APPENDIX U

DRAFT CONSTRUCTION POLLUTION PREVENTION PLAN

DRAFT*

CONSTRUCTION STORMWATER POLLLUTION PREVENTION PLAN

for

WHITEFACE MOUNTAIN SKI CENTER 2004 UMP UPDATE

Prepared in Accordance With New York State Department of Environmental Conservation SPDES General Permit for Storm Water Discharges from Construction Activities That Are Classified as "Associated With Construction Activity", General Permit GP-02-01s

*** DRAFT VERSION FOR UMP/SEQRA REVIEW PURPOSES ONLY**
FINAL VERSIONS TO BE SUBMITTED FOR COVERAGE UNDER GP-02-01

November 2002

OWNER AND CONTRACTOR CERTIFICATION
CPPP for Whiteface Mountain 2002 UMP Update

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Name: _____

Title: _____

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature	For	Responsible for
_____		
Date: _____		
_____		
Date: _____		
_____		
Date: _____		

CONSTRUCTION POLLUTION PREVENTION PLAN (CPPP)

SITE DESCRIPTION			
Project Name and Location: (Latitude, Longitude, or Address)	Whiteface Mountain 2004 UMP Update Whiteface Mountain Ski Center, Route 86, Wilmington NY	Owner Name and Address:	The Olympic Regional Development Authority, 216 Main St. Lake Placid, NY 12946
Permits Local State Federal	Site Plan Review_____ Subdivision_____ Building_____ Road_____ Wetlands (Art 24)_____ Stream(Art 15)_____ Other _____ Wetland Nationwide_____ Individual_____ **Contractor is responsible for compliance with all permits**		
Other	None		
Description: (Purpose and Types of Soil Disturbing Activities	The following activities are proposed for the five year period covered by the UMP. Increase the amount of downhill ski trails on the mountain from approximately 18.06 miles of alpine ski trails to 20.26 miles. This includes trail improvements for the following trails approved in the 1996 UMP but not yet completed: Cloudspin, Empire, Upper Mackenzie, Upper Wilderness, Upper Parkway, and Lower Thruway. Installation of snowmaking piping during trail construction. Increase lift capacity including lengthening the existing lift at Mixing Bowl and relocating bottom terminal at Bear. Relocation of mid-station lodge, construct new 5,000 sf Kid's Center (Easy Acres) building, expansion of NYSEF building, relocation and expansion of Fox Pole Barn and Lot 5 Pole barn and Don Straight building, and construct new grooming equipment maintenance building. Construct new lot #5 parking area. Perform drainage system improvements. Annually routine maintenance activities may result in limited soil disturbance.		
Runoff Coefficient:	Pre-construction weighted CN is approximately 75 (affected area site).		
Site Area:	Whiteface Mountain Ski Center Intensive Use Area covers a total of 2,910 acres. Approximately 7% or 211.4 acres presently has been developed for ski trails and lifts. Approximately 29.8 acres are proposed to be affected by ski trail construction and widening, the proposed activities that would require the great majority of soil disturbance.		

Sequence of Major Activities:

1. *Establish Limits of Disturbance.* Work areas shall be clearly defined by appropriate means. This may include measures such as flagging tape or paint marks on trees at the limits of clearing for ski trails and lifts, construction fencing around building sites, marked stakes installed in the ground for areas such as the Parking Lot #5, or other suitable methods to clearly define the limits outside which soil disturbing activities are not permitted.

2. *Vegetation Removal.* Cut trees and shrubs within defined work areas. Wherever feasible chip tree tops and smaller growth on site.

3. *Install Structural Erosion Control.*

A. Water Bars

Water bars shall be installed during construction of ski slopes and lifts in accordance with the attached specifications and details. Particular attention shall be paid to proper spacing specifications as follows:

Slope (%)	Water Bar Spacing (ft.)
<5	125
5 to 10	100
10 to 20	75
20 to 35	50
>35	25

(Source: Guidelines for Urban Erosion and Sediment Control, USDASCS, 1997)

B. Silt Fence

Where appropriate, silt fence shall be installed in accordance with the attached specifications and details. Use of silt fence is appropriate where there is no concentration of water flowing to the barrier and where the drainage area for overland flow does not exceed ½ acre per 100 feet of fence. Additionally, maximum allowable slope lengths contributing runoff to a silt fence shall be as follows:

Slope Steepness	Maximum Slope Length (ft.)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter Than 5:1	200

(Source: Guidelines for Urban Erosion and Sediment Control, USDASCS, 1997)

C. Straw Bale Dikes

Straw bale dikes may be used as a substitute for silt fence ONLY where shallow depth to rock precludes the proper installation of silt fence. Installation shall be in accordance with the attached specifications and details. Straw bale dikes shall NOT be used where there is concentrated flow. Straw bale dikes shall NOT be used where more than 3 months of erosion and sediment control is required unless bales are replaced or an additional parallel row of bales is installed prior to the original straw bales being in place for 3 months. Length of slope above the straw bale dike shall not exceed the following:

Slope Steepness	Maximum Slope Length (ft.)
2:1 (50%)	25
2.5:1 (40%)	50
3:1 (33%)	75
3.5:1 (30%)	100
4:1 (25%)	125

(Source: Guidelines for Urban Erosion and Sediment Control, USDASCS, 1997)

D. Wattles

Fiber-wrapped wattles constructed of straw, coconut fiber (koir) or rice straw may also be used in place of silt fences where shallow depth to rock precludes the proper installation of silt fence. Wattles shall be installed in accordance with manufacturer's specifications, an example of which is attached. Length of slope above wattles shall not exceed the lengths provided for straw bale dikes above.

E. Stabilized Construction Entrances

Stabilized construction entrances consisting of a stabilized pad of aggregate shall be constructed in accordance with the attached specifications and details at any point where traffic will be entering or leaving an unstabilized construction site to a public right-of-way, street or parking area. All sediment spilled, dropped or washed onto public rights-of-way must be removed immediately. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

4. *Grub Stumps.* Stumps shall be grubbed only after structural erosion control is in place. Wherever possible, stumps shall be left in place or cut to grade in order to hold soil in place.

5. *Prepare Final Grades.* Grade disturbed areas to create final as-built elevations. Earthwork activities are designed to be localized and not involve large quantities of cuts and fills. The need to stockpile soil or transport bulk materials across the site is not anticipated. Should the need arise to temporarily stockpile soils during grading operations, stockpiles shall be surrounded with one of the temporary structural erosion control measures described above.

   Trenches excavated for installation of utilities shall make use of trench blocks where trenches

are located on slopes that are in excess of 10% and trenches will remain open for more than one construction day. Sand bags or rock check dams one to two feet tall shall be installed at 100 foot intervals along the bottom of the open section of trench.

6. *Stabilize Disturbed Areas:* Stabilization shall be put in place as soon as practical after final grades are established. Stabilization shall be put in place within seven days of establishing final grades.

   Depending on the type of area being disturbed, stabilization may take the form of vegetation (ski trails and lifts), concrete (building footprints and walkways), gravel (parking areas), rip rap (culvert outfalls), or other similar means to prevent soil erosion after construction is complete. More details on acceptable vegetation stabilization measures are provided below.

7. *Remove Temporary Structural Erosion Controls.* Silt fences and other erosion and sediment controls shall be removed only after the areas which they are serving have become permanently stabilized by vegetative or other means.

Controls

Erosion and Sediment Controls

Stabilization Practices

Structural and vegetation practices to be implemented to prevent erosion and sediment transport are in accordance with NPDES Phase II Stormwater Requirements and described below.

Structural Practices

The proper use of water bars, silt fences, hay bay dikes, wattles, and stabilized construction entrances were described in a previous section.

Vegetation Practices

Maintain existing vegetation outside of marked limits of disturbance.

Soils disturbed for construction of ski trails and lifts shall be permanently stabilized by successfully establishing an herbaceous ground cover.

Seeding
A commercially available seed mixture appropriate to the climate shall be used to stabilize disturbed areas to be revegetated. The "Adirondack Seed Mix" contains the following;

43.65% Boreal creeping red fescue
34.3% perennial ryegrass
17% Kentucky bluegrass

The boreal red fescue is particularly well suited to the local climate and the perennial ryegrass will germinate rapidly and accelerate stabilization.

Seed may be applied by a number of suitable means including broadcasting, hydroseeding, or

incorporated as part of a geotextile (i.e. Green & Bio Tech SureTurf 1000 and 4000 Seeded Mat System ®, BIOMAT ® seeded mats).

The Adirondack Seed Mix will be used to stabilize the majority of the trails constructed as part of the current UMP for Whiteface Mountain. An alternative NYSDOT seed mix will be used under those special conditions that may be most suitable, including steeper slopes (i.e. >15 to 20%), or wherever the Adirondack Mix does not become effectively established. This seed mix contains a number of wildflowers as well as sheep fescue and annual ryegrass. Components of this mix were chosen by NYSDOT because of their ability to produce a root system of varying root types, including fibrous shallower roots and deep tap roots. The per acre cost for seeding using this mix is approximately $1,140 versus approximately $35 per acre for the Adirondack Mix specified.

Mulching

Broadcast seeded areas and hydroseeded areas shall also be mulched. Broadcast seeded areas shall be mulched with straw at a rate of 2 to 3 bales per thousand square feet (100-120 bales per acre). Straw mulch shall be secured in place be either driving over the mulched area with a tracked vehicle or by applying a non-asphaltic tackifier.

Hydroseeded areas shall be mulched with straw as described above or with wood cellulose mulch applied during the hydroseeding process. Wood cellulose mulch shall be applied at a rate of 50 pounds per thousand square feet (2,000 pounds per acre). A non-asphaltic tackifier may be included with the hydromulch application.

Fertilization

Seeded areas shall be fertilized at the time of seeding in order to promote seed germination and plant growth that will provide stabilization. A suitable turf starter fertilizer shall be applied as per dictated by soil test or apply 850 pounds of 5-10-10 or equivalent per acre (20 lbs/1,000 sq. ft.)

Storm Water Management

During construction water bars will serve as the primary means of controlling runoff from ski trails. For Parking Lot #5 a stormwater/sediment basin will be constructed at the downhill side of the parking lot in the earliest stages of construction and remain in place after construction is complete.

Discharges of stormwater shall not result in discharge of toxic or deleterious substances.

Discharges of stormwater shall not result in the discharge of suspended, colloidal or settlable solids in amounts that causes substantial visible contrast to natural conditions or impairs receiving waters for their best (classified) usages.

OTHER CONTROLS

Waste Disposal:

Waste Materials: Any debris will be disposed of in an approved municipal or C and D landfill as appropriate and recyclable materials will be salvaged as appropriate.

Sanitary Waste: If necessary, portable sanitary facilities will be made available to construction personnel and will be serviced regularly.

Offsite Vehicle Tracking

All activities covered under this CPPP will not involve vehicle traffic on local public roads, so no off-site vehicle tracking measures are necessary.

TIMING OF CONTROLS/MEASURES

1. Temporary structural erosion controls will be installed prior to earthwork as per this plan.

2. Seeding, fertilization and mulching of disturbed areas shall take place between June 1 and September 15. Dormant seeding done after this time should only be done when 2 inch soil temperature is less than 50 degrees. When it is necessary to stabilize disturbed areas beyond these timeframes, a qualified professional shall be retained by the Owner to provide alternative stabilization measures to the Department for their review and approval.

3. Straw mulch shall be installed immediately after finished grades are established and seeding completed. Suitable geotextile erosion control blankets may be used on steeper slopes or where surface flow may concentrate.

4. Structural erosion controls and non-stabilized areas shall be inspected once a week and within 24 hours after a rainfall of 0.5 inches or more by a licensed/certified professional. Copies of the Stabilization Inspection forms and Structural Inspection forms located at the end of this report shall be completed in full for every inspection performed. Completed inspection forms shall be retained on site.

5. Vegetation stabilization is to be performed within 14 days after establishing final grades.

6. Temporary erosion control devices will not be removed until the growth of vegetation stabilizes the area served. Vegetation coverage of 75% shall be considered "stabilized".

7. The Contractor must track the overall timing of the site construction activity. The Contractor shall record the dates for initiation of construction, implementation of erosion control measures, stabilization, etc. A copy of these records will be maintained in the construction trailer or construction office and be updated in addition to the individual Stabilization Inspection forms and Structural Inspection forms completed for each inspection.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspections and maintenance practices that will be used to maintain erosion and sediment controls.

ORDA will supervise day-to-day activities on the site. A licensed/certified professional will make at least weekly inspections of erosion control devices, as well as inspections following any storm event of 0.5 inches or greater.

All measures will be maintained in good working order. If repair is necessary, it will be initiated within 24 hours of discovery. The inspector shall identify measures in need of repair immediately upon their discovery.

Built up sediment will be removed from silt fences if it ever reaches one-third the height of the structural control.

Silt fence will be inspected for depth of sediment, tears, etc., to see if the fabric is properly functioning, securely attached to the fence posts, and to see that the fence posts are firmly in the ground.

Seeded areas will be inspected for bare spots, washouts, and healthy growth. If necessary, replanting, reseeding, or sodding will be implemented as per written notification by the inspector.

A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached. Reports should be compiled and maintained on site. The Owner's Representative and the Contractor shall be mutually responsible for keeping all record keeping required in this CPPP current and up to date.

Non-Storm Water Discharges

None involved.

INVENTORY FOR POLLUTION PREVENTION PLAN

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Petroleum shall be stored in above ground skid-tanks or in-vehicle (pickup truck) mounted tanks. Any refueling shall occur at least 100 feet from any surface water shoreline or wetland area.

Hydraulic oil shall be stored in original containers removed at least 100 feet from any shoreline or wetland area.

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project:

An effort will be made to store only enough product required to do the job. This includes fuel for machinery involved in this action.

Any materials stored onsite will be stored in a neat, orderly manner in their appropriate containers. Storage of materials is not generally anticipated for this action.

Products will be kept in their original containers with the original manufacturer's label.

Whenever possible, all of a product will be used up before disposal. There shall be absolutely no product disposal directly to surface waters or any areas that could result in discharge to surface waters.

Manufacturer's recommendations for proper use and disposal will be followed.

The Contractor will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials.

Movement of soil materials shall be limited to only those materials identified on the attached plans.

Products will be kept in original containers unless they are not resealable.

Original labels and material safety data sheets will be retained; they contain important product information.

If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Product Specific Practices

The following product specific practices will be followed on-site:

Petroleum Products:

1. Construction personnel should be made aware that emergency telephone numbers are located in this CPPP.
2. The contractor shall immediately contact NYSDEC in the event of a spill, and shall take all appropriate steps to contain the spill including constructing a dike around the spill and placing absorbent material over this spill.
3. The contractor shall instruct personnel that spillage of fuels, oils, and similar chemicals must be avoided.
4. Fuels, oils, and chemicals will be stored in appropriate and tightly capped containers, containers shall not be disposed of on the project site.
5. Store fuels, oils, chemicals, material, and equipment and locate sanitary facilities away from trees and at least 100 feet from streams, wells, wet areas, and other environmentally sensitive sites.
6. Dispose of chemical containers and surplus chemicals off the project site in accordance with label directions.
7. Use tight connections and hoses with appropriate nozzles in all operations involving fuels, lubricating materials or chemicals.
8. Use funnels when pouring fuels, lubricating materials or chemicals.
9. Refueling and cleaning of construction equipment will take place from access roads, in staging areas or along roadside areas whenever practical to provide rapid response to emergency situations.
10. All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Any vehicle leaking fuel or hydraulic fuel will be immediately removed from the site.

Fertilizers:

Fertilizer shall be stored in original containers and on pallets should the need to store fertilizers occur. Whenever possible local retail supplier shall be utilized for purchase and immediate use of fertilizers on site. Proper delivery scheduling will minimize storage time. Any damaged containers will be repaired immediately upon discovery and any released fertilizer recovered to the fullest extent practicable.

Paints:

None involved

Concrete Trucks:

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site except in a designated upland area.

While not anticipated, should concrete need to be discharged into water or wetlands, the concrete shall be poured into a tightly sealed form. This form can include a caisson which is normally used, and would prevent the movement of concrete into the groundwater.

Spill Control Practices
In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup: Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies. Any spill in excess or suspected to be in excess of two gallons will be reported to the NYSDEC Spill Response Unit. Notification to NYSDEC (1-800-457-7362) must be completed within two hours of the discovery of the spill. Materials and equipment necessary for spill cleanup will be made available to this site. Equipment and materials will include but not be limited to absorbent pads, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose. All spills will be cleaned up immediately after discovery. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with spilled substance. Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size. The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring, and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included. The construction manager responsible for the day-to-day site operations, will be the spill prevention and cleanup coordinator. He/she will designate at least one other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the onsite construction office or trailer.

SPILL RESPONSE REPORT

Within 1 hour of a spill discovery of less than 2 gallons in volume the following must be notified:

1. Bruce McCulley (518) 891-7287

Within 1 hour of a spill discovery greater than 2 gallons the following must be notified:

1. NYSDEC Spill Response Hotline 1-800-457-7362.
2. Jay Rand (518) 523-9425
3. Approved Spill Response Contractors
   Clean Harbours Environmental Services, Glenmont (518) 434-0149
   OPTEC Environmental Services, Inc., Plattsburgh (518) 561-8368
   Environmental Products and Services of Vermont, Plattsburgh (518) 562-5656

The following information will need to be provided:

Material Spilled:	**Approximate Volume:**
Location:	
Distance to nearest downgradient drainageway:	
Distance to nearest downgradient open water:	
Temporary control measures in place:	

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STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR MORE

INSPECTOR:_____DATE:_____

AMOUNT OF LAST RAINFALL _____INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STBLZD? (Y/N)	STBLZD WITH	CONDITION

STABILIZATION REQUIRED:

_____

_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

STRUCTURAL CONTROLS

DATE:_____COMPONENT(S):_____

TEMPORARY SEDIMENT BASINS _____ PERMANENT SEDIMENT BASIN _____

SEDIMENT BASINS

DEPTH OF SEDIMENT IN BASIN: _____
CONDITION OF BASIN SIDE SLOPES:_____
ANY EVIDENCE OF OVERTOPPING OF THE EMBANKMENT?_____
CONDITION OF OUTFALL FROM SEDIMENT BASIN:_____

MAINTENANCE REQUIRED FOR SEDIMENT BASIN:

_____

_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

Date	**Inspector**	**Perimeter Controls**	**Sediment Basin**	**Construction Entrance**
Weekly – Post Rainfall				

OTHER CONTROLS
STABILIZED CONSTRUCTION ENTRANCE:

DOES MUCH SEDIMENT GET TRACKED ONTO ROAD?_____
IS THE GRAVEL CLEAN OR IS IT FILLED WITH SEDIMENT?_____
DOES ALL TRAFFIC USE THE STABILIZED ENTRANCE TO LEAVE THE SITE?_____
IS THE CULVERT BENEATH THE ENTRANCE WORKING?_____

MAINTENANCE REQUIRED FOR STABILIZED CONSTRUCTION ENTRANCE:

_____
_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

_____
_____
_____
_____

REASONS FOR CHANGES:

_____
_____
_____
_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE_____DATE:_____

STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

_____
_____
_____
_____

REASONS FOR CHANGES:

_____
_____
_____
_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE_____DATE:_____

A. Detail of Proposed Erosion and Sediment Control Plan

i. Strategy

- The erosion and sediment control plan is designed to minimize accelerated erosion both during construction and after the site has been stabilized. Where necessary, upslope runoff will be diverted away from the site by means of diversion channels (water bars). Small areas will be controlled by the installation of filter fabric fencing or bale dikes to assure a minimal amount of off-site sediment.

ii. Sequencing

1. Clean ski trails of all mature vegetation. Trail work will proceed from top to bottom.
2. Rough in water bars as specified in the erosion and sediment control plan and install sediment traps.
3. Rough grading will then start with no more than 600 slope feet of mineral soil (with an area no greater than one acre) will be exposed on any trail section at any time.
4. Install snowmaking pipe.
5. Install lift foundations.
6. Once snowmaking pipe and lift foundations are installed, rough grading will be finished.
7. Fine grading, finished water bars, seeding, and mulching will then follow the rough grading down the trails. No more than 600 slope feet of mineral soil (with an area no greater than one acre) will be exposed on any trail section at any time between the rough grading and the fine grading and mulching crews.

B. Trail Specifications

iii. Clearing

- Clearing shall consist of the complete cutting and removal of all trees, down timber, brush and related growth within the designated areas. Poor risk trees within a distance equal to the total height of the tree from any ski trail or lift line shall be felled and removed.

- Trees lawfully cut cannot be removed from the premises in any manner but can be chipped or used on site by ORDA so long as such method is consistent with the guidelines of the State Land Master Plan, this UMP and Article 8 of the ECL. Virtually all trees which are cut for ski trail construction and widening and construction of lifts and other amenities are chipped and used on site as fill for construction and erosion control projects. Access for the wood chipper on steeper terrain is limited so some trees are buried for use as fill and erosion control.

- Stumps shall be cut as close to the ground as possible and in no case should they be left in excess of 6" high. However, allowances will be made by the construction supervisor for unusual situations. The removal of trees by dozing over will not be allowed.
- Trees and down timber may be hauled to yarding areas specified by the construction supervisor.
- Brush, limb wood, and other small woody debris can be chipped at their source if this appears to be more convenient and if it can be done without undue disturbance of the terrain.
- No trees, brush, down timber, or other material are to be felled, pushed, or deposited outside the trail boundaries.
- When completed, the designated areas shall be free of all brush, trees, and related growth.
- All local, state, and federal laws and regulations pertaining to clearing on this particular site shall be adhered to.
- Machinery may not be operated outside the clearing limits without specific permission from the construction supervisor.
- Bridges or culverts will be used whenever crossing live streams or stream beds during skidding operation.

iv. Rough grading

- All trails, lift lines, terminal sites, and related areas shall be rough graded according to a schedule which allows no more than 600 slope feet of mineral soil (with an area no greater than one acre) will be exposed on any trail section at any time between the rough grading and the fine grading and mulching crews.
- Topsoil may be stripped and stock piled for use during fine grading. Topsoil stock piles will have hay bales or silt fence staked down on the downhill perimeter. If stock piles are to remain for more than a week, they will be mulched.
- Rough grading with the use of bulldozers and excavators shall consist of the complete shaping of all trails, lift lines, terminal sites and related areas. This will include the removal and burial of all stumps and large rocks and the appropriate erosion control methods (i.e. Water bar, straw bales, etc.).

- Ski trails, unlike roads, must contain rolls, long radius bumps and dips, to add interest and create a quality skiing experience. So disposal of stumps, rocks and related debris shall be incorporated into the formation of these desired features whenever possible. (the precise location and configuration of trail contours and erosion control features are dependent to a great degree upon unknown subsurface conditions. Thus, the development of these features can take place only by supervision in the field as the rough grading progresses).
- Ledge, when it protrudes above the desired grade, will be drilled and blasted where necessary to permit removal during rough grading.
- In areas of smooth surface ledge, or ledge just slightly below the natural surface, dozing will proceed so as not to disturb valuable existing overburden.
- The outside limits of trails, lift lines, and related areas are to remain clean and free of any disposed material except insofar as the material is needed for proper shaping or drainage.
- Care shall be exercised so as not to destroy woods growth and the root systems of trees bordering the trails, lift lines, and related areas.
- Water bars on roads, skid trails, and ski slopes will be guided by the following specifications:

Grade (%)	<5	5-10	10-20	20-35	>35
Spacing (ft)	125	100	75	50	25

- Water bars shall have a 2 - 5% cross slope. Stabilized outlets will be constructed at the end of all water bars. They shall be checked at the termination of each work day to ensure their proper function.
- Water bars, drainages, and culverts shall be extended beyond the cutting limits of the trail if this is required to prevent water from running back onto the trail surface. Rip-rap or straw bale dikes will be placed at the discharge ends of all drainages.
- The rough grading contractor will be expected to coordinate his activities with the installation of the snowmaking piping and lift erection to eliminate duplication of effort regarding excavation.
- There shall be no more than 400 feet of snowmaking trench open at any one time. Trench plugs shall be installed at specific intervals depending on the slope of the pipe trench.

v. Fine grading and revegetation

- All trails, lift lines, terminal sites, and related areas shall be fine graded according to a schedule which allows no more than 600 slope feet of mineral soil (with an area no greater than one acre) will be exposed on any trail section at any time between the large dozers doing the rough grading and the fine grading and mulching crews.
- Fine grading shall consist of the complete finishing of all trails, lift lines, terminal sites, and related areas so that they present a well-groomed skiable surface with a required initial base snow depth not to exceed 6" (compacted).
- The process shall include all the necessary dozing, grading, handwork, seeding, and mulching to achieve the desired results.
- Water bars constructed by the rough grading crews shall be final shaped to conform with standards set forth by the erosion control plan (see figure 3).
- All water bars will be lined with a 6 1/2 foot wide erosion control blanket (North American green s75bn), or its equivalent.
- There shall be no exposed unseeded soil prior to weekends, downtime, or anticipated rainy periods.
- Mulching shall consist of the complete covering of all trails, lift lines, and related areas with straw. Application should average two tons per acre with three or more tons being required in areas of severe rock and steep grades, and 1-1/2 tons or less in areas with excellent soil and lower grades. This mulch may be applied by machine or manually. Certain areas with severe rock and/or ledge conditions will require hand-padding with hay bats prior to the actual mulching if done by machine. The banks or sides of all areas are to be mulched. All water courses are to be left free of straw.
- If no vegetation is established by September 15, due to natural causes, remulching – or other temporary stabilization such as tackifiers, geotextiles or heavy hydromulch – may be required for slope protection through the fall and winter.
- Strict erosion control measures shall be followed at all times. Water bars shall be kept established and clean at all times. Any washouts or related erosion will be repaired immediately.
- All vehicle traffic shall be confined to established work roads unless specific permission for other travel is received beforehand from the construction supervisor. All water bars on work roads shall be placed in their proper condition at the end of each work day.

- The steps involved in the fine grading process shall take place in sequence so that at no time will a fine graded section of over 600 feet be without the proper mulch cover to prevent unnecessary erosion.

vi. Erosion control for snowmaking trenches and valvehouses

- Before any earthwork the appropriate piping will be placed near the proposed trench with all the appropriate connections in place.
- There will be no more than 400 feet of trench open at any one time.
- At locations where the existing water bars are crossing the trench, the water bar will remain undisturbed until immediately before laying the pipe. Trench plugs shall be installed at regular intervals as determined by the slope of the pipe trench. Additionally, trench plugs shall be installed at the end of the pipe each day, whenever pipe advancement is halted.
- Each section of trench will be backfilled after the pipe is placed. Permanent water bars will be graded, seeded, and mulched, when trench is closed.
- All topsoil stockpiles will have hay bales or silt fence staked down on the downhill perimeter. If stockpiles are to remain for more than a week, they will be mulched.
- All water bars will be maintained on a daily basis, and vehicle traffic restricted to designated sections of the trails with stable soils and adequate drainage.
- All trenches will be backfilled with a minimum of a 6" berm to accommodate any future settling .
- Valvehouse construction sites will have silt fence or hay bales installed on the downhill perimeters. All excavated material will be stock piled for use during backfilling and finish grading. If stock piles are to remain for more than a week, they will be mulched.

C. Erosion And Sediment Control Measures

vii. Water bars

- To be placed across the slope to reduce the potential for erosion, with diversion into a natural vegetation mat or other stabilized outlet.
- To be constructed as shown in detail 5A.4.
- Construction specifications:

All dikes will be machine compacted
All dikes will have positive grade to outlet (not greater than 5%)
Field location will be adjusted to utilize a stable safe outlet
Diverted runoff will outlet directly onto an undisturbed stabilized area, a level spreader, or into a sediment trap

viii. Straw bale dikes

- The straw bale dike is to intercept and detain small amounts of sediment from unprotected areas of limited extent.

- Construction specifications (see Figure 5A.8):

Bales shall be placed in a row with ends tightly abutting the adjacent bales.
Each bale shall be embedded in the soil a minimum of 4 inches.
Bales shall be securely anchored in place by stakes driven through the bales. The first stake in each bale shall be driven toward the previously laid bale to force bales together.
Inspection shall be frequent and repair or replacement shall be made promptly as needed.
Bales shall be removed when they have served their usefulness, so as not to block or impede storm flow or drainage.

ix. Silt fence

- Typical installations

- Silt fence structures should be installed anywhere sediment retention is needed in and around a construction site.

At the toe of highly erodable slopes
Around culverts and storm water drainage systems
Adjacent to lakes, streams or creeks
Around the perimeter of a construction project

a) Installation guidelines (See figure 5A.9)

- dig a small trench
- unroll silt fence system. Position the post in the back of the trench (downhill side) and drive the post into the ground
- lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off
- backfill the trench and compact
- it is a good practice to construct the silt fence across a flat area in the form of a horseshoe. This aids in pending the runoff and allowing sedimentation.

b) Maintenance

- Silt fences should be inspected periodically for damages such as tearing by equipment, animals, or wind and for the amount of sediment which has accumulated. Removal of the sediment is generally necessary when it reaches 1/3 the height of the silt fence. In situations where access is available, machinery can be used; otherwise, it must be removed manually. The key elements to remember are:
  - ✓ The sediment deposits should be removed when heavy rain or high water is anticipated.
  - ✓ The sediment removed should be placed in an area where there is no danger of erosion.
- The silt fence should not be removed until adequate vegetation ensures no further erosion of the disturbed slopes. Generally, the fabric is cut at ground level, the wire and posts removed, the sediment spread, and seeding and mulch is applied immediately.

D. Summer Trail Maintenance Specifications

x. General

- The annual summer trail maintenance schedule or plan of work should contain regular maintenance and repair activity necessary to keep all slopes, trails and facilities in satisfactory condition for skiing, safety, aesthetics of the area and quality control of the environment.

xi. Drainage and erosion control

- In the spring of the year when the snow starts to melt, water bars should be checked to see that the water is flowing. Even with snow cover still on the ground, the partially frozen water bars can be re-channeled by the use of hand shovels. The running water will eat its way through the snow or ice and eventually open up the water bars.
- When the snow is all gone these water bars should be checked again to see that they are working properly and repairs made if needed. These checks should continue throughout the summer months especially before and after major storms. If severe erosion is noticed, the bars should be "rip-rapped" with stone or lined with jute matting. The checking interval can be reduced once the water bars are stabilized.

However, they should always be checked and cleaned out in the fall after all the leaves have fallen and in the spring when melting starts.

- Culverts and bridge openings should be checked on the same schedule as water bars. They should be kept free from obstructions and sediment buildup.
- Washed and eroded areas should be repaired as soon as the trails dry out enough so that no more damage will occur. This repair work should be accomplished by filling in the washed or eroded areas with new material, and adding seed and mulch.

xii. Trails and trail edges

- Snags, dead trees, undermined and leaning trees, limbs and other debris, rocks, etc. within or along the edges of trails should be removed.

xiii. Seeding

- To establish permanent cover over all slopes and trails, reseeding may be required from time to time. Seeding should be done in the spring after the slopes and trails have dried, (to be completed by June 10) or alternatively during the period from August 1 to September 15.

xiv. Mulching

- Remulching may become necessary if bare rocks and ledge appear or where reseeding has taken place. Mulch should be applied at a rate of 2 tons per acre.
- Mulching and proper drainage is the key in keeping valuable topsoil in place until a good sod has been developed.

xv. Weed and brush control

- The best deterrent to weed and brush growth is a dense, well-cared-for sod of grasses and legumes.

xvi. Mowing

- All slopes and trails should be mowed each year or every other year to maintain a low cover and to control woody growth. The best time to mow is mid-August after the established grasses have gone to seed giving the potential for new growth. The most desirable cutting height is 3-1/2 to 4 inches.

STANDARD AND SPECIFICATIONS FOR WATER BAR

Definition

A ridge or ridge and channel constructed diagonally across a sloping road or utility right-of-way that is subject to erosion.

Purpose

To limit the accumulation of erosive volumes of water by diverting surface runoff at predesigned intervals.

Conditions Where Practice Applies

Where runoff protection is needed to prevent erosion on sloping access right-of-ways or either long, narrow sloping areas generally less than 100 feet in width.

Design Criteria

Design computations are not required.

1. The design height shall be a minimum of 18 inches measured from channel bottom to ridge top.
2. The side slopes shall be 2:1 or flatter; a minimum of 4:1 where vehicles cross.
3. The base width of the ridge shall be six feet minimum.
4. The spacing of the water bars shall be as follows:

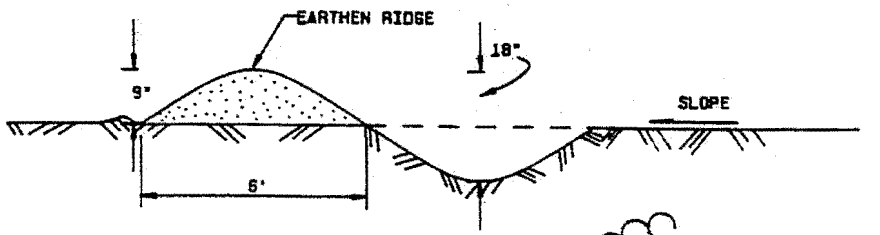
Slope (%)	Spacing (ft)
<5	125
5 to 10	100
10 to 20	75
20 to 35	50
> 35	25

5. The positive grade shall not exceed 2%. A crossing angle of approximately 60 degrees is preferred.
6. Water bars should have stable outlets, either natural or constructed. Site spacing may need to be adjusted for field conditions to use the most suitable areas for water disposal.

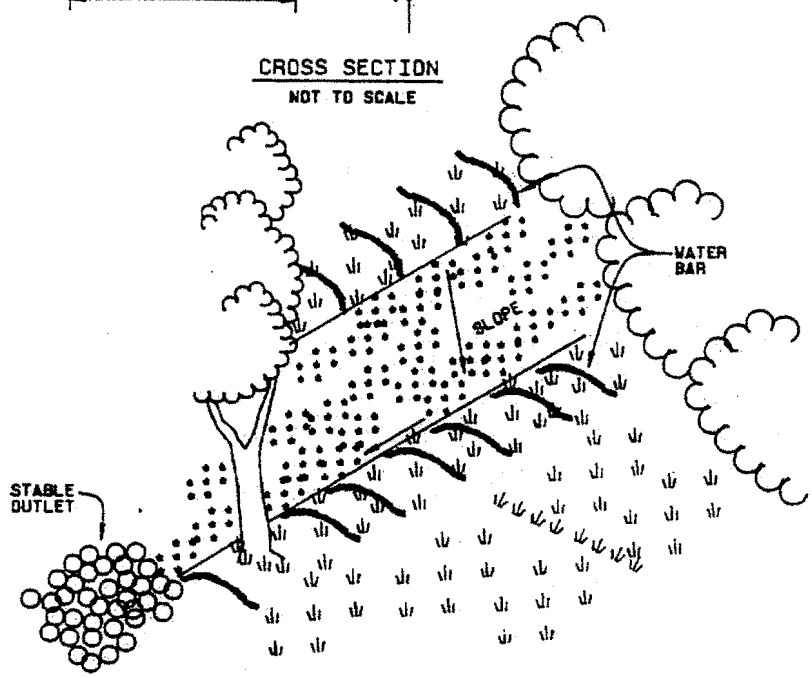
See figure 5A.4 on page 5A.10 for details.

rev

Figure 5A.4
Water Bar Details



CROSS SECTION
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. INSTALL THE WATER BAR AS SOON AS THE RIGHT OF WAY IS CLEARED AND GRADED.
2. DISK OR STRIP THE SOD FROM THE BASE FOR THE CONSTRUCTED RIDGE BEFORE PLACING FILL.
3. TRACK THE RIDGE TO COMPACT IT TO THE DESIGN CROSS SECTION.
4. THE OUTLET SHALL BE LOCATED ON AN UNDISTURBED AREA. FIELD SPACING WILL BE ADJUSTED TO USE THE MOST STABLE OUTLET AREAS. OUTLET PROTECTION WILL BE PROVIDED WHEN NATURAL AREAS ARE NOT ADEQUATE.
5. VEHICLE CROSSING SHALL BE STABILIZED WITH GRAVEL. EXPOSED AREAS SHALL BE IMMEDIATELY SEEDED AND MULCHED.
6. PERIODICALLY INSPECT WATER BARS FOR EROSION DAMAGE AND SEDIMENT. CHECK OUTLET AREAS AND MAKE REPAIRS AS NEEDED TO RESTORE OPERATION.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE SYRACUSE, NEW YORK	WATER BARS	STANDARD SYMBOL —WB—

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric (filter cloth) used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used.

