

**Natural Resource Inventory
of the
Bureau of Parks and Lands
Kennebec Highlands Unit**



Round Pond

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**For the
Bureau of Parks and Lands**

July 2007

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Preface

This Natural Resource Inventory (NRI) was conducted for the Bureau of Parks and Lands (BPL) by the Maine Natural Areas Program (MNAP) as part of the Bureau's management plan development process for the Kennebec Highlands unit. No previous NRIs have been completed for this unit.

The primary purpose of this NRI is to identify and describe important natural resources that should be considered in drafting the Bureau's management plan for the unit. Previous fieldwork has been completed by MNAP staff, including Sue Gawler and Matt Arsenault, in 2000 and 2005. An additional day of fieldwork was completed in June 2007, and information gleaned from that work was appended to the preliminary NRI report. In all cases, fieldwork is preceded by landscape analysis performed using relevant GIS layers, aerial photos, and consultation with BPL staff.

Acknowledgements

This NRI was a collaborative effort between MNAP and BPL staff. BPL staff with particular insight into the Kennebec Highlands unit includes Tom Charles and Joe Wiley. Important information about land use history and wildlife was provided by Brian Alexander (BRCA), Roy Bouchard (BRCA), Keel Kemper (IFW), and Don Mairs. Sarah Becker (MNAP) provided technical support.

Kennebec Highlands Unit

Regional Overview

Though technically part of the Central Interior biophysical region of Maine, Kennebec Highlands, with its relatively high elevation peaks, has much in common with the neighboring Western Foothills biophysical region (Charles 2007). While its surroundings are characterized by flat to gently rolling terrain, elevations on the Kennebec Highlands unit range from 237 to over 1,200 feet above sea level, and Vienna and McGaffey Mountains are two of the area's highest peaks.

Compared to other inland regions, the climate is moderate. Summers are warm, and the frost-free season is about 120 days. Mean maximum July temperature is 80° F, and the mean minimum January temperature is 3° F. Average annual precipitation (45") and snowfall (90") are intermediate between southern and northern regions. The flora of this region reflects its

relatively moderate climate. Among forest ecosystems, there is a transition from a northern Appalachian forest of oak, pine, and mixed hardwoods in southern Maine to the spruce, fir, northern hardwoods forests found in northern and eastern Maine (McMahon 1993). Forests on the Kennebec Highlands unit reflect this transition, with oak-dominated forests only present in small patches on warm, south-facing slopes.



A view of Round Pond from Round Top.

Property Description

The 5,000 acre Kennebec Highlands unit features remote ponds, streams, rolling uplands, and several low mountains (Map 1). The uplands are forested with early- to mid-successional growth. Most of the uplands have a relatively recent history of timber

harvest or other human intervention such that undisturbed upland settings are scarce. Several small, undeveloped ponds on the unit provide important native fish habitat. Other features include deer wintering areas, wading bird and waterfowl habitat, and an exemplary Unpatterned Fen Ecosystem.

Geology and Soils

A variety of metamorphic rocks and granite underlie the Vienna Mountain area west of Great and Long Ponds in Belgrade (Map 2). The metamorphic rocks were originally heterogeneous units of sand and mud, with some limy layers, that were deposited in an ocean adjacent to North America about 435 million years ago. A collision between a microcontinent and the North American margin around 400 million years ago built the largest mountains ever to exist here and also consumed the ocean basin, contorting and metamorphosing the sedimentary materials. The thickening of continental crust that accompanies such collisions caused the lower crust to partially melt. The more buoyant magma then migrated upward to mid-crustal levels before cooling into granite. The heat that accompanied the granite intrusion additionally metamorphosed the rocks it contacted, creating metamorphic rock that is highly resistant to erosion. Nearly 400 million years of erosion followed, culminating with Nature's greatest agent of erosion – glacial ice – to expose the granite and metamorphic rocks at the surface of the Earth (Marvinney 2007).

The high ground of this tract of land is underlain with the more resistant metamorphic rocks, including quartzite, schist, and metamorphosed limy sediments called calc-silicate rock. A dark gray schist and metasandstone unit exposed just west of the summit of Roberts Hill and on the western slopes of McGaffey Mtn contains abundant sulfide minerals that produce a rusty weathering rind and often give rocks an orangey hue. Geologic forces contorted the original horizontal layering of these rocks such that it is now tilted on edge and aligned in a northeast-southwest direction. The distribution of these units and the orientation of layering is the primary control on topography in the area. On the east and northwest sides, the lower slopes of these hills are underlain with granite, which is less resistant to weathering and erosion. This granite is medium grained, with abundant quartz, orthoclase and plagioclase feldspars, and both biotite and muscovite micas. These so-called two-mica granites typically have substantial quantities of naturally occurring uranium (Marvinney 2007).

Sculpting by glaciers during the last 2 million years has rounded the hills, imparting a secondary northwest-oriented streamlining to some (particularly those underlain with granite). Thin, sandy glacial till drapes over most of the lower to intermediate slopes of the hills, with most of the summit areas having abundant rock exposures (Map 3). Post-glacial swamp materials underlie the low-lying areas (Marvinney 2007).

Soils at Kennebec Highlands formed in glacial till and the underlying bedrock. The two most common soil types on the unit are Lyman loam and Berkshire very stony fine sandy loam. The Lyman series is characterized by shallow, somewhat excessively drained soils

that developed in a thin mantle of glacial till and frost fractured rock fragments. The Berkshire series consists of very deep, well drained soils on glaciated uplands.

Hydrology and Water Quality

Ponds in the Kennebec Highlands include McIntire Pond, Kidder Pond, and Boody Pond in the western half of the area, and the Round Pond – Beaver Pond complex in the eastern portion. The Kennebec Highlands unit borders Watson Pond, which has camps along its east side but is otherwise undeveloped. Long Pond, a major lake in the Belgrade Lakes chain, lies to the east. The western half of the unit is part of the Androscoggin River watershed, via Hopkins Stream and Androscoggin Lake. The eastern half of the unit is part of the Kennebec River watershed via Long Pond.

Several of the ponds at Kennebec Highlands have been selected by The Nature Conservancy as portfolio lakes, meaning they are high value waters that best represent the ecosystems, natural communities, and species characteristic of the region. Criteria used in evaluating lakes and ponds include water quality, dam impacts, presence of rare or noteworthy species, rarity, and remoteness. Portfolio lakes in the Kennebec Highlands unit include: Beaver Pond, Round Pond, McIntire Pond, and Boody Pond.



