is located along the western border of Nahmakanta lake (south of Nesuntabunt Mountain), primarily within the Appalachian Trail corridor and on lands managed by BPL.

This rugged, 500+ acre area shows little or no evidence of past harvesting except for some more operable (flat) areas. It includes components of Sugar Maple Forest, White Pine- Mixed Conifer Forest, Montane Spruce-Fir Forest, and Spruce- Fir Northern Hardwoods Forest. Cored spruce trees were 110, 175, and 195 years old. For context less than 1% of the forest stands in Piscataquis County are over 160 years old (US Forest Service 2012).



Emily Stone coring a 195 year old spruce along the AT corridor south of Nesuntabunt Mountain

The **Aspen – Birch Woodland/Forest** is common throughout Maine, especially following fire or even-aged timber harvesting operations in central and eastern Maine. This natural community type is characterized by a dominant canopy of big-toothed aspen, quaking aspen, paper birch, and red maple, and can occur either as a closed canopy forest or as early successional woodland based on time since disturbance, damage to soils and topography.

The largest example of this type at Nahmakanta is found north of Nahmakanta Lake in the Ecological Reserve area. Here, approximately 950 contiguous acres of burn origin forest and woodland occur. Although some harvesting may have occurred in this area in the past, virtually all evidence has been erased by fire. Paper birch is the dominant tree species, with the largest individuals growing to 60 ft tall, with a diameter of 10” and ranging from 45-55 years old. Other common tree species in the overstory include white pine, red maple and big-tooth aspen. Common and characteristic understory species in this fire-origin forest include lowbush blueberry (*Vaccinium angustifolium* and *V. myrtilloides*), bracken fern (*Pteridium aquilinum*), shadbush (*Amelanchier sp.*) and striped maple (*Acer pennsylvanicum*). Dominant trees in the seedling/sapling age class

include balsam fir, red maple, white pine, red spruce and northern white cedar, indicating a successional change to a mixed forest within the next several decades. Another large area of this type, occurring south of Nahmakanta Lake, has been harvested within the last several years, allowing a transition in some stands to mixed softwood and northern hardwood forest.

Two very similar spruce dominated natural communities occur at Nahmakanta, both occurring on steep and/or rocky soils. **Lowland Spruce – Fir Forest** occupies cool, bouldery slopes and valleys at lower elevations and is the most common coniferous forest type at Nahmakanta. In higher elevation areas, **Montane Spruce – Fir Forest** occurs. These two community types differ in that the montane type has a greater proportion of yellow birch in the mix and possesses more extensive herbaceous cover, while **Spruce – Fir – Broom Moss Forest** contains less yellow birch, more red maple and paper birch, and supports sparse herbaceous cover.

An excellent example of the **Lowland Spruce – Fir Forest** type occurs northeast of Long Pond and south of Rabbit Pond, and can be accessed via the Turtle Ridge Trail. Large, mature examples of this community type are rare in the region. The majority of this area of Nahmakanta has a fire origin; the most recent large fire in the area occurred in the 1920s. Many spruce trees we cored date to this period (~95 years old), but at several sites pockets of older forest were apparently skipped by fire, and sampled spruce trees were between 140-190 years old. This Lowland Spruce – Fir – Forest at Turtle Ridge is dominated by red spruce (80%), with paper birch (10%) and white cedar (10%) also occurring. Basal area varies from 100-130 ft²/acre, and the soil is sandy loam and very stony. The understory has a dense carpet of mosses, with red stem moss (*Pleurozium schreberi*) and Broom Moss (*Dicranum sp.*) the dominant species. Balsam fir is surprisingly sparse to absent.

One of the best examples of **Montane Spruce – Fir Forest** occurs near the top of Farrar Mountain. The canopy is dominated by mature spruce, with about 85% canopy closure. Scattered balsam fir and yellow birch and heart-leaved paper birch occur in the canopy, and the regeneration layer is mostly spruce, with some sugar maple and beech. There was no evidence of past harvest at this site. Basal area is 130 square feet per acre. One 25" red spruce was aged at 226 years, while two other red spruce were aged at 110 and 214 years.