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

2. Maximum drainage area for overland flow to a silt fence shall not exceed 1/2 acre per 100 feet of fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required. All silt fences shall be placed as close to the area as possible, and the area below the fence must be undisturbed or stabilized.

A detail of the silt fence shall be shown on the plan, and contain the following minimum requirements:

1. The type, size, and spacing of fence posts.
2. The size of woven wire support fences.
3. The type of filter cloth used.
4. The method of anchoring the filter cloth.
5. The method of fastening the filter cloth to the fencing support.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. See Figure 5A.9 on page 5A.20 for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance. Statewide acceptability shall depend on in field and/or laboratory observations and evaluations.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.
3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14-1/2 gage with a maximum 6 in. mesh opening, or as approved.
4. Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.9.

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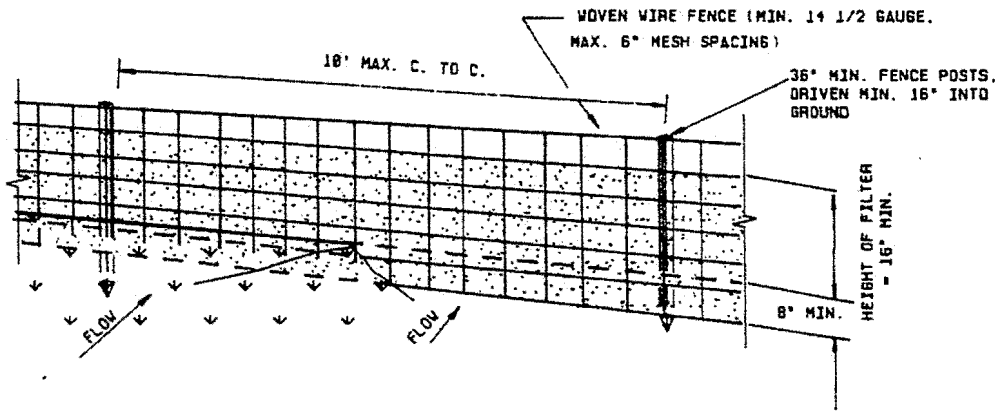
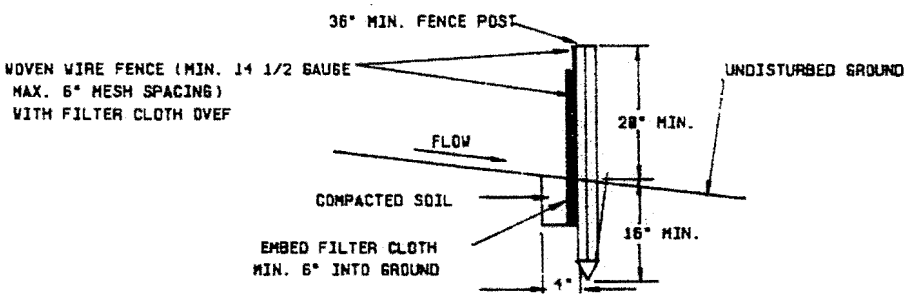
Figure 5A.9
Silt Fence Details



PERSPECTIVE VIEW



SECTION

CONSTRUCTION NOTES FOR FABRICATED SILT FENCE

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE

POSTS: STEEL EITHER "T" OR "U" TYPE OR 2" HARDWOOD

FENCE: WOVEN WIRE, 14 1/2 GA. 6" MAX. MESH OPENING

FILTER CLOTH: FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL.

PREFABRICATED UNIT: GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE SYRACUSE, NEW YORK	SILT FENCE	STANDARD SYMBOL

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw or similar material used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes have an estimated design life of three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits.

Constructed Slope	Percent Slope	Slope Length (ft.)
2:1	50	25
2 -1/2:1	40	50
3:1	33	75
3-1/2:1	30	100
4:1	25	125

Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

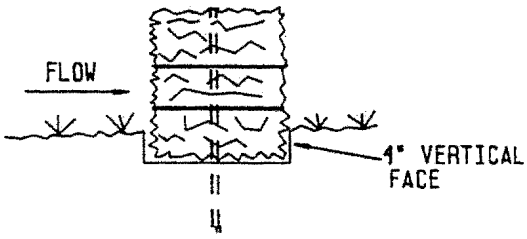
The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Design Criteria

A design is not required. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 5A.8 on page 5A.18 or details.

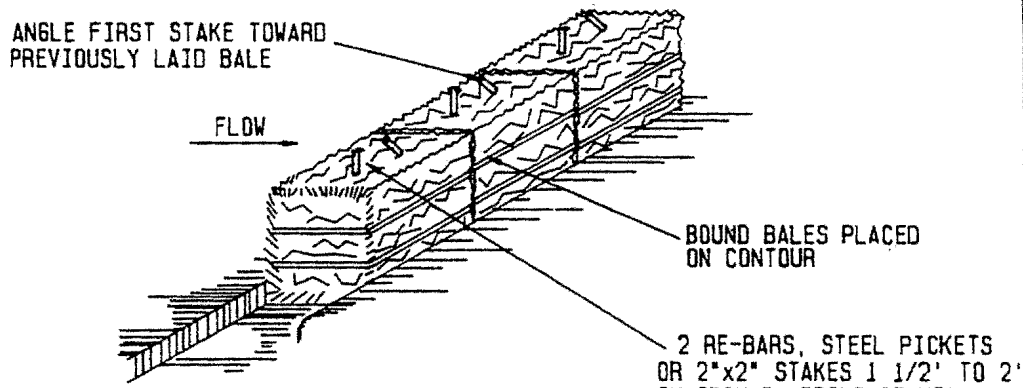
rev

Figure 5A.8
Straw Bale Dike Details



BEDDING DETAIL

DRAINAGE AREA NO MORE THAN 1/4 AC. PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%



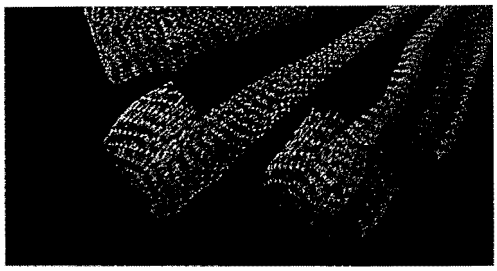
ANCHORING DETAIL

NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE SYRACUSE, NEW YORK	STRAW BALE DIKE	STANDARD SYMBOL SBD



What are Earth Saver Rice Straw Wattles?

Earth Saver Rice Straw Wattles are made from recycled naturally weed-free California rice straw. Earth Saver Wattles are available in three types of netting: biodegradable, photodegradable, and burlap. Earth Saver Wattles come in three diameters; 9", 12", and 20". The standard length for 9" is 25', 12" and 20" wattles standard length is 10'.

What do Earth Saver Rice Straw Wattles do?

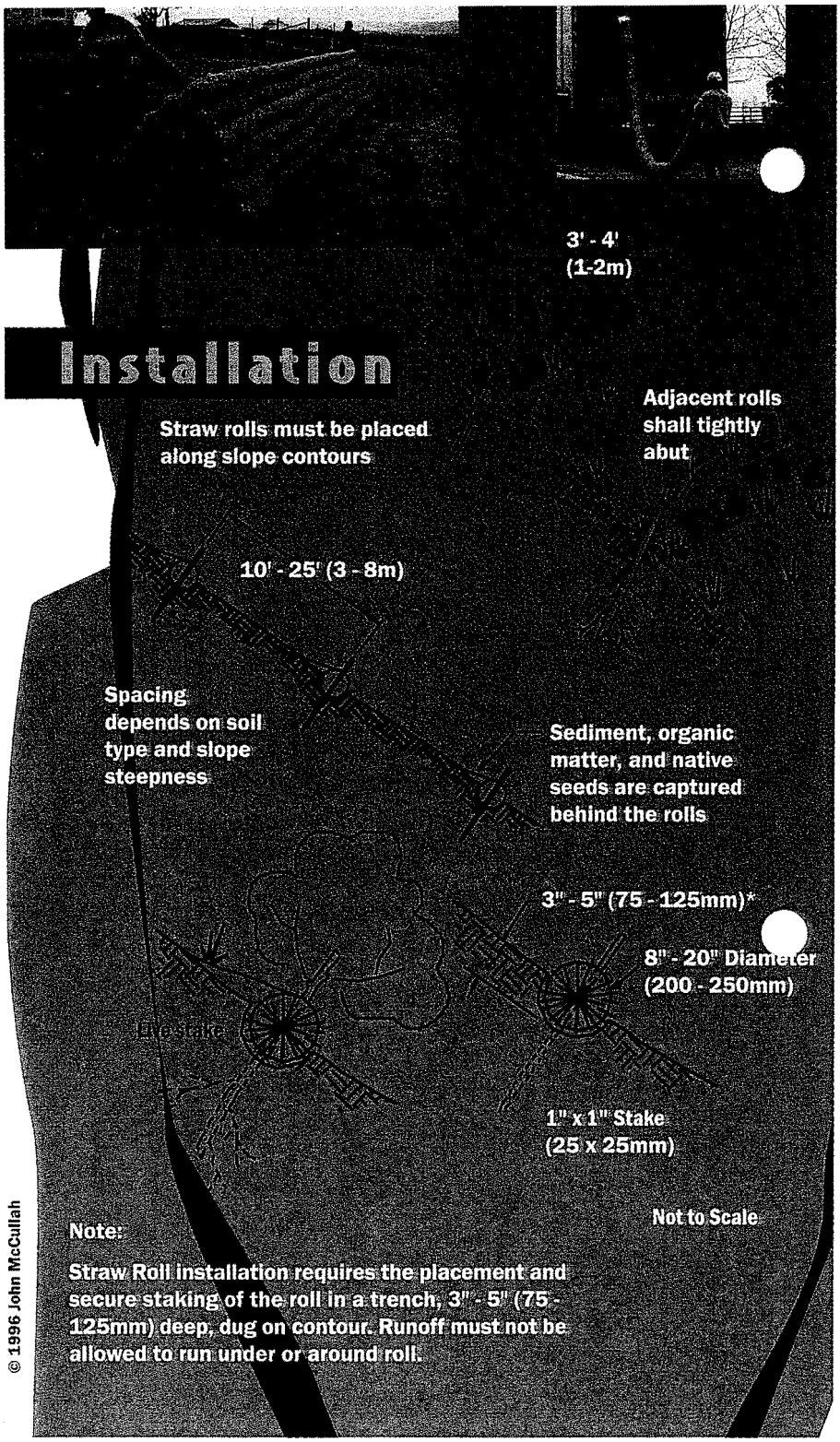
The wattles imitate natural stabilization by reducing rate of flow, absorbing water and filtering sediment runoff. By trapping silt and seed, native vegetation and brush begin to re-vegetate and restore root integrity within one year. Stabilization of the hillside will eventually transition to the reformed growth as the Earth Saver Wattles decay. The wattles also form a durable containment area to prevent polluted runoff from reaching surface waters.

What do Earth Saver Wattles replace?

Earth Saver™ Rice Straw Wattles replace Silt Fences, Sandbags, Willow Wattles, and Straw Bales, with a natural, earth-friendly, weed free solution.

Installation of Earth Saver™ Rice Straw Wattles*

Stake Earth Saver™ Rice Straw Wattles to contour of slope in a 2" to 4" trench. For sandy soils, dig a 3"- 4" trench. For dense soils, dig a 2" - 3" trench. Place Earth Saver™ RIce Straw Wattle firmly in the trench. Pack soil against the wattles on the up hill side. Stakes are to be placed at each end of the 25' Earth Saver™ and every 4'. Stakes are to be placed on each end and in the middle of the 10' Earth Saver™, leaving 2"of the stake above the Earth Saver™. For continuous rows, Earth Saver™ should be butted, not overlapped. Earth Saver™ rows should be placed horizontally, approximately 6' to 20' apart on slope, depending on site conditions. When Earth Saver™ is used on flat ground, drive stakes in vertically, when used on slopes, drive the stakes at an angle towards the up hill side of the slope. Close spacing is needed for sandy soil, high rainfall, and to catch sediment. Wide spacing is needed for heavy soil, low rainfall, and low sediment loads.



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STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE

Definition

A stabilized pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area.

Purpose

The purpose of stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

A stabilized construction entrance shall be used at all points of construction ingress and egress.

Design Criteria

See Figure 5A.38 on page 5A.74 for details.

Aggregate Size: Use 2 in. stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12 foot minimum but not less than the full width of points where ingress or egress occurs. 24 foot minimum if there is only one access to the site.

Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Filter cloth: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Filter Cloth

The filter cloth shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Brust Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 modified
Equivalent Openning Size	40-80	40-80	US Std Sieve CW-02215
Aggregate Depth (in)	6	10	—

[1] Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 1OOX, Typar 3401, or equivalent.

[2] Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Miraft 600X, or equivalent.

[3] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

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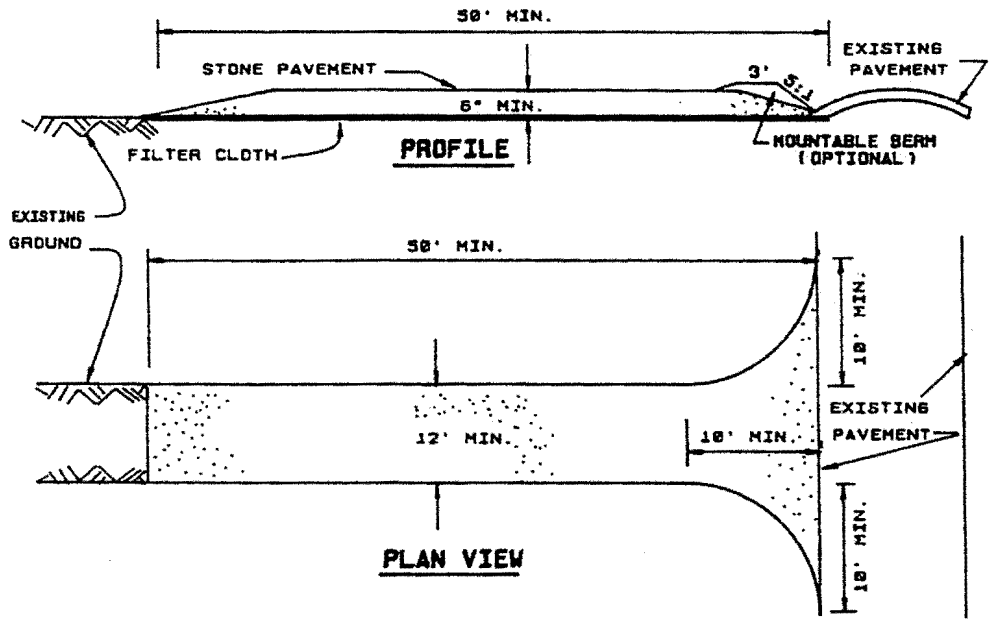
Figure 5A.38
Stabilized Construction Entrance Details



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN (6) INCHES.
4. WIDTH - TWELVE (12) MINIMUM, BUT NOT LESS THAN THE FULL WIOTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABLIZED WITH STONE AND WHICH DRAINS INTO AM APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE SYRACUSE, NEW YORK	STABLIZED CONSTRUCTION ENTRANCE	STANDARD SYMBOL

APPENDIX V

SNOWMAKING WITHDRAWAL COOPERATIVE AGREEMENT

COOPERATIVE AGREEMENT
BETWEEN
THE NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AND
THE NY OLYMPIC REGIONAL DEVELOPMENT AUTHORITY

The NYS Department of Environmental Conservation (DEC) and the New York Olympic Regional Development Authority (ORDA) enter into the following agreement in connection with the need to protect the surface water resource of the West Branch of the Ausable River in relation to the water to be withdrawn for snowmaking operations at Whiteface Mountain Ski Center. Whiteface Mountain Ski Center is under DEC's care and custody, and ORDA manages the operation and maintenance of the ski center.

The purpose of this Cooperative Agreement is to establish mutually agreeable methods and procedures by which water for snowmaking operations can be withdrawn from the West Branch of the Ausable River while maintaining the integrity of this surface water resource. Flow monitoring of the West Branch of the Ausable River has been implemented to minimize the impacts to the river's aquatic ecology and properly manage the fishery during times of low flow.

It shall be the responsibility of the signatories or their designees to generally administer the provisions of this Cooperative Agreement. This agreement amends the existing Memorandum of Understanding between DEC and ORDA which became effective March 8, 1991, and which established mutually agreeable methods and procedures for implementation of the MOU relating to Whiteface Mountain Ski Center and Memorial

Highway, Mt. Van Hoevenberg Recreation Area and Gore Mountain Ski Center (copy attached).

Compliance with this agreement in conjunction with the individual Unit Management Plan for Whiteface Mountain Ski Center shall occur immediately.

Water Withdrawal from the West Branch of the Ausable River

Monthly water withdrawals for snowmaking during some winter months exceed the threshold for requiring a Great Lakes Water Withdrawal Registration Certificate. A certificate covering the period July 7, 2003 through July 7, 2005 was issued and will be renewed as necessary (copy attached).

Flow monitoring of the West Branch of the Ausable River is necessary to minimize the impacts to the river's aquatic ecology from snowmaking water withdrawals and properly manage the fishery during times of low flow.

The stream improvement structure on the West Branch has been built, and provides a flow monitoring station.

In order to define the pumping parameters for snowmaking as they relate to stream flows, several meetings were held with the NYSDEC during the preparation of the 1996/2002 Whiteface Mountain UMP. The following parameters were developed for water

withdrawals in order to protect the aquatic environment of the river and to minimize the potential impacts to the resource during times of low flow:

1. Pumping withdrawal rates will be based on the instantaneous flow measured at the flow monitoring station.

2. Unrestricted pumping at approved withdrawal rates is permitted if the flow is 51.4 cubic feet per second (cfs) or greater. The currently permitted maximum withdrawal rate is 13.4 cfs (6,014 gallons per minute). Withdrawals by Whiteface will not reduce river flows below 38 cfs.

3. For instantaneous flows measured at the flow monitoring station between 51.4 cfs and 38 cfs, the pumping rate will be incrementally reduced. Instantaneous flows will not be reduced below 38 cfs by withdrawals by Whiteface.

4. If, during any pumping day the "instantaneous" flow rate is less than or equal to 38 cfs, then the immediate shut down of the snowmaking system will occur. ("Instantaneous" is defined as a fifteen minute average of readings taken within the 15 minute period.) Approved pumping withdrawal rates can resume when the instantaneous flow measured at the flow monitoring station is at least 44 cfs for at least 8 hours or 46 cfs for at least 6 hours, 48 cfs for at least 4 hours or 50 cfs for at least 2 hours, in order to maintain suitable downstream flow conditions.

5. The flow data and pumping data will be provided to the DEC for compliance monitoring. During the snowmaking season, the data will be provided to the DEC monthly on a routine basis, and more frequently in response to direct requests by DEC for data from specific dates. The routine submittals will include the daily minimum river flow for all days and the "Daily Detail" (15 minute flow reports) for days when, at any time during the day, river flows declined below 52 cfs. Records of withdrawals from the river should also be provided on days when river flows declined below 52 cfs. The monthly report will be provided to the DEC by five days after the end of the month.

6. During periods of severe anchor ice formation, data from the two gauges installed in the flume will be manually compared to determine if backwater effects are altering the gauge readings. Such comparisons will be done for periods upon request by the DEC.

7. The flume will be re-calibrated annually, preferably shortly before the start of the snowmaking season.

8. This Cooperative Agreement will be reviewed annually by DEC Fisheries staff and ORDA management and can be modified, amended, or canceled at any time upon mutual agreement of the signatories to this agreement.

9. This term of this agreement will be concurrent with the term of the Whiteface Mountain Ski Center UMP.

This Cooperative Agreement will become effective upon its execution by each of the parties hereto.

Department of Environmental Conservation

By: _____
Nancy Lussier, Director of Management and Budget

Date: 9/25/03

Olympic Regional Development Authority

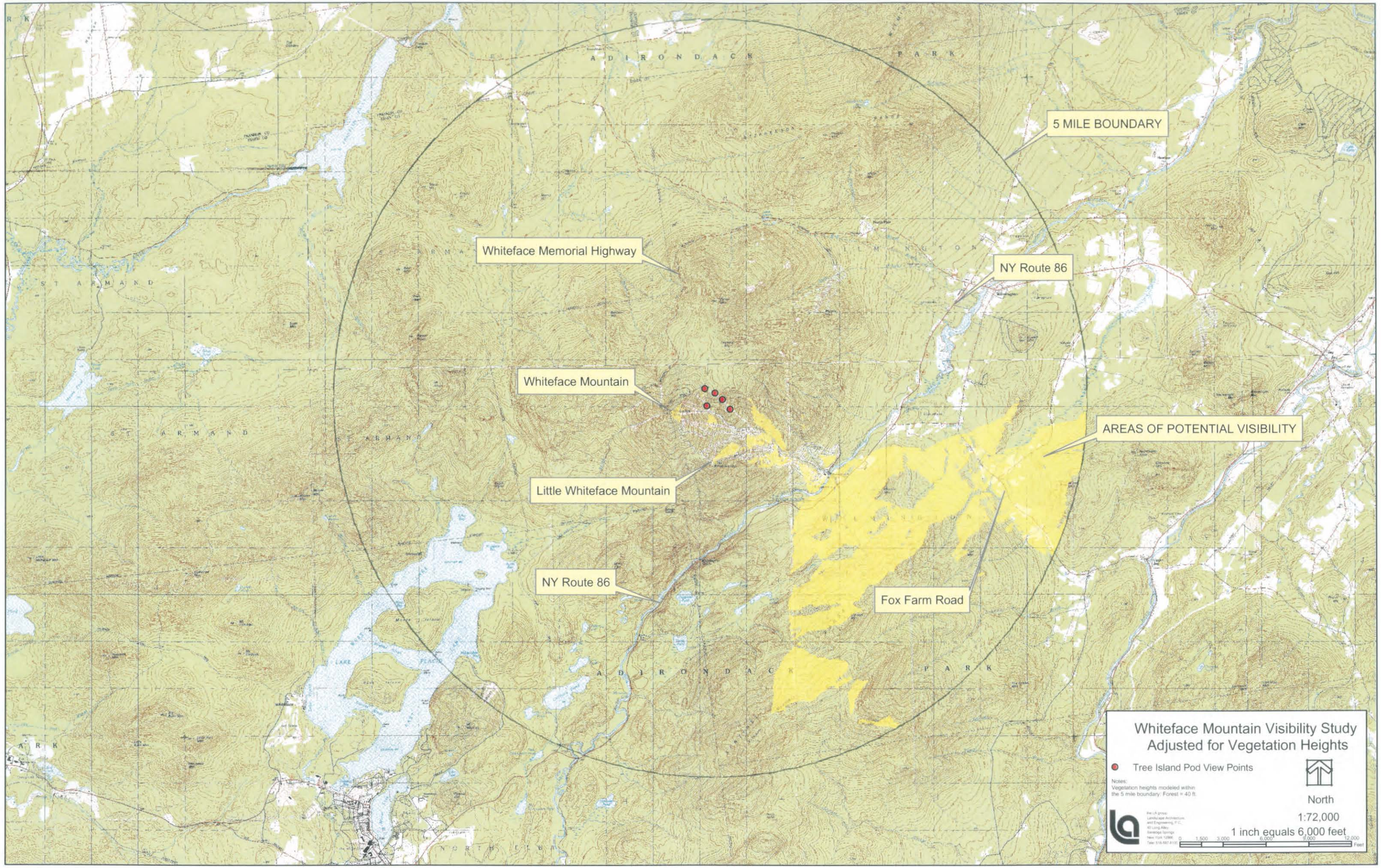
By: _____
Ted Blazer, President, C.E.O.

Date: 11-18-03

01043/cooperative.agreement

APPENDIX W

VISUAL IMPACT ASSESSMENT FIGURES


5 MILE BOUNDARY
Whiteface Memorial Highway
NY Route 86
Whiteface Mountain
AREAS OF POTENTIAL VISIBILITY
Little Whiteface Mountain
NY Route 86
Fox Farm Road
ADIRONDACK PARK
ST ARMAND
WILMINGTON
NORTH ELBA
LAKE PLACID
Whiteface Mountain Visibility Study
Adjusted for Vegetation Heights
Tree Island Pod View Points
Notes:
Vegetation heights modeled within the 5 mile boundary: Forest = 40 ft.
North
1:72,000
1 inch equals 6,000 feet
0 1,500 3,000 6,000 9,000 12,000 Feet

1. **View from Route 86 at the former Paleface Ski Center near Bassett Mountain looking southwest.**

   Tree Island Pod not visible (Blocked by topography).

Photo #1

2. **View from Route 86 near Beaver Brook looking southwest.**

   Tree Island Pod not visible (Blocked by topography).

Photo #2

3. **View from Route 86 on the west branch of the Ausable River bridge looking south in the hamlet of Wilmington.**

   Tree Island Pod not visible (Blocked by topography).

Photo #3

WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

PREPARED BY: ESA BELLEVUE, WA BOULDER, CO DENVER, CO GOODYEAR, AZ IRVINE, CA PARK CITY, UT PASADENA TOKYO

SE GROUP

IZA Engineering & Planning
Ivan Zafrabul Associates, PLLC

COMPREHENSIVE MANAGEMENT AND PLANNING REVIEW AND UNIT MANAGEMENT PLAN

TITLE: VIEWSHED PHOTOS

DATE: OCT 31, 2001

EXHIBIT: V - 1

PROJECT NUMBER: 01102

FILE: [whitefce]

4. **View from Fairview Avenue on Quaker Mountain looking southwest.**

   Very upper portion of Tree Island Pod is visible in context of existing ski trail.

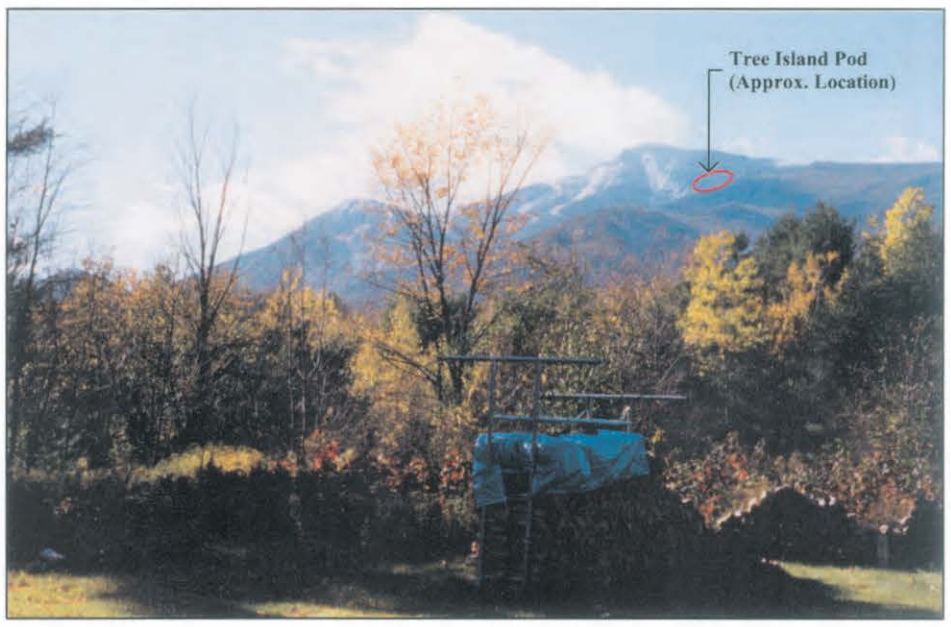
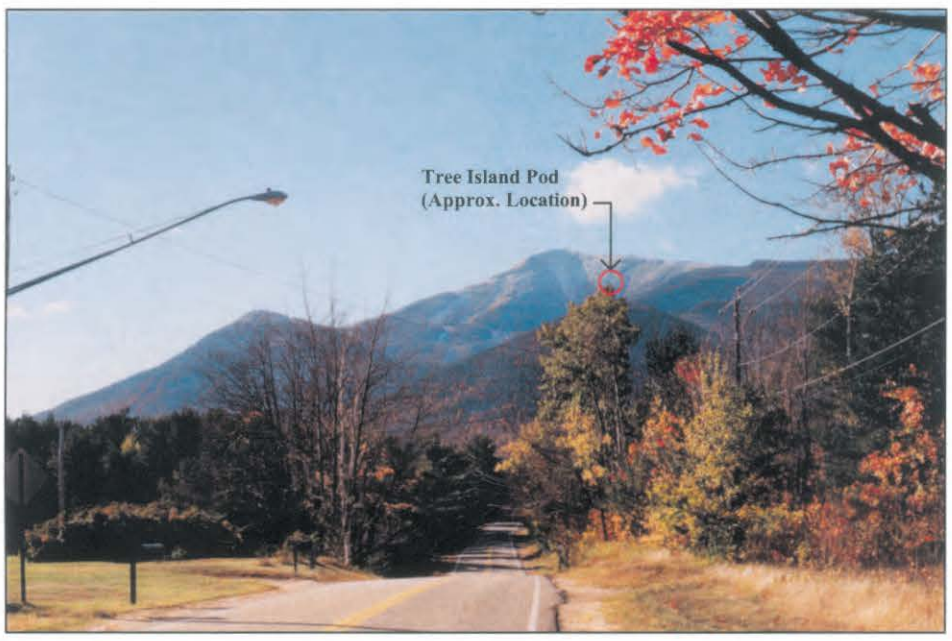


Photo #4



5. **View from Fox Farm looking west.**

   Very upper portion of Tree Island Pod is visible in context of existing ski slopes.

Photo #5

6. **View from Route 86 to the entrance of Whiteface Mountain Ski Center looking west.**

   View of Tree Island Pod location in context of existing ski area.

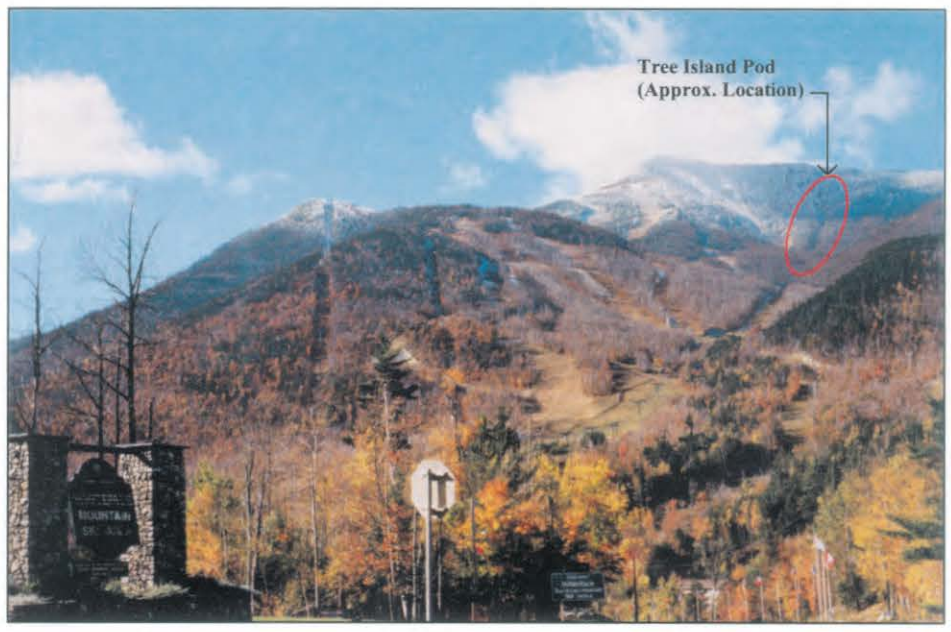


Photo #6

WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

PREPARED BY:
EDAW
BELLEVUE, WA
BOULDER, CO
DENVER, CO
GUILFORD, CT
PARK CITY, UT
TOKYO

SE GROUP

IZA Engineering & Planning
Ivan Zafrabal Associates, PLLC

COMPREHENSIVE MANAGEMENT
AND PLANNING REVIEW
AND UNIT MANAGEMENT PLAN

TITLE:
VIEWSHED PHOTOS

DATE: OCT 31, 2001

EXHIBIT:
V - 2

PROJECT NUMBER: 01102

FILE: [whiteface]

7. View from Route 86 just south of Monument Falls looking north.

Ski Trails not visible.

Photo #7

8. View from River Road at Lake Placid Skeet Range looking north.

Ski Trails not visible.

Photo #8

9. View from Route 73 looking north.

Ski Trails not visible.