McIntire Pond

Wetlands

The relatively steep, narrow drainages within the unit don't lend themselves to the creation of large wetlands. Kennebec Highlands has 337 acres of wetlands, only 97 of which are forested (Map 4). These wetlands tend to surround ponds or be in small, isolated pockets along drainages. The largest wetland in the unit is the exemplary Unpatterned Fen Ecosystem that surrounds Beaver and Round Ponds.

Ecological Processes

As noted below, Kennebec Highlands differs from most other BPL units in its intensity of human use. Human use has had a profound impact on the landscape and constitutes one of the major disturbances on the unit. Homesteads established in the late 1800s have left a lasting imprint on the landscape, and clearing of areas for agriculture and pasture likely affected soil structure. Heavy harvests in recent times may mask other natural disturbance patterns such as blowdowns.

Portions of the forest on the unit were heavily damaged in the 1998 ice storm. Damage is worst on east and north-facing slopes and is less noticeable west of Vienna and McGaffey Mountains (Charles 2007).

Isolated lightning strikes have likely occurred on the unit, though no large-scale fires are known (Alexander 2007). Small fires, such as those caused by lightning strikes, open up patches of forest that are typically recolonized by fast growing, short lived species such as aspen and paper birch. This patchy disturbance contributes to an uneven and diverse forest canopy.

Beaver activity has been noted along many of the drainages in the unit. Beavers build dams to give them safe access to the hardwoods they prefer to eat. When active, beaver ponds flood adjoining uplands, enlarging wetlands and creating new areas for wetland species to colonize. Once the hardwoods within a safe distance of the pond are gone, beavers often abandon their dam and build a new dam in a different location. These abandoned ponds typically slowly fill with sediment and transition from marshy wetlands back to uplands. By creating and abandoning impoundments along the stream course, beavers create a mosaic of habitats for other plant and wildlife species.

Land Use and Harvest History

Kennebec Highlands was acquired through a series of transactions between 2000 and 2004. The unit includes old homesteads and pasture land, as evidenced by numerous stone walls and old foundations. During a 2003 survey of the area, 15



Stone walls throughout the region indicate a long history of human habitation and use of the land.

homesteads were documented, and the 1897 town maps of Vienna and Rome indicate that the remains of at least 20 houses and two schools may be within the parcel (Mosher and Cranmer 2004) (Map 7). It's estimated that as much as one-quarter of the Kennebec Highlands parcel may have been cleared for agriculture and pasture at one time (Alexander 2007). In addition, diversion ditches were dug from Kidder Pond to the Mill Stream watershed and from Round Pond to the Watson Pond drainage; both presumably served to provide more water to small mills downstream (Alexander 2007). Timber has been harvested multiple times, including recent heavy harvests that occurred prior to BPL's acquisition of the unit.

Fisheries and Wildlife

The unit has 516 acres of deer wintering area and 389 acres of inland wading bird and waterfowl habitat (Map 5). Though no systematic terrestrial wildlife surveys have been completed, wildlife or wildlife signs observed on the unit include: beaver, moose, deer, bear, bobcat, turkey, fisher, coyote, rabbit, muskrat, raccoon, and porcupine (Alexander 2007; Kennebec Highlands public meeting May 2007). The unit also likely supports snowshoe hare, red fox and numerous other mammals common to the region (DeGraaf and Yamasaki 2001). The tables below list fish species for ponds that have been surveyed and birds one might encounter on the unit (PEARL 2007; Mairs 2007).

Fish at Kennebec Highlands

Pond Name	Size (acres)	Total Drainage Area (sq. miles)	Mean Depth (feet)	Maximum Depth (feet)	Fish Species
Beaver Pond	15	3.09	Not surveyed	Not surveyed	Not surveyed
Boody Pond	13	0.53	4	12	Brown bullhead, banded killifish, golden shiner, creek chub
Kidder Pond	31	0.27	8	26	Brown bullhead, white sucker, chain pickerel, smallmouth bass, golden shiner, brook trout
McIntire Pond	12	0.24	7	20	Golden shiner, northern redbelly dace, blacknose dace, brook trout, creek chub
Round Pond	10	1.64	Not surveyed	Not surveyed	Not surveyed
Watson Pond	69	1.02	12	24	Brown bullhead, American eel, chain pickerel, pumpkinseed, smallmouth bass, white perch, golden shiner, brook trout

Birds at Kennebec Highlands

Expected Species

Additional Species Probably Present

Canada Goose	Herring Gull	Common Raven	Black-and-white Warbler	Mallard
Wood Duck	Mourning Dove	Tree Swallow	American Redstart	Common Goldeneye
American Black Duck	Black-billed Cuckoo	Black-capped Chickadee	Ovenbird	Green Heron
Green-winged Teal	Great Horned Owl	Tufted Titmouse	Northern Waterthrush	Merlin
Ring-necked Duck	Barred Owl	Red-breasted Nuthatch	Common Yellowthroat	Virginia Rail
Hooded Merganser	Northern Saw-whet Owl	White-breasted Nuthatch	Canada Warbler	Greater Yellowlegs
Common Merganser	Ruby-throated Hummingbird	Brown Creeper	Scarlet Tanager	Solitary Sandpiper
Ruffed Grouse	Belted Kingfisher	House Wren	Eastern Towhee	Rock Pigeon
Wild Turkey	Yellow-bellied Sapsucker	Winter Wren	American Tree Sparrow	Common Nighthawk
Common Loon	Downy Woodpecker	Eastern Bluebird	Chipping Sparrow	Brown Thrasher
American Bittern	Hairy Woodpecker	Veery	Savannah Sparrow	Tennessee Warbler
Great Blue Heron	Northern Flicker	Hermit Thrush	Fox Sparrow	Cape May Warbler
Osprey	Pileated Woodpecker	Wood Thrush	Song Sparrow	Palm Warbler
Bald Eagle	Olive-sided Flycatcher	American Robin	Swamp Sparrow	Mourning Warbler
Northern Harrier	Eastern Wood-Pewee	Gray Catbird	White-throated Sparrow	Wilson's Warbler
Sharp-shinned Hawk	Alder Flycatcher	European Starling	Dark-eyed Junco	Field Sparrow
Cooper's Hawk	Least Flycatcher	Cedar Waxwing	Rose-breasted Grosbeak	Lincoln's Sparrow
Northern Goshawk	Eastern Phoebe	Nashville Warbler	Red-winged Blackbird	White-crowned Sparrow
Red-shouldered Hawk	Great Crested Flycatcher	Northern Parula	Common Grackle	Northern Cardinal
Broad-winged Hawk	Eastern Kingbird	Yellow Warbler	Brown-headed Cowbird	Indigo Bunting
Red-tailed Hawk	Northern Shrike	Chestnut-sided Warbler	Baltimore Oriole	Pine Grosbeak
American Kestrel	Blue-headed Vireo	Magnolia Warbler	Purple Finch	Evening Grosbeak
Peregrine Falcon	Warbling Vireo	Black-throated Blue Warbler	Red Crossbill	
Sora	Red-eyed Vireo	Yellow-rumped Warbler	White-winged Crossbill	
Spotted Sandpiper	Blue Jay	Black-throated Green Warbler	Common Redpoll	
American Woodcock	American Crow	Blackburnian Warbler	Pine Siskin	
		Pine Warbler	American Goldfinch	