Acidic Cliff communities, such as those at Turtle Ridge, occur on steep exposed rocky areas, with granite the primary bedrock component. Red spruce and northern white cedar grow at the top of the cliffs, while the rest of the cliffs support scattered patches of common polypody (*Polypodium virginicum*), marginal wood fern (*Dryopteris marginalis*), mountain maple (*Acer spicatum*), and beech fern (*Phegopteris hexagonoptera*). The rare fragile fern (*Dryopteris fragilis*) was found at several sites throughout the property.

Areas with slightly deeper soils occasionally support **Beech – Birch – Maple Forest**. These forests are dominated by a heterogeneous mix of American beech, yellow birch

and sugar maple, with striped maple common in the understory. Characteristic understory species found in this community include False solomon's seal (*Maianthemum racemosum*), lady fern (*Athyrium filix-femina*) and mountain wood fern (*Dryopteris campyloptera*). In some especially rich sites, the uncommon Braun's holly fern (*Polystichum braunii*) and silvery false spleenwort (*Deparia acrostichoides*) were found.

Occasional throughout, but especially near lakes and ponds **White Pine-Mixed Conifer Forest** occurs. These areas are dominated by white pines, often with lesser amounts of spruce, hemlock and northern white cedar. At one site immediately north of Nahmakanta Lake, 24" diameter white pines are 90' tall and form a super canopy in a multi-aged stand with red spruce. Three lobed bazzania moss (*Bazzania trilobum*), and red stemmed feather moss (*Pleurozium schreberi*) carpeted the forest floor. Two red spruce trees were aged at 195 and 175 years old

Fisheries and Wildlife

Most of the water bodies on the Unit support cold water fisheries, such as brook trout, lake trout (togue), and landlocked salmon. A few water bodies on the Unit are periodically stocked by MDIF&W with hatchery reared brook trout: they are Fifth and Sixth Debsconeag Ponds, Leavitt Pond, Big Murphy Pond, and Crescent Pond. Long Pond is stocked with splake (a hybrid of brook trout and lake trout). Lake trout is the principal species sought by anglers in Nahmakanta Lake, Wadleigh Pond, and Fourth Debsconeag Lake. Lake trout were stocked in Nahmakanta and Fourth Debsconeag Lakes beginning in the 1970's and early 1980's, and the population at Fourth Debsconeag Lake is now self-sustaining, while Nahmakanta Lake is still stocked periodically. Wadleigh Pond has a native lake trout population (Tim Obrey, personal communication).

Nahmakanta is an oligotrophic lake (low in nutrients, high in dissolved oxygen) that supports outstanding cold and warm water fisheries, with the principal species being white perch, landlocked salmon, and lake trout. Nahmakanta Stream and Pollywog Stream provide the necessary spawning and nursery habitat to maintain the wild salmon population in the lake. According to MDIFW, 'the reproductive and physical aspects of the habitat are excellent' (Obrey, personal communication).

MDIF&W has surveyed the fisheries in 18 Great Ponds and 2 ponds less than 10 acres on the Unit. There are several other Great Ponds and many unnamed ponds with surface areas less than 10 acres on the unit that have not been surveyed. MDIF&W plans to continue its efforts to survey the remaining Great Ponds as time permits.

All of the water bodies on the unit are open to fishing during the open-water season. Regulations vary from water body to water body to afford angling opportunity to the public while maintaining the quality of the native fisheries. Nahmakanta Lake is the only water body on the unit open during the ice fishing season. See Appendix 2 for detailed fisheries information on the water bodies within the Unit.

Wildlife

The variety of forest types, along with the streams, lakes, ponds and wetlands on the unit, provide habitats which support wildlife characteristic of the central and north Maine woods, including moose, deer, black bear, fisher, beaver, and bobcat.

The ridgeline's high softwood forests on Wadleigh, Farrar, and Female mountains may support uncommon species such as the American marten, Blackpoll warbler, Bicknell's thrush, spruce grouse, boreal chickadee, white-winged crossbill, and three-toed woodpecker. A natural resources inventory in 1992 identified eighty-six species of birds on the unit incidental to conducting other field work. No formal breeding bird surveys have been made.