Photo #9

WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

PREPARED BY: ESA BELLEVUE, WA BOULDER, CO DENVER, CO GAINESVILLE, FL PARK CITY, UT TOKYO

SE GROUP

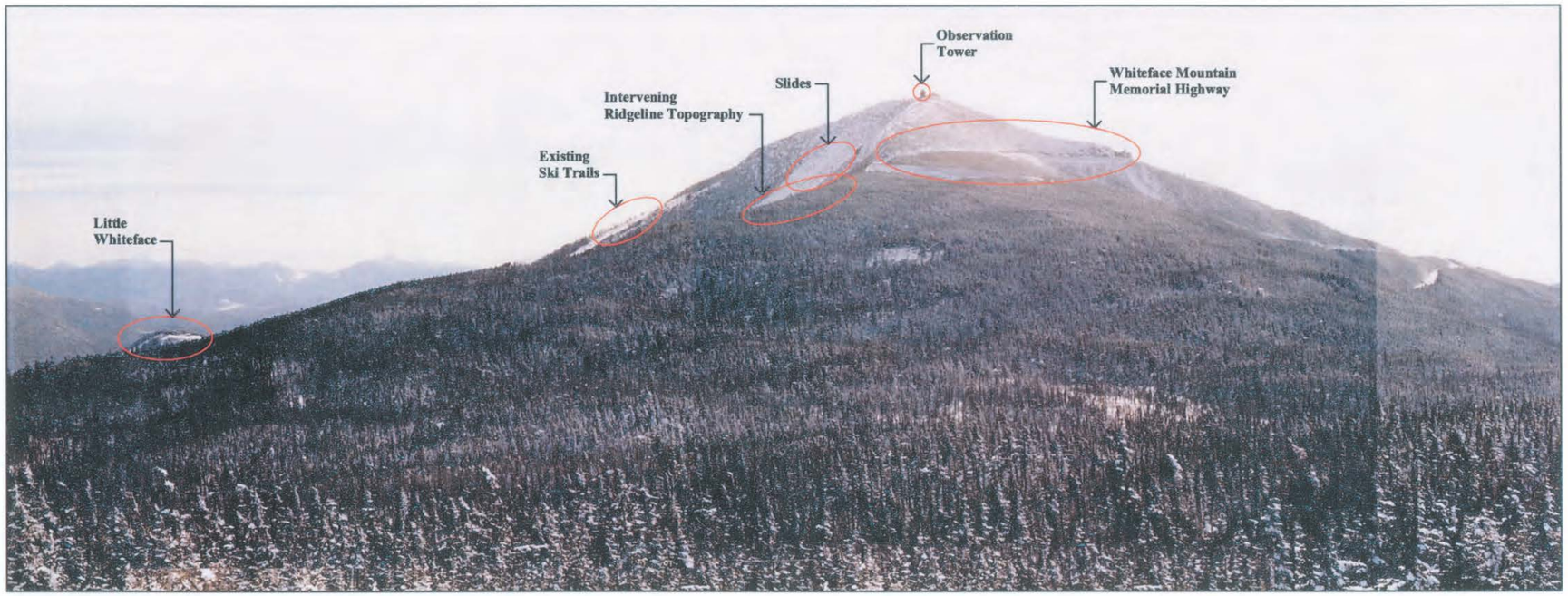
IZA Engineering & Planning
Ivan Zabalbal Associates, PLLC

COMPREHENSIVE MANAGEMENT
AND PLANNING REVIEW
AND UNIT MANAGEMENT PLAN

TITLE: VIEWSHED PHOTOS

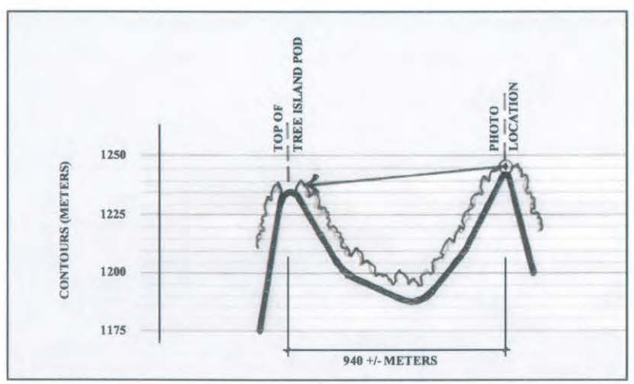
DATE: OCT 31, 2001

EXHIBIT: V - 3



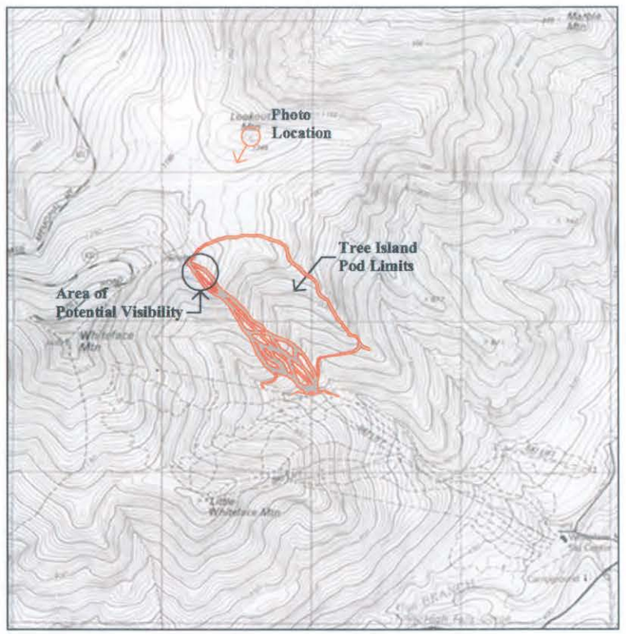
Southwest view from Lookout Mountain Summit.

Only very upper portion of Tree Island Pod potentially visible.



SECTION VIEW
SCALE: VERT 1:2,500
HORIZ 1:25,000

LOCATION MAP
NTS



WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

SE GROUP | the LA group Landscape Architecture and Engineering, PA | IZA Engineering & Planning, Ivan Zdrahal Associates, PLLC

COMPREHENSIVE MANAGEMENT AND PLANNING REVIEW AND UNIT MANAGEMENT PLAN

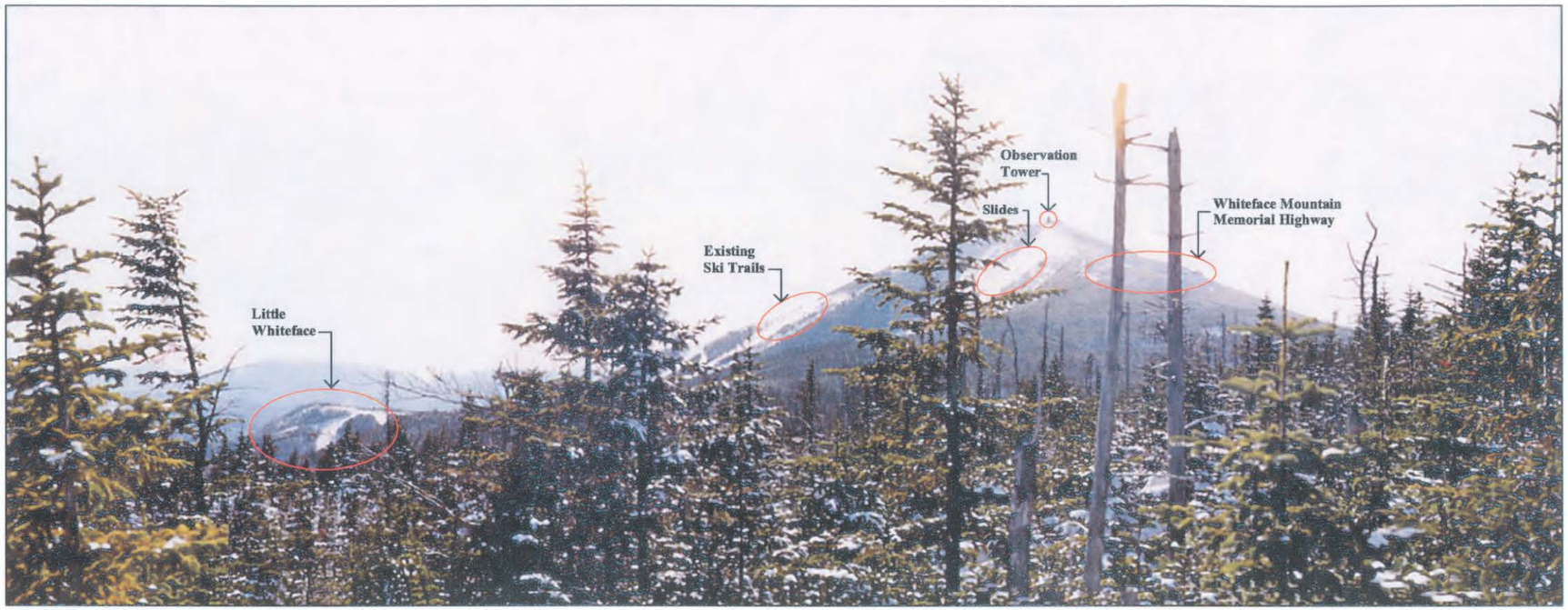
TITLE: **VIEWSHED PHOTOS**

DATE: MARCH 20, 2003

EXHIBIT: V - 4

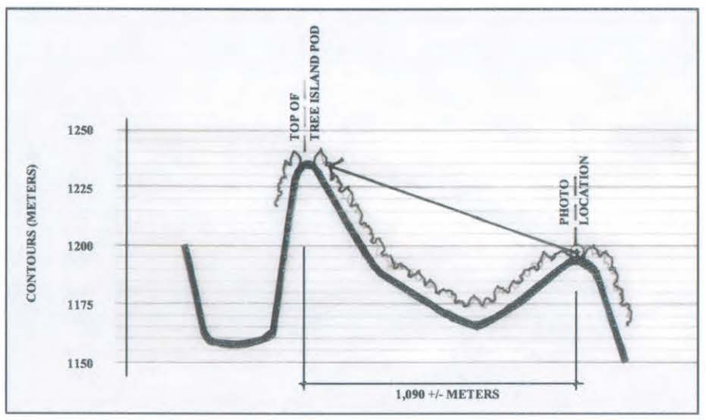
PROJECT NUMBER: 01043

FILE: [whiteface]



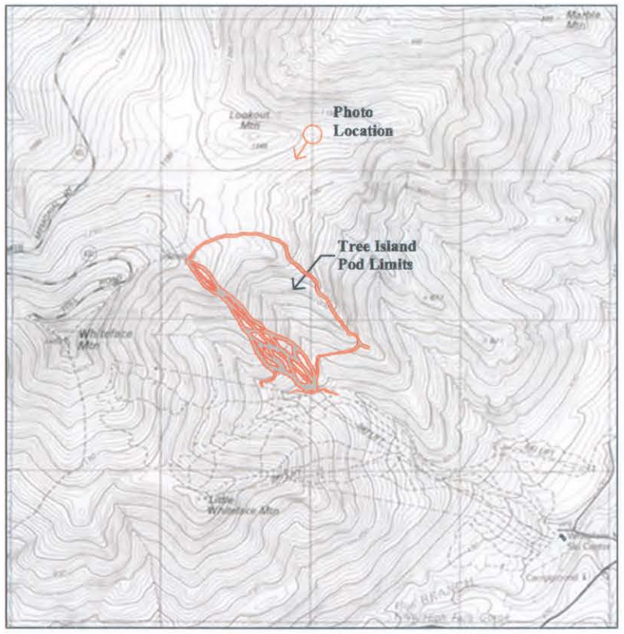
Southwest view
from Wilmington Trail east of Lookout Mountain summit.

Tree Island Pod not visible.



SECTION VIEW
SCALE: VERT 1:2,500
HORIZ 1:25,000

LOCATION MAP
NTS



WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

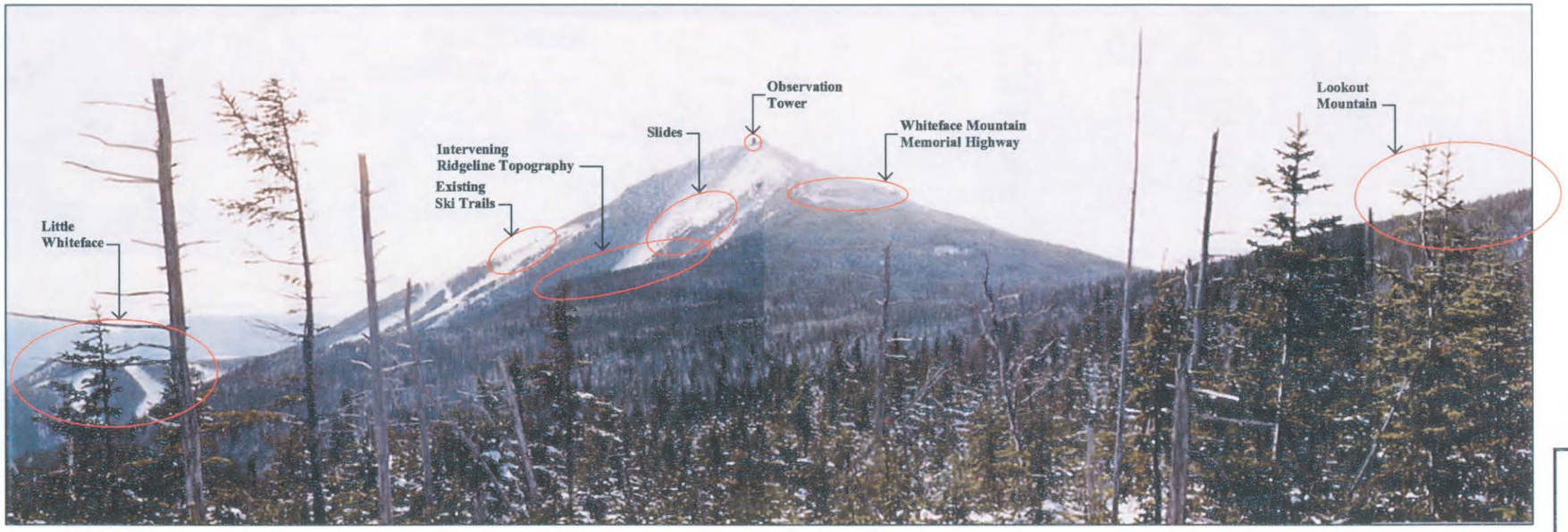
SE GROUP

the LA group landscape architecture and planning, PC

IZA Engineering & Planning
Ivan Zdrahal Associates, PLLC

COMPREHENSIVE MANAGEMENT AND PLANNING REVIEW AND UNIT MANAGEMENT PLAN

TITLE:	DATE:
VIEWSHED PHOTOS	MARCH 20, 2003
	EXHIBIT: V - 5
PROJECT NUMBER: 01043	FILE: [whiteface]

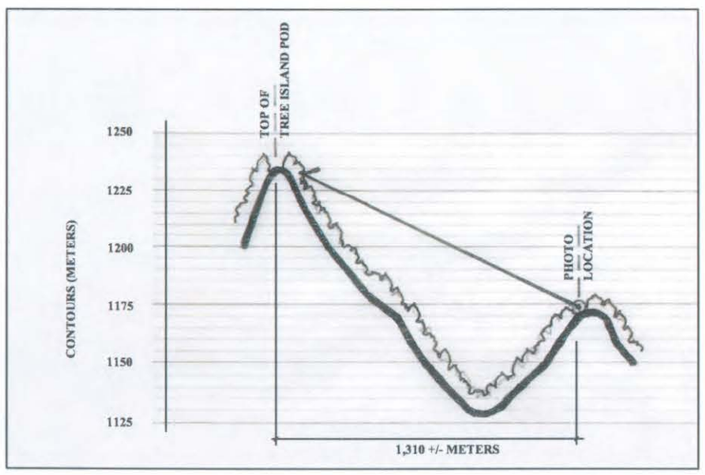


Southwest view
from Wilmington Trail before steep descent toward Marble Mountain.

Tree Island Pod not visible.

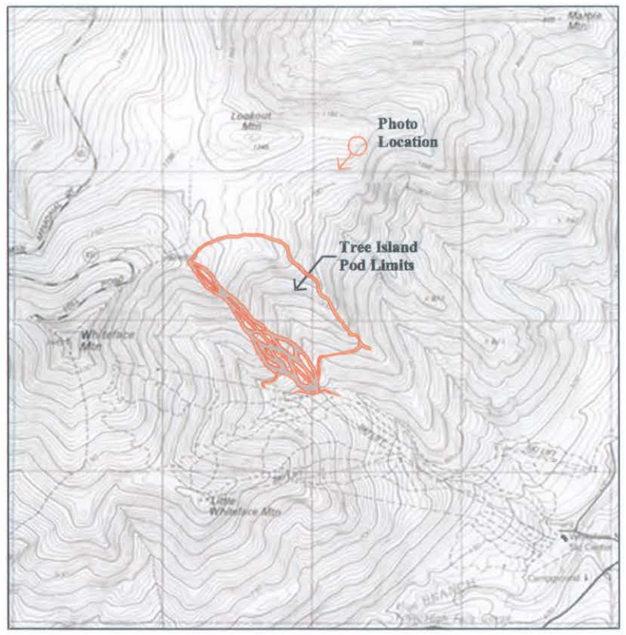
SECTION VIEW

SCALE: VERT 1:2,500
HORIZ 1:25,000



LOCATION MAP

NTS



WHITEFACE

Prepared For:
OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
LAKE PLACID, NEW YORK

Prepared By:

SE GROUP | the LA group Landscape Architecture and Engineering, P.C. | IZA Engineering & Planning, Ivan Zdrahal Associates, PLLC

COMPREHENSIVE MANAGEMENT AND PLANNING REVIEW AND UNIT MANAGEMENT PLAN

TITLE:	DATE:
VIEWSHED PHOTOS	MARCH 20, 2003
	EXHIBIT: V - 6
PROJECT NUMBER: 01043	FILE: [whiteface]

APPENDIX X

AMMONIUM NITRATE MSDS

Hydro Agri Canada

Tel.: (514) 849-9222
Fax: (514) 849-3362

MATERIAL SAFETY DATA SHEET

SECTION I. MATERIAL IDENTIFICATION

UN#: 2067
CAS: 6484 52 2

Emergency Telephone#: (514) 203-9906
Canutec #: (613) 996-6666
Chemtrec #: 1-800-424-9300

NFPA/HMIS RATING: 1, 0, 3; Health, Flammability, Reactivity

Distributor: **Hydro Agri Canada L.P.**
Complete Mailing Address: 1130 Sherbrooke St. West
Suite #1050
Montreal, PQ H3A 2M8

Telephone Number: (514) 849-9222
Fax Number: (514) 849-3362

Trade/Material Name: **Ammonium Nitrate - Fertilizer Grade**
Description: Solid granule, WHMIS Class 'C' OXIDIZER, NH_4NO_3

Other Designations: AMMONIUM SALT, NH_4NO_3

SECTION II. INGREDIENTS AND HAZARDS

INGREDIENT NAME	CAS #	PERCENT	HAZARD
Ammonium Nitrate	6484-52-2	95.3%	Exposure limits in air (give units) ACGIH TLV OSHA PEL other
Magnesium Nitrate	10377-60-3	1.5%	(Specify) 10 mg/^{3}
Dolomite	----	3.0%	

SECTION III. PHYSICAL DATA

Boiling Point:	210°C (410°F)	**Bulk Density:**	960 kg/m^3 (61lb/cubic ft.)
Vapour Pressure:	N.A.	**Melting Point:**	169.6°C (336°F)
Vapour Density:	N.A.	**pH (0.1M Solution):**	5.4 approx.
Solubility :	187g/100g H_2O	**Molecular Weight:**	80 approx.

Appearance and Odour: white/pale yellow prills or granules.

HYDRO

SECTION IV. FIRE AND EXPLOSION DATA

FLASH POINT(Method)	AUTOIGNITION TEMP.	FLAMMABILITY LIMITS IN AIR:
N/A	N/A	LOWER: N/A UPPER: N/A

Stabilized Product: - IMF class 5.1 - UN2067

EXTINGUISHING MEDIA
Flood with water only. Do not use smothering agents. Wear self-contained breathing apparatus. Releases ammonia and nitrogen oxides on decomposition.

SECTION V. REACTIVITY DATA

NH_4NO_3 is stable when stored and used under proper conditions. It is hygroscopic. Strong oxidizing agent. Reacts with strong alkalies to liberate ammonia.

SECTION VI. HEALTH HAZARD INFORMATION

SUMMARY OF RISKS

Contact with skin may cause mild skin irritations. Individuals may be exposed to nitrogen oxides due to decomposition of NH_4NO_3 at high temperatures. This is a toxic gas which can quickly cause acute respiratory problems.

Use NIOSH/MSHA approved respirator/ total dust respirator when handling clay coated prills.

FIRST AID

Eye Contact: Immediately flush with tempered running water. Get medical attention.

Skin Contact: Flush with tempered water. Wash immediately with soap and water. Get medical attention.

Inhalation: Remove to fresh air. Restore and/or support breathing as needed.

Ingestion: Seek immediate medical attention.

This product is not known as a carcinogen. Toxic hazard rating (SAX)

Hydro Agri
Canada

Tel.: (514) 849-9222
Fax: (514) 849-3362

MATERIAL SAFETY DATA SHEET

SECTION I. MATERIAL IDENTIFICATION

UN#: 2067
CAS: 6484 52 2

Emergency Telephone#:	(514) 203-9906
Canutec #:	(613) 996-6666
Chemtrec #:	1-800-424-9300

NFPA/HMIS RATING: 1, 0, 3; Health, Flammability, Reactivity

Distributor:	**Hydro Agri Canada L.P.**
Complete Mailing Address:	1130 Sherbrooke St. West Suite #1050 Montreal, PQ H3A 2M8
Telephone Number:	(514) 849-9222
Fax Number:	(514) 849-3362
Trade/Material Name:	**Ammonium Nitrate - Fertilizer Grade**
Description:	Solid granule, WHMIS Class 'C' OXIDIZER, NH_4NO_3
Other Designations:	AMMONIUM SALT, NH_4NO_3

SECTION II. INGREDIENTS AND HAZARDS

INGREDIENT NAME	CAS #	PERCENT	HAZARD
Ammonium Nitrate	6484-52-2	95.3%	Exposure limits in air (give units) ACGIH TLV OSHA PEL other
Magnesium Nitrate	10377-60-3	1.5%	(Specify) 10 mg/^{3}
Dolomite	----	3.0%	

SECTION III. PHYSICAL DATA

Boiling Point:	210°C (410°F)	**Bulk Density:**	960 kg/m^3 (61lb/cubic ft.)
Vapour Pressure:	N.A.	**Melting Point:**	169.6°C (336°F)
Vapour Density:	N.A.	**pH (0.1M Solution):**	5.4 approx.
Solubility :	187g/100g H_2O	**Molecular Weight:**	80 approx.

Appearance and Odour: white/pale yellow prills or granules.

HYDRO

SECTION IV. FIRE AND EXPLOSION DATA

FLASH POINT(Method)	AUTOIGNITION TEMP.	FLAMMABILITY LIMITS IN AIR:
N/A	N/A	LOWER: N/A UPPER: N/A

Stabilized Product: - IMP class 5.1 - UN2067

EXTINGUISHING MEDIA
Flood with water only. Do not use smothering agents. Wear self-contained breathing apparatus. Releases ammonia and nitrogen oxides on decomposition.

SECTION V. REACTIVITY DATA

NH_4NO_3 is stable when stored and used under proper conditions. It is hygroscopic. Strong oxidizing agent. Reacts with strong alkalies to liberate ammonia.

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SUMMARY OF RISKS

Contact with skin may cause mild skin irritations. Individuals may be exposed to nitrogen oxides due to decomposition of NH_4NO_3 at high temperatures. This is a toxic gas which can quickly cause acute respiratory problems.

Use NIOSH/MSHA approved respirator/ total dust respirator when handling clay coated prills.

FIRST AID

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Skin Contact: Flush with tempered water. Wash immediately with soap and water. Get medical attention.

Inhalation: Remove to fresh air. Restore and/or support breathing as needed.

Ingestion: Seek immediate medical attention.

This product is not known as a carcinogen. Toxic hazard rating (SAX)

APPENDIX Y

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APPENDIX Z

NYSEF ENVIRONMENTAL ASSESSMENT FORM

Appendix A
State Environmental Quality Review
FULL ENVIRONMENTAL ASSESSMENT FORM

Purpose: The full EAF is designed to help applicants and agencies determine, in an orderly manner, whether a project or action may be significant. The question of whether an action may be significant is not always easy to answer. Frequent-IV, there are aspects of a project that are subjective or unmeasureable. It is also understood that those who determine significance may have little or no formal knowledge of the environment or may not be technically expert in environmental analysis. In addition, many who have knowledge in one particular area may not be aware of the broader concerns affecting the question of significance.

The full EAF is intended to provide a method whereby applicants and agencies can be assured that the determination process has been orderly, comprehensive in nature, yet flexible enough to allow introduction of information to fit a project or action.

Full EAF Components: The full EAF is comprised of three parts:

Part 1- Provides objective data and information about a given project and its site. By identifying basic project 'data, it assists a reviewer in the analysis that takes place in Parts 2 and 3.

Part 2- Focuses on identifying the range of possible impacts that may occur from a project or action. It provides guidance as to whether an impact is likely to be considered small to moderate or whether it is a potentially-large impact. The form also identifies whether an impact can be mitigated or reduced.

Part 3- If any impact in Part 2 is identified as potentially-large, then Part 3 is used to evaluate whether or not the impact is actually important.

DETERMINATION OF SIGNIFICANCE- Type 1 and Unlisted Actions

Identify the Portions of EAF completed for this project: ☒ Part 1 ☒ Part 2 ☒ Part 3

Upon review of the information recorded on this EAF (Parts 1 and 2 and 3 if appropriate), and any other supporting information, and considering both the magnitude and importance of each impact, it is reasonably determined by the lead agency that:

☐ A. The project will not result in any large and important impact(s) and, therefore, is one which **will not** have a significant impact on the environment, therefore a **negative declaration will be prepared.**

☐ B. Although the project could have a significant effect on the environment, there will not be a significant effect for this Unlisted Action because the mitigation measures described in PART 3 have been required, therefore a **CONDITIONED negative declaration will be prepared.***

☐ C. The project may result in one or more large and important impacts that may have a significant impact on the environment, therefore a **positive declaration will be prepared.**

* A Conditioned Negative Declaration is only valid for Unlisted Actions

Whiteface Mountain Ski Area - Amendment of Existing Unit Management Plan
Name of Action

Olympic Regional Development Authority, ORDA
Name of Lead Agency

Print or Type Name of Responsible Officer in Lead Agency | Title of Responsible Officer

Signature of Responsible Officer In Lead Agency | Signature of Preparer (If different from responsible officer)

March 16, 2004
Date

1

PART 1-PROJECT INFORMATION

Prepared by Project Sponsor

NOTICE: This document is designed to assist in determining whether the action proposed may have a significant effect on the environment. Please complete the entire form, Parts A through E. Answers to these questions will be considered as part of the application for approval and may be subject to further verification and public review. Provide any additional information you believe will be needed to complete Parts 2 and 3.

It is expected that completion of the full EAF will be dependent on information currently available and will not involve new studies, research or investigation. If information requiring such additional work is unavailable, so indicate and specify each instance.

NAME OF ACTION Whiteface Mountain Ski Area - Amendment of Existing Draft Management Plan		
LOCATION OF ACTION (Include Street Address, Municipality and County) Whiteface Mountain Ski Area - NY Route 86, Town of Wilmington, Essex County, NY		
NAME OF APPLICANT/SPONSOR Olympic Regional Development Authority	BUSINESS TELEPHONE (518) 523-1655	
ADDRESS 218 Main Street		
CITY/PO Lake Placid	STATE NY	ZIP CODE 12946
NAME OF OWNER (If different) State of New York - Department of Environmental Conservation	BUSINESS TELEPHONE (518) 897-1200	
ADDRESS P.O. Box 296		
CITY/PO Ray Brook	STATE NY	ZIP CODE 12997
DESCRIPTION OF ACTION Amendment of existing Unit Management Plan to construct a New York Ski Education Foundation (NYSEF) building.		

Please Complete Each Question- Indicate N.A. if not applicable

A. Site Description

Physical setting of overall project, both developed and undeveloped areas.

1. Present land use: ☐Urban ☐Industrial ☐Commercial ☐Residential (suburban) ☐Rural (non-farm)
☐Forest ☐Agriculture ☒Other Forest Preserve - Intensive Use Area

2. Total acreage of project area: 0.91± acres.

APPROXIMATE ACREAGE	PRESENTLY	AFTER COMPLETION
Meadow or Brushland (Non-agricultural)	0.54 acres	0.6 acres
Forested	0.08 acres	0 acres
Agricultural (includes orchards, cropland, pasture, etc.)	0 acres	0 acres
Wetland (Freshwater or tidal as per Articles 24, 25 of ECL)	0 acres	0 acres
Water Surface Area	0 acres	0 acres
Unvegetated (Rock, earth or fill)	0 acres	0 acres
Roads, buildings and other paved surfaces	0.28 acres	0.43 acres
Other (Indicate type)_____	0 acres	0 acres

3. What is predominant soil type(s) on project site? Glacial till / loam
a. Soil drainage: ☒Well drained 100 % of site ☐Moderately well drained _____ % of site
☐Poorly drained _____ % of site

b. If any agricultural land is involved, how many acres of soil are classified within soil group 1 through 4 of the NYS Land Classification System? N/A acres. (See 1 NYCRR 370).

4. Are there bedrock outcroppings on project site? ☐Yes ☒No
a. What is depth to bedrock? Not Determined (in feet)

5. Approximate percentage of proposed project site with slopes: ☐0-10% _____ % ☐10-15% 15 %
☒15% or greater 85 %

6. Is project substantially contiguous to, or contain a building, site, or district, listed on the State or the National Registers of Historic Places? ☒Yes ☐No

7. Is project substantially contiguous to a site listed on the Register of National Natural Landmarks? ☐Yes ☒No

8. What is the depth of the water table? not determined (in feet)

9. Is site located over a primary, principal, or sole source aquifer? ☐Yes ☒No

10. Do hunting, fishing or shell fishing opportunities presently exist in the project area? ☐Yes ☒No

11. Does project site contain any species of plant or animal life that is identified as threatened or endangered?
☐Yes ☒No According to Natural Heritage Program
Identify each species _____

12, Are there any unique or unusual land forms on the project site? (i.e., cliffs, dunes, other geological formations)
☐Yes ☒No Describe _____

13. Is the project site presently used by the community or neighborhood as an open space or recreation area?
☒Yes ☐No If yes, explain Downhill Ski Center

14. Does the present site include scenic views known to be important to the community?
☒Yes ☐No

15. Streams within or contiguous to project area: Yes
a. Name of Stream and name of River to which it is tributary unnamed tributary to West Branch Ausable River

16. Lakes, ponds, wetland areas within or contiguous to project area: None
a. Name _____ b. Size (In acres) _____

17. Is the site served by existing public utilities? ☒Yes ☐No
a) If Yes, does sufficient capacity exist to allow connection? ☒Yes ☐No
b) If Yes, will improvements be necessary to allow connection? ☐Yes ☒No

18. Is the site located in an agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐Yes ☒No

19. Is the site located in or substantially contiguous to a Critical Environmental Area designated pursuant to Article 8 of the ECL, and 6 NYCRR 617? ☐Yes ☒No

20. Has the site ever been used for the disposal of solid or hazardous wastes? ☐Yes ☒No

B. Project Description

1. Physical dimensions and scale of project (fill in dimensions as appropriate)
a. Total contiguous acreage owned or controlled by project sponsor 2910 acres.
b. Project acreage to be developed: 0.91 acres initially; 0.91 acres ultimately.
c. Project acreage to remain undeveloped 0 acres.
d. Length of project, in miles: N/A (If appropriate)
e. If the project is an expansion, indicate percent of expansion proposed N/A .
f. Number of off-street parking spaces existing N/A , proposed N/A
g. Maximum vehicular trips generated per hour N/A (upon completion of project)?
h. If residential: Number and type of housing units:

	One Family	Two Family	Multiple Family	Condominium
Initially				
Ultimately				

i. Dimensions (in feet) of largest proposed structure 33 ft height; 55.5 width,. 90.1 length.
l. Linear feet of frontage along a public thoroughfare project will occupy is? N/A ft.

2. How much natural material (i.e., rock, earth, etc.) will be removed from the site? 0 tons/cubic yards

3. Will disturbed areas be reclaimed? ☒Yes ☐No ☐N/A

a. If yes, for what intended purpose is the site being reclaimed? Erosion Control

b. Will topsoil be stockpiled for reclamation? ☐Yes ☒No

c. Will upper subsoil be stockpiled for reclamation? ☐Yes ☒No

4. How many acres of vegetation (trees, shrubs, ground covers) will be removed from site? 0.08 acres.

5. Will any mature forest (over 100 years old) or other locally-important vegetation be removed by this project? ☐Yes ☒No

6. If single phase project: Anticipated period of construction 4 months, (including demolition).

7. If multi-phased:

a. Total number of phases anticipated _____ (number).

b. Anticipated date of commencement phase 1 _____ month _____ year, (including demolition).

c. Approximate completion date of final phase _____ month _____ year.

d. Is phase 1 functionally dependent on subsequent phases? ☐Yes ☐No

8. Will blasting occur during construction? ☒Yes ☐No

9. Number of jobs generated: during construction 10, after project is complete 0

10. Number of jobs eliminated by this project 0

11. Will project require relocation of any projects or facilities? ☐Yes ☒No If yes, explain _____

12. Is surface liquid waste disposal involved? ☐Yes ☒No

a. If yes, indicate type of waste (sewage, industrial, etc.) and amount _____

b. Name of water body into which effluent will be discharged _____

13. Is subsurface liquid waste disposal involved? ☒Yes ☐No Type Sewage

14. Will surface area of an existing water body increase or decrease by proposal? ☐Yes ☒No

Explain _____

15. Is project or any portion of project located in a 100 year flood plain? ☐Yes ☒No

16. Will the project generate solid waste? ☒Yes ☐No

a. If yes, what is the amount per month unknown tons

b. If yes, will an existing solid waste facility be used? ☒Yes ☐No

c. If yes, give name as determined by commercial hauler, location _____

d. Will any wastes not go into a sewage disposal system or into a sanitary landfill? ☐Yes ☒No

e. If Yes, explain _____

17. Will the project involve the disposal of solid waste? ☐Yes ☒No

a. If yes, what is the anticipated rate of disposal? _____ tons/month.

b. If yes, what is the anticipated site life? _____ years.

18. Will project use herbicides or pesticides? ☐Yes ☒No

19. Will project routinely produce odors (more than one hour per day)? ☐Yes ☒No

20. Will project produce operating noise exceeding the local ambient noise levels? ☐Yes ☒No

21. Will project result in an increase in energy use? ☒Yes ☐No

If yes , indicate type(s) electrical

22. If water supply is from wells, indicate pumping capacity source is the Ski Center water supply, which has a safe yield of 35 gallons per minute.

23. Total anticipated water usage per day 0 gallons/day.

24. Does project involve Local, State or Federal funding? ☐Yes ☒No

If Yes, explain _____

25. Approvals Required:

			Type	Submittal Date
City, Town, Village Board	☐Yes	☒No		
City, Town, Village Planning Board	☐Yes	☒No		
City, Town Zoning Board	☐Yes	☒No		
City, County Health Department	☐Yes	☒No		
Other Local Agencies	☐Yes	☒No		
Other Regional Agencies	☐Yes	☒No		
State Agencies	☒Yes	☐No	Adirondack Park Agency, NYSDEC	
Federal Agencies	☐Yes	☒No		

C. Zoning and Planning Information

1 Does proposed action involve a planning or zoning decision? ☒Yes ☐No

If Yes, indicate decision required:

☐zoning amendment ☐zoning variance ☐special use permit ☐subdivision ☐site plan

☐new/revision of master plan ☐resource management plan ☒other Amendment of existing plan

2. What is the zoning classification(s) of the site? Forest Preserve - Intensive Use

3. What is the maximum potential development of the site if developed as permitted by the present zoning?

N/A

4. What is the proposed zoning of the site? N/A

5. What is the maximum potential development of the site if developed as permitted by the proposed zoning?

Ski Center

6. Is the proposed action consistent with the recommended uses in adopted local land use plans? ☒Yes ☐No

7. What are the predominant land use(s) and zoning classifications within a 1/4 mile radius of proposed action?

Forest Preserve - Intensive Use, Ski Center

8. Is the proposed action compatible with adjoining/surrounding land uses within a 1/4 mile? ☒Yes ☐No

9. If the proposed action is the subdivision of land, how many lots are proposed? N/A

a. What is the minimum lot size proposed? _____

10. Will proposed action require any authorization(s) for the formation of sewer or water districts? ☐Yes ☒No

11. Will the proposed action create a demand for any community provided services (recreation, education, police, fire protection)? ☐Yes ☒No

a. If yes, is existing capacity sufficient to handle projected demand? ☐Yes ☐No

12. Will the proposed action result in the generation of traffic significantly above present levels? ☐Yes ☒No

a. If yes, is the existing road network adequate to handle the additional traffic? ☐Yes ☐No

D. Informational Details

Attach any additional information as may be needed to clarify your project. If there are or may be any adverse impacts associated with your proposal, please discuss such impacts and the measures which you propose to mitigate or avoid them.