Rare Animal and Plant Species

A small population of alpine clubmoss (*Huperzia selago*), also known as northern firmoss, is located just south of the southern tip of Watson Pond adjacent to a trail. This rare (S2) plant is growing in a saturated area overlain by *Sphagnum* moss. Associated species include cinnamon fern (*Osmunda cinnamomea*), bunchberry (*Cornus canadensis*), and hemlock (*Tsuga canadensis*) and balsam fir (*Abies balsamea*) seedlings growing beneath a canopy of spruce and fir.

No rare animals are known from this unit.

Natural Communities

As mentioned earlier, forests on the unit have an extensive history of human use including recent harvests. The forest is dominated by hardwood (59%) and mixed wood (34%), with small amounts of pine (5%), softwood (2%), and one small patch of oak (15 acres) on the south side of Round Top. Recent harvests combined with topography mean that 70% of the unit's forest has less than 66% canopy closure and 12% of the forest has less than 33% canopy closure.



The north end of the Unpatterned Fen Ecosystem forms the south end of Round Pond.

The Kennebec Highlands unit includes an exemplary Unpatterned Fen Ecosystem surrounding Beaver and Round Ponds (Map 6). Unpatterned Fen Ecosystems are peatlands that form along a low gradient stream channel where flow is impeded such that peat can accumulate but where water still flows in and out of the system. These fens are well distributed throughout the state; however the Kennebec Highlands fen is a good example of the smaller-sized expression of this type of peatland. The peatland ecosystem is comprised of at least four vegetation types, which occur in different portions of the wetland and provide habitat diversity. The vegetation types are: Mixed Tall Sedge Fen, Sweetgale Mixed Shrub Fen, Leatherleaf Boggy Fen, and Mixed Graminoid – Shrub Marsh. In addition, the wetland is of interest because it represents the northern range limit of poison sumac (*Toxicodendron vernix*), a plant of southern affinities which is uncommon in Maine. There is also open water aquatic

vegetation in Beaver Pond and its inlet, including Water-lily – Macrophyte Aquatic Bed and Pickerelweed – Macrophyte Aquatic Bed vegetation. These are all common vegetation types statewide but form a high-quality mosaic here.

A small, open slope is located on the upper, eastern aspect slopes of Round Top. The large slabs (2-6 feet across) of rock form a rough slope with 40% cover of vegetation. Species include: mountain maple (*Acer spicatum*), bush-honeysuckle (*Diervilla lonicera*), low bush blueberry (*Vaccinium angustifolia*), red oak seedlings (*Quercus rubra*), serviceberry (*Amelanchier sp.*), and a sedge (*Carex lucorum*). Shallow soils and dryness seem to be the limiting factors here. Over time, the slope may revegetate. A flock of turkey vultures were spooked off the slope.

The area surrounding the slope has been harvested within the last 40 years. It currently consists of stunted red oak, with an understory of low bush blueberry, trailing arbutus (*Epigaea repens*), wintergreen (*Gaultheria procumbens*), Canada mayflower (*Maianthemum canadense*), and rock cap polypody (*Polypodium virginianum*). As the community continues to recover from harvests, it may mature into a Birch – Oak Talus Woodland, but for now, it appears that the canopy closure might still be increasing and understory vegetation associations have not stabilized.

Further upslope, the community becomes a Red Oak – Northern Hardwoods – White Pine Forest. Again, the community is relatively young, and large, decaying stumps are common. Red oak dominates, with paper birch and red maple also in the canopy. The largest trees are scarcely more than 20 feet tall. Common species in the understory include: bush-honeysuckle, marginal wood fern (*Dryopteris marginalis*), whorled aster (*Oclemena acuminata*), wild sarsaparilla (*Aralia nudicaulis*), and bindweed (*Fallopia sp.*). On the southern slope, the community seemed more mature, with 80% canopy closure and young to mid-aged trees. Beech is a significant component in the canopy in this location.

No exemplary natural communities were documented in upland areas surveyed by MNAP staff. All of the forest seen was mid-successional or recently harvested, with some areas cut hard. Small bands of mature forest remain around most of the ponds and some of the wetlands, but these forests are not extensive enough to be considered exemplary. They do, however, provide important buffer functions. Given sufficient time to develop, some of the upland areas could become good representative natural forests. At present, Kennebec Highlands' primary conservation values are as undeveloped open space, undeveloped ponds, and large unfragmented habitat.

Management Considerations

- One of the prime ecological values of Kennebec Highlands is the comparative lack of permanent roads, and additional fragmenting features should be minimized where possible. Though the Kennebec Highlands unit has relatively few exemplary features, its size as an undeveloped block of land in rapidly developing central Maine makes it especially valuable wildlife habitat. Large habitat blocks are especially important to species with large home ranges, such as bobcat, bear, and fisher. Large habitat blocks also are likely to include a wider diversity of species than smaller blocks. Maintaining its unfragmented character (by, for instance, not building permanent roads) will help sustain the values of this parcel.
- Management activities in or adjacent to the exemplary features on the unit, including the Unpatterned Fen Ecosystem and the alpine clubmoss population, should be planned in consultation with MNAP staff.
- While different species can have different buffering requirements, wider buffers provide better protection for riparian and wetland-dependent species. Buffering ponds

and wetlands from roads and harvests will help maintain the high quality of the numerous small ponds on the unit.

