STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
DIVISION of FORESTS and LANDS
172 Pembroke Road P.O. Box 1856 Concord, New Hampshire 03302-1856

GEORGE M. BALD
Commissioner

PHILIP A. BRYCE
Director

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N.H. Natural Heritage Inventory
FAX

November 3, 1999

To: Jay Gamble

Fax #: 763-5989

Subject: Forest Structure Assessment of Polygon 23

From: David VanLuven, N.H. Natural Heritage Inventory

Telephone # to Call If Any Problems: (603) 271-3623

Number of Pages, Including Cover: 5

Notes: I have attached our findings and conclusions regarding exemplary old forest in Polygon 23 for your review. Please feel free to call me if you have any questions. Otherwise, I'll see you next Tuesday.

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GEORGE M. BALD
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November 2, 1999

MEMORANDUM

To: Commissioner Bald *via* Phil Bryce

cc: Rich McLeod, Tom Miner, Jay Gamble
Mt Sunapee Advisory Committee

From: David VanLuven

re: **Proposed Ski Area Development within Polygon 23 in the Mt Sunapee State Park Ski Lease Area**

As promised at the October Mt Sunapee Advisory Committee meeting, I have summarized the findings of the Division of Forests & Lands intensive survey of forest structure within Polygon 23 at the Mt Sunapee State Park Ski Lease Area.

BACKGROUND

As the state agency responsible for facilitating protection of New Hampshire's rare plant populations and exemplary natural communities, the Division of Forests & Lands is particularly interested in the old growth forest on Mt Sunapee. The presence of old growth in the ski lease area, as detailed in *Old Forests and Rare Plants at the Mount Sunapee Ski Lease Area* (1998), is well established. As less than 4,000 acres of New Hampshire's 4,500,000 acres of forest are old growth, protection of remaining old growth forest on state lands is a high priority. Given our responsibilities and the significance of all old growth stands, we agree with your assertion at the Mt Sunapee Advisory Committee meeting on May 11, 1999 that we assume projects near old growth areas in the Mt Sunapee ski lease area will have a deleterious effect on the old growth unless there is convincing evidence that there will not be an impact.

Funding for the NH Natural Heritage Inventory's initial survey of Mt Sunapee allowed a general inventory of old forest areas within the ski lease area. Forest fragments surrounded by ski runs, or Polygons, were characterized in three ways: (a) as having a high proportion of exemplary old growth conditions, (b) as having small areas of old growth conditions, or (c) as having no definitive indication of old growth conditions. Two polygons -- #23 and #20 -- were identified as containing exemplary old growth conditions, but the NH Natural Heritage Inventory survey could not go beyond that assertion.

In response to the Resort's proposal to construct a chair lift, add a 150'-180' wide ski trail, and create glade skiing in Polygon 23, the Division of Forests & Lands undertook a second survey of the forest structure in Polygon 23 to delineate the forest structure in more detail. This was undertaken in September 1999, involved three forestry staff led by Ken Desmaris, and took more than 40 staff days. The Division of Forests & Lands also undertook an extensive literature search to see if there were any recent reports in the scientific literature that provided specific information about buffer areas and minimum forest acreage for protecting old growth forests.

METHODS

Field surveys were undertaken by Division of Forests & Lands foresters and involved sample plots set 200' apart in a grid pattern. At each plot, foresters used a 10-factor prism to record all trees greater than 5" diameter at breast height (DBH), and for each tree noted the species, DBH, height to 4" top, presence/absence of cavities, % crown damage and estimated cause of this damage, and crown height of these trees. The foresters also noted the species, DBH, height of snags, and the slope of the terrain, and used a 28.04 angle point relascope to sample coarse woody debris greater than 6" DBH. At every even numbered plot, foresters took cores from the oldest looking tree and two trees from each apparent cohort. These tree cores were then mounted and sanded. Ken Desmaris counted the rings on each tree core (there were approximately 160 cores) with assistance from biologists at the Harvard Forest, Petersham, MA.

In addition to assessing forest structure in the field, Ken Desmaris reviewed stereo-paired aerial photos from the 1950s and aerial photos from the 1940s. These reviews helped us gain a picture of the forest structure 50 years ago.

Using field data and aerial photo interpretation, Ken Desmaris delineated the forest structure within Polygon 23. The proposed ski run and glade skiing zones were delineated by Jay Gamble and provided to David VanLuven on September 14, 1999. These delineations were digitized by DRED personnel, and acreage calculated using AutoCad.