E. Verification

I certify that the information provided above is true to the best of my knowledge.

Applicant/Sponsor Name Ted Blazer, President and CEO of ORDA Date _____

Signature _____ Title _____

If the action is in the Coastal Area, and you are a state agency, complete the Coastal Assessment Form before proceeding with this assessment.

Part 2-PROJECT IMPACTS AND THEIR MAGNITUDE

Responsibility of Lead Agency

General Information (Read Carefully)

- In completing the form the reviewer should be guided by the question: Have my responses and determinations been **reasonable?** The reviewer is not expected to be an expert environmental analyst.
- Identifying that an impact will be potentially large (column 2) does not mean that it is also necessarily **significant.** Any large impact must be evaluated in PART 3 to determine significance. Identifying an impact in column 2 simply asks that it be looked at further.
- The **Examples** provided are to assist the reviewer by showing types of impacts and wherever possible the threshold of magnitude that would trigger a response in column 2. The examples are generally applicable throughout the State and for most situations. But, for any specific project or site other examples and/or lower thresholds may be appropriate for a Potential Large Impact response, thus requiring evaluation in Part 3.
- The impacts of each project, on each site, in each locality, will vary. Therefore, the examples are illustrative and have been offered as guidance. They do not constitute an exhaustive list of impacts and thresholds to answer each question.
- The number of examples per question does not indicate the importance of each question.
- In identifying impacts, consider long term, short term and cumulative effects.

Instructions (Read carefully)

a. Answer each of the 19 questions in PART 2. Answer Yes if there will be any impact.

b. **Maybe** answers should be considered as Yes answers.

c. If answering Yes to a question then check the appropriate box (column 1 or 2) to indicate the potential size of the impact. If impact threshold equals or exceeds any example provided, check column 2. If impact will occur but threshold is lower than example, check column 1.

d. If reviewer has doubt about size of the impact then consider the impact as potentially large and proceed to PART 3.

e. If a potentially large impact checked in column 2 can be mitigated by change(s) in the project to a small to moderate impact, also check the Yes box in column 3. A No response indicates that such a reduction is not possible. This must be explained in Part 3,

IMPACT ON LAND	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change	
1 Will the proposed action result in a physical change to the project site? ☐NO ☒YES				
Examples that would apply to column 2				
• Any construction on slopes of 15% or greater, (15 foot rise per 100 foot of length), or where the general slopes in the project area exceed 10%.	☐	☒	☐Yes	☒No
• Construction on land where the depth to the water table is less than 3 f eet.	☐	☐	☐Yes	☐No
• Construction of paved parking area for 1,000 or more vehicles.	☐	☐	☐Yes	☐No
• Construction on land where bedrock is exposed or generally within 3 feet of existing ground surface.	☒	☐	☐Yes	☒No
• Construction that will continue for more than 1 year or involve more than one phase or stage.	☐	☐	☐Yes	☐No
• Excavation for mining purposes that would remove more than 1,000 tons of natural material (i.e., rock or soil) per year.	☐	☐	☐Yes	☐No
• Construction or expansion of a sanitary landfill.	☐	☐	☐Yes	☐No
• Construction in a designated floodway.	☐	☐	☐Yes	☐No
• Other impacts _____	☐	☐	☐Yes	☐No
2. Will there be an effect to any unique or unusual land forms found on the site? (i.e., cliffs, dunes, geological formations, etc.)☒NO ☐YES				
• Specific land forms: _____	☐	☐	☐Yes	☐No

IMPACT ON WATER

	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change	
3. Will proposed action affect any water body designated as protected? (Under Articles 15, 24, 25 of the Environmental Conservation Law, ECL) ☒NO ☐YES				
Examples that would apply to column 2				
• Developable area of site contains a protected water body.	☐	☐	☐Yes	☐No
• Dredging more than 100 cubic yards of material from channel of a protected stream.	☐	☐	☐Yes	☐No
• Extension of utility distribution facilities through a protected water body.	☐	☐	☐Yes	☐No
• Construction in a designated freshwater or tidal wetland.	☐	☐	☐Yes	☐No
• Other impacts: _____	☐	☐	☐Yes	☐No
4. Will proposed action affect any non-protected existing or new body of water? ☒NO ☐YES				
Examples that would apply to column 2				
• A 10% increase or decrease in the surface area of any body of water or more than a 10 acre increase or decrease.	☐	☐	☐Yes	☐No
• Construction of a body of water that exceeds 10 acres of surface area.	☐	☐	☐Yes	☐No
• Other impacts: _____	☐	☐	☐Yes	☐No
5. Will Proposed Action affect surface or groundwater quality or quantity? ☒NO ☐YES				
Examples that would apply to column 2				
• Proposed Action will require a discharge permit.	☐	☐	☐Yes	☐No
• Proposed Action requires use of a source of water that does not have approval to serve proposed (project) action.	☐	☐	☐Yes	☐No
• Proposed Action requires water supply from wells with greater than 45 gallons per minute pumping capacity.	☐	☐	☐Yes	☐No
• Construction or operation causing any contamination of a water supply system.	☐	☐	☐Yes	☐No
• Proposed Action will adversely affect groundwater.	☐	☐	☐Yes	☐No
• Liquid effluent will be conveyed off the site to facilities which presently do not exist or have inadequate capacity.	☐	☐	☐Yes	☐No
• Proposed Action would use water in excess of 20,000 gallons per day.	☐	☐	☐Yes	☐No
• Proposed Action will likely cause siltation or other discharge into an existing body of water to the extent that there will be an obvious visual contrast to natural conditions.	☐	☐	☐Yes	☐No
• Proposed Action will require the storage of petroleum or chemical products greater than 1,100 gallons.	☐	☐	☐Yes	☐No
• Proposed Action will allow residential uses in areas without water and/or sewer services.	☐	☐	☐Yes	☐No
• Proposed Action locates commercial and/or industrial uses which may require new or expansion of existing waste treatment and/or storage facilities.	☐	☐	☐Yes	☐No
• Other impacts-_____	☐	☐	☐Yes	☐No
6. Will proposed action alter drainage flow or patterns, or surface water runoff? ☒NO ☐YES				
Examples that would apply to column 2				
• Proposed Action would change flood water flows.	☐	☐	☐Yes	☐No

	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change
• Proposed Action may cause substantial erosion.	☐	☐	☐Yes ☐No
• Proposed Action is incompatible with existing drainage patterns.	☐	☐	☐Yes ☐No
• Proposed Action will allow development in a designated floodway.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
IMPACT ON AIR			
7. Will proposed action affect air quality? ☒NO ☐YES			
Examples that would apply to column 2			
• Proposed Action will induce 1,000 or more vehicle trips in any given hour.	☐	☐	☐Yes ☐No
• Proposed Action will result in the incineration of more than 1 ton of refuse per hour.	☐	☐	☐Yes ☐No
• Emission rate of total contaminants will exceed 5 lbs. per hour or a heat source producing more than 10 million BTU's per hour.	☐	☐	☐Yes ☐No
• Proposed action will allow an increase in the amount of land committed to industrial use.	☐	☐	☐Yes ☐No
• Proposed action will allow an increase in the density of industrial development within existing industrial areas.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
IMPACT ON PLANTS AND ANIMALS			
8. Will Proposed Action affect any threatened or endangered species? ☒NO ☐YES			
Examples that would apply to column 2			
• Reduction of one or more species listed on the New York or Federal list, using the site, over or near site or found on the site.	☐	☐	☐Yes ☐No
• Removal of any portion of a critical or significant wildlife habitat.	☐	☐	☐Yes ☐No
• Application of pesticide or herbicide more than twice a year, other than for agricultural purposes.	☐	☐	☐Yes ☐No
• Other impacts-_____	☐	☐	☐Yes ☐No
9. Will Proposed Action substantially affect non-threatened or non-endangered species? ☒NO ☐YES			
Examples that would apply to column 2			
• Proposed Action would substantially interfere with any resident or migratory fish, shellfish or wildlife species.	☐	☐	☐Yes ☐No
• Proposed Action requires the removal of more than 10 acres of mature forest (over 100 years of age) or other locally important vegetation.	☐	☐	☐Yes ☐No
IMPACT ON AGRICULTURAL LAND RESOURCES			
10. Will the Proposed Action affect agricultural land resources? ☒NO ☐YES			
Examples that would apply to column 2			
• The proposed action would sever, cross or limit access to agricultural land (includes cropland, hayfields, pasture, vineyard, orchard, etc.)	☐	☐	☐Yes ☐No

	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change
• Construction activity would excavate or compact the soil profile of agricultural land.	☐	☐	☐Yes ☐No
• The proposed action would irreversibly convert more than 10 acres of agricultural land or, if located in an Agricultural District, more than 2.5 acres of agricultural land.	☐	☐	☐Yes ☐No
• The proposed action would disrupt or prevent installation of agricultural land management systems (e.g., subsurface drain lines, outlet ditches, strip cropping); or create a need for such measures (e.g. cause a farm field to drain poorly due to increased runoff)	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
IMPACT ON AESTHETIC RESOURCES			
11 Will proposed action affect aesthetic resources? ☒NO ☐YES (If necessary, use the Visual EAF Addendum in Section 617.21, Appendix B. **Examples** that would apply to column 2			
• Proposed land uses, or project components obviously different from or in sharp contrast to current surrounding land use patterns, whether man-made or natural.	☐	☐	☐Yes ☐No
• Proposed land uses, or project components visible to users of aesthetic resources which will eliminate or significantly reduce their enjoyment of the aesthetic qualities of that resource.	☐	☐	☐Yes ☐No
• Project components that will result in the elimination or significant screening of scenic views known to be important to the area.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
IMPACT ON HISTORIC AND ARCHAEOLOGICAL RESOURCES			
12, Will Proposed Action impact any site or structure of historic, pre-historic or paleontological importance? ☐NO ☒YES Examples that would apply to column 2			
• Proposed Action occurring wholly or partially within or substantially contiguous to any facility or site listed on the State or National Register of historic places.	☒	☐	☐Yes ☐No
• Any impact to an archaeological site or fossil bed located within the project site.	☐	☐	☐Yes ☐No
• Proposed Action will occur in an area designated as sensitive for archaeological sites on the NYS Site Inventory.	☐	☐	☐Yes ☐No
• Other impacts-_____	☐	☐	☐Yes ☐No
IMPACT ON OPEN SPACE AND RECREATION			
13. Will Proposed Action affect the quantity or quality of existing or future open spaces or recreational opportunities? Examples that would apply to column 2 ☒NO ☐YES			
• The permanent foreclosure of a future recreational opportunity.	☐	☐	☐Yes ☐No
• A major reduction of an open space important to the community.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No

	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change
IMPACT ON TRANSPORTATION			
14. Will there be an effect to existing transportation systems? ☒NO ☐YES			
Examples that would apply to column 2			
• Alteration of present patterns of movement of people and/or goods.	☐	☐	☐Yes ☐No
• Proposed Action will result in major traffic problems.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
IMPACT ON ENERGY			
15. Will proposed action affect the community's sources of fuel or energy supply? ☒NO ☐YES			
Examples that would apply to column 2			
• Proposed Action will cause a greater than 5% increase in the use of any form of energy in the municipality.	☐	☐	☐Yes ☐No
• Proposed Action will require the creation or extension of an energy transmission or supply system to serve more than 50 single or two family residences or to serve a major commercial or industrial use.	☐	☐	☐Yes ☐No
• Other impacts: _____	☐	☐	☐Yes ☐No
NOISE AND ODOR IMPACTS			
16. Will there be objectionable odors, noise, or vibration as a result of the Proposed Action? ☒NO ☐YES			
Examples that would apply to column 2			
• Blasting within 1,500 feet of a hospital, school or other sensitive facility.	☐	☐	☐Yes ☐No
• Odors will occur routinely (more than one hour per day).	☐	☐	☐Yes ☐No
• Proposed Action will produce operating noise exceeding the local ambient noise levels for noise outside of structures.	☐	☐	☐Yes ☐No
• Proposed Action will remove natural barriers that would act as a noise screen.	☐	☐	☐Yes ☐No
• Other impacts-_____	☐	☐	☐Yes ☐No
***IMPACT ON* PUBLIC HEALTH**			
17, Will Proposed Action affect public health and safety? ☒NO ☐YES			
Examples that would apply to column 2			
• Proposed Action may cause a risk of explosion or release of hazardous substances (i.e. oil, pesticides, chemicals, radiation, etc.) in the event of accident or upset conditions, or there may be a chronic low level discharge or emission.	☐	☐	☐Yes ☐No
• Proposed Action may result in the burial of "hazardous wastes" in any form (i.e. toxic, poisonous, highly reactive, radioactive, irritating, infectious, etc.)	☐	☐	☐Yes ☐No
• Storage facilities for one million or more gallons of liquified natural gas or **other flammable liquids.**	☐	☐	☐Yes ☐No
• Proposed action may result in the excavation or other disturbance within 2,000 feet of a site used for the disposal of solid or hazardous waste.	☐	☐	☐Yes ☐NO
• Other impacts: _____	☐	☐	☐Yes ☐No

IMPACT ON GROWTH AND CHARACTER OF COMMUNITY OR NEIGHBORHOOD

18. Will proposed action affect the character of the existing community? ☒NO ☐YES

Examples that would apply to column 2

	1 Small to Moderate Impact	2 Potential Large Impact	3 Can Impact Be Mitigated By Project Change
• The permanent population of the city, town or village in which the project is located is likely to grow by more than 5%.	☐	☐	☐Yes ☐No
• The municipal budget for capital expenditures or operating services will increase by more than 5% per year as a result of this project.	☐	☐	☐Yes ☐No
• Proposed action will conflict with officially adopted plans or goals.	☐	☐	☐Yes ☐No
• Proposed action will cause a change in the density of land use.	☐	☐	☐Yes ☐No
• Proposed Action will replace or eliminate existing facilities, structures or areas of historic importance to the community.	☐	☐	☐Yes ☐No
• Development will create a demand for additional community services (e.g. schools, police and fire, etc.)	☐	☐	☐Yes ☐No
• Proposed Action will set an important precedent for future projects.	☐	☐	☐Yes ☐No
• Proposed Action will create or eliminate employment.	☐	☐	☐Yes ☐No
• Other impacts-_____	☐	☐	☐Yes ☐No

19. Is there, or is there likely to be, public controversy related to potential adverse environmental impacts? ☒NO ☐YES

If Any Action in Part 2 Is Identified as a Potential Large Impact or If You Cannot Determine the Magnitude of Impact, Proceed to Part 3

Part 3-EVALUATION OF THE IMPORTANCE OF IMPACTS

Responsibility of Lead Agency

Part 3 must be prepared if one or more impact(s) is considered to be potentially large, even if the impact(s) may be mitigated.

Instructions

Discuss the following for each impact identified in Column 2 of Part 2-

1 Briefly describe the impact.

2 . Describe (if applicable) how the impact could be mitigated or reduced to a small to moderate impact by project change(s).

3. Based on the information available, decide if it is reasonable to conclude that this impact is **important.**

To answer the question of importance, consider:

- The probability of the impact occurring
- The duration of the impact
- Its irreversibility, including permanently lost resources of value
- Whether the impact can or will be controlled
- The regional consequence of the impact
- Its potential divergence from local needs and goals
- Whether known objections to the project relate to this impact.

(Continue on attachments)

Please see attachment

ATTACHMENT TO PART 3

EVALUATION OF THE IMPORTANCE OF IMPACTS

Statement on Action Significance:

1. This action does not rise to the level of significance that would warrant a supplemental EIS. Please see the appropriate section of the EIS for information regarding this action.

2. Mitigation of Large Potential Impacts on Land:

   This proposed action could have a potential large impact on land since the proposed construction is on slopes greater than 15%.

   Mitigation of this potential impact is proposed by design.

   The design is placing the proposed building "into" the existing grade and it is proposing to construct retaining walls which will allow the final grades around the building and on the site to be constructed in the 8 to 15 percent range. Such finished grade can be easily stabilized by topsoiling, seeding and mulching to prevent erosion.

The number of people using the Base Lodge on Peak Days is approximately 3,200. This number is not expected to increase upon completion of the new NYSEF building and the renovations to the former building. The use, and therefore the loading volume, will be spread out between the buildings, but the loading to the system will remain the same.

APPENDIX AA

DGEIS COMMENT LETTERS

September 12, 2002 – SEQRA Public Hearing Minutes

5 people attended, 7 with Jay and Vinny.

Only comments that were received were from Douglas Wolfe after Jay Rand did an excellent job running through history of UMP including a description of items ORDA is trying to get accomplished this year.

Douglas Wolfe is with the Whiteface Preservation Resource Association. Their objective is to focus on Whiteface Mountain history, natural resources and ecology. They are interested in using some of the EIS information in their educational brochures. The Toll House Interpretive Center is an example of one of their efforts. His concerns:

- Whiteface objectives include everything but the educational aspect of the mountain.
- State projects should be "green." Would like to see lodge on top of Little Whiteface incorporate passive solar design, good installation, energy savings, etc. Suggest architect look at Mt. Washington observatory for ideas on height and orientation to wind, etc.
- All facilities should be "universally accessible" (handicap accessible).
- Traffic wasn't really addressed, especially as far as conflict between pedestrians and vehicles.

1043WR07.DOC

THE ASSOCIATION FOR THE PROTECTION OF THE ADIRONDACKS

P.O. Box 951 • Schenectady, New York 12301-0951
Phone/Fax 518/377-1452
Web Site: www.protectadks.org

RECEIVED
SEP 18 2002
The LA Group

September 16, 2002

Jay Rand, Supervisor
Whiteface Mountain Ski Center
Route 86
Wilmington, NY 12997

Re. Whiteface Mountain Ski Center UMP Update, Draft GEIS

Dear Mr. Rand:

The Association for the Protection of the Adirondacks is quite concerned about the following aspects of this UMP update:

1. "Build Out" and Constitutional Limits:

With the development proposed in this latest Update, Whiteface Mountain Ski Center is essentially at its constitutional limit with regard to downhill ski trails, or 25 miles. The Update tell us new improvements will bring the total mileage to 24.51 miles. Given the very rapid increase in trail mileage that has occurred since the 1996 UMP revision, the remaining half-mile permitted under the Constitution will be developed in the very near future.

In May of 2001, Tom Martin, Regional DEC Forester, responded to our concerns about the trail mileage question at Whiteface. The approved 1996 revision of the UMP indicated there were 16.4 miles of ski trails. "Regardless of which order trail are widened, closed or opened, as approved in the UMP and this amendment, the maximum mileage of ski trails at the Whiteface Mountain Ski Center will not exceed 18.40 miles," Martin wrote in May 2001. Just over a year later, you are again expanding and the trail mileage is now at or around 25 miles.

We note that the total trail mileage contemplated in the **Executive Summary (page V)** of 25.51 miles is at variance with that contemplated in the section on **1987 Constitutional Amendment on page I-10** that says "under this plan, ski trail miles will be increased to 24.45 miles." Needless to say, it is important to be accurate in this Update. If it is found that the Update actually brings the total mileage above 25 miles, this would seriously compromise planning under this Updated UMP.

Given the limits you are up against, it is rather surprising to the reader to find nothing that would illuminate ORDA's future plans with respect to next UMP update. Given the rapid expansion since 1996, one must conclude that Whiteface will continue to seek to expand its operations on the mountain. I find no statement to the effect that this UMP update and trail expansion is the last contemplated for the next 10, 15, 25...or more years.

1901 100th Anniversary 2001

Dedicated to the Protection of the New York State Forest Preserve in the Adirondack and Catskill Mountains

Thank you for considering the Association in your Estate Planning

What is your long-term goal? Isn't it time in this Update to address a final development "build-out" at Whiteface Mountain for the next 25-50 years? If ORDA expects legislative and public support for another constitutional amendment, you will be expected to lay this out. Even if you do so, statewide support for another constitutional amendment for Whiteface is by no means guaranteed. How would ORDA and Whiteface Mountain Ski Center go about improving its facilities in the absence of a constitutional amendment? We urge you to incorporate a new section on Future Planning.

It bears mentioning that frequently the document promises: "proposed UMP actions on all state lands at Whiteface Mountain will be conducted in accordance with the provision of Article XIV as they apply (page vi)." Needless to say, planning to assure strict constitutional compliance with respect to trail mileage on the mountain is required to fulfill that promise.

II. Tree Cutting

The cutting of 54,941 trees for developments proposed in this Update constitutes a very significant level of tree cutting on the Forest Preserve over the course of a very short time span. If such tree cutting were proposed over a much-longer planning horizon, say 25 years, that would be one thing. Repeated UMP Updates authorizing such significant tree-cutting is quite another. Even if one-third of those trees are "small or less than 4" diameter at breast height," (page vi) this results in the cutting of over 36,000 mature trees.

As you know, the 2001 UMP Update to widen trail 19a, Upper Parkway Trail and Upper Thruway Trail, and Lower Valley Trail proposed no more than 831 trees over 3" DBH would need to be removed to accomplish the modifications proposed in the amendment. The sudden jump to over 50,000 trees for modifications proposed in this Update one year later is remarkable. As you know, in McDonald v. The Association for the Protection of the Adirondacks (1930) the Court of Appeals ruled that the cutting of 1,373 trees passed the point of constitutional "materiality." As you know, ORDA, pursuant to public comment, significantly reduced the level of tree cutting proposed for the Mt. Van Hoevenberg UMP improvements to under 500 trees in 1999.

Although Whiteface Mountain Ski Center and appurtenances thereto are constitutionally authorized, this does not imply to our organization that any and all tree cutting should be considered reasonable or permissible.

This is not only a constitutional issue. The document states that considerable soil erosion of thin soils can be expected from the trail and other developments (page V-1) and that mitigation measures will be taken as shown. One of those mitigation measures is to assure the public that only the very minimum number of trees will be cut. This document does state "only areas absolutely necessary for construction of tree trails, ski lifts and other proposed improvements will be cleared of vegetation." However, we believe ORDA and DEC should conduct further field work to assure the public that 54,941 trees constitutes the minimum necessary to carry out the work.

III. Erosion Control

Filter fabric fences, erosion-control blankets, and staked straw bale filters are all to be used to control soil erosion (V-2). Just as importantly, the document plans for staged clearing so as to limit soil exposure at any given time. "As much natural vegetative cover as possible will remain intact" (V-2).

Lacking environmental engineering expertise, we ask if these measures constitute the upper limits of the best possible and available practices to avoid soil erosion on steep mountain, protected environments? Can further improvements and technologies be applied, even if they are experimental, to assure the public that sensitive, high elevation Forest Preserve soils are not being unnecessarily degraded or lost with consequent damage to downstream environments?

IV. Fish and Wildlife/Natural Resource Inventory and Evaluation

With respect to Bicknell's Thrush, we appreciate the attention paid to the natural history and preliminary data about the species on page V-14, and the mitigation measure to avoid trail construction at or above 3000 feet until after August 1, or after the majority of juvenile birds have fledged according to existing evidence gained elsewhere. However, it is not in the least bit reassuring that Appendix L, Wildlife Resource Description, fails to even list the Bicknell's Thrush as a listed Species of Special Concern on or near Whiteface Mountain. Further, this section contradicts ORDA's concern for the Bicknell's Thrush on page V-14 by stating: "None of the activities associated with the Ski Center is expected to have any impact on any of the endangered, threatened or species of special concern listed." The failure to list Bicknell's in the appendices is a serious omission and fails to give the public confidence that this document is serious about biological inventory and evaluation.

There has been considerable research on Bicknell's Thrush elsewhere in the Northeast, but apparently not on Whiteface Mountain. We suggest that it is time that the State of New York, ORDA, Whiteface Ski Center and private partners like Audubon New York sponsor intensive research on this species as part of this UMP Update. Given the concern for the species expressed in this Update, it is time that a study is designed for Whiteface that seeks to ascertain in detail the effects of ski expansion on this species and perhaps others.

There is a complete failure in our opinion to discuss or document the occurrence of small mammals on Whiteface Mountain. The Update states: "Included in Appendix N is a description of wildlife habitat types and additional information regarding the wildlife at Whiteface" (II-25). The reader finds that Appendix N is about Existing and Proposed Whiteface Snowmaking Electrical Loads. We think the document meant to say Appendix L. Be that as it may, the inventory, description and evaluation of mammals, either in Appendix L or in the text itself, seems inadequate to say the least. For example, discussion of Yellow-nosed (Rock) vole, one of the rarest North American voles known to occur in the area, seems to be omitted entirely.

It appears to us that the Natural Resource Inventory, description and evaluation in this Update must be judged inadequate by standards clearly listed in the Adirondack Park State Land Master Plan.

These are some of our most prominent concerns at this stage in our review of the Update. We may issue an additional comment letter should additional issues come to our attention. Thank you very much for this opportunity to comment. We look forward to hearing from you.

Sincerely,

David H. Gibson

David H. Gibson
Executive Director

cc: Jeff Anthony, LA Group
Tom Martin, NYS DEC
Peter Duncan, NYS DEC
Karyn Richards, NYS DEC
Walt Linck, NYS APA
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926 J

September 25, 2002

Jay Rand
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New York State Department of Environmental Conservation
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Walter Elander
SE Group, Planning and Design
156 College Street
Burlington, VT 05401

Re: WhiteFace Ski Center Unit Management Plan Update and Draft Generic Environmental Impact Statement (2002-2007) (August 2002)

Dear Mr. Rand, Mr. Buchanan, and Mr. Elander:

New York Rivers United respectfully comments on this document. Our interest is protection of the values of the West Branch of the AuSable River, as designated under the Wild, Scenic, and Recreational River Systems Act. Because the DEIS does not address the adverse impacts and legal authority for the proposed water withdrawal, we request that a supplement be published for further public comment before final action.

COMMENTS

The DEIS proposes to increase the increase water withdrawal from the West Branch, in order to enhance snowmaking. See p. IV-40. Water withdrawal may occur only when the flow downstream of the intake exceeds 38 cfs. Id. We understand the DEIS to recommend water withdrawal from the pool stored behind the concrete weir that ORDA built under DEC Permit no. 5-1554-00013/00007 (Exhibit 1). See pp. IV-48 – IV-49. If this is factually correct, then the DEIS is incomplete. It does not state the legal

authority for such use of the weir, which occupies the banks, channel, and waters of a Recreational River.

The permit for construction and operation of the weir, DEC no. 5-1554-00013/00007, states only one purpose: flow monitoring to assure compliance with the 38 cfs threshold for diversion. *See* Exhibit 1, p. 1. Use of the storage capacity for water withdrawal is a different purpose not expressly authorized by that permit. The "Memorandum of Understanding, ORDA-DEC" (March 8, 1991) (Exhibit 2) does not address this facility and thus does not comply with Environmental Conservation Law § 15.0501.5's procedure for a State agency's exemption from a Stream Disturbance Permit. *See also* Exhibit 3. Further, the proposed increase in water withdrawal from this Recreational River is subject to a permit under 6 NYCRR § 666.13, Table ¶ B.1, since it involves "diversion" and is outside of the scope of DEC Permit no. 5-1554-00013/00007. Finally, we have not located in the DEIS any analysis of the impacts of the increased water diversion on the flow, biological resources, or other values of the West Branch.

We request that the ORDA and DEC publish a supplement to the DEIS to address the environmental impacts of increased water withdrawal and the legal authority for that use of the monitoring weir.

Sincerely,

Richard Roos-Collins
NATURAL HERITAGE INSTITUTE

Attorney for NEW YORK RIVERS UNITED

New York Rivers United

Comments Concerning the Whiteface Unit Management Plan Update and Draft Generic Environmental Impact Statement August 2002

by
Dan Kwasnowski
River Restoration Specialist
New York Rivers United
September 23, 2002
Hardcopy to follow.

Mr. Rand,

This letter documents the initial concerns and issues of New York Rivers United, a not for profit 501 (c) 3 organization with statewide membership and ten years experience analyzing and influencing the current and future management of our state's river ecosystems, with respect to the Unit Management Plan Update and Draft Generic Environmental Impact Statement of August 2002.

Primary Concerns

There is very little to no technical data or design detail in the document. This is especially true concerning river and stream impacts. There is no flow data, base flow curves or any analyses or rationale for specific management decisions. These are necessary to determine the soundness of the reasoning, as well as accurately and fully determine the impacts in the short and long term.

Based upon the lack of raw or represented data we have to assume that most of the decisions are arbitrary and capricious and are not only made without a full inclusive and holistic perspective (which would represent the full public interest) but are worse, not able to be monitored with respect to their stated intended result (environmental integrity). This flies in the face of the role of government as acting on behalf of the people of the State

of New York who are the primary beneficiaries of the management of this land.

Unfortunately, even if the data were supplied or sufficiently represented, our organization would not have had sufficient time to review it given the late reception of the Draft. This late reception is in spite of numerous letters requesting information and drafts from both the DEC and ORDA, and requesting that NYRU be considered an interested party in all management decisions and processes, especially those concerning streams and wetlands. DEC and ORDA have repeatedly ignored this request, which is in exact contrast to every other similar process we have been involved in statewide. Letters can be supplied if this claim is doubted. By not filing on time, any following legitimate appeals can be dismissed. This is no small matter.

New York Rivers United

Specific Issues Within the Document

Section 2
A. Inventory of Natural Resources
Page II-6
c)Hydrology
(1) Surficial
Paragraph 4
"An operational plan has been developed in conjunction with the NYSDEC and formalized in a Memorandum of Understanding between the two organizations to ensure snowmaking operations will not adversely affect the stream environment."

This MOU does not exist if it is not supplied with the Draft UMP. NYRU followed up this statement with one phone call to a DEC Reg, 5 staff person. They were unsure why it was not included. If it is not present in the DRAFT it cannot be considered for review. The generalized agreement does not count for managment of the stream NYS law requires a specific MOU for management of the stream.

This MOU was actually required before construction and operation of the flume (formerely referred to as a weir, very confusing) and NYRU requested a copy of this MOU in writing. Enclosed is the letter from NYSDEC stating it does not exist. If it has been developed in the year since that letter it should have been included in the current draft UMP under review.

That MOU should also include all supporting data to determine that the decision was made on sound information.

Section 2
Page II-25
(2) Forest Cover Types and Ecological Communities
c) Fish and Wildlife
(2) Fish

3. "Habitat problems contribute significantly...Substrate embeddedness contributes to the winter mortality, probably decreasing invertebrate production and reducing natural reproduction of trout."

Probably doesn't cut it. There is need for invertebrate surveys to determine the overall suitability of what habitat exists for wintering trout. With the proposed increase of water withdrawal by Whiteface this habitat will decrease downstream due to a decrease in submerged habitat. As well the proposed dam on Stag Brook will withhold sediments from the system and will further lead to a loss of habitat and resources for the stream's ability to support trout.

To mitigate these effects, Whiteface should develop mitigation measures. This should include the following:
-possible increase of habitat and substrate using natural stream channel design techniques in the West Branch Ausable.
-Whiteface could support projects enhancing riparian habitat in other parts of the Ausable River watershed to mitigate the effects on the West Branch.

Section 2
C. Existing Snowmaking System
1. General Description
Page II-45

Under the General Description is described how the water from the pumphouse 1 has to be filtered of sand silt etc. This is the very material needed by the riparian system to provide habitat for invertebrates, which in turn feeds trout through the winter. How much do you remove from the system and where does it go?

In the same paragraph the MOU between NYS DEC and ORDA is again referred to with reference to the minimum flow agreed to in this yet undisclosed document. What data was used? What are the methods and procedures? Why is the minimum flow set at a level which will protect the current integrity when that integrity is admittedly (in this very UMP) not what it should be for a stream of this character and water quality? All of these questions and more should be addressed in this document for meaningful review and comment.

New York Rivers United

Same paragraph "Flow monitoring of the river will minimize the impacts to the river's aquatic ecology and properly manage the fishery during times of low flow."

The above quoted statement is not even credible. Monitoring flow does not ensure anything. It measures how much water is flowing in the stream and records it. That record must be interpreted and management decisions made based upon that and other information. Flow data no matter how accurate does not ensure proper management. What other data will you collect to make your decision? What data have you collected to determine the minimum flow of 38 cfs?

More importantly how will NYS DEC or Whiteface know whether or not a detrimental impact is occurring due to withdrawals or not occurring?

You need baseline data of fish assemblage, existing instream habitat, invertebrate abundance etc. This data has to be collected at a specified interval and compared and trends determined. There is not enough data available in this document to judge whether or not the minimum flow of 38 cfs is even appropriate. Withdrawing to that limit often during the winter will decrease habitat. We cannot wait until the response is noticed by anglers (a very unreliable and non-scientific measure anyway) to adjust management decisions. The UMP should determine a method that the entire stream health is monitored. Government may not act arbitrarily or capriciously.

Also, this flow guage and weir was described in the 1996 UMP as a structure as it is here. It was meant to be a fisheries enhancement structure which is the only type of structure allowed in a state designated Recreational River. Enhancement to most people, dare I say everyone, would indicate that the fishery would be improved. All that you have presented indicates that habitat will be lost, and the current lacking performance of the ecosystem will be maintained. That is not enhancement. That makes the weir an illegal structure.

Section 4
Page IV-48
f) Water System Improvements

New York Rivers United

Last paragraph
" An ideal long-term solution is to install a new feed line from the river to PH 1 that originates above the flume structure."

The purpose of constructing the weir was to monitor flow rates in the stream under description in the 1996 UMP and the subsequent permit application. It was not stated to be an impoundment structure for removing water.

This alternative flies in the face of NYS law. It is completely inconsistent with the 1996 UMP. It also completely disqualifies the weir as a fisheries enhancement structure.

Further, if the new intake would limit the amount of water withdrawn guaranteeing that the minimum flow would never be threatened then the weir and guage are completely unneeded.

Finally
Section 5
B. Biological Resources
1. Freshwater Wetlands
Impacts
5. "A new snowmaking reservoir will be constructed on Stag Brook, adjacent to the Upper Boreen trail. Deposition of fill for the dam and flooding from the impoundment will affect approximately 800 linear feet of the stream, and between about 12,000 to 25,000 square feet (0.3-0.6) of wetland.