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Appendix 1: Exemplary Features of the Kennebec Highlands Unit

Exemplary Features of the Kennebec Highlands Unit

Feature Name	Location	S-rank/ G-rank	EO- Rank	Last Obs.	Size (ac)
Alpine clubmoss (<i>Huperzia selago</i>)	Watson Pond	S2/G5	C	2005	point
Unpatterned Fen Ecosystem	Round and Beaver Ponds	S4/GN R	B	2000	98

Appendix 2: Rare Plant Fact Sheet



Maine Department of Conservation
Natural Areas Program

Huperzia selago (L.) Bernh. ex Mart. & Schrank

Northern Firmoss

- Habitat:** Damp or mossy rocks, barrens, cold woods
- Range:** Circumboreal; Labrador and Greenland to Alaska, south to the mountains of Maine, New Hampshire, Vermont and northern New York, on the summits of the higher Alleghenies to North Carolina, and to Michigan and Washington. Also in Europe and Asia.
- Phenology:** Sporates July - September.
- Family:** Huperziaceae (formerly in Lycopodiaceae)

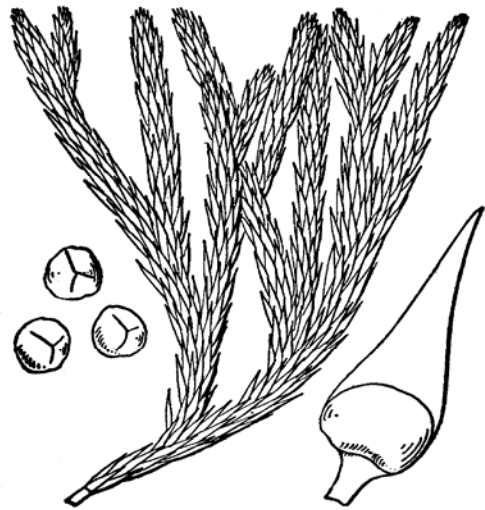


Illustration from Britton & Brown's Illustrated Flora of the Northern United States and Canada, 2nd ed.

Aids to Identification: Northern firmoss is similar in appearance to some other, more common, firmosses. Its dense, leafy stems grow 5-10 cm high, in close tufts, giving the clumps a flat-topped appearance. The scale-like leaves bear the sporangia (spore-producing bodies) in their axils, so that the yellowish spikes characteristic of most clubmosses are lacking. *Huperzia selago* is very similar to *H. appalachiana* and the two species are very difficult to separate. *H. appalachiana* has smaller, more upward oriented leaves and determinate stems (i.e., the entire stem dies and turns yellow). *H. selago* has larger, more spreading or recurved leaves and indeterminate stems.

Ecological characteristics: *Huperzia selago* is not an alpine species, contrary to previous thought. Popular sites for *H. selago* in New England include disturbed sites near water, such as shores, ditches, and coniferous forests. Hybrids with *H. appalachiana* are frequent above treeline on New England's higher alpine summits. But *H. selago* is not found above treeline.

Synonyms: Formerly known as *Lycopodium selago*.

Rarity of *Huperzia selago*

State Rank:	S1	Critically imperiled in Maine because of extreme rarity or vulnerability to extirpation.
New England Rank:	INDT	Indeterminate. Under review for inclusion in appropriate division. Taxonomy, nomenclature, or status not clearly understood.
Global Rank:	G5	Demonstrably widespread, abundant, and secure globally.

Status of *Huperzia selago*

Federal Status:	None	No Federal Status.
State Status:	Threatened	
Proposed State Status:	Threatened	Rare and, with further decline, could become endangered; or federally listed as Threatened. Listing criteria met: Special habitat, At edge of range, Vulnerable to human activity

Known Distribution in Maine:

This rare plant has been documented from a total of 3 town(s) in the following county(ies): Franklin, Oxford, Washington.

Dates of documented observations are: 1975, 1990, 1999



- ▲ Historical (before 1982)
- Recent (1982 - present)

Reason(s) for rarity:

At southern limit of its range.

Conservation considerations:

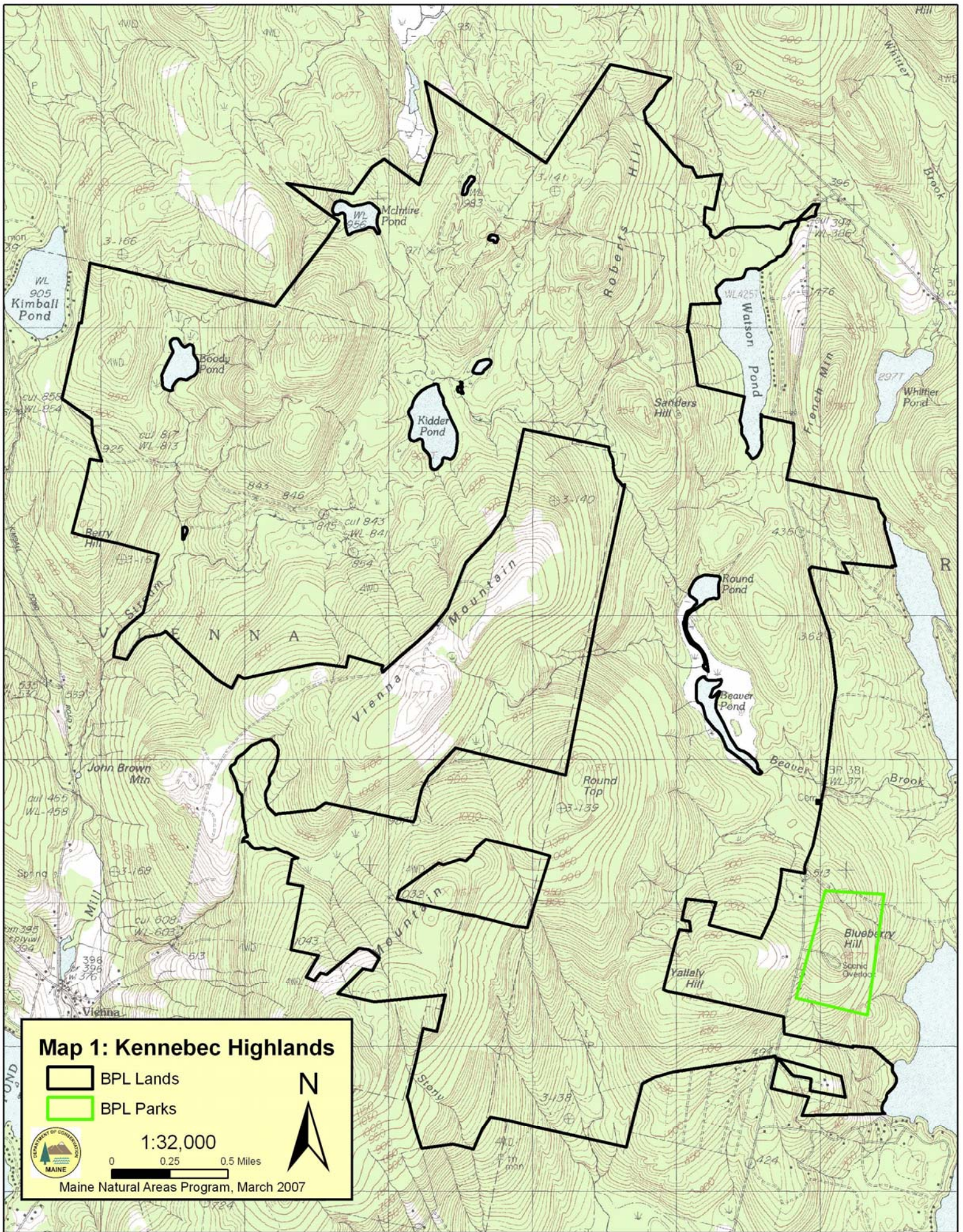
Populations could be threatened by heavy recreational (hiking) use.