As a result of fires and harvests prior to State acquisition, many stands contain a high proportion of den trees and snags. These stands have a relatively high value for wildlife and support populations of cavity nesting and roosting birds and dens for mammals. Representative bird species with a preference for these stands include red-eyed vireo, black-throated blue warbler, black-throated green warbler, white-breasted nuthatch and sharp shinned hawk.

Nearly a third of the unit is covered by former burned areas where mature aspen is the dominant species (this acreage is reducing because recent harvests within this type are converting it to mixed stands of spruce and northern hardwood). Because of the relatively older age and crown closure of the Unit's remaining aspen stands, the early successional plant species favored by many wildlife species are not abundant. However, in spite of the sparse understory, the mature aspen type is occasionally used by songbirds, raptors and grouse.

Over one-third of the Unit is mixed wood forest. This type tends to have more variability and supports more species than the burn-origin type. A few northern hardwood stands skipped by fires were also not harvested and now contain some relatively large, old trees. Some mammals with a preference for northern hardwood include white-footed mouse, porcupine and northern flying squirrel. The northern hardwood type also provides important food sources, such as beech nuts among others, for black bear, fisher and deer.

Softwood stands tend to occur along poorly drained lowlands and upper ridges. Snowshoe hare are dependent on dense young softwood stands for protection from predators. Hare are a primary prey species for the common avian (great-horned owl and goshawk) and mammalian predators (coyote, red fox and fisher), and these predator populations may fluctuate with the hare population. Reversion of some of the burn-origin aspen stands to softwood sites is well underway from advanced softwood regeneration in the understory. In some areas, this transition has been accelerated by harvesting the overstory aspen.

There are 340 acres of zoned Deer Wintering Areas on the unit. The Pollywog Pond deer yard along Gulliver Brook has 90 acres on the Unit and 331 acres north of the unit. The 90 acre portion on the Unit has not been harvested for at least 20 years and provides fair

winter shelter for deer. Access to this corner of the unit for management purposes is remote. The Black Pond deer yard encompasses 250 acres around Black Pond and its tributaries and is entirely within the unit. The Nahmakanta Stream deer yard contains 206 acres and lies almost entirely within the National Park Service (NPS) Appalachian Trail (AT) corridor along the Stream.

Rare Plant and Animal Species

Maine's Threatened and Endangered Plant list, administered by MNAP, is maintained for informational purposes only and does not carry regulatory implications. Two state-listed plant species have been found on the unit: pygmy water lily (*Nymphaea liebergii*) is listed as a Threatened Species, and fragrant fern (*Dryopteris fragrans*) is listed as a "Special Concern" species. Pygmy water lily has been found at Little Penobscot, First and Second Musquash, and Wadleigh Ponds, all of which are part of the same watershed. Second Musquash Pond contained the largest number of individual plants--75 to 100--growing as a discrete population in an emergent marsh community. Pygmy water lily is like other water lilies only smaller--approximately three inches in diameter---with a deep, v-notch in the leaf.

Fragrant fern was found in several locations in Pollywog Gorge (within the NPS corridor) and Tumbledown Dick Stream gorge, and at one location near Eighth Debsconeag Pond. Fragrant fern looks like other ferns but is smaller and distinguished by its growth habit; it is found growing in robust clumps, usually about 8-12 inches wide, from the sides of cliffs. Fragrant fern gets its name from the sweet, fruity smell released when the leaves are rubbed between the fingers.

Luminous moss (*Schistostega pennata*) is a rare moss named because it reflects light like a green cat's eye. (The State Endangered Plant List does not include mosses, but this species is believed to be rare based on current and historic collections.) It typically occurs in rock crevices near water, and on Nahmakanta it was found in Pollywog Gorge (within the NPS corridor) in a small horizontal crack on two large granitic slabs and in a similar habitat adjacent to Eighth Debsconeag Pond.