This reservoir was never mentioned as a dam on a brook in the 1996 UMP. It is impossible to know the impacts of such a construction without knowing the exact design of the dam. The impacts of dams generally are well known and NYRU is a noted expert by many on Dams and there affect on riparian ecosystems. The dam will block nutrients from any stream downstream and will increase water temperature. It will disrupt the natural dynamics of the brook and will undoubtedly ruin valuable habitat and ecological function for terrestrial species as well as aquatic (riparian aquatic habitat has the highest biodiversity of any ecosystem). You will need in addition to the permits you

mentioned a dam safety permit. This part of the UMP is completely inconsistent with the 1996 document.

End of Comments.

The Adirondack Council

Defending the East's last great wilderness

CHURCH STREET PO BOX D-2 ELIZABETHTOWN, NEW YORK 12932-0640 TEL. (518) 873-2240 FAX (518) 873-6675

September 23, 2002

Jay Rand
Whiteface Mountain Ski Center
Route 86
Wilmington, NY 12997

RE: WHITEFACE MOUNTAIN UMP UPDATE

Dear Mr. Rand,

On behalf of the Adirondack Council, I offer the following comments on the August 2002 Whiteface Unit Management Plan (UMP) Update which has been released for public review and comment. Due to the complexity and scope of the proposals in the UMP, I have highlighted our major concerns with development projects and management activities. We fully intend to remain involved throughout the UMP process.

We recognize the desire to provide skiers with the best skiing experience possible. But the magnitude of the construction activities proposed in this UMP update may very well go far beyond the need to provide a safe and enjoyable skiing experience. More importantly, we are concerned about the extent of the negative impacts that many of these UMP proposals are likely to have on the environment and wild forest character of the Forest Preserve. And we are reviewing whether or not the UMP proposals are within the legal authority of the Olympic Regional Development Authority as provided by the pertinent amendments to the New York State Constitution. Furthermore, these construction activities are likely to compromise the desired "Adirondack wilderness image" that was listed as one of the "Management Goals" in the UMP.

We are greatly concerned about the fact that the proposals that emerge with each Whiteface Mountain UMP update may well constitute "segmentation" of a larger project, which is specifically forbidden by the State Environmental Quality Review Act (SEQRA). This practice is not tolerated by the Adirondack Park Agency (APA) for private projects and should not be allowed for construction of this scope and magnitude on the Forest Preserve. This UMP should disclose the full set of development proposals envisioned for the Whiteface Mountain site over the long term to allow full and appropriate review

of the myriad impacts expected and of the mitigation measures necessary.

We are also troubled by the fact that the UMP is virtually devoid of any meaningful discussion of likely negative environmental impacts associated with currently-proposed development projects and management activities. And it also lacks appropriate and detailed discussions of associated mitigation measures and reasonable alternatives. Any private development proposal for construction activities of this magnitude on a site having such extreme limitations to development would be required to provide a thorough assessment of site-specific and off-site physical, visual, and social impacts, as well as a detailed plan for mitigation of negative impacts. For example, no such assessment was provided for the Cloudsplitter Lodge, described as a "light-flooded building with fireplaces and many windows." It is apparent that by maximizing the views from this 13,500 square foot building that it will have a negative environmental impact on the visual and natural resources of the area. This building will be a light emitting beacon and will by no means comport with the APA's standard of "substantial invisibility," which has been applied to visually obtrusive development elsewhere in the Park. Furthermore, the ambiguity of the water source for the Cloudsplitter Lodge is another concern. Any private development proposal would be expected to include the necessary hydrogeological studies to determine the presence of an adequate water supply along with likely negative environmental impacts. In short, this massive and highly disruptive set of development proposals on one of the Park's most sensitive, fragile and visible sites, should be held to at least as thorough an environmental review as a similar private proposal.

Another concern of ours is the proposal to cut approximately 55,000 trees. The removal of this enormous number of trees and the resulting soil disturbance and habitat destruction is inappropriate, especially given its location on highly erodable, shallow, steep, high-elevation soils. To make matters worse, this cutting is proposed on the Forest Preserve, which is protected under Article XIV of the New York State Constitution. Tree removal of this magnitude and site disruption associated with trail construction and development projects will have numerous unavoidable negative environmental impacts on the visual and natural resources as well as the water quality and natural flow regimes of the entire Whiteface Mountain region.

This UMP update has set ambitious goals for the Whiteface Mountain Ski Center, which is located on public Forest Preserve lands. These proposals seriously threaten the wild forest character of this portion of the Forest Preserve. And it is doubtful that the Governor would support such disruption of the Forest Preserve at a ski center where he, himself, skis. These proposals should be significantly scaled back. And they should be presented in the context of long-term development plans, including all the necessary studies and analyses required by SEQRA. When people come through the gates of the Whiteface Mountain Ski Center, they should be reminded that they are in the Adirondack Forest Preserve, where protection of the natural environment is paramount, and where such protection does not take a back seat to unbridled commercial development for public recreation.

Thank you for this opportunity to comment and we look forward to remaining involved throughout the UMP process.

Sincerely,

Jaime A. Ethier
Program Associate

CC: Ted Blazer (ORDA), Karyn Richards (Region 5 DEC), Stu Buchanan (Region 5 DEC), Tom Martin (Region 5 DEC), Dan Fitts (APA), Walt Linck (APA), APA Commissioners

Adirondack
ADK
Mountain Club

Conservation
Education
Recreation
Since 1922

September 23, 2002

VIA FAX AND MAIL

Jay Rand
Whiteface Mountain Ski Center
Route 86
Wilmington, New York 12997

Re: Whiteface Mountain UMP Update and DGEIS

Dear Mr. Rand:

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Web site: www.adk.org

The Adirondack Mountain Club, Inc. has the following comments on the August 2002 Whiteface Mountain UMP Update and DGEIS.

1. We are concerned about the visual impact of the proposed lodge on Little Whiteface. It is the normal practice in visual impact assessment to provide simulations of potential projects of this scale, so that the visual impacts can be assessed properly. See DEC's Policy on Assessing and Mitigating Visual Impacts, #DEP-00-2. There do not appear to be any such simulations or other assessments in this EIS, nor does it appear that the EIS has followed the DEC Policy in its assessment of visual impacts. For instance, there is no analysis of the impacts upon sensitive receptors such as scenic overlooks, peaks or hiking trails.

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A supplement to the DGEIS should be prepared which contains a proper professional Visual Impact Assessment.

2. The plan proposes to increase snowmaking, but does not assess the adverse environmental impacts on fisheries and other aspects of river ecology of removing additional water volume from the Ausable River.

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ADK urges ORDA to investigate under SEQR the alternative of constructing a storage reservoir large enough to supply all of its snowmaking needs, and not just to meet the peak demand as is discussed at page IV-46. The reservoir could possibly also capture runoff on the mountain, so as to reduce or eliminate the need to remove water from the river, except at the very highest river flows.

Also, the comparison of the different types of snowmaking technology should also include an analysis of any differences in water use and conservation among the various types.

3. The plan will destroy habitat for the Bicknell's thrush (page V-14), and does nothing to mitigate that loss. Delaying construction until after August 1 may protect young birds born that year, but the loss of nesting habitat due to tree cutting will be permanent and could reduce the number of nesting pairs and young that are able to survive on the mountain in the future.

4. Page iv mentions "extreme skiing" as a new feature, and this is shown on Figure IV-1 as being the "Slides Extreme Skiing Area." However, the EIS does not seem to describe this anywhere. While ADK itself is involved with backcountry skiing elsewhere in the Adirondacks, we are concerned about the lack of information about this proposal, since lift serviced skiing could put large numbers of skiers into fragile alpine environment. Our questions include: How will skiers access this area? What are the anticipated skier numbers? Has any assessment been made of possible damage to protected alpine vegetation or krumholz vegetation?

5. ADK would also like to know if all trails have been measured to ensure that they adhere to the constitutional limits on their width.

Due to the foregoing concerns, we urge ORDA to prepare a supplemental EIS for this action.

Sincerely,

John W. Caffry, Chair
ADK Conservation Committee

Neil F. Woodworth (MB)
Neil F. Woodworth
Deputy Executive Director
and Counsel

cc: Walter Linck, APA
David Gibson, Ass'n for Prot. Ad'ks
Jo Benton, ADK
Betty Lou Bailey, ADK
Holly Elmer, LA Group

JWC/mlb
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THE ASSOCIATION FOR THE PROTECTION OF THE ADIRONDACKS

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Phone/Fax 518/377-1452
Web Page: www.protectadks.org

September 23, 2002

Jay Rand
Whiteface Mountain Ski Center
Wilmington, NY 12997

Dear Jay;

On behalf of the Association for the Protection of the Adirondack's, I am submitting the following comments for the Whiteface UMP. These comments are to compliment a previous letter by Dave Gibson, the Association's Executive Director sent September 16, 2002.

1. Water Storage

The mention of a structure with the storage capacity of 5 MG to 8 MG on page IV-46 is not clear and we feel needs a more detailed description.

2. Water Intake

Page IV-48 vaguely describes a long-term solution to install a new feed line from the river to PH1 that originates above the flume structure. A more concise description including a map and a detailed written explanation of this alternative needs to be included in the UMP.

3. Porcupine Lodge

On several maps, including Figures IV-1, IV-2, and IV-18, "Porcupine Lodge" is shown at the top of the Tree Island Pod. The UMP should describe this structure in detail or remove it from the maps.

4. Erosion Control

The Association has a long history of preserving rivers of the Adirondacks to ensure their wild character. With the Ausable River running at its base, sediment runoff effects from Whiteface Mountain are immediate and are of great concern to the Association. Attached are recent pictures from Whiteface of failing attempts to prevent sediment from entering the Ausable River.

Figure 1 is a picture from Parking Lot 2. The silt and sand pile in the foreground is being washed into the river below. Sadly, the source of the pile appears to be sediment excavated from the sediment trap in the background.

Figure 2 is a sediment trap that is no longer working below the Ausable River Bridge.

Figure 3 is erosion and subsequent sediment being carried towards the Ausable River.

Similar failures on a larger scale during the proposed developments would be very devastating. This UMP needs to outline in greater detail erosion control measures during construction and on proposed trails.

The Association is also concerned about the UMP's stated justification for the proposal of the Cloudsplitter Lodge and the Tree Island Pod. Keeping up with competitive resorts such as Killington, Mont Tremblant and mega resorts in Colorado or Utah is comparing apples and oranges. These facilities are not within a constitutionally protected "forever wild" forest preserve.

We look forward to your responses and thank you for this opportunity to comment on the Whiteface UMP.

Sincerely,

Kevin G. Prickett
Wilderness Stewardship Advocate

CC: David Gibson, Association for the Protection of the Adirondacks
Board of Trustees, Association for the Protection of the Adirondacks
Jaime Ethier, The Adirondack Council

Figure 1

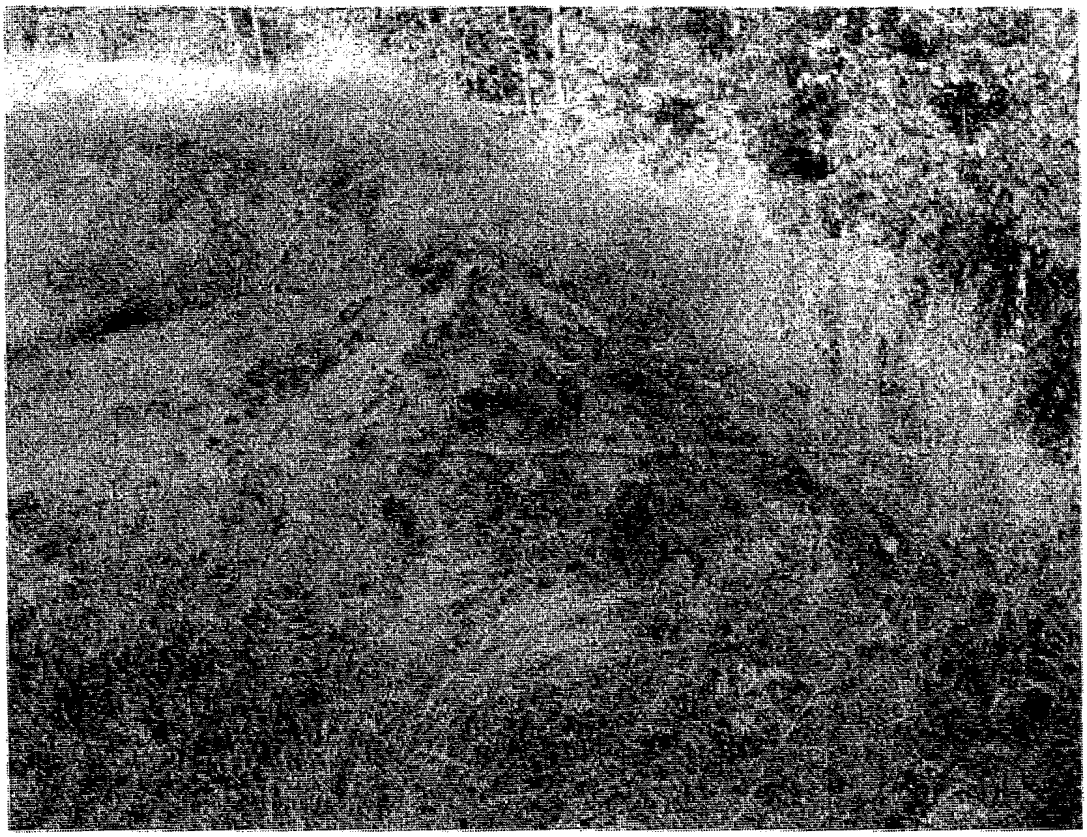

Figure 2

Figure 3

ADIRONDACK COMMUNITIES & CONSERVATION PROGRAM
138A RIVER STREET SARANAC LAKE, NY 12983
TELEPHONE: (518) 891-8872 FAX: (518) 891-8875
WWW.WCS.ORG/ADIRONDACKS

To: Tom Wahl, NYS DEC

From: Heidi Kretser, WCS

Re: Whiteface Mountain Unit Management Plan

Date: September 23, 2002

Proposed activities on Whiteface Mountain under the draft version of the Unit Management Plan Update & Draft Generic Environmental Impact Statement of August 2002 have the potential to disturb critical breeding habitat of Bicknell's Thrush (*Catharus bicknelli*), a species of Special Concern in New York State and a species identified on the Partners in Flight (PFW) Watch List and as a PFW Priority Bird for mountaintop stunted conifer woodlands.

Bicknell's Thrush is one of a few species that breed in the inhospitable, high montane environments of the Adirondack High Peaks. In the Adirondack Park, Bicknell's habitat is limited to krummholtz and dense spruce-fir forest near the tops of mountains above 3000 feet in elevation. Through a partnership with the Vermont Institute of Natural Science and the Adirondack Mountain Club, the Wildlife Conservation Society's Adirondack Communities and Conservation Program (WCS/ACCP) has sponsored Mountain Birdwatch for two years to detect high elevation species, including Bicknell's Thrush, on more than 40 mountaintop routes in the Adirondacks and Catskills. This year, surveyors detected Bicknell's at and near the summit of Little Whiteface and along the toll road as well as on neighboring Ester Mountain. Habitats found on Whiteface are obviously well-suited to support Bicknell's Thrush. In addition, Whiteface Mountain - with easy access via the toll rode, chair lifts, and ski trails- is a prime location that birders visit for a chance to hear or see Bicknell's Thrush in their natural habitat. Given the species' conservation status and potential social importance, the Whiteface UMP should more explicitly describe the management efforts that will be undertaken to ensure minimal impact to the Bicknell's Thrush breeding habitat.

Enclosed are two important documents discussing the natural history of, threats to, and preferable management practices for Bicknell's Thrush. First is a copy of Bicknell's Thrush from *The Birds of North America: Life Histories for the 21st Century*, 2001. Second is a draft plan from the Vermont Fish and Wildlife Department regarding appropriate ski area management practices in Bicknell's Thrush Habitat. Please review these materials with regard to the specific areas of the Whiteface UMP outlined below.

We are happy to see a page devoted to Bicknell's Thrush in Section V – 14 of the UMP; particularly, we are happy to see the proposal to work on trail construction after August 1st. Given the vulnerability of this species and the importance of Whiteface Mountain as breeding habitat, we recommend you recognize Bicknell's Thrush in the Fish & Wildlife Section of the Appendix and in the Fish and Wildlife portion of Section II in the main document.

In summary, we support the management recommendations from the Vermont Fish and Wildife Department. We would like to reiterate the importance of maintaining low dense fir-spruce stands along the edges of trails and as islands. We recommend that you adopt some specific verbiage from the Vermont draft regarding the management of trees along trails and on islands. We recommend that ORDA commit to trail maintenance (in addition to trail construction) above 3000 feet, especially cutting trees along the edges of trails and in the Tree Island Pod, only *after* August 1st. We also recommend that construction of the Cloudsplitter Lodge occur *after* August 1st. In addition, given the fact that the breeding times occur during prime construction period, we also recommend that ORDA work with the Wildlife Conservation Society or other local bird groups to determine the presence or absence of breeding Bicknell's Thrush at or near the proposed activity site specifically on Little Whiteface (i.e. construction of Cloudsplitter Lodge) and in the Tree Island Pod (i.e. Trail Construction and Maintenance). This partnership would be in addition to the transects that WCS already surveys on Whiteface, Little Whiteface, and Ester. This partnership would target specific areas slated for development.

As an avid skier myself, I am hopeful that the NYS DEC and ORDA will seriously consider this information and update the UMP as appropriate. Bicknell's Thrush can coexist with a ski facility as long as careful management of key habitats is undertaken. WCS/ACCP is committed to integrating conservation and development in the Adirondack Park and here is a clear situation where foresight and a working partnership can create a win-win situation for wildlife and humans. If you have additional questions about our recommendations please contact me at the address and phone provided or by email at hkretser@wcs.org Thank You.

CHRISTOPHER C. RIMMER, KENT P. MCFARLAND,
WALTER G. ELLISON, AND JAMES E. GOETZ

Catharus bicknelli

Bicknell's Thrush

FRENCH:
Grive de Bicknell
SPANISH:
Zorzal migratorio (Hispaniola), Tordo de Bicknell (Cuba)

© Tim Laman / VIREO

The song is in a minor key, finer, more attenuated, and more under the breath than that of any other thrush. It seemed as if the bird was blowing in a delicate, slender, golden tube, so fine and yet flute-like and resonant the song appeared. At times it was like a musical whisper of great sweetness and power.

Burroughs 1904: 51

. . . only a freak ornithologist would think of leaving the trails [on Mt. Mansfield] for more than a few feet. The discouragingly dense tangles in which Bicknell's Thrushes dwell have kept their habits long wrapped in mystery.

Wallace 1939: 285

The nasal, gyrating song and plaintive calling of Bicknell's Thrush are familiar to few birders or ornithologists. The species' remote, inhospitable montane and maritime forest habitats, its penchant for dusk and dawn activity, and its reclusive behavior underscore its status as one of the least-known breeding birds in North America. It is also among the most rare and, possibly, most threatened. Breeding from the northern Gulf of St. Lawrence and easternmost Nova Scotia southwest to the Catskill Mountains of New York State, Bicknell's Thrush probably numbers no more than 50,000 individuals across its naturally fragmented breeding range. The species inhabits an even more restricted winter range, occurring regularly on only four islands in the Greater Antilles. Habitat loss and degradation at both ends of its migratory spectrum suggest a tenuous conservation status for Bicknell's Thrush, which is ranked as the Nearctic-

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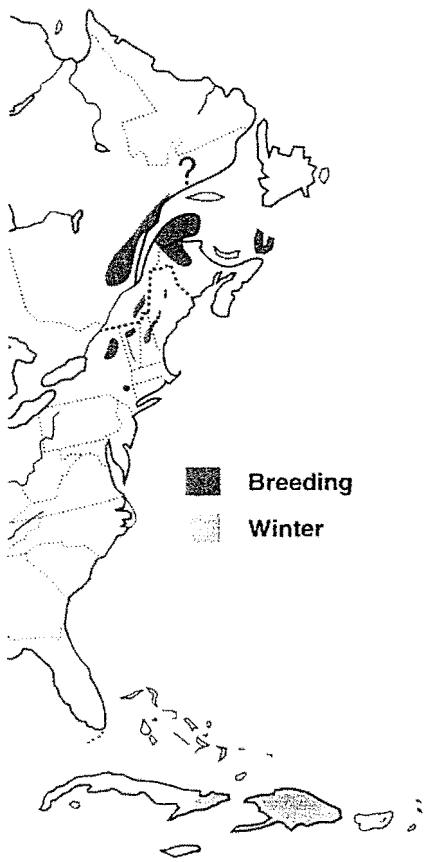

Figure 1.
Distribution of Bicknell's Thrush. Patchy distribution throughout its range makes exact delineation difficult. See text for details.

Neotropical migrant of highest conservation priority in the Northeast (Rosenberg and Wells 1995, Pashley et al. 2000).

Following its discovery in 1881 by Eugene Bicknell on Slide Mountain in New York's Catskill range, Robert Ridgway named and described Bicknell's Thrush in 1882, then classifying it as a subspecies of Gray-cheeked Thrush (*Catharus minimus*). George Wallace's (1939) classic natural-history study focused attention on Bicknell's Thrush, and a careful taxonomic assessment by Henri Ouellet (1993) led to specific recognition in 1995 (Am. Ornithol. Union 1995). Although reliable field identification of Bicknell's and Gray-cheeked thrushes remains dubious at best, marked morphological, vocal, and biochemical differences between the two taxa support this designation. The ranges are completely allopatric, with Gray-cheeked breeding farther north (Newfoundland to Siberia) and wintering farther south (Panama through northwestern Brazil and Colombia) than Bicknell's Thrush. The recent elevation of Bicknell's Thrush to full species status has heightened interest and concern among birders, scientists, land-use planners, and conservationists.

Bicknell's Thrush is adapted to naturally disturbed habitats. Historically, the species probably selected patches of regenerating forest caused by fir waves, wind throw, ice and snow damage, fire, and insect outbreaks, as well as chronically disturbed, stunted altitudinal and coastal conifer forests (Ouellet 1993, Nixon 1999, Vermont Institute of Natural Science [VINS]). In addition to these natural successional habitats, Bicknell's Thrush has recently been discovered in areas disturbed by timber harvesting, ski trail and road construction, and other human activities (Ouellet 1993, VINS). Evidence of local declines and extinctions in "traditional" breeding habitats may indicate either a shift in habitat use or increasing populations (Ouellet 1993, 1996), but more likely reflects the species' opportunistic use of disturbed habitats. Extensive loss and degradation of the primary forests that Bicknell's Thrush appears to prefer in winter pose the greatest threat to the species' long-term viability.

Despite detailed studies by Wallace (1939), VINS, and others, few concrete data are available by which to assess the conservation status of Bicknell's Thrush. The species is poorly monitored by traditional sampling methods, and its unusual spacing and mating system makes estimation of breeding densities unreliable at best. Current range-wide population estimates represent little more than educated guesses. Knowledge of the species' wintering ecology and demography is fragmentary, and its migratory routes and stopover ecology are poorly known. Recent research on the breeding and behavioral ecology of Bicknell's Thrush has documented a strongly male-biased sex ratio, with 2 to 4 males feeding young at 75% of nests and multiple paternity of most broods. Possible sexual habitat or geographic segregation on wintering grounds may cause differential survivorship of females and promote skewed breeding sex ratio, but firm evidence is lacking. Much work remains to be done on Bicknell's Thrush at all stages of its annual cycle and in all parts of its range.

DISTINGUISHING CHARACTERISTICS

Medium-sized thrush (16–17 cm, 26–30 g), but smallish and slender for a *Catharus*. Generally wary and hard to observe, occasionally sings on exposed song-post. Field identification subtle and difficult under best circumstances. Plumage separation from very similar Gray-cheeked Thrush relies on slight color differences and contrasts (e.g., tail vs. lower back), less useful than soft part color and morphometrics (Ouellet 1993, Knox 1996). Body coloration of both species varies across respective breeding ranges, obscuring differences in all but extreme variants. Most Bicknell's have olive-brown or brown dorsal coloration, whereas most Gray-cheeked have olive-gray or olive (Ouellet 1993). In comparison to Gray-cheeked, Bicknell's shows contrast between chestnut-tinged tail and wings, and rest of upperparts. This may be obscured by worn, dull tail and wings, or low contrast in warmest brown birds. Also shows warmer brown upperparts and a lighter buffy wash on the breast (underlying the dark spots) than continental subarctic Gray-cheeked Thrush (*C. m. aliciae*). This, combined with bright yellow to yellow-orange basal half or more of lower mandible, provides a subtle but generally reliable method of separating Bicknell's from *aliciae* Gray-cheeked Thrush. Potential confusion with Gray-cheeked Thrushes of Newfoundland and nearby St. Lawrence estuary coasts (*C. m. minimus*), which show some chestnut edging on wings and tail, are generally warmer brown than the more olive-gray *aliciae*, and often have extensive pale yellow on the lower mandible, although apparently not as bright as Bicknell's (McLaren 1995). In Bicknell's, color of legs purplish flesh, with toes darker than tarsi and soles of feet flesh to dull pale yellow; in Gray-cheeked, tarsi lighter flesh color, with toes invariably much darker and soles of feet brighter yellow than in Bicknell's (Ouellet 1993).

Subtle but clear distinctions in song help separate Bicknell's and Gray-cheeked thrushes. Primary difference is constant or slightly rising inflection at end of Bicknell's song, whereas Gray-cheeked song

falls to lower frequencies towards the end (Ouellet 1993). This difference consistent across breeding range of both species and detectable in field. Nocturnal flight calls of the two species also differ subtly (see Ball 1952, Evans 1994), these perhaps only safely distinguished by spectrographic examination of recordings.

Bicknell's Thrush best identified in hand on basis of size and relative wing shape (Pyle 1997). Usually smaller than Gray-cheeked, although considerable overlap in measurements exists. Wing-chord of adult Bicknell's 82–100 mm (n = 415; VINS), of Gray-cheeked 93–109 mm (n = 200; Pyle 1997). Tail length of Bicknell's 60–75 mm (n = 127; VINS), of Gray-cheeked 63–79 mm (n = 185; Pyle 1997). Majority of Gray-cheeked Thrushes have wings >95 mm in length (Ouellet 1993); 85% of Bicknell's have wings <95 mm (VINS). Those with wing lengths 94–98 mm (usually young female *C. m. minimus* and adult male Bicknell's) are not safely identifiable. As befits a longer distance migrant, Gray-cheeked Thrush shows more pointed wing morphology (Phillips 1991, Pyle 1997). Difference in length between primaries (P) 8 and 6 is 3–7 mm for Bicknell's and 5–10 mm for Gray-cheeked; P8 is 24–29 mm longer than P1 in Bicknell's; 27–35 mm longer in Gray-cheeked (Pyle 1997). Ratio of primary:tertial length may be useful in separating the two species: ≤1:1 in Bicknell's, ≥1:1 in Gray-cheeked (Lane and Jaramillo 2000).

Identification from other North American *Catharus* is less difficult, but requires care. Hermit Thrush (*C. guttatus*) is much brighter rufous on upper tail-coverts and tail, showing far more contrast than Bicknell's. Hermit also has more extensively and discretely spotted breast with a whiter ground color. Swainson's Thrush (*C. ustulatus*) has pale lores more or less connected to a broad buffy eye-ring broken narrowly before the eye, a warm buff wash on face and breast and, particularly in boreal-eastern populations (*swainsoni* group), colder olive-brown upperparts. Bicknell's Thrushes that are more olivaceous on back tend to show noticeable contrast with reddish highlights in tail and wings. Pacific Swainson's Thrush (*ustulatus* group) shows rufescent color in tail that contrasts with back, which itself is a warmer brown than in boreal-eastern (*swainsoni* group) birds, but buffy facial pattern invariably distinguishes all individuals of this species from Bicknell's Thrush. Boreal-eastern populations of Veery (*C. fuscescens*) more richly and uniformly reddish brown above, less heavily spotted on breast; spots, if discrete, sparse and small. Populations breeding in Newfoundland, central Appalachian, and the West, e.g., Rocky Mtn. region, duller and less rufescent (or tawny) above and evince sharper breast spotting; these differ from Bicknell's Thrush in having more uniformly colored upperparts, sparsely and finely spotted breast, orange-pink base of lower mandible, and greater contrast of flanks with upperparts (gray versus brown).

Males and females indistinguishable in field. Individuals in Basic I plumage often separable from adults through first full summer by retention of buffy-tipped Juvenal feathers in greater and median wing-coverts, occasionally scapulars and mantle. No appreciable seasonal changes in plumage after completion of Definitive Prebasic molt.

DISTRIBUTION

THE AMERICAS

Breeding range. Figure 1. Occupies a restricted and highly fragmented breeding range. Breeds north to sw. Quebec in Réserve La Verendrye, se. Quebec along northern shore of St. Lawrence River and Gaspé Peninsula (Ouellet 1993, 1996), Magdalen Is., Quebec (probably extirpated; Ouellet 1996, D. McNair pers. comm.), nw. and n.-central New Brunswick (Erskine 1992, Nixon 1996), and Cape Breton I., Nova Scotia, including the small, outlying St. Paul and Scaterie Is. (Erskine 1992, D. Busby pers. comm.). Breeds south to Catskill Mtns. of se. New York State (Peterson 1988, Atwood et al. 1996), Green Mtns. of s. Vermont (Kibbe 1985, Atwood et al. 1996), White Mtns. of central New Hampshire (Richards 1994, Atwood et al. 1996), mountains of w. and central Maine (Adamus 1987, Atwood et al. 1996), s.-coastal New Brunswick (possibly extirpated; Erskine 1992, Christie 1993), and sw.-coastal Nova Scotia (probably extirpated; Erskine 1992, D. Busby pers. comm.). Possible but unconfirmed local and sporadic breeding in n.-coastal Maine (Atwood et al. 1996, Rimmer and McFarland 1996).

Winter range. Figure 1. Confined to Greater Antilles. Specimen and field-survey data indicate bulk of wintering population in Dominican Republic (Wetmore and Swales 1931; Ouellet 1993; Rimmer et al. 1997, 1999), where widely distributed and locally common from sea level to 2,220 m (Rimmer et al. 1999). Few records from Haiti; restricted to higher elevations, mainly in southwest (Massif de la Hotte) and east (Massif La Visite; Wetmore and Swales 1931; Woods and Ottenwalder 1983, 1986). Uncommon and local in Jamaica, mainly in Blue Mtns. from 1,200 to 2,225 m elevation (R. and A. Sutton unpubl.; VINS). Rare winter resident in e. and se. Puerto Rico, in Luquillo Mtns. at 450–720 m elevation and Sierra de Cayey at 720 m (Arendt 1992, J. Wunderle unpubl.). Recorded in e. Cuba at 1,600–1,960 m in Sierra Maestra (Rompré et al. 2000, Y. Aubry and G. Rompré pers. comm.); two

Oct specimens from w. Cuba (Havana) in 1960s (Garrido and Garcia Montaña 1975) probably represent transients. No confirmed winter records elsewhere.

OUTSIDE THE AMERICAS

Owing to difficulty of sight identification of Bicknell's and Gray-cheeked thrush, none of 43 "Gray-cheeked Thrush" records from Britain and Ireland has been conclusively identified as Bicknell's (Knox 1996). A specimen from Bardsey, Gwynedd, Britain on 10 Oct 1961 was identified by Charles Vaurie as *bicknelli* (Clafton 1963), but the bird had a 100-mm wing and a dull lower mandible more consistent with Gray-cheeked (Knox 1996). A well-photographed bird on Isles of Scilly on 20 Oct 1986 appeared to be Bicknell's (Curson 1994), but could be extreme example of nominate Gray-cheeked (Knox 1996). Most records of the 2 species from Isles of Scilly, all between 22 Sep and 26 Nov, majority in second half of Oct (Curson 1994). A small number of "Gray-cheeked Thrush" records also from France, Germany, Norway, Italy, and Iceland (Curson 1994).

HISTORICAL CHANGES

Local extirpations documented during twentieth century, but no clear evidence of rangewide declines. Few quantitative data to assess population changes. Historic breeding populations disappeared on Mt. Greylock, MA (10 pairs in 1950s, 0 in 1973; Veit and Petersen 1993); Magdalen Is., Quebec (Ouellet 1996, D. McNair pers. comm.); Seal and Mud Is., Nova Scotia (Wallace 1939, Erskine 1992, D. Busby pers. comm.); Cape Forchu, sw. Nova Scotia (J. Marshall pers. comm.); Fundy National Park, New Brunswick (Christie 1993); and Grand Manan I., New Brunswick (B. Dalzell pers. comm.). Further range contraction in Canadian Maritime provinces suggested by mid-1990s surveys showing fewer occupied sites than during 1986–1991 Breeding Bird Atlas (D. Busby pers. comm.) survey period. Species' presence, however, confirmed on 63 of 73 historic (pre-1992) U.S. breeding sites surveyed in 1992–1995 (Atwood et al. 1996), suggesting no large-scale changes in recent distribution. Recently discovered occupancy of second-growth habitats in industrial forestry landscapes in Quebec, New Brunswick, and Nova Scotia (Ouellet 1993, 1996; Holmes and Nixon 1997; D. Busby pers. comm.) may indicate either a shift in habitat use or population increases (Ouellet 1993, 1996), but more likely reflects species' specialization on disturbed habitats.

Changes on wintering grounds not well documented but likely due to extensive habitat loss and degradation throughout Greater Antilles, including montane forests currently preferred by Bicknell's Thrush; <1.5% of forest cover remains in Haiti and about 10% in Dominican Republic (Stattersfield et al. 1998). Jamaica has lost 75% of its original forest and Cuba 80-85% (Stattersfield et al. 1998). Of 14 identifiable historic (pre-1991) sites of occurrence in Dominican Republic, Bicknell's Thrush located at 7 of 11 surveyed in 1995–1997; several reported historic sites severely degraded to point of being unrecognizable or unsuitable for species' continued occupancy (Rimmer et al. 1999).

FOSSIL HISTORY

No known records; late-Pleistocene fossils of *Catharus* sp. from cave deposits in Virginia could apply to *bicknelli* (Guilday et al. 1977) and additional unidentified *Catharus* fossil records cited in Wetmore 1962.

SYSTEMATICS

Formerly classified as subspecies of Gray-cheeked Thrush, this view recently maintained by Marshall (2001), who adhered to taxonomy presented by Wallace (1939).

GEOGRAPHIC VARIATION

Possible latitudinal variation, both in size and dorsal coloration, but rigorous study needed (Todd 1963, Ouellet 1993). Todd (1963) proposed the possibility of a tawnier brown montane subspecies in New York State and New England, and a colder olive-brown subspecies in the Canadian Maritime Provinces and se. Quebec. He further suggested that the brown versus olive color polymorphism seen in n. Vermont by Wallace (1939) represents contact between these forms. It is now unclear if the trend from brown birds in south to olive birds in north represents a true cline or if the two forms are intermixed throughout the range (see Appearance: molts and plumages, below). It should be clarified whether this is true polymorphism, or only the separation of extremes in normal variation in dorsal color.

SUBSPECIES

None recognized. See Geographic variation, above.