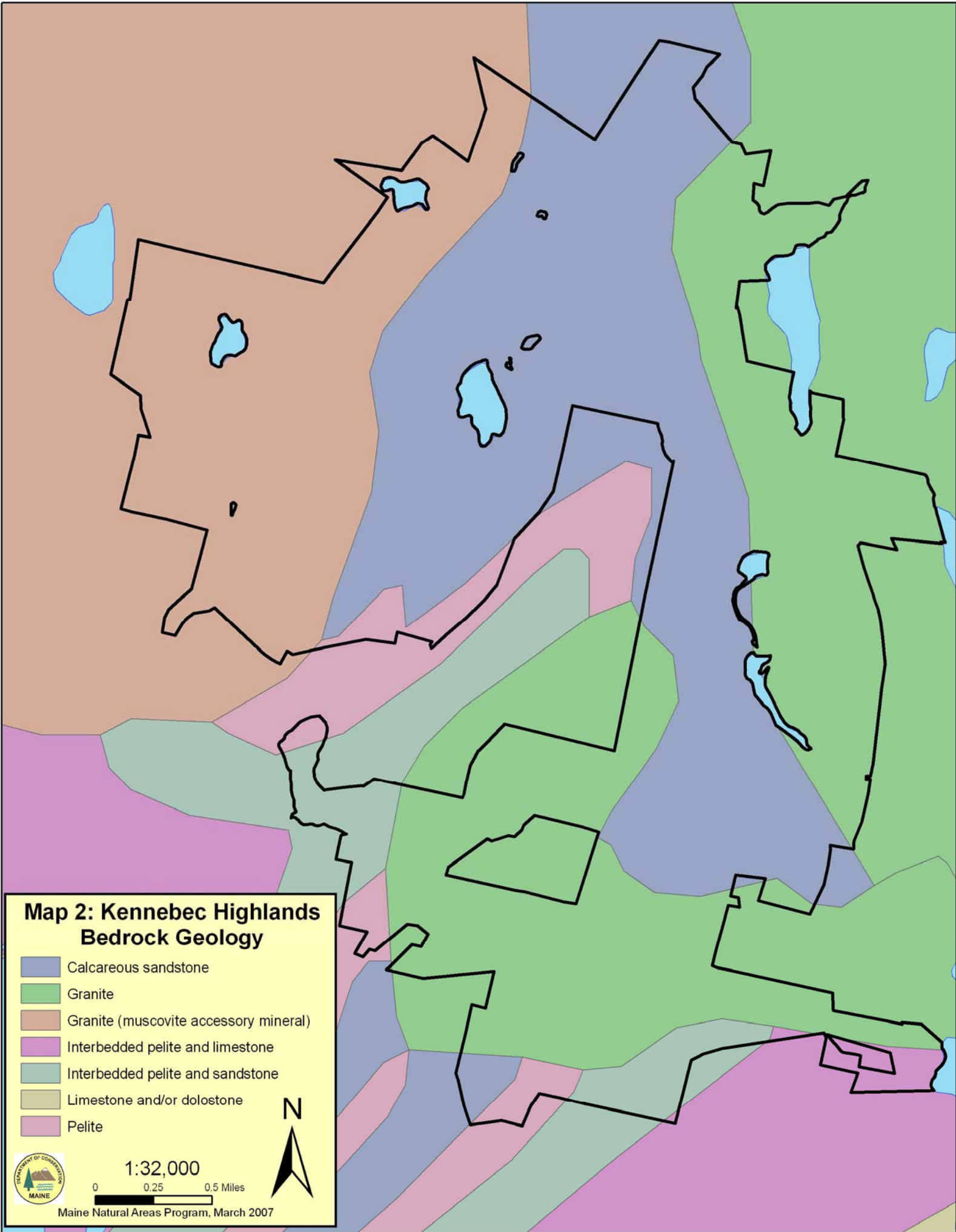
The information in this fact sheet was downloaded from the Natural Areas Program's Biological and Conservation Database on 13 MAY 2004. We are grateful to our Botanical Advisory Group for additional information on particular species, and in particular, to Arthur Haines for his assistance with identifying characteristics and taxonomic questions. Nomenclature follows Haines and Vining's *Flora of Maine* (V.F. Thomas Press, 1998); where older works refer to a plant by another name, it is given under "Synonyms". The Natural Areas Program, within the Department of Conservation, maintains the most comprehensive source of information on Maine's rare or endangered plants and rare or exemplary natural communities, and is a member of the Association for Biodiversity Information.

If you know of locations for this plant or would like more information on this species, please contact the Natural Areas Program
State House Station 93, Augusta, Maine 04333; telephone (207) 287-8044.