RESULTS AND DISCUSSION

The forest structure in Polygon 23 (which totals 59 acres) can be broken into three categories although the forest within the polygon operates as a cohesive ecological system (see Map). The southern portion of the polygon, covering approximately 38 acres, is Mature Forest with Very Old Components. Trees in this area generally range between 60 and 120 years old, with scattered trees more than 200 years old. The central and northern portion of the polygon is Old Growth Forest which spans approximately 19 acres. The northern tip of the polygon is Young Forest, and covers approximately two acres. The trees in this area generally ranged in age between 60 and 100 years, with no very old trees present. The forest structure of this northern tip is similar to that of the forest which runs along the eastern edge of the polygon between the base of the slope and the road to the Sun Bowl Chair Lift.

Based on the current forest structure and our analysis of aerial photos from the 1940s and 1950s, it appears that spruce was selectively cut out of portions of Polygon 23 around the turn of the century, which is consistent with Ayres (1915). Site conditions, however, indicate that there probably was not much spruce in the old growth portions of Polygon 23 to begin with, so any selective removal in this area probably had relatively little long-term effect on the old growth forest area. After the presumed removal of spruce from the mature forest area, the forest structure indicates that little if any additional forest management took place in that area. Some trees may have been removed for the local mill, but the mature forest clearly was not heavily cut over. The forest at the base of the slope, however, does appear to have been cut intensively, and was probably the area that was primarily harvested for the mill.

There is an old road that cuts up the slope of Polygon 23, and there has been speculation that this was used for timber harvests. The structure of the road, however, indicates that this may not have been the case. Ken Desmaris noted that the road cuts into the hillside in a manner more consistent with roads made by bulldozers than turn of the century twitch roads. Based on his extensive experience with forestry in New England, Ken surmises that the road may have been cut during the ski resort's early days. Regardless, the forest structure clearly indicates that little harvesting ever took place in Polygon 23, so even if the road was cut for hauling timber, it received little use.

CONCLUSIONS

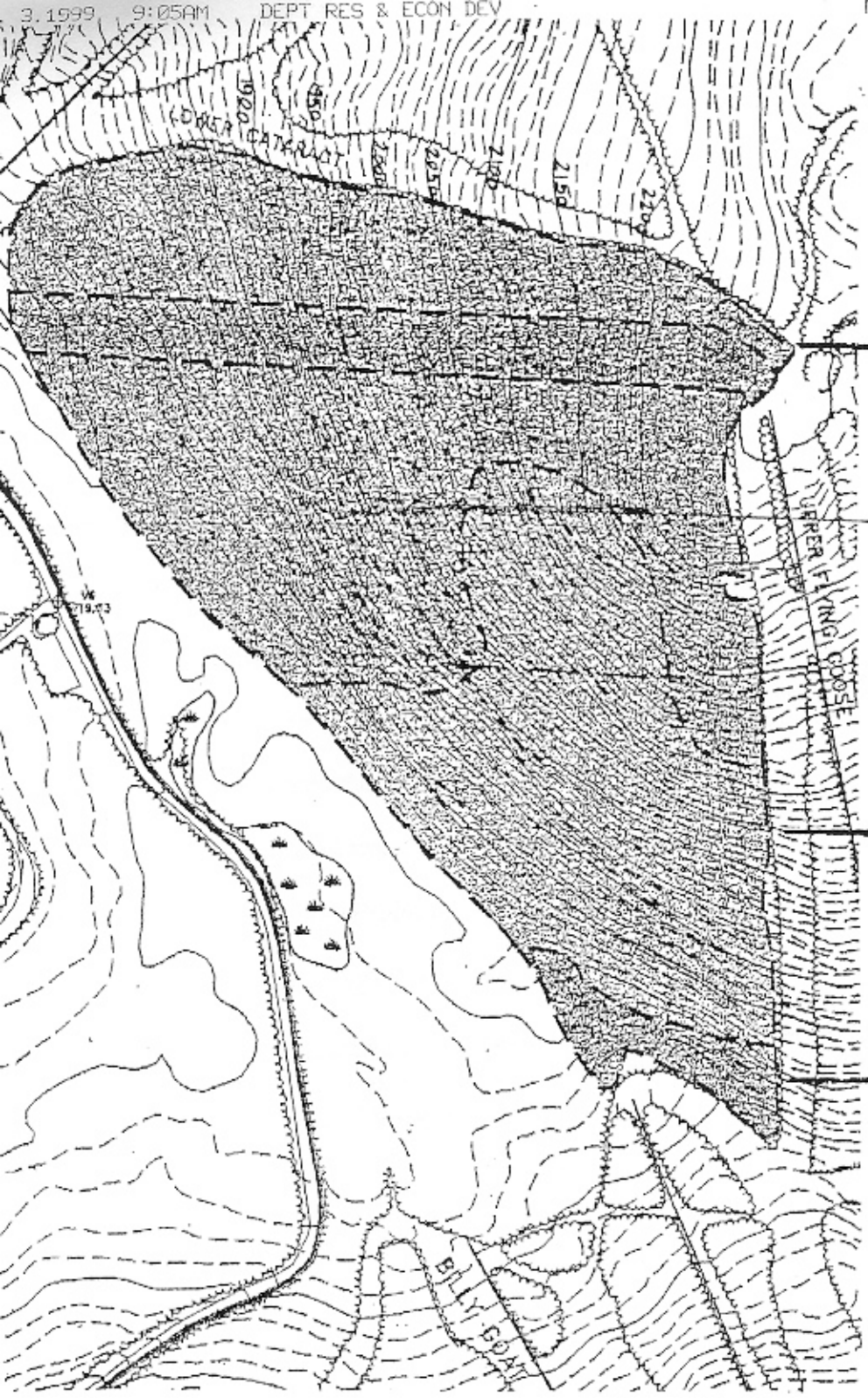
Polygon 23 is a complex of mature, minimally disturbed forest. As discussed in *Old Forests and Rare Plants at the Mount Sunapee Ski Lease Area,* Polygon 23 is an integral component of the old forest system in Mt Sunapee State Park, which is unprecedented in New Hampshire south of the White Mountains. Only one other northern hardwood-spruce-fir forest example of this condition and quality has been confirmed in the southern and central parts of the state.