RELATED SPECIES

Belongs to a species group with other Nearctic spotted *Catharus* thrushes, including Swainson's, Hermit, Gray-cheeked, and Veery; especially closely related to the latter two. Percent nucleotide divergence in mitochondrial DNA nonprotein coding control region (396 base pairs sequence) is 2.2% to

Veery and 2.3% to Gray-cheeked Thrush (Ellison 2001). Relationships among these species are so close as to make specifying sister taxa uncertain. Bicknell's Thrush and Veery probably arose from within a Gray-cheeked-like ancestor. Based on control region-molecular clocks derived from Zink and Blackwell (1998) and Freeland and Boag (1999) for passerines, this split probably occurred in the mid-Pleistocene era (about 500,000 to 850,000 yr ago). This is also suggested by the 1.7% divergence estimated by G. Seutin for a restriction fragment analysis of the entire mitochondrial genome of Gray-cheeked and Bicknell's thrushes (cited in Ouellet 1993). Relationships of Nearctic *Catharus* to Neotropical *Catharus* and Wood Thrush (*Hylocichla mustelina*) yet to be worked out, although it seems likely Wood Thrush is a *Catharus* (Winker and Rappole 1988).

MIGRATION

NATURE OF MIGRATION IN THE SPECIES

A nocturnal, long-distance migrant; routes and timing poorly documented owing to difficulty of distinguishing Bicknell's and Gray-cheeked thrushes in the field. Examination of hand-held birds only reliable means of separating migrants of the 2 species. Analysis of specimen and banding data, using wing-chord as identification criterion (<94 mm = Bicknell's, >98 mm = Gray-cheeked), suggests elliptical southern portion of migratory route between North American breeding grounds and Greater Antillean winter range. Most southbound migrants may depart East Coast from mid-Atlantic states or Carolinas on overwater flight to Greater Antilles; fall records scarce south of Virginia. Northward passage appears to be more concentrated through Southeast, as spring specimens from Florida, Georgia, both Carolinas, and Virginia outnumber fall records nearly 2:1. Entire migration in both directions concentrated east of Appalachian Mtns.

TIMING AND ROUTES OF MIGRATION

Spring. No information on departure from Greater Antillean wintering grounds; probably late Apr, as birds still present in Dominican Republic second week of Apr (J. Faaborg unpubl.). No verifiable U.S. records prior to May. Based on identification of specimens (n = 2; Wallace 1939) and nocturnal flight calls (n = 8 birds; Evans 1994) in e.-central Florida, migrants pass northward first half of May; earliest specimen record 3 May in Brevard Co. (Wallace 1939). No records from Florida's west coast or other Gulf Coast states. Only one reliable spring record from Georgia, a male collected on McQueen's I., Chatham Co., 8 May 1949 (Georgia Museum Natural History specimen data). Three verifiable spring specimens from S. Carolina: two near Charleston 10 and 15 May, one inland at Chester 6 May (Charleston Museum specimen data). Spring migrants of Bicknell's/Gray-cheeked thrush complex in N. Carolina recorded 24 Apr to 30 May, with 2 unsubstantiated Mar reports; 50% pass in 15-d period mid-May (Lee 1995). Only Bicknell's specimen considered authentic, taken near Southport, Brunswick Co., 12 May 1939 (Lee 1995), although 3 additional specimens reported by Wallace (1939) collected 5–18 May. Three specimen records Virginia coastal plain 17–21 May (Wallace 1939).

Bulk of confirmed (on basis of wing length) spring migrants recorded between Maryland and New England. Two specimens from Washington, D.C. on 16 and 27 May; two from Laurel, MD, both 14 May (Wallace 1939). Ten Bicknell's Thrushes banded at two e. Maryland sites 18-31 May (B. Ross and J. Weske unpubl.). At Island Beach State Park, NJ, only 3 of 43 identified Bicknell's Thrushes banded 1964–1999 captured in spring, 18–26 May (G. and E. Mahler, R. McKinney, R. Yunick unpubl.). At a Queen's Co. banding station in w. Long I., NY, species made up 24% of spring transients of Bicknell's/Gray-cheeked thrush complex (n = 24 Bicknell's, 76 Gray-cheeked) banded from 1932 to 1939; earliest date 11 May, latest 27 May (Beals and Nichols 1940). Farther east in Suffolk Co., Long I., NY, Bicknell's Thrush comprised 24% of identified spring migrants (n = 4 Bicknell's, 17 Gray-cheeked) banded in 1959–1974, all on single date 28 May 1967 (Lanyon et al. 1970, W. Lanyon unpubl.).

In New England, 5 verifiable (wing-chord ≤93 mm) spring specimens in coastal Connecticut 15–27 May, 4 in e. Massachusetts 20 May–11 Jun, the latter record of an exceptionally late female (Wallace 1939). At a coastal banding site in se. Massachusetts, 18% of new captures of Bicknell's/Gray-cheeked thrush complex in 1966–1996 referable to Bicknell's (n = 17); earliest date 23 May, latest date 6 Jun, mean date 29 May ± 4.1 d SD (Manomet Observatory for Conservation Sciences [MOCS] unpubl.). On Appledore I. off s. Maine coast, 4 captures of Bicknell's among 44 individuals of the species complex banded in 1983–1999, 18 May–1 Jun (S. Morris unpubl.). Earliest recorded occurrence on high-elevation breeding grounds in n.-central Vermont 16 May, well established in Green Mtns. by 25 May in most years (VINS). Reported to return to n. White Mtns. 25–30 May (Wallace 1939).

West of Appalachian Mtns., no identifiable Bicknell's among 94 individuals of Bicknell's/Gray-cheeked thrush complex banded in springs of

1961–1961–1994 in sw. Pennsylvania (Powdermill Nature Reserve [PNR] unpubl.). Possible vagrancy indicated by spring captures of 5 apparent Bicknell's among 371 individuals of both species banded on n. Lake Erie shore at Long Point, Ontario in 1962–1998 and 6 of 102 captures at Prince Edward Point on northeast shore of Lake Ontario in 1975–1989 (Long Point Bird Observatory [LPBO] unpubl.). At Braddock Bay on south shore of Lake Ontario, 2 identifiable Bicknell's among 50 individuals of species complex banded in springs of 1986–1999 (E. Brooks unpubl.). Possibility of misidentifications of similar *Catharus* species and erroneous wing-length measurements must be considered in evaluating all banding records of apparent Bicknell's Thrush.

Fall. Migrants identified on basis of nocturnal flight calls passing over n. Gaspé Peninsula in late Sep 1948 (Ball 1952, Evans 1994). Latest record on Mt. Mansfield, VT, 3 Oct; one presumed local hatch-year (HY) bird banded 29 Aug 1996 was recaptured 30 Sep (VINS). Six birds reported from Whiteface Mt., an Adirondacks breeding site, 26 Sep 1948 (Carleton 1999). Few reliable records from northern part of migratory range, as migrants appear to move rapidly southeastward. No confirmed Bicknell's among 21 "Gray-cheeked Thrushes" banded at a central Vermont site 1981–2000 (VINS). On the east slope of Adirondack Mtns. at 730 m elevation, individual HY Bicknell's banded on 9 Sep 1992 and 24 Sep 1994, respectively (W. Lanyon unpubl.). In Canadian Maritime Provinces, 1 of 7 "Gray-cheeked Thrushes" banded on Kent I., New Brunswick, a Bicknell's by wing length, a HY bird on 5 Oct 1980 (J. Cherry and P. Cannell unpubl.). Similarly, at Atlantic Bird Observatory off sw. Nova Scotia, 1 of 7 individuals of the two species banded in 1996–1998 had a wing length consistent with Bicknell's, this a HY bird on 14 Sep 1998 (T. Fitzgerald unpubl.).

In New England, majority of fall records from coastal or near-coastal locations. Seven identified specimens from Massachusetts 26 Sep–16 Oct, 9 from Connecticut 21 Sep–12 Oct (Wallace 1939). On se. Massachusetts coast, 19 of 214 banded fall migrants (9%) of Bicknell's/Gray-cheeked thrush complex identifiable as Bicknell's by wing length; earliest date 22 Sep, latest 20 Oct, mean date 6 Oct ± 6.9 d SD (MOCS unpubl.).

Fall transients appear to concentrate at coastal sites between Long I., NY, and Virginia. At w. Long I. banding station, Bicknell's Thrush constituted 42% of identified fall migrants of the two species (n = 117 Bicknell's, 278 Gray-cheeked); earliest date 7 Sep, latest date 8 Nov, 66% of captures 21 Sep–5 Oct (Beals and Nichols 1940). At Huntington, Suffolk Co., Long I., Bicknell's Thrush constituted 16% of identified fall migrants of both species (n = 17 Bicknell's, 109 Gray-cheeked); early date 9 Sep, late date 24 Oct, mean passage date 5 Oct ± 8.6 d SD (Lanyon et al. 1970, W. Lanyon unpubl.). At Island Beach State Park in e. New Jersey, 40 identifiable Bicknell's banded 11 Sep–20 Oct in 1964–1999 (G. and E. Mahler, R. McKinney, R. Yunick unpubl.). At Cape May, NJ, 2 of 11 individuals of Bicknell's/Gray-cheeked thrush complex banded in 1990 and 1991 identifiable as Bicknell's, both HY birds captured on 7 Oct 1990 (T. Leukering unpubl.). At Sandy Spring, MD, 7 Bicknell's banded 1975–1984, between 20 Sep–19 Oct (J. Weske unpubl.). At another e. Maryland site, 7 Bicknell's banded 1979–1994 over a similar range of dates, 21 Sep–13 Oct (B. Ross unpubl.). On Shenandoah River in e. Virginia, 3 identifiable Bicknell's banded among 53 individuals of the species complex in 1976–1994, all HY birds 12 Sep–18 Oct (W. Oberman unpubl.). Among fall migrants of Bicknell's/Gray-cheeked thrush complex (n = 947) at a coastal Virginia banding site (Kiptopeke), Bicknell's Thrush accounted for 30% of individuals captured over 4 yr (1968, 1969, 1971, 1980; Wilson and Watts 1997). Median autumn capture dates over same 4 yr: 4–7 Oct, differing significantly from Gray-cheeked Thrush in only one year (1968; 7 Oct and 2 Oct, respectively; Wilson and Watts 1997). Range of passage dates at this site narrower for Bicknell's than for Gray-cheeked Thrush; none captured during first half of Sep, none after third week of Oct (Wilson and Watts 1997). One Kiptopeke bird captured on 26 Sep 1999 originally banded at Appledore I. off s. Maine coast on 18 May 1998 (B. Wilson pers. comm.).

Reliable fall records relatively scarce south of Virginia, suggesting offshore flight from mid-Atlantic to Greater Antilles. Two records support such an overwater flight: a specimen collected on Bermuda on the exceptionally late date of 23 Nov 1957 (American Museum of Natural History specimen data, *fide* J. Marshall) and a migrant banded on New Providence I., Bahamas, 16 Oct 1993 (G. Seutin unpubl.). On mainland, only one reliable record for N. Carolina, a specimen collected on 27 Sep 1900 in Raleigh (Wallace 1939). Within the Bicknell's/Gray-cheeked thrush complex, 75% of fall migrants in N. Carolina occur during a 20-d period late Sep–early Oct, with earliest record 30 Aug and latest 29 Oct (Lee 1995). In S. Carolina, only a single fall record, a HY specimen collected south of Charleston 13 Oct 1993 (Charleston Museum specimen data). Two identifiable Georgia specimens, both from Atlanta area, 7 Oct 1915 (Wallace 1939) and 21 Sep 1970 (Georgia Museum of Natural History specimen data). At three Georgia banding sites, one identifiable Bicknell's among 22 individuals of Bicknell's/Gray-cheeked complex in 1984–1999, banded at Butler I., 26 Oct 1996 (D. Cohrs and G. Schmalz

unpubl.). In Florida, only three reliable fall records: 1 Bicknell's among 31 birds of both species banded in Tallahassee 1967–1998 (HY bird on 23 Sep 1979; P. Homann unpubl.); another among 41 birds of the two species banded near Orlando 1995–1998 (HY on 13 Oct 1997; P. Small et al. unpubl.); single fall Florida specimen near Apalachicola 23 Sep 1967 (Tall Timbers Research Station specimen data). No other reliable fall record from any Gulf Coast states.

As in spring, birds identifiable as Bicknell's Thrush on basis of wing length captured at fall banding sites well west of breeding range and main migration path. At Long Point, Ontario, 1% of all Bicknell's/Gray-cheeked thrushes (n = 55 of 4,102) banded 1963–1998 referable to Bicknell's; dates ranged from 31 Aug–6 Oct (LPBO unpubl.). At Prince Edward Point, Ontario, 9 of 265 (3%) individuals of the species complex banded 1975–1989 identifiable as Bicknell's; dates 15 Sep–7 Oct (LPBO unpubl.). At Braddock Bay, NY, 1% of banded birds of both species referable to Bicknell's, two HY individuals on 16 Sep 1988 and 26 Sep 1990 (E. Brooks unpubl.). In Finger Lakes region of New York, 1 Bicknell's banded among 32 birds of the two species in 1987–1999 (15 Sep 1999; J. Gregoire unpubl.). Farther south, 18 identifiable Bicknell's among 1,441 new bandings of Bicknell's/Gray-cheeked thrush in sw. Pennsylvania 1961–1994; early date 22 Sep, late date 12 Oct (PNR unpubl.). At fall banding site in Allegheny Mtns. of W. Virginia, 3 apparent Bicknell's among 74 individuals of the species complex banded 1991–1999, 9 Sep–5 Oct (Allegheny Front Migration Observatory unpubl.).

Winter residents on territories in Dominican Republic in early Nov; earliest date 5 Nov (VINS).

MIGRATORY BEHAVIOR

Little information. Stopover lengths not well documented, but few transients appear to linger at stopover sites. No evidence of spring stopovers. Mean minimum autumn stopover on se. Massachusetts coast 2.9 d ± 2.1 SD (range 1–7, n = 8 of 19 birds; MOCS unpubl.). Mean stopover of banded Bicknell's Thrushes (n = 10 of 24 birds) in w. Long I., NY, 1.3 d, maximum stopover 2 d (Beals and Nichols 1940). No recaptures of banded fall migrants at another Long I. site (n = 17 Bicknell's; W. Lanyon pers. comm.), at Kiptopeke, VA, in 1997–2000 (n = 9 Bicknell's; B. Johnson unpubl.), or in sw. Pennsylvania (n = 18 Bicknell's; PNR unpubl.). Possible premigratory movements in e. Dominican Republic suggested by mist-net captures of 6 individuals 10–11 Apr 1974; none captured at same site 7–9 Jan 1975 (J. Faaborg unpubl.). This might, however, simply indicate food-based habitat shift in response to late-winter dry season.

Age ratios in fall strongly skewed towards HY birds throughout migratory range. Of 152 known-age birds banded at 18 e. North America sites, 90% were immature. Only 3 mid-Atlantic banding stations with fall adult ratios >20% (Kalbfleisch on Long I., NY [29% after-hatch-year [AHY] individuals, n = 5; W. Lanyon unpubl.], Sandy Spring, MD [29%; n = 2; J. Weske unpubl.], and Kiptopeke, VA [22%; n = 2; B. Johnson unpubl.]). Small sample sizes obscure possible differences in timing between age classes.

CONTROL AND PHYSIOLOGY

Little information. Some evidence for premigratory fat deposition. On Mt. Mansfield, VT, of 8 birds (2 known breeding adults, 6 presumed local immatures) examined 2–44 d after initial captures in fall (Aug–Sep), 5 gained 0.7–10.2% (mean 5.3%) of original body mass, 1 remained at same mass, and 2 lost 1% and 6%, respectively, of original mass (uncorrected for time of day; VINS). Only 1 HY bird had detectable subcutaneous fat.

Few data on fat or mass changes of migrants. On se. Massachusetts coast, mean mass of transients at initial capture 29.9 g ± 4.5 SD in fall (n = 20), 32.9 g ± 3.9 SD in spring (n =17); fall migrants (n = 8) gained average of 2.9 g ± 4.7 SD during stopovers (range -0.2–10.2; MOCS unpubl.). In sw. Pennsylvania, mean mass of 17 fall migrants 30.8 g ± 2.7 SD (PNR unpubl.). At Kiptopeke, VA, mean mass of AHY birds (n = 2) 29.2 g ± 3.4 SD, of HY birds (n = 7) 27.6 g ± 1.6 SD; AHY birds with higher average fat scores than HYs (B. Johnson unpubl.).

HABITAT

BREEDING RANGE

In U.S., a habitat specialist restricted to montane forests dominated by balsam fir (*Abies balsamea*), with lesser amounts of spruce (red [*Picea rubens*] and black [*P. mariana*]), white birch (*Betula papyrifera* var. *cordifolia*), mountain ash (*Sorbus* sp.), and other hardwood species. At southern extent of range in Catskill Mtns., generally breeds above 1,100 m elevation; minimum elevations at which species occurs decrease by 85 m / 1° latitude northward, with individuals recorded as low as 750 m on several Maine peaks (VINS). Lowest nest in Vermont documented at 1,006 m (VINS). Often associated with recently disturbed areas undergoing vigorous succession, characterized by standing dead conifers and dense regrowth of balsam fir (Wallace 1939, VINS). Highest densities typically found in chronically disturbed (high winds, heavy winter ice accumulation) stands of dense, stunted fir on exposed ridgelines or along edges of human-created openings (e.g., ski trails),

or in regenerating "fir waves" (*cf.* Sprugel 1976; Marchand 1984, 1995; VINS). In the White Mtns. of New Hampshire, Sabo (1980) found Bicknell's Thrush at a mean elevation of 1,290 m in exposed mid- to upper slopes dominated by conifers (75% of foliage volume) with mean canopy height of 4.8 m.

In Canada, occupies montane fir forests in s. Quebec and New Brunswick up to 1,178 m elevation (Ouellet 1993, Rompré et al. 1997, Connolly 2000, Nixon et al. in press, D. Busby pers. comm.), coastal maritime spruce-fir forests in New Brunswick and Nova Scotia (Wallace 1939, Erskine 1992, D. Busby pers. comm.), and regenerating stands of mixed forest following forest fires or clear cutting in Quebec and New Brunswick, generally >450 m (Ouellet 1993, Nixon 1996, Nixon et al. in press).

In Quebec montane forests, occupied sites had significantly higher components of balsam fir than unoccupied sites (19,920 stems/ha versus 7,240 stems/ha; Connolly 2000); fir made up 71.1%, 75.1%, and 88.5% of all stems recorded at 3 discrete geographic study areas (Rompré et al. 1997). Spruce and hardwoods species significantly less abundant on occupied than unoccupied sites (Connolly 2000). Mean total stem density varied from 43.7 to 106.3/m^2 on occupied sites, and trees <2.5 cm diameter at 20 cm height above ground were the dominant size class (Rompré et al. 1997). Occupied sites had a lower percentage of herbaceous ground cover, higher percentage of moss ground cover, more dead fallen trees, more snags and stumps, and higher overall tree density (stems >2.5 cm diameter) than unoccupied sites (Connolly 2000). Mean canopy heights of occupied habitats ranged from to 5.4 m in Parc de la Gaspésie, to 7.5 m in ZEC des Martres, to 14.1 m on Mont-Mégantic (Rompré et al. 1997).

In predominantly industrial forest landscape of Central Highlands of New Brunswick, Bicknell's Thrush found at 457–760 m elevation, but most (67%) >600 m (Nixon 1996, Nixon et al. in press). Most occupied sites in second-growth, regenerating forest following large-scale disturbance by clear-cutting or fire. These "non-traditional" habitats (Ouellet 1993) dominated by deciduous species; 89% of occupied sites with higher densities of deciduous stems than coniferous stems, 63% of these with twice as many deciduous as coniferous stems (Nixon et al. in press). White birch dominant tree species on occupied sites, followed by balsam fir and cherry (*Prunus* sp.). Stem densities on regeneration sites high (47% of sites >40,000 stems/ha, 74% sites >20,000 stems/ha), but similar between occupied and unoccupied sites (Nixon et al. in press). Most (>70%) trees on occupied sites had diameters ≤2.5 cm, but in 5–10 cm size class, balsam fir significantly more abundant than on unoccupied sites. Mean canopy height on occupied regeneration sites 4.4 m; most harvested or planted 10–12 yr earlier (range 5–17 yr; Nixon et al. in press).

On Cape Breton I., Nova Scotia, most (78%) birds found in unmanaged "traditional" fir-dominated habitat, 22% in areas of regenerating industrial forest (D. Busby pers. comm.). Over all habitat types occupied by Bicknell's Thrush on Cape Breton, 54% with >70% coniferous cover, 30% classified as "mixed," 15% with >70% deciduous cover (D. Busby pers. comm.). Mean canopy height <5 m on 46% of occupied Cape Breton sites.

SPRING AND FALL MIGRATION

Little information. Reported to be habitat generalist; " . . . migrants usually . . . in shady lanes, along well-vegetated beaches, and in denser woodlots, occasionally emerging into more open orchards and gardens" (Wallace 1939: 259). In coastal Virginia, regularly captured in mist-nets in upland shrub and dune scrub forest dominated by loblolly pine (*Pinus taeda*), various oak species (*Quercus* sp.), wax myrtle (*Myrica cerifera*), and early successional, oldfield habitats (Wilson and Watts 1997). Little evidence that montane forests preferentially selected by migrants (e.g., Rimmer and McFarland 2000; but see Wallace 1939: 259–260).

WINTER RANGE

Current preferred winter habitat mesic to wet broadleaf montane forests in Dominican Republic (Rimmer et al. 1999), Haiti (Wetmore and Swales 1931; Woods and Ottenwalder 1983, 1986), Cuba (Rompré et al. 2000, Y. Aubry and G. Rompré pers. comm.), Jamaica (R. and A. Sutton pers. comm., VINS), and Puerto Rico (J. Wunderle unpubl.). In Dominican Republic, found at all elevations from sea level to 2,200 m, although 62% of occupied sites in forests >1,000 m elevation (Rimmer et al. 1999). Majority (75%) of occupied sites (n=24) in broadleaf-dominated forests ("cloud/montane broadleaf forest" and "submontane broadleaf rainforest"; Tolentino and Peña 1998) at all elevations, 19% in mixed broadleaf-pine forests, and 6% in pine-dominated forests. Primary, wet and/or mesic forests constituted 78% of all occupied sites; only 6% of occupied sites in predominantly dry forests (Rimmer et al. 1999). Use of regenerating secondary forests (22% of occupied sites) in Dominican Republic may indicate winter habitat flexibility or recent shift from preferred primary broadleaf forest habitat, much of which has been lost or degraded.

In Cuba's Parque Nacional Turquino, found in ridgeline forest ("bosque nublado" and "matoral subalpino"), characterized by steep slopes and dense, broadleaf vegetation with few or no pines (Y. Aubry and G. Rompré pers. comm.). In Parc

Nacional Macaya in Haiti, occurs in wet montane rain forest and cloud forest (Woods and Ottenwalder 1983). In Jamaica's Blue Mtns., inhabits montane forests, including "upper montane rain forest over shale," "high altitude scrub forest over shale," and "modified upper montane rain forest" (R. and A. Sutton pers. comm.). These habitats, considered to be "highest quality" available, characterized by undisturbed, mature broadleaf trees with relatively open understory and few invasive exotic plant species (R. and A. Sutton pers. comm.). Most occupied sites in Jamaica featured *Podocarpus urbani*. In e. and se. Puerto Rico, found in "lower montane wet forest," characterized by a human-modified, heterogeneous mix of native secondary forest, shrubby edges and fields, dense fern and bamboo thickets, and overgrown plantations (Wunderle 1995, J. M. Wunderle pers. comm.).

In Dominican Republic, some evidence for sexual habitat segregation, or segregation of sexes by geographic area (VINS). In Sierra de Bahoruco on Haitian border, in predominantly undisturbed broadleaf montane forests, 19 of 23 birds mist-netted in Nov 1998 and Jan 2000 were males. At a smaller, more recently disturbed montane forest site in Cordillera Septentrional in northcentral part of country, 9 of 11 birds captured in Jan 2000 were female. At a similar site 23 km to east, 4 females and 3 males captured in Jan 2000. These results preliminary and may be an artifact of small sample sizes or habitat disturbance from human activities and/or 1998 hurricane; warrant more intensive investigation.

FOOD HABITS

FEEDING

Main foods taken. Insects and other arthropods during breeding season; beetles (Coleoptera) and ants (Formicidae) constitute bulk of food volume. Regularly takes wild fruits during migration. Forages primarily for arthropods during winter, but may feed regularly on fruits.

Microhabitat for foraging. During breeding season, generally feeds on or close to ground, but may glean foliage or branches of both coniferous and deciduous trees; sometimes fly-catches from exposed perches (Wallace 1939, VINS). Considered predominantly a ground forager in interior forest habitat by Dilger (1956a). Nestling diet samples suggested that majority of prey delivered were taken above ground (A. Strong unpubl.). No information during migration. Little information from wintering grounds, but reported in dense vine tangles within a few meters of forest floor, but not actually on ground, in the Dominican Republic; 1 record of 3 birds in canopy of an aril-producing tree (R. Greenberg pers. comm.).

Food capture and consumption. Reported to be a "versatile" feeder, moving rapidly by swift hops or short flights on ground below trees or among low branches (Wallace 1939, VINS). Often searches methodically for insects, pausing and peering; may foliage-glean in outer branches; some aerial pursuit of insect prey (Wallace 1939, VINS). "Sally-strikes" and foot-scratching under litter surface recorded in Vermont (A. Strong unpubl., VINS). In winter, recorded hover-gleaning at foliage for arthropods (R. Greenberg pers. comm.).

DIET

Major food items. Invertebrates during breeding season, primarily ants, beetles and lepidopteran larvae. Stomach contents of adults collected on Mt. Mansfield, VT ($n = 5$), and Slide Mtn., New York ($n = 2$) in late Jun and early Jul contained an average of 34% beetles (range 1–95%) and 29% ants (range 0–55%); one bird contained 90% chrysomelid beetles (Wallace 1939). Animal matter constituted nearly 100% of these samples, but 2 birds showed small amounts of unidentified plant matter (Wallace 1939). Lepidopteran and other larvae constituted bulk of food delivered to nestlings in Vermont, but beetles and adult Hymenoptera important nestling prey items (Wallace 1939; A. Strong unpubl.).

Quantitative analysis. Wallace (1939) reported average stomach analyses from 7 breeding adults from the Green and Catskill Mtns.: 34% beetles (Coleoptera, dominated by Chrysomelidae, Elateridae, Cerambycidae, Carabidae, and Staphylinidae), 29% ants (Hymenoptera: Formicidae), 12% Diptera (dominated by Tipulidae), and 9% holometabolous larvae (dominated by Lepidoptera). Less than 5% of the diet was made up of each of Gastropoda, Phalangida, Aranidae, Hemiptera, Homoptera, Neuroptera, Tricoptera, Lepidoptera, and other Hymenoptera.

Ants were not found in any of 4 Vermont nestlings sampled immediately after being fed (A. Strong unpubl.). All 4 chicks had been fed coleopterans (mean 41.3% ± 34.4 SD of total diet, including Chrysomelidae, Elateridae, Cephaloidae, Cantharidae), while the esophagi of 3 contained larvae (mean 49.3% ± 15.8 SD of their total diet, including Diprionidae, Neuroptera, Geometridae, and Bibionidae). Dipterans were found in the diets of 2 nestlings (one with 17% Tipulidae, the other with 12% Chironimidae), each of which had also been fed homopterans (9% Cicadellidae, 6% *Cinara* sp. [an exotic aphid that attacks fir]). One nestling had been fed a slug (Gastropoda), one a mite (Acarina), one a spider, and one an adult conifer sawfly (Diprionidae; A. Strong unpubl.). Size of

prey delivered to nestlings averaged 10.72 mm ± 5.11 SD in length (range 3.6 mm [aphid]–25.1 mm [larvae], n = 41); mean length of larvae 13.63 mm ± 5.14 SD (range 5.6–25.1 mm, n = 20) and of Coleoptera 9.32 mm ± 3.07 SD (range 5.6–14.6 mm, n = 10; A. Strong unpubl.).

On Mt. Mansfield, VT, three 7-d-old nestlings contained Lepidoptera larvae, one probable metallic wood-boring beetle (Buprestidae) larvae, a grasshopper (*Melanoplus* sp.) nymph, and several unidentified beetles and ants (Wallace 1939). Stomach of a depredated 11-d-old fledgling just out of the nest contained 1 cerambycid beetle, a small snail shell, a green Lepidoptera larvae, chitinous remains of unidentified beetles and fragments of various Hymenoptera (Wallace 1939).

FOOD SELECTION AND STORAGE

No information.

NUTRITION AND ENERGETICS

No information.

METABOLISM AND TEMPERATURE REGULATION

Resting oxygen consumption at thermoneutrality 3.26 ± 0.05 (SE) $cm^3 O_2/(g \cdot h)$ (n = 4 adults from Mt. Moosilaukee, NH; Holmes and Sawyer 1975). At temperatures below thermoneutrality, metabolic rate increased linearly with decreasing ambient temperature, but at a lower rate than in 4 sympatric thrush species, suggesting adaptation to colder summer temperatures of subalpine zone (Holmes and Sawyer 1975).

DRINKING, PELLET-CASTING, AND DEFECATION

No information.

SOUNDS

VOCALIZATIONS

Development. Little information. One captive-reared juvenile on Mt. Mansfield, VT, acquired all characteristic call notes during first summer, but developed only rudimentary song, beginning at 15 d, that lacked typical phrasing and precise tonal quality (Wallace 1939). Same captive bird, exposed to wild males the following summer, learned to imitate their songs "with perfection, but usually reverted soon after to his off-tune, winter song" (Wallace 1939: 317).

Vocal array. *Call Notes.* Most characteristic call note during breeding season is harsh, penetrating, downward slurred whistle, the *Beer* Call (Fig. 2A), variously rendered as *beer, veer, peert, queep,* or *quee-a* (Brewster 1883, Langille 1884, Ball 1952, Dilger 1956b). Highly variable in intensity and pitch, given by both sexes. Mean high frequency 5.8 kHz, mean low frequency 3.2 kHz (n = 29 recordings; Ouellet 1993), mean duration 3,052 ms (n = 25 recordings; Ouellet 1993). Variants include less piercing, lower-pitched notes, e.g., inquisitive *pe-irt* (Wallace 1939).

Several additional calls used in situations of alarm and aggression. A rolling, wrenlike chatter, or Growl Call, *crr-rr-rr,* given by agitated adults (Fig. 2B; Wallace 1939, VINS); also heard in captive-reared juvenile (Wallace 1939). Soft, low-pitched *chook-chook* or *chuck-chuck* given by both sexes, especially near nest (Wallace 1939, VINS). Adults tending nest or fledglings also give soft, whining, high-pitched whistle *weee,* similar to that of American Robin (*Turdus migratorius*; VINS). Fledglings give thin, nasal or metallic *cheer* calls, difficult to locate, often when parents away foraging (VINS).

Variety of call notes described by Wallace (1939) at nest, including several exchange calls and various chirps and warbles by female during nest-building, incubating, and brooding.

Nocturnal flight calls of migrants, distinguishable from those of Gray-cheeked Thrush, recorded in e.-central Florida (Evans 1994) and described from Gaspé Peninsula as *cree-e-e* (Ball 1952). These calls characterized by tone with bandwidth of 0.5–1.0 kHz and duration of 150-280 ms, rising sharply within 10–20 ms from initial frequency of 1.5–2.0 kHz to 4.8–5.8 kHz, then descending uniformly at 6–8 Hz/ms (Evans 1994). Initial rising section of lower amplitude than latter descending portion and often inaudible to human ear. Frequency domain and shape parameters similar to those of diurnal calls recorded on Mt. Mansfield, VT (Evans 1994).

Song. Delivered primarily by male, but females occasionally sing on nest during incubation, hatching, and brooding (Wallace 1939, VINS), as well as during activities away from nest (VINS). Song composed of 4 measurable phrases (see Fig. 2C), quantitatively described below by Ouellet (1993) from 32 individual recordings across breeding range. Part I consists of 3–4 introductory notes generally audible to humans only from distances ≤10–12 m. Part II mean duration 0.77 ms ± 0.04 SE, mean high frequency 7.2 kHz ± 0.16 SE, mean low frequency 3.2 kHz ± 0.17 SE, mean amplitude (difference between highest and lowest frequencies) 3.8 kHz ± 0.21 SE. Mean duration of Part III 0.56 ms ± 0.04 SE, mean high frequency 6.4 kHz ± 0.15 SE, mean low frequency 2.9 kHz ± 0.07 SE, mean amplitude 3.7 kHz ± 0.15 SE. Part IV mean duration 0.61 ms ± 0.04 SE, mean high frequency 6.0 kHz ± 0.84 SE, mean low frequency 2.9 kHz ± 0.11 SE, mean amplitude 3.1 kHz ± 0.13 SE.

Qualitative rendering of typical male song *chook-chook, wee-o, wee-o, wee-o-ti-t-ter-ee* (Wallace 1939). Introductory (2–3) low plucking notes "hurriedly followed by two to four, usually three, high-pitched, vibrant, ringing phrases that slur downward . . .

Usually on the third of these phrases, there is an emphatic break which is accompanied by both rise in pitch and increased intensity . . . This climax phrase, consisting of several merged notes, is held for an instant, then runs imperceptibly into the closing notes, which are unemphasized" (Wallace 1939: 308–309). Pitch of final phrase constant or rising, whereas that of Gray-cheeked Thrush drops (Ouellet 1993).

Songs variable within populations, sometimes delivered in abbreviated form (Wallace 1939, VINS). Full songs regularly given in flight, most often at dusk, presumably by males (see Behavior: locomotion, below). Female song on nest described as "very low, whisperingly thin, and hoarse" (Wallace 1939). Males heard to give Whisper Songs next to females before copulations, occasionally in winter (VINS).

Geographic variation. Individual variation in song quality confounds interpretation of geographic variation; no consistent differences or regional dialects apparent (J. Marshall pers. comm.). Call notes reported to be similar across breeding range (J. Marshall pers. comm.), but sonographic analysis reveals up to 10 quantitatively distinct call types/bird (Ball 2000).

Phenology. Vocalizes regularly throughout winter. Sporadic calls throughout day, but most vocalizing confined to 15–20 min periods at dawn and dusk; typical *Beer* Call is perceptibly quieter and less intense than on breeding grounds (VINS). Subdued, partial and full songs occasionally heard (VINS).

Songs seldom heard within first week after arrival on breeding grounds, frequency of calling gradually increases during first 1–2 wk after return (VINS). Within 2 wk after arrival (early Jun in Vermont), songs and calls given frequently throughout day (Rimmer et al. 1996). Singing reaches peak in mid-Jun, declines sharply by late Jun and becomes more restricted to dawn and dusk (Rimmer et al. 1996). During incubation and hatching periods, dawn and dusk chorus involves fewer birds, vocal bouts shorter than during mating period (Ball 2000). Vocal activity increases during week after young fledge (Ball 2000).