Appendix 3: Maps of the Kennebec Highlands Unit





Map 2: Kennebec Highlands Bedrock Geology

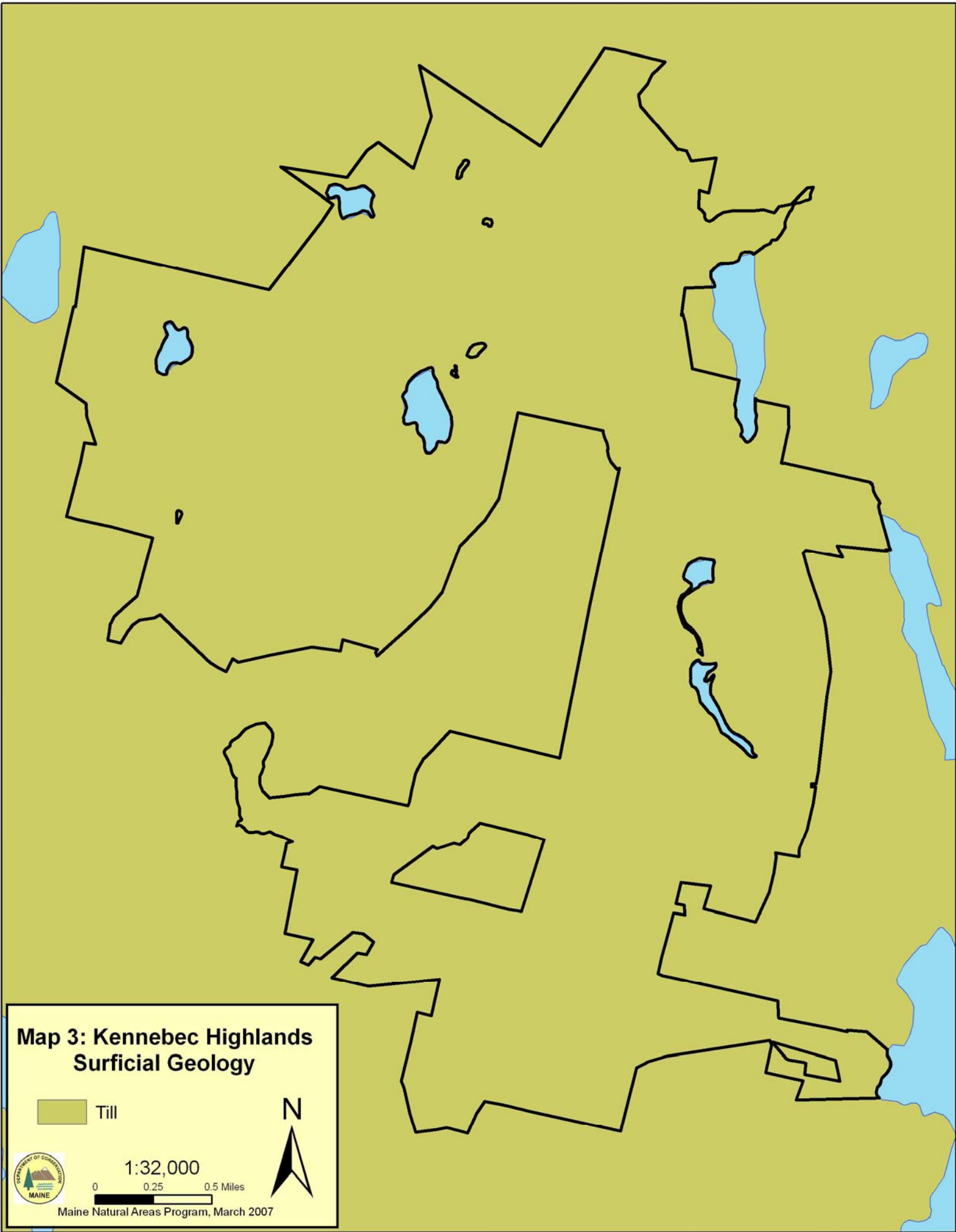
- Calcareous sandstone
- Granite
- Granite (muscovite accessory mineral)
- Interbedded pelite and limestone
- Interbedded pelite and sandstone
- Limestone and/or dolostone
- Pelite

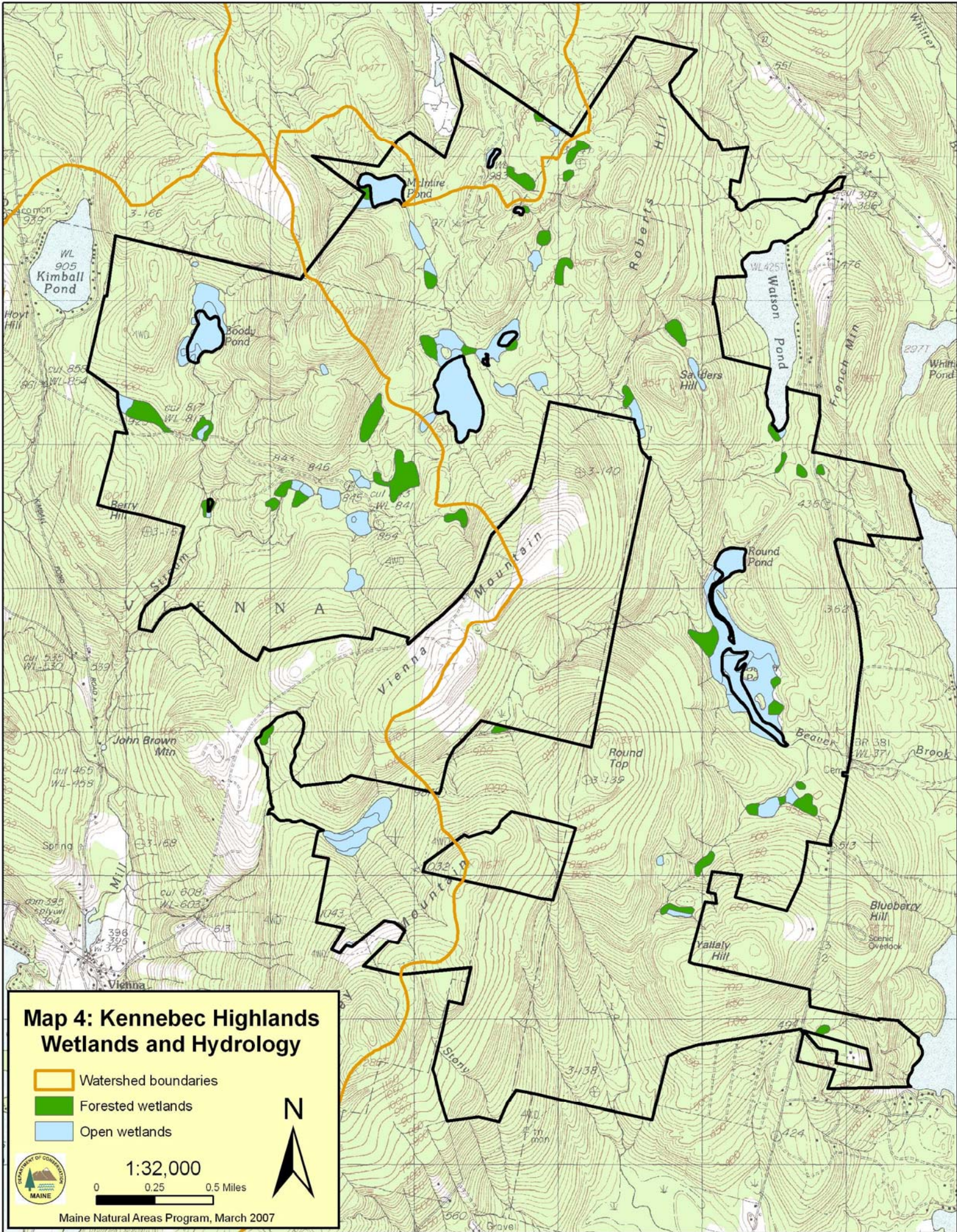


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Maine Natural Areas Program, March 2007