Pygmy water lily, fragrant fern and luminous moss are at relatively low risk of impacts, for the most part, due to their inaccessible locations. The largest population of pygmy water lily is located at Second Musquash Pond, which has no vehicle access. The population is also surrounded by an emergent marsh plant community, which provides a natural buffer from many potential disturbances. First Musquash and Little Penobscot Ponds also do not have vehicle access, while Wadleigh Pond has a rough boat access site suitable for launching small boats. On Wadleigh Pond, damage to the pygmy water lily population from boat propellers is a potential threat.

Only one rare animal has been observed in the Nahmakanta Unit: the **creeper** (*Strophitus undulatus*), a freshwater mussel species listed as Special Concern in Maine. Creepers prefer cool, moving freshwater and were documented in 1996 in Nahmakanta Stream not far below Nahmakanta Lake. Several dozen individuals were found, indicating that the

population was healthy. In fact, six of the ten native mussel species that occur in Maine were found in either Nahmakanta Lake or Nahmakanta stream – reflective of the overall good health of these water bodies

Ecological Reserve

The 11,080 acre Nahmakanta Ecological Reserve, situated north and northeast of Nahmakanta Lake on either side of the Appalachian Trail, is the largest Reserve in the state's system. Ecological Reserves were enabled by an act of the Maine legislature in 2000 with multiple purposes: “to serve as benchmarks against which change can be measured, to protect habitat for species whose needs may not be met on managed forests, and to serve as sites for scientific research, monitoring, and education” ([Public Laws of Maine, Second Regular Session of the 119th, Chapter 592](#)).

Also known as the ‘Debsconeag Backcountry’, the Nahmakanta Ecological Reserve encompasses a network of remote hiking trails and isolated ponds prized for their intact, native brook trout fisheries. East of Nahmakanta Lake, the Reserve includes the watersheds of the 5th through 8th Debsconeag Lakes. North of Nahmakanta Lake, the Reserve shares the intact watersheds of the Murphy Ponds with The Nature Conservancy's neighboring Debsconeag Wilderness Area. In fact, the adjoining Nature Conservancy and BPL reserve tracts contain the highest concentration of remote, pristine ponds in New England (TNC 2011).

Forest stands consist of a variety of mid-successional, fire-origin hardwood and softwood stands (aspen, red pine, spruce). Most of the uplands within the Reserve show some evidence of harvesting or fire, but some remote stands support stands with trees over 300 years old, including a 320 year old northern white cedar and a 397 year old red spruce (Lortie et al 1992). Many of the exemplary natural communities are partly within lands protected by the National Park Service as part of the Appalachian Trail.

The intact and roadless watersheds, remote ponds, and native fisheries were all important features in justifying the establishment of the Ecological Reserve. Moreover, the diversity of intact forest types in an un-fragmented setting enabled the Reserve to meet all the Reserve criteria established by McMahon (1998) and later updated by the Ecological Reserve Scientific Advisory Committee (2009).

A series of 50 baseline forest monitoring plots were established in the Reserve in 2005. Data from these plots are used to compare Reserve forests to managed lands and to track ecological changes over time.

References

Hall, J. BPL. Personal communication. August 2011.

Lortie, J., Rooney, S., Royte, J., and J. McMahon. 1992. Landscape Analysis and Inventory of the Nahmakanta Management Unit. Prepared for the Maine Bureau of Public Lands.

McMahon, J. 1998. An Ecological Reserves System Inventory: Potential Ecological Reserves on Maine's Existing Public and Private Conservation Lands. Maine Forest Biodiversity Project. Maine State Planning Office, Augusta.

Maine Bureau of Parks and Lands. 1995. Nahmakanta Unit Management Plan. Maine Department of Conservation, Augusta.

Maine Ecological Reserves Scientific Advisory Committee. 2009. Ecological Reserves in Maine: A Status Report on Designation, Monitoring, and Uses. Maine Department of Conservation. Augusta.

Obrey, T. MDIFW. Personal communication, August and September 2011.

Penobscot Development Company, 1922 The Penobscot Lumbering Association Records, University of Maine.

The Nature Conservancy, 2011. Information on the Debsconeags Wilderness at <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/maine/placesweprotect/debsconeag-lakes-wilderness-area.xml>.