In Quebec, song activity peaks earlier (5–30 Jun) than calling activity (30 Jun–23 Jul; Ball 2000). Extent of vocal activity in Jul varies among years (Wallace 1939, VINS), may be influenced primarily by frequency of renesting attempts (see Demography and populations: population regulation, below). Very little vocalizing during period of Prebasic molt and fledgling independence in Aug, but a marked resurgence of calling, with intermittent singing, occurs early to mid-Sep (Wallace 1939, VINS). Dusk flight songs occasionally given during this time.

Daily pattern. During breeding season, calls and songs may start as early as 1 h before sunrise. Vocalizing concentrated at dawn and dusk, although spread throughout day during peak of mating activities,

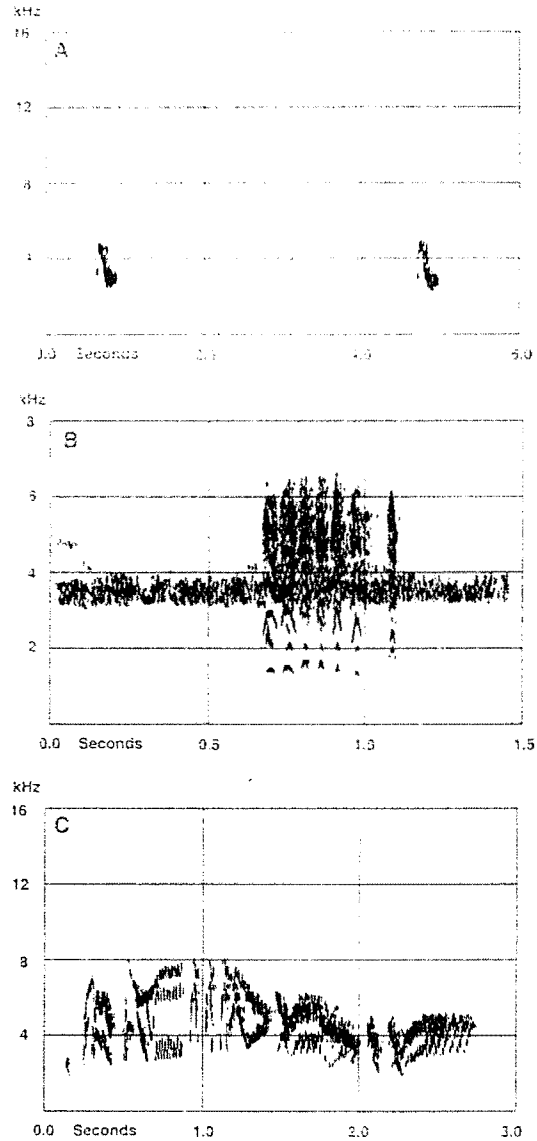

Figure 2. Vocalizations of Bicknell's Thrush. A. Characteristic diurnal call note (*Beer* Call; BLB no. 17542, recorded 19 Jun 1989, Whiteface Mtn., NY). B. Chatter or Growl Call note (Library of Natural Sounds, Laboratory of Ornithology, Cornell University, no. 96097. C. Advertising song (BLB no. 17543, recorded 29 Jun 1989, Gaspé Peninsula, Quebec). Prepared by staff of Borror Laboratory of Bioacoustics (BLB), The Ohio State University, using a Kay Elemetrics DSP 5500 Sona-Graph (with effective frequency resolution of 300 Hz [A and C] and 150 Hz [B] and a 200-point FFT transform size).

generally lowest during early to mid-afternoon (Wallace 1939, VINS). Dawn and dusk bouts consist of both calling and singing, which often climax in brief period of only 5–10 min (VINS). In Quebec, dawn song peak earlier (04:00–05:00) than dawn peak of calling (06:00); dusk peak for both songs and calls similar (21:00; Ball 2000). Dusk bouts typically more

vigorous than dawn bouts but cease abruptly with onset of darkness, although vocalizations occasionally given in full darkness at all hours of night (Wallace 1939, Ball 2000, VINS).

No clear evidence of weather effects on vocal activity, as songs and calls given during all but most severe weather conditions in early and mid-Jun (Rimmer et al. 1996). High winds single most limiting condition on vocal behavior in Vermont. Frequency of singing in Quebec higher during dry, warm weather than in cold, wet conditions (M. Ball unpubl.).

Places of vocalizing. Male song often delivered from exposed perches, usually on dead snags or tops of live trees. May also be given from well-concealed perches in dense vegetation. During mating period, male often sings vigorously near female or prospective nest site (Wallace 1939, VINS). Females known to sing while on nest (Wallace 1939), and from concealed song perches (documented through radiotelemetry) away from nest (VINS).

Repertoire and delivery of songs. Little information, not well studied. Extensive inter- and intra-individual variation in song quality obscures differentiation of male song types. Statistical analysis of sonograms from 18 males throughout breeding range, however, indicates mean repertoire size of 2.4 song types ± 1.21 SD (range 1–6, based on differences in number, shape, frequency, and duration of syllables; M. Ball unpubl.). Song types appear not to be shared among individuals or across breeding range; song types sung serially within an individual song bout, which may contain 4 to as many as 175 songs (Ball 2000). Individuals probably convey their identity through distinct song types; not known whether particular song types used to communicate other information. Song-switching rates higher during dawn and dusk choruses than at other times of day, suggesting that individuals switch song types in relation to social context (Ball 2000).

Mean repertoire size of statistically identifiable call types (all variants of *Beer* Call) across breeding range 3.5 ± 2.54 SD (range 1–10, $n = 23$ presumed males; M. Ball unpubl.). Mean call repertoire from Gaspesie, Quebec 5.5 ± 2.59 SD (range 1–10, $n = 10$), from elsewhere in breeding range 1.9 ± 0.86 SD (range 1–4, $n = 13$; M. Ball unpubl.). In Vermont, 5–10% males have repeated song elements or other anomalies (distinguishable to human ear) that allow consistent, accurate individual identification (VINS).

Little information on rates of delivery. Rarely, up to 15–20 songs / min given by males for several minutes, typically when females absent from nest (VINS).

Social context and presumed functions. Male song presumed to serve primarily for mate-attraction, although counter-singing suggests function in male-male communication, may be especially strident, accelerated (speed approx. 2 times), and frequent (exceeding 15 songs / min) when soliciting females in the presence of other males and during mate-guarding. Penetrating, counter *Beer* Calls often given between or among neighboring males, appear to be primary means of indicating location. Less intense versions of these calls also exchanged by neighboring birds on wintering grounds, may function in territorial defense. Rolling / staccato Growl Call often used in close male-male aggressive encounters, between neighboring birds in winter, or by male or female in response to perceived threats near nest (VINS). Whisper or sub-song is a quiet version of full song, given by males in close proximity (<5 m) to female; may function to attract female while avoiding detection by nearby males; often precedes copulations. Female known to give sub-song while eggs hatching on nest (Wallace 1939, VINS). Stridency, speed, and rate of sub-song appear to vary inversely to proximity of other males. Close range observation via radiotelemetry suggests that females occasionally sing away from nest.

NONVOCAL SOUNDS

None known.

BEHAVIOR

LOCOMOTION

Walking, hopping, climbing, etc. Little information. Hopping appears to be primary mode of terrestrial locomotion; long, springing hops associated with relatively short femur and long tarsometatarsus may be adaptation for foraging in dense microhabitats (Dilger 1956a).

Flight. In montane forests, occasionally hawks insects with short sallies from perch (Wallace 1939, VINS). Flight songs common at dusk during peak mating period, less common at dawn (Wallace 1939, Dilger 1956b, VINS). Typically consist of 10- to 15-s flights 25–75 m above ground, often in large circles >100 m in diameter (Wallace 1939, VINS). Some straight-line flights up- or down-slope up to 0.5 km in distance (Wallace 1939, VINS). Birds tend to rise rapidly from perches before circling and to drop abruptly back after completing flight songs (Dilger 1956b). Dusk flight song heard on one occasion in Sierra de Bahoruco, Dominican Republic, on 7 Nov 1998, occasionally given at dusk during fall pre-migratory period (VINS).

SELF-MAINTENANCE

Preening, head-scratching, stretching, bathing, anting, etc. Adults on breeding grounds observed preening and bathing; older nestlings preen, head-scratch, stretch, and flap wings (Wallace 1939, VINS).

Sleeping, roosting, sunbathing. Nocturnal roost locations of breeding males vary from night to night.

Females roost on nest during incubation and brooding periods. In montane forests of Dominican Republic, radio-tagged wintering birds moved 150–500 m from diurnal home ranges in broadleaf forests to nocturnal roost sites in adjacent pine forests. Most roost sites in canopy of pine forests 10–20 m above ground; some evidence of loosely communal roosting. Individual birds roosted in same general locations of pine forest each night, but one bird that typically roosted in pines remained on daytime territory in broadleaf forest for an entire night and following day, returned to pines the next evening. Movements to and from roost sites occurred at dusk and dawn, respectively.

Daily time budget. Not well documented. Vocal activities concentrated at dawn and dusk on both breeding and winter grounds.

AGONISTIC BEHAVIOR

Physical interactions. Chases common on breeding grounds, especially during mating period, but physical attacks appear to be rare. Both male-male and male-female chases observed.

Communicative interactions. Aggressive postures described by Dilger (1956b) include Upward and Horizontal Stretch. Other hostile displays include Bill-Gaping, Crest-Raising, Wing- and Tail-Flicking, and Foot-Quivering (Dilger 1956b). *Beer* Call frequently elicits aggressive response, especially among males (Dilger 1956b, VINS, WGE). Adults with older nestlings or fledglings may aggressively scold human intruders, giving loud, harsh *peert* calls with bill opened wide and crest-feathers raised; occasionally may fly directly at intruder, veering abruptly <1 m away (Wallace 1939, VINS).

SPACING

Territoriality. See Demography and populations: range, below. On breeding grounds males not territorial in classic sense. Shortly after arrival, males begin to call and sing from song-posts throughout home range but show little physical defense of these areas. Identification of individuals using radiotelemetry and color-band resights verifies that several males often call and sing from same area within one hour. Females apparently territorial, often overtly aggressive to conspecifics during nest-building and egg-laying periods. In montane broadleaf forests of Dominican Republic, maintains discrete territories that are largely non-overlapping and appear to be defended, primarily by vocalizations. Older birds more sedentary than first-winter birds, some of which adopt mobile, "floating" strategy.

Individual distance. No information.

SEXUAL BEHAVIOR

Mating system and sex ratio. Mating system unusual and not easily categorized; may be most similar to that of Smith's Longspur (*Calcarius pictus*), which has been termed female-defense polygynandry (Briskie 1993), in that both males and females mate with multiple partners, multiple paternity is common, and >1 male often feeds nestlings. In Vermont, >75% of broods sired by multiple males; some males with offspring in 2 nests in the same breeding season. Of 13 broods in 1998 and 1999, 10 with ≥2 sires, 3 with single father (VINS).

Overall, 4-yr mean male:female ratio on 3 Vermont study plots 1.8:1.0 (annual range 1.4–2.8:1.0; VINS). Cause of male-biased sex ratio not known, may relate to ratio at hatching, differential natal dispersal patterns, events on wintering grounds (e.g., differential male and female survival due to winter habitat segregation); needs investigation.

Pair bond. No specific information. Extremely difficult to assess, given dynamic nature of mating associations.

Courtship displays. Males pursue females in rapid flights through dense thickets, with crest erect and bill gaping, often singing (Wallace 1939). Up to 3 males observed around female on ground singing Whisper Songs, apparently competing for copulations; male may droop and then rapidly flutter wings before copulating (VINS). Male observed to resume foraging shortly after copulation. Dusk flight songs during mating period assumed to have courtship function.

Extra-pair copulations. Apparent rarity or absence of traditional pair bonds obscures terminology. Multiple paternity of most broods indicates that females regularly copulate with ≥2 males during fertile period.

SOCIAL AND INTERSPECIFIC BEHAVIOR

Degree of sociality. See Spacing: territoriality, above. During migration, most often solitary or in groups of 2–3 individuals.

Play. No information.

Nonpredatory interspecific interactions. Agonistic encounters with Swainson's Thrush occasionally observed on breeding grounds, including chases and displacement from song-posts (Able and Noon 1976, VINS). This species and Hermit Thrush attracted to playbacks of Bicknell's Thrush vocalizations and may react aggressively to song broadcasts (VINS, WGE). American Robin and White-throated Sparrow (*Zonotrichia albicollis*) observed to displace Bicknell's Thrush from song-posts (VINS).

PREDATION

Kinds of predators. Few documented predators of adults. Remains of 2 radio-tagged females found in or below active Sharp-shinned Hawk (*Accipiter striatus*) nest in mid-elevation red spruce forest up to 2 km from known home ranges on Mt. Mansfield, VT (VINS). Five other dead, radio-tagged adults found

on hardwoods forest floor probably depredated by Sharp-shinned Hawks; 2 of these recovered at plucking-posts of this species. Radio-tagged female with dependent fledglings found cached underneath rotting log; tooth marks in skull suggested depredation by long-tailed weasel (*Mustela frenata*; VINS). Occasional mobbing and chasing of Northern Saw-whet Owl (*Aegolius acadicus*) suggests that this species may depredate adults or free-flying young (VINS).

Of 7 radio-tagged fledglings known to have died, all taken by predators. One found at Sharp-shinned Hawk plucking-post, others apparently killed by mammals. Juveniles probably more susceptible to mammalian predation than adults, due to less developed flight skills and conspicuous begging behavior.

Red squirrel (*Tamiasciurus hudsonicus*) only confirmed predator of eggs and nestlings (Wallace 1939, VINS). Other suspected or likely nest predators include Blue Jay (*Cyanocitta cristata*), Common Raven (*Corvus corax*), eastern chipmunk (*Tamias striatus*), boreal red-backed vole (*Clethrionomys gapperi*), deer mouse (*Peromyscus maniculatus*), and weasel (*Mustela* sp.; Wallace 1939, VINS). Other potential predators observed in breeding habitat include red fox (*Vulpes fulva*), coyote (*Canis latrans*) and raccoon (*Procyon lotor*). Possible predators in winter include Sharp-shinned Hawk, Ridgway's Hawk (*Buteo ridgwayi*), mongoose (*Herpestes auropunctatus*), and rats (*Rattus* sp.).

Response to predators. Agitated *Beer* Calls by nesting adults often given in response to approach of potential predators, including humans, especially during nestling stage (VINS). Growl Call may also be used. Mobbing of red squirrel, Northern Saw-whet Owl, and Blue Jay occasionally observed (VINS). One incubating female flushed silently at approach of red squirrel, did not vocalize or remain visibly close by while squirrel ate eggs in nest (VINS).

BREEDING

PHENOLOGY

Pair formation. Little information. Earliest known arrival date of breeding male in Vermont 16 May, of female 23 May (VINS). Breeding males arrive significantly earlier than females (mean difference 1.7 d, 95% Confidence Interval [CI] = 3.2–0.3). Mating activities probably begin shortly after female arrival, as evidenced by frequent singing and calling throughout day in late May and early Jun (Rimmer et al. 1996). Mating associations are dynamic and probably tied to stage of individual females' fertile periods, likely influenced by availability of other mating opportunities and chick-feeding by males.

Nest-building. Earliest confirmed nest construction date in Vermont 1 Jun (VINS); other extrapolated nest-initiation dates of 2–4 Jun (Wallace 1939). Reported nest with 3 eggs on Seal I., Nova Scotia, 3 Jun 1901 (Reed 1904) suggests late May construction and is exceptionally early, as eggs laid in 3 other Seal I. nests were 13–14 Jun (Tufts 1909).

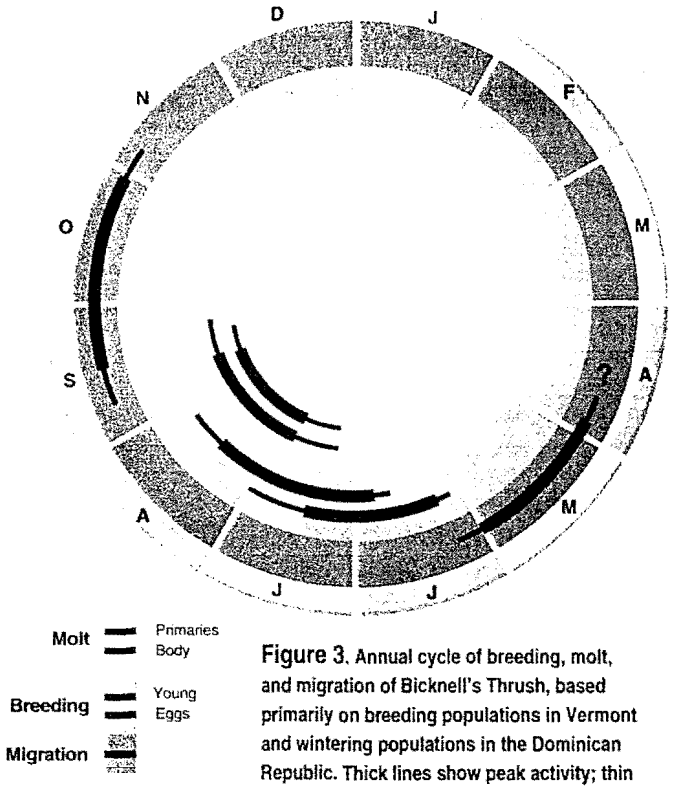

Figure 3. Annual cycle of breeding, molt, and migration of Bicknell's Thrush, based primarily on breeding populations in Vermont and wintering populations in the Dominican Republic. Thick lines show peak activity; thin lines, off-peak.

First brood per season. See Figure 3. In Vermont, 71% of 89 clutches initiated in first 3 wk of Jun; later clutches probably represent renesting attempts. Clutch initiation dates: Vermont, 7 Jun–14 Jul (n = 89; Wallace 1939, VINS); New Hampshire, 21 Jun–14 Jul (n = 5; Wallace 1939, Richards 1994); Massachusetts, 18 Jun (n = 1; Veit and Petersen 1993); Quebec, 6 Jun–20 Jul (n = 7; Wallace 1939, Y. Aubry unpubl.); Nova Scotia, 3–14 Jun (n = 4; Wallace 1939, Tufts 1962). Known hatching dates 23 Jun–29 Jul (70% by 6 Jul) in Vermont (n = 68; Wallace 1939, VINS), 26 Jun–14 Jul in Quebec (n = 6 nests; Y. Aubry unpubl.). Known fledging dates 3 Jul–3 Aug (70% by 14 Jul) in Vermont (n = 53; Wallace 1939, VINS), 8–24 Jul in Quebec (n = 6 nests; Y. Aubry unpubl.). Young stay in nest 9–13 d (average 11.4 ± 1.3 SD, n = 17; Wallace 1939, VINS).

Second brood per season. Second brood rare, one confirmed instance in Vermont. Female that fledged 2 chicks on 2 Jul initiated second clutch on 7 Jul, built nest while feeding fledglings and continued feeding during egg-laying (VINS). Renesting attempts after early-season failures common. Mean interval between loss of first nest and initiation of second clutch in Vermont 6.8 d (range 5–12, n = 5). One female renested

successfully on third attempt, requiring only 2 d from loss of second clutch to initiation of third (VINS).

NEST SITE

Selection process. Little information. Probably selected solely by female. Females build nests 17–1,344 m apart in successive years (mean 182.9 m ± 267.8 SD, n = 26; VINS). No statistical difference between distances for females of failed versus successful previous year's nest, although large movements tend to follow failures. One older female moved 1,344 m and another 540 m after failing the prior year; these distances more than twice those between any other successive year's nests. One female in 2000 nested 1,715 m away from nest she built in 1998 as yearling bird. Renesting attempts averaged 52.7 m ± 28.5 SD from first nest (range 19–87, n = 7; VINS).

Microhabitat. Usually located in dense stands of young to mid-successional fir or "krummholz," uncommonly in more mature, open forests (Wallace 1939, VINS). Often found in dense regrowth along natural or artificially created edges. On 2 ski areas in Green Mtns. of Vermont, nests averaged 10.8 m ± 8.97 SD from ski-trail edge (range 0–33, n = 26; VINS).

On nest-centered 5-m radius plots (n = 103) in Vermont, mean densities of large woody stems (<8.0 cm diameter at 10 cm above ground) 163.4 ± 107.34 SD (VINS). Balsam fir accounted for 67% of all live woody stems <8.0 cm diameter within 5 m of nests, followed by white birch (11.7%), dead stems (9%), mountain ash (6.1%), mountain-holly (*Nemopanthus mucronata*; 1.9%), and red spruce (1.1%); 11 other species each accounted for <1%. Leaf litter depth ranged from 1.5 to 21.5 cm (mean 5.1 ± 2.9, n = 74). On nest-centered 11.3-m radius plots (n = 103), mean density of live trees 8–23 cm dbh (diameter at breast height) was 33.4 ± 18.7 SD (range 5–89), mean density of dead standing trees 8–23 cm dbh 11.9 ± 8.2 SD (range 0–34). Mean densities of live trees >23 cm dbh was 3.25 ± 4.95 SD (range 0–30), of standing dead trees >23 cm dbh 2.3 ± 2.9 SD (range 0–22). Canopy dominated by balsam fir at 81 of 103 nests (79%), balsam fir and white birch codominant at 9 nests, mix of balsam fir and mountain ash at 5 nests, white birch dominant at 4 nests, mix of several species at 2 nests, balsam fir and red spruce codominant at 1 nest, red spruce at 1 nest. Mean canopy height within 11.3 m of nests ranged from 1.2 to 17.9 m (mean 5.4 ± 2.9 SD, n = 103). Slope ranged from 0° to 46° (mean 18.7° ± 10.4 SD, n = 101).

Site characteristics. Vermont nests typically built at base of 1–4 horizontal branches against trunk of small tree (70%; n = 105), occasionally up to 3 m from trunk on horizontal branches of larger trees (VINS). Support branches average 1 cm diameter (range 0.1–5.25, n = 93). Some nests supported between two closely spaced trees (23%; n = 105). One nest inside cavity of balsam-fir snag, another perched on shelf created by broken snag. Most nests (103 of 118; 87%) in balsam fir, but also in red spruce (n = 10), white birch (n = 3), and dead standing fir (n = 2; Wallace 1939, VINS). Average nest tree height 3.2 m ± 1.55 SD (range 0–11, n = 102) and mean dbh 5.7 cm ± 5.24 SD (range 1–31.5, n = 102). Nest orientation in relation to trunk averaged 161° (n = 27 in southeastern quadrant, 22 in southwestern quadrant, 15 in northwestern quadrant, 13 in northeastern quadrant). Of 118 Vermont nests, mean height above ground 2.05 m ± 1.18 SD (range 0.46–10 m; Wallace 1939, VINS). Mean vegetation concealment in 25-cm diameter circle around 98 nests, estimated from 1 m away, was 74.7% ± 24 SD overhead, 62.7% ± 27.4 SD to north, 64.9% ± 29.3 SD to south, 63.8% ± 27.4 SD to east, and 67% ± 27.1 SD to west. Mean nest height of 8 Quebec nests 1.5 m ± 0.34 SD (range 1.0–2.0), 7 in balsam fir, 1 in a paper birch (Y. Aubry unpubl.).

NEST

Construction process. Only females observed constructing nests (Wallace 1939, VINS). One nest built in 11 d (Wallace 1939), one in 9 d (VINS). One renest built in 2 d (VINS). May exceptionally prolong construction or abandon nest if interrupted while building (Wallace 1939, VINS). Interval between nest-building visits about 2 min; same as time spent arranging material from each load (Wallace 1939). Foundation built first, followed by walls, interior cavity, and lining (Wallace 1939).

Structure and composition matter. Bulky, cup-shaped nest built primarily of twigs and moss. Exterior shell of most nests in montane forests of Vermont constructed of twigs of balsam fir, occasionally of red spruce and white birch, profusely interwoven with strands of moss (primarily *Pleurozium schreberi*, often lesser amounts *Sphagnum* spp.; Wallace 1939, VINS). Proportions of twigs and moss vary; some nests reported to be almost entirely constructed of moss (Wallace 1939). Other materials found in nest walls include grasses, sedges, stalks of herbaceous flowering plants or ferns, dry leaves, bark strips, hair, and lichen (Wallace 1939, VINS). Interior layer of wall consists of decayed vegetation, such as leaf mold. Inner lining of Vermont nests invariably composed of threadlike, black rhizomorphs of horsehair fungus (*Marasimius androsaceous*; McFarland and Rimmer 1996); some nests may also be lined with fine stems of grasses or sedges (Wallace 1939, VINS). One nest on ski area contained pieces of nylon rope woven in cup (VINS).

Dimensions. Mean minimum-maximum outside diameter of 20 Mt. Mansfield, VT, nests in 1930s, 11.5 × 12.8 cm (range 10.3–14.1); inside diameter 6.3 × 7.2 cm (range 5.8–8.7); outside height 8.6 cm (range 7.1–9.6); inside depth 4.6 cm (range 3.8–6.4; Wallace 1939). Average outside diameter of 79 nests from

Vermont in 1992–2000, 11.3 cm ± 1.8 SD (range 5–16); inside diameter 7.1 cm ± 1.3 SD (range 5.3–12); outside height 8.1 cm ± 1.9 SD (range 1.6–14); inside depth 4.4 cm ± 0.9 SD (range 2–6.5; VINS).

Microclimate. No information.

Maintenance or reuse of nests. Not known to reuse old nests; builds new nest when renesting. One female reused exact nest site in tree for 2 yr in Vermont. Female often pokes and probes rapidly at bottom of nest during nestling stage (VINS).

Nonbreeding nests. None reported.

EGGS

Shape. Subelliptical.

Size. Twenty-nine eggs from 8 clutches on Mt. Mansfield, VT, in 1935 had mean length of 21.9 mm (range 21.0–23.0) and mean breadth of 16.6 mm (range 16.0–17.5; Wallace 1939). Ten eggs from Vermont in late 1990s had mean length of 22.38 mm ± 0.78 SD (range 20.48–23.6) and 8 eggs had mean breadth of 16.29 mm ± 1.64 SD (range 12.36–17.5; VINS).

Mass. No information.

Color. Bluish green with variable amounts of light brown speckling. Spots typically concentrated around larger end but may be uniformly distributed over egg, ranging in appearance from very small dots to larger, irregular blotches. Eggs of olive-phased birds reported to be nearly plain, those of brown-phased birds more heavily blotched (Wallace 1939). Individual clutches may contain both lightly and heavily spotted eggs (Wallace 1939, VINS).

Surface texture. Smooth, semiglossy.

Eggshell thickness. No information.

Clutch size. First clutches invariably 3–4 eggs. Of 13 Mt. Mansfield, VT, nests examined in 1935, 7 contained 3 eggs, 6 contained 4 (Wallace 1939). Of 59 known or probable first-clutch nests examined on Mt. Mansfield and Stratton Mtn., VT, mean clutch size 3.6 ±0.49 SD (range 3–4; VINS). Three Nova Scotia clutches from 1907 each with 3 eggs (Tufts 1962), two 1999 nests from Gaspé Peninsula in Quebec each with 4 eggs, 3 Gaspé nests in 2000 each with 3 eggs (Y. Aubry unpubl.). Nests initiated earlier in season tend to have 4 eggs, later nests 3 (Wallace 1939, VINS). Mean clutch size of 13 known second attempts 3.1 ± 0.28 SD (range 2–4; VINS). One known third attempt contained 3 eggs.

Egg-laying. Little information. Eggs laid at 1-d intervals, usually in early morning. One observation of an egg laid at noon (Wallace 1939). For first nests, laying begins several days after nest completion. For renests, laying may begin before nest completely constructed; building continued during and after eggs laid in one documented second-brood nest (VINS). Prior to and during egg-laying, males active and vocal in nest area. Females often aggressive toward conspecific intruders. Intraspecific nest parasitism at one Quebec nest documented on basis of genetic analyses (G. Seutin pers. comm.).

INCUBATION

Onset of broodiness and incubation. By female alone, usually beginning with penultimate egg (Wallace 1939, VINS).

Incubation patch. Developed only by female; single median abdominal patch. In Vermont, earliest date of fully developed patch 9 Jun and latest 31 Jul (VINS).

Incubation period. In Vermont, incubation period to nearest day, 9–14 d (average 12 ± 1.6 SD, $n = 8$; Wallace 1939, VINS). Eggs in 1 Quebec nest hatched 13–14 d after incubation began (Y. Aubry unpubl.).

Parental behavior. Female alert and watchful but restless on nest, frequently shifting position, rolling and inspecting eggs, picking at nest bottom, preening, and taking insects within reach (Wallace 1939, VINS). Most females remain tightly on nest, flushing only at close range (Wallace 1939, VINS). Female may leave nest to feed as early as predawn, frequently leaves during day, some birds at 5–10 min intervals; few remain off nest >15 min, but one bird left clutch unattended for >1 h (Wallace 1939, VINS). Females reported to sing during all stages of incubation, including hatching, at 4 Mt. Mansfield nests (Wallace 1939). At one Stratton Mtn. nest, female sang muted song on nest as eggs began to hatch (VINS). Males occasionally visit nests and sing or call nearby during incubation, but are not known to feed incubating females (see Parental care: feeding, below; Wallace 1939, VINS).

Hardiness of eggs against temperature stress; effect of egg neglect. No information.

HATCHING

Preliminary events. Female reported to become increasingly agitated during 24 h before hatching, frequently inspecting and picking at eggs, in one case even bringing an insect and prodding at eggs with it (Wallace 1939).

Shell-breaking and emergence. Eggs pipped in circle around widest part of egg, break into 2 parts (Wallace 1939). Chicks generally hatch within 24 h of each other (Wallace 1939, VINS). Hatching of individual chicks may take up to 12 h (Wallace 1939).

Parental assistance and disposal of eggshells. Female may assist emerging chick by tugging vigorously at egg (Wallace 1939). Eggshells invariably removed and deposited away from nest (Wallace 1939, VINS), not known to be eaten.

YOUNG BIRDS

Condition at hatching. Altricial and nidicolous. Skin with flushed, pale reddish appearance; margin of bill whitish yellow, interior of mouth bright orange (Wallace 1939). Body mass of one nestling immediately after hatching 1.7 g (Wallace 1939).

Growth and development. See Table 1 for measurements. Combined average daily rate of mass gain for

Table 1. Mass (g) and body measurements (mm) of nestling Bicknell's Thrush from Green Mtns., VT. Day 1 is hatching day. Data shown as mean (*n*) for Wallace 1939 (A) and mean ± SD (*n*) for VINS (B).

Age (d)	Mass	Wing length	Tarsus length	Source
1	2.5 (3)		8 (3)	A
2	3.6 (4)	7.8 (3)	10.1 (6)	A
3	6.47 (9)	9.5 (9)	11.8 (9)	A
4	9.8 (9)	12.1 (9)	14.9 (9)	A
5	12.9 (9) 15.5 ± 2.83 (2)	16.5 (9)	18.2 (9)	A B
6	15.7 (6) 18.5 ± 3.3 (5)	21.7 (6)	21.2 (6)	A B
7	17.2 (5) 15.4 ± 0.87 (5)	25.8 (8)	22.8 (8) 22.6 (1)	A B
8	20.7 (5) 20.6 ± 2.11 (11)	31.6 (8)	25.8 (8)	A B
9	22.9 ± 1.15 (4)	35.6 (5)	26.9 (5)	A B
10	21.8 (3)	41.7 (8)	28.9 (8)	A
11	Slight increase (3) 23.7 ± 1.47 (3)	44.8(3)	30 (3)	A B
12	24.8 (1)			A

3–9 nestlings on Mt. Mansfield, VT, 2.6 g ± 0.9 SD (range 1.2–3.5) between ages 1–8 d, total increase of little more than 1 g between ages 8–11 d (Wallace 1939). Mean wing length increased 4.6 mm/d ± 1.4 SD (range 1.8–6.1) between days 2–11, mean tarsus length 2.2 mm/d ± 0.8 SD (range 1.1–3.3; Wallace 1939). Tail-feathers erupted on day 7, grew average of 3.1 mm/d ± 1.6 SD between days 8–11 (Wallace 1939). Four clutches on Mt. Mansfield measured at mid-nestling stage (5–8 d old) and just before fledging gained 0.3–2.1 g/d (average 1.3 ± 0.6 g, n = 10; VINS). Chicks sometimes audible up to 15 m from nest from about day 5 to fledging. Late in nestling period, young preen, stretch, and beat wings. Just before fledging, may perch on nest rim, walk and hop around nest and onto nest support branches. Young leave nest with body mass nearly that of adult's (Wallace 1939, VINS).

PARENTAL CARE

Brooding. Only by female. Time spent brooding declines with nestling age, sharply after day 1. Mean brooding periods 20.2 min on 1-d-old chicks (range 4.6–42.3, n = 14 brooding events), 7.6 min on 2-d-old chicks (range 0.3–18.5, n = 28 brooding events), 7.5 min on 3-d-old chicks (range 0.2–17.2, n = 45 brooding events), 6.9 min on 5-d-old chicks (range 0.7–23.7, n = 40 brooding events), 3.3 min on 7-d-old chicks (range 0.2–10.3, n = 12 brooding events; VINS).

Feeding. Both sexes feed chicks. Male occasionally delivers food to brooding female, who feeds nestlings or may eat it herself, especially when nestlings are very young (Wallace 1939, VINS). Male and female may feed young simultaneously (Wallace 1939, VINS). First food deliveries of day may be brought by male in near darkness of predawn, before female has left nest from night's brooding (Wallace 1939). At 25 Vermont nests observed by videography, one female fed at each nest, with 2 provisioning males most common (60%), followed by 1 male (20%), 3 males (16%), and 4 males (4%; VINS). Four males documented to feed at >1 nest within single breeding season, 3 feeding 2 broods simultaneously (nests 186–443 m apart). One male simultaneously provisioned

at two nests 443 m apart, shared feeding of nestlings at first nest, was sole male feeder at second nest. First nest fledged 3 d after second nest hatched; male then left care of fledglings to the other male and fed second brood at nearly twice the rate as he had fed young at first nest. Individual female, total male, and total adult provisioning rates did not differ between nests with single and multiple male feeders. Some males did not feed at nests in which they sired young, and some males fed at nests in which they sired no young. Male feeding rates increased with nestling age until day 7–8 and then decreased until fledging. Multiple male feeders also reported at nests in Gaspé Peninsula, Quebec, with 3 males attending 2 different nests in 2000 (Y. Aubry unpubl.).

Nest sanitation. Unhatched eggs often removed within several days of others hatching. Chicks that die at early age are removed. In one case, an 8-d-old chick died and was crushed into nest cup bottom by surviving siblings. Young produce fecal sacs, usually subsequent to food deliveries. Adults typically wait after feeding young, peering at raised and protruding cloaca, which is oriented towards outside of nest, until fecal sac emerges. Adults eat up to 3 fecal sacs/visit, especially when chicks young. No more than one uneaten fecal sac carried away each feeding trip. Few fecal sacs eaten and none carried away during first day of nestling life. With nestlings 2–7 d old, adults eat 0.7 to 1.9 fecal sacs/h and carry away 0.05–0.36 sacs/h. By day 7, eating:disposal ratio nearly 1:1; from day 8 to fledging ratio steadily increases to 1:2, as fewer and fewer fecal sacs produced. From 8–12 d, adults eat 0.23–0.3 fecal sacs/h and carry away 0.6–1.1 sacs/h. Chicks usually leave excrement in nest cup and on rim when fledging. (VINS).