Map 4: Kennebec Highlands Wetlands and Hydrology

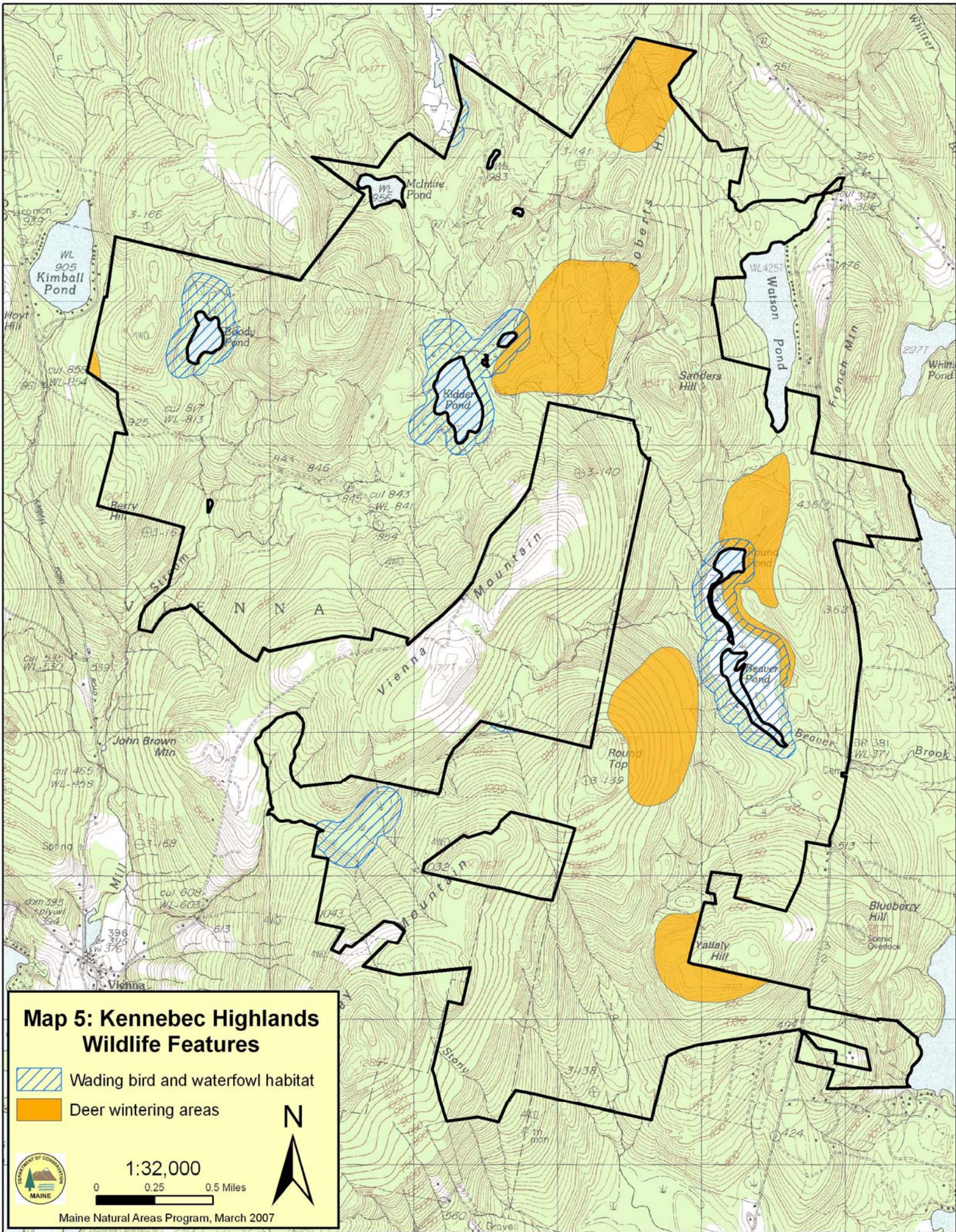
- Watershed boundaries
- Forested wetlands
- Open wetlands