Appendix 1: Exemplary Natural Communities and Rare Plant and Animal Species of the Nahmakanta Unit

Fact sheets are available for each of the rare species
and natural communities at

<http://www.maine.gov/doc/nrimc/mnap/features/index.htm>

Nahmakanta					
Rare Plants	Location	S-Rank/ G-rank	EO Rank	Last Obs.	Size (ac)
Fragrant fern (<i>Dryopteris fragrans</i>)	Tumbledown Dick Gorge	S3/G5	C	2003	1
Pygmy water lily (<i>Nymphaea liebergii</i>)	First and Second Musquash Ponds	S2/G5	A	1992	11
Rare Animals	Location	S-Rank/ G-rank	EO Rank	Last Obs.	Size (ac)
Creeping (<i>Strophitus untulatus</i>)	Nahmakanta Stream	G5	Not available	1996	N/A
Natural Communities	Location	S-Rank/ G-rank	EO Rank	Last Obs.	Size (ac)
Spruce – Northern Hardwood Forest	Nusuntabunt Mountain	S5	B	2010	90
Spruce – Northern Hardwood Forest	South of Nahmakanta Lake	S5	B	2003	56
Montane Spruce Fir Forest	Farrar Mountain	S5	B	2010	302
Montane Spruce Fir Forest	Wassataquoik Stream	S5	B	2008	133
Aspen – Birch Woodland	Nahmakanta Ecological Reserve	S5	A	2005	942

**Appendix 2: Water Quality and Fisheries Data on Lakes and Ponds
within the Nahmakanta Unit**

Water Body	Water Quality Data (Y/N)	Depth Maps (Y/N)	Principal Fisheries	Stocked? (Y/N)	Vehicle Access? (Y/N)	Fishing Use (H/M/L)	Comments
Black	Y	Y	Brook trout	N	Y	Low	marginal trout fishery
Crescent	Y	Y	Brook trout	Y	N	Moderate	
Eighth Debsconeag	N	N	Unknown	N	N	Unknown	Unsurveyed
Female	Y	Y	Brook trout	N	N	Low	Native brook trout pond
Fifth Debsconeag	Y	Y	Brook trout	Y	N	Low	
First Musquash	Y	Y	None	N	Y		
Fourth Debsconeag	Y	Y	Lake Trout	Y*	Y	Low	*Last year stocked 1982, now self sustaining
Gould	Y	Y	Brook trout	N	N	Low	Native brook trout pond
Harding	N	N	Unknown	N	N	Unknown	Unsurveyed
Hedgehog	Y	Y	None - minnows present	N	N	Unknown	
Leavitt	Y	Y	Brook trout	Y	Y	Low	
Little Penobscot	N	N	Unknown	N	N	Unknown	Unsurveyed
Long	Y	Y	Brook trout, splake	Y	Y	Moderate	No plans to stock brook trout in the future.
Loon	Y	Y	Fishless	N	N	Unknown	
Murphy	Y	Y	Brook trout	Y	N	Unknown	
Nahmakanta	Y	Y	Lake trout, landlocked salmon, white perch	Y	Y*	Low	Vehicle access to within 1/4 mile of launch site
Penobscot	Y	Y	Brook trout	N	Y	Low	
Pollywog	Y	Y	Brook trout, lake trout	N	Y	Low	Native brook trout pond.
Prentiss	Y	Y	Brook trout	N	Y?	Moderate	Native brook trout pond
Rabbit	Y	Y	Brook trout	N	N	Low	Native brook trout pond
Second Musquash	N	N	None	N	Y	Unknown	
Seventh Debsconeag	N	N	Unknown	N	N	Unknown	Unsurveyed
Sing Sing	Y	Y	Brook trout	N	N	Low	Native brook trout pond
Sixth Debsconeag	Y	Y	Brook trout	Y	N	Low	
Stink Pond	N	N	Unknown	N	N	Unknown	Unsurveyed - Likely fishless
Third Musquash	N	N	Unknown	N	N	Unknown	Unsurveyed
Wadleigh	Y	Y	Lake Trout, Brook Trout	N	Y	Low	Native brook trout and lake trout pond

Source: MDIFW and DOC staff, 2011

Appendix 3: Maps of the Nahmakanta Unit