The proposed chair lift, 150'-180' ski run, and glade skiing would reduce the core forest area of Polygon 23 by effectively eliminating 30% of the polygon (approximately 6.5 acres would be converted to grassy ski trail, and 11 acres would have the understory cleared for glade skiing). These proposed activities would further isolate Polygon 23 from the old growth system in Polygon 20 and in the East Bowl, would allow invasive species to penetrate more deeply into the forest, would increase the forest's susceptibility to windthrow and other disturbances, and would eliminate habitat for any old-growth dependent species that were not inventoried. We therefore conclude that any development activities in Polygon 23 would have a deleterious effect on this exemplary old forest system.

Mary Reynolds of the Division of Forests & Lands undertook an intensive literature search this fall to see if there were any studies of old growth published since NH Heritage produced *Old Forests and Rare Plants at the Mount Sunapee Ski Lease Area.* Her primary objective was to find any reliable reports or articles that outlined clear minimum acreage or buffer zones for protecting old growth forest in the Northeast. Her results were disappointing. After reviewing numerous journal articles, reading reports, and interviewing old growth researchers, she determined that while studies of buffers and edges are the hottest areas of research at present, no results are yet available.

Polygon 23 is a tremendous opportunity to further our understanding of how northern hardwood-spruce-fir forests respond to light harvesting and natural disturbances. We have only begun a detailed analysis of the tree core data set gathered this fall. With these data as benchmarks, Polygon 23 becomes a laboratory for exploring forest dynamics. The lessons we could learn from this and future studies could give insights into forest management activities throughout New England. Eliminating 30% of Polygon 23 would dramatically decrease the potential benefits of these data.

At the May 11, 1999 Mt Sunapee Advisory Committee meeting, you asserted that the Department would assume that projects near old growth areas in the Mt Sunapee ski lease area would have a deleterious effect on the old growth forest unless there was convincing evidence that there would not be an impact. The Division of Forests & Lands undertook the detailed inventory of Polygon 23 because there was question about the NH Natural Heritage Inventory's assertion that any development within Polygon 23 would be detrimental to the old growth forest there. In light of this research, (a) the old growth area is larger than previously thought, and (b) the mature forest area is older and less seriously affected by timber management activities than initially assessed. As such, the NH Natural Heritage Inventory's initial conclusion stands: any development activities within Polygon 23 would have a detrimental effect on Mt Sunapee's old forests.



Mature Forest with Very Old Components
(approx. 38 acres)

- *Proposed Glade Skiing (approx. 11 acres)*
- *Proposed Ski Trail (approx. 6.5 acres)*
- *Proposed Remaining (approx. 20.5 acres)*

200' buffer
300' buffer all but 250'
700' buffer all but 400'

Old Growth Forest
(approx. 19 acres)

ADJACENT TO SKI TRAIL GOOSEBL

Young Forest
(approx. 2 acres)

Forest Structure

Mt. Sunapee State Park Ski Lease Area - Polygon 23

State of New Hampshire Dept. of Resources & Economic Development

sed Ski Trail and Glade Skiing
ated by Jay Gamble, September 14, 1999

Forest Structure delineated by NH Division of Forests & Lands, October 1999

: 1" = 400'

North

e information shown on this plan (contours, buildings, roads, etc.) is derived from the aerial plan done by Eastern Topographics, Wolfeboro, NH, 1985. Some revisions have been made.