1:32,000

0 0.25 0.5 Miles

Maine Natural Areas Program, March 2007



Map 5: Kennebec Highlands Wildlife Features

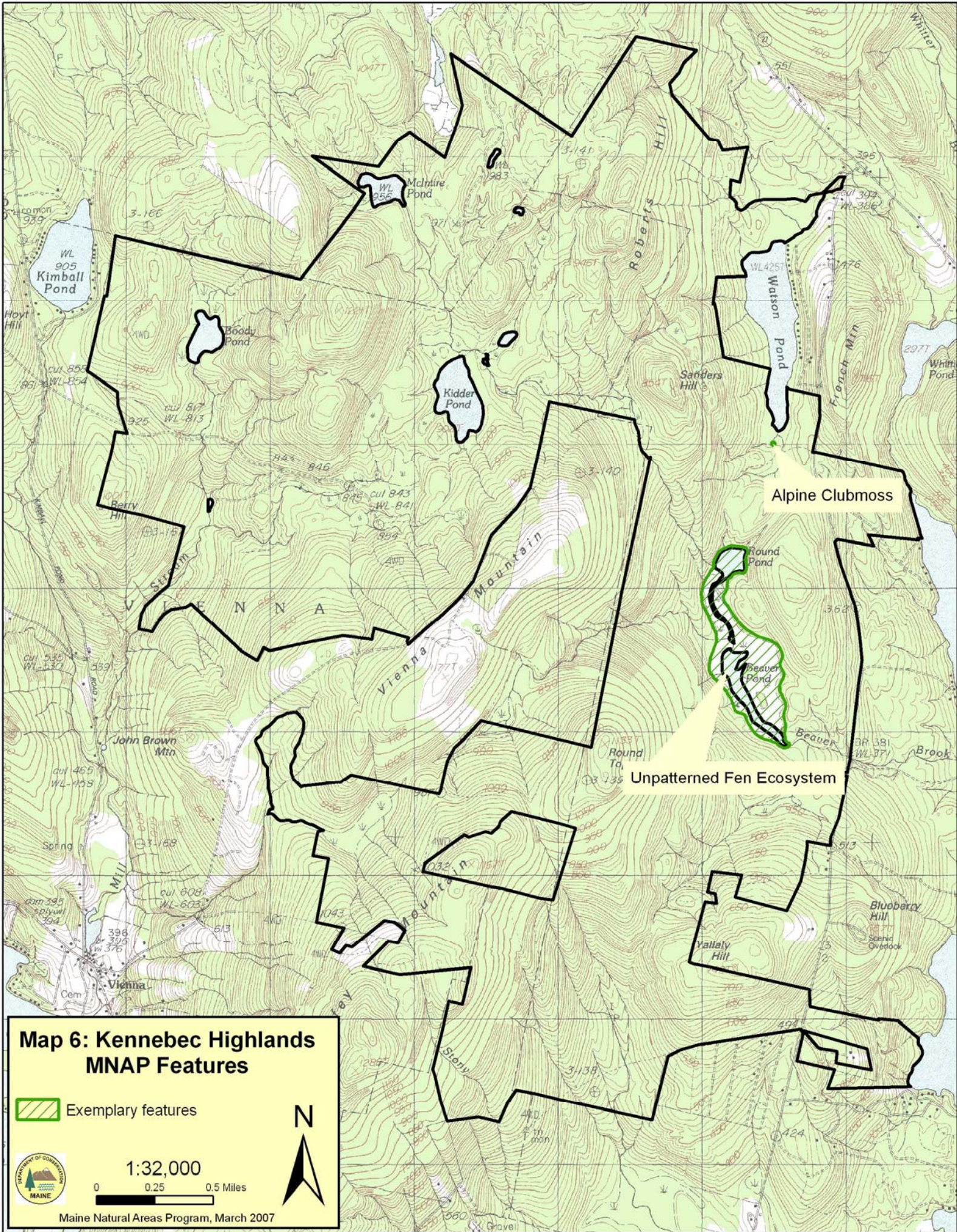
-  Wading bird and waterfowl habitat
-  Deer wintering areas



1:32,000

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Alpine Clubmoss

Unpatterned Fen Ecosystem

Map 6: Kennebec Highlands MNAP Features

[Green hatched box] Exemplary features

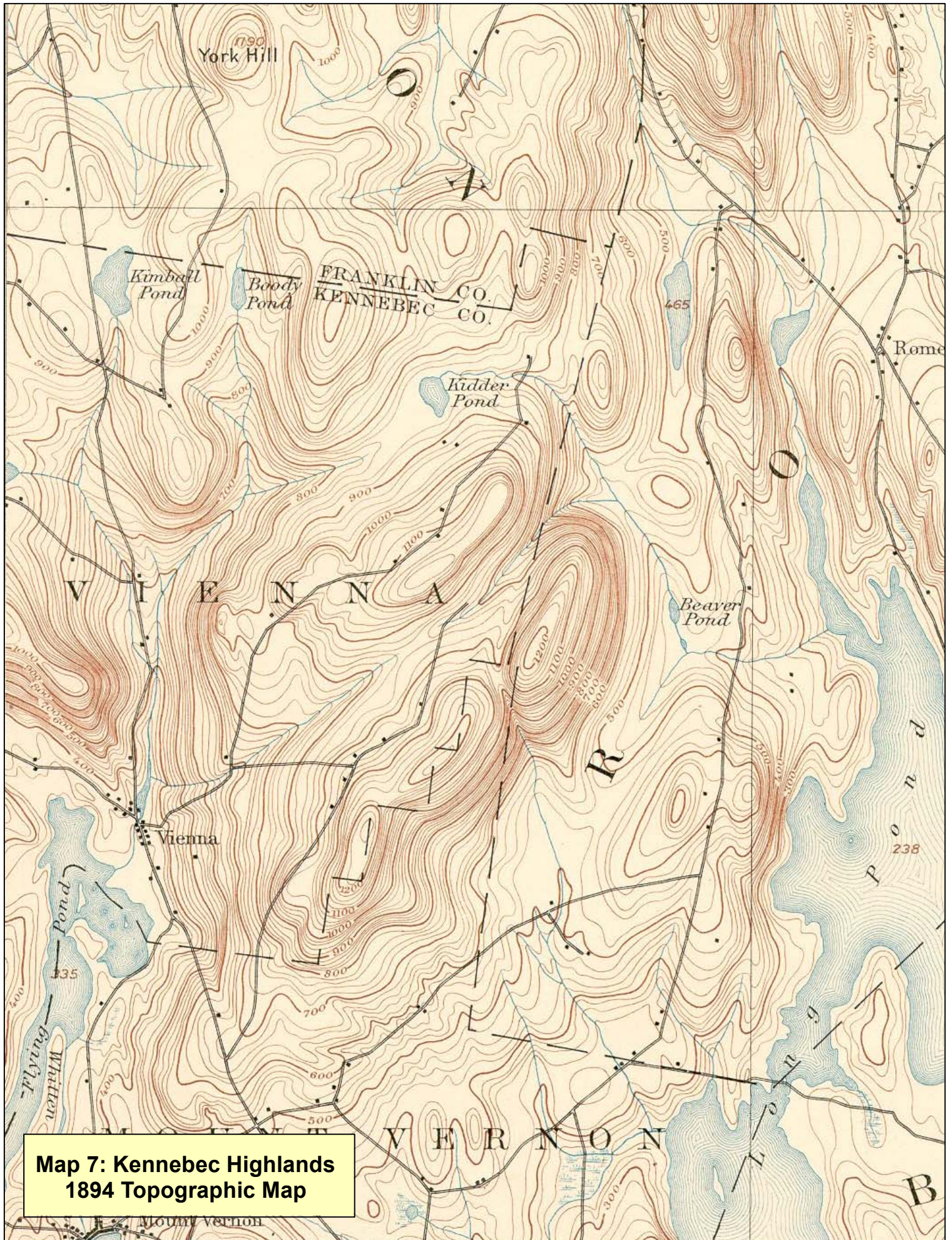


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Maine Natural Areas Program, March 2007



**Map 7: Kennebec Highlands
1894 Topographic Map**

ALOUQU VERNON