COOPERATIVE BREEDING

Not documented.

BROOD PARASITISM

Interspecific brood parasitism not known to occur; little or no overlap in breeding habitat with Brown-headed Cowbird (*Molothrus ater*).

FLEDGLING STAGE

Departure from nest. Nestlings fledge 9–13 d after hatching (average 11.4 d ± 1.3 SD, $n = 17$ known to exact day; Wallace 1939, VINS). In 3 Quebec nests, fledging 12–14 d after hatching (Y. Aubry unpubl.). Tarsus, toes, and bill are adult length, but wings only half-grown and tail about one-fifth grown at fledging (Wallace 1939, VINS). Young at nearly adult weight when leaving nest (Wallace 1939, VINS).

Growth. Little information. One Vermont fledgling captured 30 d after leaving nest increased mass from 22.1 g to 25.8 g (VINS). One nestling retained in captivity grew wings and tail about 3 mm/d until adult size achieved (Wallace 1939).

Association with parents or other young. Little information, but fledglings may remain with adults up to 14 d after leaving nest. Adults often split brood. One known case of 2 males splitting brood, apparently emancipating female. In another case, female and one of 2 male feeders split brood; second male continued to feed nestlings in another nest. Movements of family groups not well documented, but adults with dependent fledglings found up to 280 m away from known nest sites. (VINS)

Ability to get around, feed, and care for self. No information.

IMMATURE STAGE

Little information. Movements and habitat use during postfledging period of independence poorly known. Of 11 Vermont fledglings radio-tagged in 2000, 7 known to have been depredated (mean survival 8.1 d ± 6.6 SD after fledging, range 1–19), 2 disappeared after 8 and 19 d, respectively, and 2 survived until transmitter batteries expired (40 and 31 d, respectively). Of these latter 2 birds, one remained within 275 m of its natal nest site in montane fir forest, while the other moved nearly 1 km downslope after about 10 d to hardwood-dominated forest at elevations 700–900 m, and remained there. One free-flying juvenile banded on 25 Jul stayed within 100-m radius of banding location in stunted fir forest at 1,150–1,175 m elevation until 22 Aug, then disappeared (VINS).

DEMOGRAPHY AND POPULATIONS

MEASURES OF BREEDING ACTIVITY

Age at first breeding; intervals between breeding. Breeds at approximately 1 yr old and annually thereafter. Of known-age female breeders at 85 Vermont nests in 1994–1999, older (≥2-yr-old) females outnumbered yearling females 73 to 12 (85.9% to 14.1%). Of 25 Vermont males with known paternity at 1998 and 1999 nests, only 2 (8%) were yearling birds, while this age-class constituted about 25% of entire male study population. Highly irregular settlement patterns further suggest that some yearling males fail to sire young (VINS).

Clutch. See Breeding: eggs, above. Mean clutch size in Vermont 3.6 ± 0.49 SD (range 3–4, $n = 59$; VINS).

Annual and lifetime reproductive success. In Vermont, annual reproductive success among males skewed but generally low. Of 21 males with known paternity at nests in 1998 and 1999, 13 (62%) sired only 1 chick, 4 (19%) sired 2 chicks, 3 (14%) sired 3 chicks, and 1 (5%) sired 4 chicks; these are minimum estimates (VINS).

Annual Mayfield daily survival rate of nests (probability of nest surviving 1 d without failure) on Stratton Mtn., VT: 0.98 ± 0.014 SE (n = 39 nests), and on Mt. Mansfield, VT: 0.96 ± 0.007 SE (n = 56 nests). Daily survival rates of Vermont nests strikingly biennial in response to balsam fir cone production and red squirrel population cycles. From 1994 to 2000, fall cone crops very high in even-numbered years, resulting in high red squirrel populations during following springs and summers, with consequent low productivity for Bicknell's Thrush because of nest depredation. In odd-numbered years, fall cone production invariably lower, spring and summer squirrel populations reduced, and thrush nesting success markedly higher (VINS).

Average number of young fledged/nest in Vermont: Stratton Mtn. 2.1 ± 1.37 SD (range 0–4, n = 30); Mt. Mansfield 1.5 ± 1.59 SD (range 0–4, n = 46).

Number of broods normally reared per season. Only one brood normally reared; one documented second brood (see Breeding: phenology, above).

Proportion of total females that rear at least one brood to nest-leaving. Percentage of females that raise one brood to independence each year in Vermont: Stratton Mtn. 1997 = 85.7%, 1998 = 88.8%, 1999 = 0%, 2000 = 90.9%; Mt. Mansfield 1999 = 62.5%, 2000 = 62.5% (VINS).

LIFE SPAN AND SURVIVORSHIP

Longevity record for banded male 8 yr, for female 7 yr. Annual survival rate of older birds captured on Vermont breeding grounds, based on Cormack-Jolly-Seber model (Lebreton et al. 1992, Cooch and White 1998, White and Burnham 1999, Bertram et al. 2000), was not dependent on time or sex on 4 study plots. To account for uncertainty in model selection, range of mean parameter estimates averaged over all 16 models in the candidate set for each study plot, weighted by Akaike model weights, and most parsimonious model used (Burnham and Anderson 1998, Bertram et al. 2000). Annual survivorship on Mt. Mansfield ridgeline in 1992–1999: 54.7% ± 6.5% SE with mean parameter estimates for all models ranging from 54% to 55.8%; Mt. Mansfield east slope in 1995–1999: 74.8% ± 8.6% SE, mean estimates 71.9–79.1%; Stratton Mtn. ski-area plot 1997–1999: 73.9% ± 10.1% SE, mean estimates 75.6–88.3%; Stratton Mtn. natural plot 1997–1999: 94.6% ± 28.4 SE, mean estimates 86.1–94%. No difference in survivorship between Stratton Mtn. ski area and natural area plots. Survival rate of juveniles poorly known because of apparent natal dispersal; only 3 of 115 (2.6%) nestlings and dependent fledglings and 9 of 62 (14.5%) independent juveniles banded in Vermont 1992–1998 documented to return to breeding site. Two nestlings that returned were females from the same nest. On Mt. Mansfield in 2000, only 2 of 11 (18.2%) radio-tagged fledglings known to have survived beyond 30 d. Annual survival rate of wintering individuals captured at montane broadleaf forest site in Sierra de Bahoruco, Dominican Republic, based on Cormack-Jolly-Seber model estimates, was not time dependent in 1994–1999: 72.9% ± 14.3% SE, with mean parameter estimates for all models ranging from 68.4% to 79.7% (VINS).

DISEASE AND BODY PARASITES

Diseases. No information.

Body parasites. Unidentified *Mallophaga* found on remiges of 36 of 90 (40%) adults examined in Vermont during 2000 and on primaries of 15 of 46 (33%) birds examined in Dominican Republic 1996–2000 (VINS). Nymphs of 4 individual *Ixodes scapularis* ticks removed from base of bill and around eyelids of 2 adult Bicknell's Thrushes (1 male, 1 female) on Stratton Mtn., VT, in late May 1999; these presumably acquired during northward migration in U.S. (VINS). Unidentified ticks found on 3 of 46 (7%) birds examined in Dominican Republic. Nestlings reported parasitized by blow flies (*Protocalliphora* sp.) at 1 Vermont nest (Wallace 1939), but no instances of this parasitism noted at 85 Vermont nests in 1990s.

CAUSES OF MORTALITY

Exposure. Some nestling deaths attributable to severe weather, e.g., >2-d periods of cold (3–5°C), wet conditions, often with heavy rain and high winds (VINS).

Predation. See Behavior: predation, above.

Competition with other species. Not known.

RANGE

Initial dispersal from natal site. Little information. See Breeding: immature stage, above. One Vermont juvenile captured in mist-net 507 m from nest site 30 d after fledging (VINS). No documentation of dispersal away from natal site, but assumed due to very low natal philopatry of banded juveniles in Vermont.

Fidelity to breeding site and winter home range. See Breeding: nest site, above. Both older males and females of all ages site-faithful on breeding grounds, as indicated by mist-net recaptures at same sites over successive years. Between-winter philopatry documented in broadleaf forest in Sierra de Bahoruco, Dominican Republic, with 14 of 27 banded individuals recaptured between winters (mean distance between captures 95.4 m ± 92.6 SD, range 0–260 m; VINS).

Male banded on Mt. Mansfield, VT, on 16 Jun 1995 recaptured in mist-net in Sierra de Bahoruco of Dominican Republic <6 mo later, on 2 Dec 1995. This individual occupied same breeding home range during 1996 and 1997 summers and was strongly suspected, although not confirmed, to reoccupy same winter territory in 1996/1997 (Rimmer and McFarland in press). High variance in feather deuterium values

from small study areas in Sierra de Bahoruco, Dominican Republic, compared to more uniform values in discrete areas of breeding range, suggests mixing of breeding populations in winter (Hobson et al. 2001).

Dispersal from breeding sites. Only 1 documented long-distance breeding dispersal of yearling male on Equinox Mtn., VT, that was captured 17.2 km distant 2 yr later on Stratton Mtn., VT. High variance in feather deuterium values of yearling birds within breeding populations suggests high natal dispersal and/or considerable movement among montane habitat patches (Hobson et al. 2001). This is also supported by estimates of gene flow among 4 ne. U.S. mountain ranges derived from mitochondrial DNA control region sequence data (WGE).

Home range. On breeding grounds, males range more widely than females. Using 95% fixed-kernel estimates from radio-tracking data on Stratton Mtn., VT, male home ranges averaged 4.53 ha ± 2.17 SD, while those of females averaged 2.33 ha ± 1.01 SD. Individual male home ranges overlap extensively with those of 2–7 other males, often intersecting near nest sites. Males had 1–4 known nest sites within home range. Female home ranges generally overlap little. During inclement weather early in breeding season on Mt. Mansfield, VT, some males descend to midelevation transitional forest, some females move to south-facing slopes. Winter home range sizes poorly known, but evidence from mapping vocalizations in broadleaf forests of Sierra de Bahoruco, Dominican Republic, suggests 0.5–2 ha (VINS).

POPULATION STATUS

Numbers. Breeding densities difficult to ascertain because of unusual mating system, rugged terrain, and dense habitat. One of the most rare, range-restricted breeding species in e. North America. Based on amount of potential breeding habitat from remote-sensing data, mean home range area in Vermont, and dual assumptions of nonoverlapping home ranges and saturated habitat, estimated rangewide breeding population of 25,000–50,000 individuals (VINS). Estimates of effective population size derived from mitochondrial DNA control region genealogies, with methods derived from coalescence theory, are comparable (WGE). More than 90% of birds believed to breed within U.S, only an estimated 2,000–2,500 pairs breeding in Canada (Nixon 1999). In U.S., Adirondack Mtns. contain largest area of montane forest breeding habitat, followed in descending order by White Mtns. of New Hampshire, mountains of w. and central Maine; Green and Taconic Mtns. of Vermont, and Catskill Mtns. of New York (Atwood et al. 1996, VINS).

Trends. See Distribution: historical changes, above. Little information from any part of range, due to lack of adequate baseline data on population levels. Virtually unsampled by Breeding Bird Survey. Point-count data collected annually at 68 ne. U.S. montane forest sites beginning in early 1990s; trend information not yet available. Anecdotal evidence of recent breeding-population declines on several small Vermont peaks (VINS). Capture rates of migrant "Gray-cheeked" Thrushes (n = 3,252, included known Bicknell's and Gray-cheeked) in coastal Virginia declined significantly from 1968 to 1995 (Wilson and Watts 1997).

POPULATION REGULATION

Few data. Apparent biennial cycle of balsam-fir cone crops in montane forests of Vermont correlates to elevated predator populations and depressed reproductive success of Bicknell's Thrush in summers following high cone crops. Recruitment in Vermont, as measured by annual number of yearling individuals captured, correlated to previous year's breeding productivity.

CONSERVATION AND MANAGEMENT

EFFECTS OF HUMAN ACTIVITY

Shooting and trapping. No information.

Pesticides and other contaminants/toxins. Little information. Blood and feather mercury (Hg) levels examined in 18 adults from 5 breeding sites across ne. U.S. in 1999 and 2000. Mean blood Hg 0.192 ppm ± 0.188 SD (range 0.038–0.795, n = 14); no consistent age, sex, or geographic differences. Mean feather Hg levels, indicating chronic body burden, 0.739 ppm ± 0.429 SD (range 0.171–1.61, n = 18), highest in 2 older males from Whiteface Mtn. in Adirondacks, 1.561 and 1.61 ppm, respectively. Among known-aged birds on Mt. Mansfield, VT, significantly higher feather Hg levels in older birds (mean 0.924 ppm ± 0.26 SD; males 0.801 ± 0.203 SD [n = 4], females 1.170 ± 0.175 SD [n = 2]) than in yearling birds (mean 0.434 ppm ± 0.118 SD, n = 3 males). Mercury toxicity thresholds not known in this or other terrestrial insectivorous bird species.

Collisions with stationary/moving structures or objects. No documented cases of mortality from collisions with TV towers, but several migrants that may be Bicknell's Thrush recovered below towers in Leon Co., FL (Tall Timbers Research Station specimen data; n = 5) and in downtown Atlanta, GA (Georgia Museum of Natural History [GMNH] specimen data; n = 2). One record of a fall migrant killed by striking a building in Atlanta (GMNH specimen data).

Degradation of habitat. Well-documented decline of high-elevation forests in ne. U.S. during 1960s and 1970s (Johnson and Siccama 1983, Eager and Adams 1992). Red spruce dieback especially pronounced, but mortality of balsam fir also extensive and widespread (Miller-Weeks and Smoronk 1993), although most of this from naturally occurring fir waves. Atmospheric deposition of acidic ions from industrial

sulfur and nitrogen oxides strongly, although not conclusively, implicated as a causal factor in red spruce decline (Johnson et al. 1992, NAPAP 1992). Increased winter-freezing injury of spruce, possibly mediated through reductions in calcium reserves, may be directly linked to high levels of acidic deposition (DeHayes et al. 1999). Despite declining trends in atmospheric sulfate concentrations resulting from mandates of 1990 Clean Air Act amendments, acidity of precipitation in ne. North America does not appear to be decreasing (Scherbatskoy et al. 1999).

Heavy metal toxicity from airborne pollutants also implicated as contributing cause of high-elevation forest decline in ne. U.S., particularly in Adirondack and Green Mtns. (Gawel et al. 1996). Several recent studies, however, indicate that lead concentrations in the forest floor are rapidly decreasing (Friedland et al. 1992, Miller and Friedland 1994, Wang and Benoit 1997). Little information on other heavy metals in montane forests.

Atmospheric deposition of airborne mercury 2–5 times higher in montane forests of Mt. Mansfield, VT, than in surrounding low-elevation areas (Lawson 1999). Methylation rates and possible uptake in terrestrial food chain of montane forests unknown.

Global climate change may exert profound, long-term impacts on balsam-fir forests. The average global surface temperature could rise 1.6–6.3°F (0.9–3.5°C) by 2100, with significant regional variation (EPA 2000). A modeling effort using USDA Forest Service Forest Inventory Data, numerous environmental variables, and equilibrium climate variables provided by five Global Circulation Models (assuming doubling of atmospheric carbon dioxide) predicts an average reduction of 96% in area occupied by balsam fir in e. U.S. (Iverson et al. 1999, Prasad and Iverson 1999).

Recreational and commercial development in montane forests contribute to increased habitat fragmentation and loss, but cumulative effects poorly known. In Vermont, 13 mountains >915 m in elevation are developed for recreational skiing; many of these offer mountain-biking programs during summer. Ski area development pressures similar in New Hampshire and Maine, less so in Catskill and Adirondack Mtns. of New York.

Proliferation of telecommunications towers on mountaintops of ne. U.S., also development of wind-power generation facilities, may further fragment montane breeding habitat and introduce disturbance from construction and servicing activities.

Industrial forestry practices in Canada, such as clear-cutting and pre-commercial thinning, may cause adverse, short-term impacts on Bicknell's Thrush breeding habitat, but effects unknown.

Disturbance at nest and roost sites. Incubating and brooding females vary in tolerance to disturbance near nest. Qualitative observations suggest that birds nesting in areas of high or moderate human activity may become habituated to nearby disturbance. Females in areas of undisturbed habitat and low human activity much more prone to flush from nests (VINS).

Direct human/research impacts. Little evidence. Of 108 Vermont nests monitored from 1992 to 2000, 3 abandonments in early egg stage may have resulted from discovery and/or subsequent visits by researchers (VINS).

MANAGEMENT

Little specific information. Vegetation management of montane forest breeding sites developed for recreational skiing can enhance habitat for Bicknell's Thrush, or minimize possible adverse impacts. Maintenance of low fir-spruce thickets in 3–7 m wide bands of gradually increasing height along ski-trail edges can provide nesting and foraging sites. Maintaining forested "islands" of maximum size between ski trails, minimizing width of trails, and maximizing connectivity of habitat in developed areas may increase suitability. Vegetation management or construction at breeding sites should be conducted outside nesting season. In industrial forests of Canada, harvesting operations should be scheduled to ensure a continuous supply of regenerating (5–15 yr old) clear cuts across the landscape (Nixon et al. in press).

APPEARANCE

MOLTS AND PLUMAGES

The following is based on Dwight 1900; Wallace 1939, 1949; Ouellet 1993; Curson 1994; Pyle 1997; Lane and Jaramillo 2000; and personal observations of authors. Sexes known or assumed to be similar in all plumages, unless otherwise noted.

Hatchlings. Natal down dark gray or blackish, visible at hatching only in cephalic, dorsal, and humeral tracts. Remigial quills emerge from skin at 2–3 d, feather tips from quills at 6–7 d.

Juvenal plumage. Acquired by complete Prejuvenal (postnatal) molt.

Upperparts, including lesser and median wing-coverts, olive-brown to brown (sepia or raw umber), most feathers with prominent buffy subterminal spots or shaft streaks, these markings darker and more diffuse on rump and upper tail-coverts. Greater wing-coverts brownish, variably tipped with narrower, buffy shaft-streaks. Remiges brownish, rectrices brownish to chestnut-brown. Chin and throat whitish, unstreaked or with few faint dusky streaks. Breast and sides whitish to buffy-white, feathers darker buff towards tip with dusky terminal bar, giving scaled appearance. Remainder of underparts dull whitish with buffy tinge, under tail-coverts more strongly

tinged buffy to buffy-brown. Moderately distinct buffy eye-ring, slightly thicker posteriorly.

Basic I plumage. Prebasic I molt partial; includes all feathers except remiges, rectrices, and primary-coverts. Usually includes some to all median-coverts and 0–4 inner greater-coverts (Pyle 1997, VINS). Occurs late Jul–mid-Sep on breeding grounds (Fig. 3).

Basic I plumage similar to Definitive Basic, but often with variable numbers of retained buff-tipped Juvenal feathers in median and greater wing-coverts, occasionally in scapulars and mantle. Retained Juvenal rectrices significantly more pointed than those of Definitive Basic birds (Collier and Wallace 1989, VINS), P10 is 0–6 mm in length (4–10 mm in Definitive plumages; Pyle 1997).

No documented Prealternate I molt. Worn spring aspect of Basic I plumage similar to Definitive Alternate plumage, but remiges and rectrices may have browner appearance than those of Definitive-plumaged birds (Wallace 1939). Close inspection may reveal moderate wear of distal flight feathers.

Definitive Basic plumage. Definitive Prebasic molt complete, early Jul through Sep on breeding grounds (Fig. 3). In Vermont, birds in very early stages of remigial molt (≤3 primaries shed; n = 8) captured from 4 Jul to 1 Aug (VINS). Latest individuals in active flight-feather molt examined in mid-Sep (latest 13 Sep). Mean calculated molt-duration of 4 males examined both early and late in same molt cycle was 50.5 d ± 4.9 SD (range 47–59 d). Birds in midmolt stages typically had 4–5 primaries growing simultaneously (none >5) and all 12 rectrices. Yearling males tended to initiate molt slightly earlier than older birds of both sexes. One male examined in molt in 3 consecutive years was calculated to begin 23 Jul as yearling, 29 Jul and 30 Jul in following 2 yr. Weight changes of 5 males recaptured 24–43 d apart in same molt cycle varied from -1.0 g to 3.0 g (mean 0.8 g ± 1.5 SD). Nearly all captures of molting birds (n = 14 of 17) in same area occupied during breeding season.

Contour-feather molt begins shortly after shedding of P1, usually in spinal and ventral tracts, and terminates in capital tract shortly after remigial molt is complete.

No evidence for Definitive Prealternate molt. Worn spring aspect of Definitive Basic plumage nearly indistinguishable from that in fall; slightly more olive (versus grayer) dorsal coloration reported by Wallace (1939) to be acquired through wear.

Upperparts (head, nape, mantle, wing-coverts, upper tail-coverts) vary from olive-brown to brownish (sepia or raw umber), typically contrasting with brighter, chestnut-tinged tail; this contrast may be less evident when tail- and wing-feathers worn and duller, or contrast may be slight in birds with warmest brown back color. Degree of chestnut tinge in tail and of contrast with dorsal coloration varies. Although Wallace (1939) suggested clinal dichromatism in dorsal coloration, with northern birds tending to be olive and southern birds brown, much geographic intergradation exists, even within breeding sites (VINS, WGE). Wings brownish to olive-brown, remiges often showing slight chestnut tone, especially on outer webs and bases of primaries, giving perceptibly warmer effect than rest of upperparts (except tail). Chin and throat unstreaked off-white to buff, males tending more towards buff. Lores and postocular crescent dull gray. Double malar stripes dusky, lower stripe more prominent. Breast off-white with buffy wash, with prominent, wedge-shaped dusky (blackish) spots; these become more diffuse, more rectangular in shape, and paler (brownish) on sides and lower breast, less extensive and bold overall than on Hermit Thrush. Belly off-white, flanks usually show grayish or dusky brownish wash.

BARE PARTS

Bill and gape. Upper mandible and distal half to one-third of lower mandible blackish gray, proximal half to two-thirds of lower mandible bright pale yellowish to orange-yellow. Entire lower mandible may be suffused with pale yellowish flesh in juveniles.

Iris. Dark brown in all ages.

Legs and feet. Light purplish flesh to purplish flesh, some individuals with darker brownish wash on tarsi. Toes invariably darker than tarsi. Soles of feet vary from flesh to dull pale yellow. Legs grayish in juveniles, especially on leading edge, grayish flesh on hind edge; soles of feet pale yellow.

MEASUREMENTS

LINEAR

See Appendix.

MASS

See Appendix. Also see Migration: control and physiology, above. Mass of some females during breeding season may reflect addition of egg in oviduct (VINS).

PRIORITIES FOR FUTURE RESEARCH

Many aspects of the breeding and wintering ecology, demography, and behavior of Bicknell's Thrush remain poorly known. A lack of baseline population data and logistical difficulties hinder attempts to clarify this species' conservation status. A standardized, rangewide monitoring program, currently in its early stages, is needed to determine breeding-population trends and distributional changes. Similar efforts are warranted on the wintering grounds, where limiting factors may be most severe. Development of accurate methods to census populations

and estimate densities are needed in both areas. Accurate calculations of total population size, based on GIS projections of occupied habitats and spatially explicit density estimates, are needed throughout the breeding range. A formal conservation assessment is needed to assess the possibility that Bicknell's Thrush may qualify for federal Endangered or Threatened listing, in both the U.S. and Canada.

Many landscape-level questions about the species' ecology and population dynamics require focused research. Information is needed on reproductive success, demographics, and site persistence in habitat patches of different size and isolation; on the existence of source/sink population dynamics; on patterns of natal dispersal and breeding recruitment; and on levels of population interchange among habitat patches. The apparent male-biased breeding sex ratio requires rangewide investigation; its causes and demographic/ecological correlates must be determined. Accurate estimates of breeding population density in different habitat types across the species' range are needed. Detailed understanding of habitat use, breeding status and success, demography, site persistence, and effects of silvicultural practices (e.g., pre-commercial thinning) in regenerating industrial forests of Maritime Canada is needed to guide management. The species' status in regenerating clearcuts in both montane and low-elevation forests in Maine should be investigated. Distributional status in coastal maritime forests of Canada needs clarification, as does possible existence of contact/hybrid zone with Gray-cheeked Thrush along north shore of Gulf of St. Lawrence. The possibility that Bicknell's Thrush may occur in unglaciated areas of southeastern Newfoundland should be investigated.

Research is needed on potential effects of food availability and its temporal-spatial variability on breeding system structure and reproductive success; relative diets of adults, nestlings, and fledglings; postfledging dispersal and habitat use; postbreeding movements and habitat use of adults; effects of human activities (e.g., recreational development, telecommunications towers) on spacing patterns and reproductive success.

In winter, distribution and habitat use of Bicknell's Thrush in Cuba and Haiti, and to lesser extent Jamaica, need to be better understood. Protected status of core wintering areas must be carefully assessed, and needs for further protection specifically identified. Occupancy of primary versus second-growth winter habitats needs study, as does existence of possible sexual habitat segregation. Demographic studies are needed to investigate microhabitat use, overwinter survival and site persistence by age and sex, between-winter site fidelity and survivorship. Spacing patterns and movements of age and sex classes throughout winter need further study, as do possible seasonal shifts in diet and body condition.

Stopover ecology is virtually unknown. Studies of banded, transient individuals are needed to determine stopover lengths, physiological condition, diet, and habitat use. A thorough study (currently underway by VINS, summary in Migration: timing and routes, above) of available banding and specimen data would help establish migratory routes and timing, and might identify specific geographic areas of importance to stopover migrants. Establishment of standardized criteria for field and in-hand identification would facilitate determination of distribution and migration patterns.

Additional research is needed on song and call repertoire, degree of sharing across breeding range and among neighbors, recognition of "types" by birds themselves, responses of Bicknell's Thrush to Gray-cheeked Thrush vocalizations, and vice versa, across the breeding range.

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Appendix. Linear measurements (mm) and mass (g) of Bicknell's Thrush. Breeding-range data from specimens (Ouellet 1993), regional and winter data from mist-netted birds (VINS, WGE). Data shown as mean ± SD (range, *n*).

	AHY males	AHY females	HY individuals[1]	AHY sex unknown	HY sex unknown
BILL LENGTH					
Exposed culmen					
Breeding range	12.71 ± 0.76 (10.6–16.7, 73)	12.56 ± 0.52 (11.8–13.7, 19)			
S. Vermont	12.6 ± 0.81 (11–14.2, 36)	13.0 ± 1.49 (11.1–17.9, 17)			
N. Vermont	12.8 ± 1.16 (8.9–14.9, 40)	12.2 ± 1.13 (8.9–13.2, 13)			
Mt. Mansfield, VT			11.3 ± 0.61 (9.9–12.3, 27)		
Dominican Republic				12.7 ± 0.68 (11.8–15.1, 33)	12.6 ± 0.86 (11.1–13.7, 12)
Culmen from nares					
Breeding range	9.09 ± 0.41 (8.1–10.2, 73)	9.1 ± 0.42 (8–9.9, 19)			
Catskills, NY	9.2 ± 0.4 (8.3–9.7, 12)				
Adirondacks, NY	9.2 ± 0.44 (8.5–10, 17)				
S. Vermont	9.3 ± 0.54 (7.6–10.5, 42)	9.5 ± 0.67 (8.4–10.9, 18)			
N. Vermont	9.4 ± 0.61 (8–10.3, 40)	9.1 ± 0.43 (8.6–10.2, 14)			
White Mtns., NH	9.2 ± 0.32 (8.5–9.6, 11)				
Mt. Mansfield, VT			8.4 ± 1.06 (7–12.9, 27)		
Dominican Republic				9.4 ± 0.6 (8.4–10.9, 33)	9.7 ± 1.55 (8.4–14.1, 11)
Culmen depth					
S. Vermont	4.0 ± 0.21 (3.5–4.3, 37)	4.2 ± 0.2 (3.8–4.5, 17)			
N. Vermont	4.1± 0.35 (3.6–4.9, 33)	4.0 ± 0.44 (3.3–4.9, 10)			
Mt. Mansfield, VT			3.8 ± 0.18 (3.7–4, 3)		
Dominican Republic				3.9 ± 0.15 (3.7–4.3, 33)	4.0 ± 0.37 (3.6–5, 11)
Culmen width					
S. Vermont	4.2 ± 0.37 (3.6–5.1, 37)	4.3 ± 0.53 (3.5–5.5, 17)			
N. Vermont	4.4 ± 0.49 (3.6–5.5, 37)	4.4 ± 0.42 (3.9–5.2, 11)			
Mt. Manfield, VT			4.1 ± 0.31 (4–5, 27)		
Dominican Republic				4.1 ± 0.24 (3.6–4.8, 33)	4.2 ± 0.23 (4–4.7, 11)
WING LENGTH					
Unflattened wing-chord					
Breeding range	92.92 ± 2.73 (84.8–98.8, 74)	87.78 ± 3.87 (81.7–95.2, 19)			
Catskills, NY	91.9 ± 2.42 (88–96, 32)	86.9 ± 2.46 (82.5–88, 5)			
Adirondacks, NY	93.9 ± 1.96 (91–97, 17)				
S. Vermont	91.0 ± 2.75 (85.5–97, 60)	87.8 ± 2.04 (83.5–91, 25)			
N. Vermont	91.8 ± 2.94 (84.5–100, 134)	87.4 ± 2.24 (83.5-93, 56)			
White Mtns., NH	93 ± 2.73 (86.5–96, 12)				
Mt. Mansfield, VT			88.7 ± 2.87 (82–95, 61)		
Dominican Republic				92.1 ± 3.5 (85–100, 66)	89.1 ± 2.32 (84.5–94.5, 41)
TAIL LENGTH					
Breeding range	68.73 ± 2.79 (62.1–77.6, 74)	65.57 ± 2.61 (61.6–70.6, 19)			
Catskills, NY	69 ± 3.41 (64–75, 12)				
Adirondacks, NY	70.6 ± 2.53 (65.5–74, 17)				
S. Vermont	66.8 ± 2.66 (62–73, 37)	62.4 ± 2.97 (54–67, 18)			
N. Vermont	67.2 ± 3.94 (60.7–74.5, 37)	63.9 ± 3.0 (60.4–68.3, 10)			
White Mtns., NH	68.9 ± 3.26 (62–73, 11)				
Mt. Manfield, VT			62.6 ± 3.04 (57–69, 23)		
Dominican Republic				68.3 ± 3.09 (63.1–73.5, 30)	64.4 ± 2.77 (60.5–68.8, 10)

Appendix (continued).

	AHY males	AHY females	HY individuals[1]	AHY sex unknown	HY sex unknown
TARSUS LENGTH[2]					
Breeding range	29.24 ± 0.69 (27.5–30.7, 72)	28.89 ± 0.5 (28.1–29.7, 17)			
Catskills, NY	28.6 ± 1.02 (27–30.1, 12)				
S. Vermont	33.0 ± 0.93 (31–34.9, 37)	31.8 ± 0.83 (30.1–33.1, 17)			
N. Vermont	32.7 ± 1.37 (28.3–34.7, 40)	32.1 ± 1.88 (28.2–34.5, 13)			
Mt. Manfield, VT			29.3 ± 1.73 (26.6–34.2, 28)		
Dominican Republic				32.9 ± 1.32 (29.9–35.3, 31)	32.6 ± 1.1 (30–34, 11)
MASS[3]					
Breeding range	28.18 ± 2.02 (20.5–33.0, 38)	31.97 ± 4.27 (28.7–36.8, 3)			
Catskills, NY	27.7 ± 1.85 (24.3–31.9, 33)	27.8 ± 1.97 (24.6–29.5, 5)			
Adirondacks, NY	27.8 ± 1.32 (26–30, 17)				
S. Vermont	27.5 ± 1.95 (21–32.4, 62)	26.8 ± 2.65 (22.3–34.5, 26)			
N. Vermont	27.5 ± 1.54 (24–31.9, 118)	28.1 ± 3.51 (23–37, 45)			
White Mtns., NH	28.3 ± 1.54 (24.9–30.8, 12)				
Mt. Mansfield, VT			26.9 ± 1.44 (24.1–30.2, 62)		
Dominican Republic[4]				27.2 ± 1.76 (23.8–30.6, 60)	26.8 ± 1.86 (22.1–30.6, 41)

[1]Late summer/fall hatch-year individuals.
[2]Regional and winter data reported using "field" tarsus (distance from lateral condyle to third scale; VINS).
[3]Mass of some females during breeding season may reflect addition of egg in oviduct (VINS).
[4]Individuals in Sierra de Bahoruco, broadleaf forest captured in Nov and recaptured in Mar had changes in mass ranging from -1.4 to 2.0 g (0.13 ± 1.18, n = 7).

ABOUT THE AUTHORS

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Vermont Fish and Wildlife Department
Draft Management Recommendations for Vermont Ski Areas

December 1999 (minor revisions in 2000 and 2001)

Bicknell's Thrush Vegetation Management Plan

Purpose: to provide guidance for vegetation management of existing ski trails for Bicknell's Thrush breeding habitat.

Introduction: Bicknell's Thrush is an uncommon to rare bird species, both within Vermont and globally, that inhabits high elevation forests in the state. Although not protected by the Vermont State Endangered Species Law or Federal Endangered Species Act, it is listed as a species of special concern by the Scientific Advisory Group on Birds of the Vermont Endangered Species Committee. Bicknell's Thrush has also been listed as a wildlife species of regional conservation concern in the northeastern United States by the Northeast Endangered Species and Wildlife Diversity Technical Committee, which is a working committee of the Northeastern Association of Fish and Wildlife Agencies. Furthermore, concern over the population status of this species has prompted federal and state agencies and private groups to be concerned over impacts to its habitat. It was ranked as the number one Neotropical migrant for conservation concern in the Northeast by Rosenberg and Wells (1995, Partners in Flight working group, NE Region). Finally, it was recently added to a list of globally threatened and vulnerable bird species by the International Union for Conservation of Nature (IUCN) in their new edition of the IUCN Red Book.

The Vermont Institute of Natural Science (VINS) has spearheaded research on Bicknell's Thrush in New England since 1992 and is the key non-government organization in Vermont for thrush research. VINS' findings have been significant in recognizing the importance of Bicknell's Thrush conservation in the Northeast.

Bicknell's Thrush nest mainly in low, dense fir-spruce and mixed ~~forests on high~~ elevation exposed ridges, blow-downs, or fir-wave areas. Optimal thrush habitat appears to be moderate-sized areas of low, dense, fir-dominated forest. Areas along ski trails often mimic these naturally disturbed forest types, and their development often is greatly accelerated because ~~of increased exposure~~. ~~Statewide, Bicknell's~~ Thrush nest mainly above 3000 feet in elevation and occasionally lower if the habitat is appropriate. Furthermore, it appears that birds regularly descend below 3000 feet for foraging, especially early in the breeding season. It should be noted that there are few data on fledgling or post-breeding dispersal in fall, but that both juvenile and adult thrushes have been documented to use lower elevation forests at this time.

VINS' recent research has determined that by leaving fir-spruce cover along the edges of trail to the greatest extent possible, without interfering with skiing, it is possible to enhance the habitat for Bicknell's Thrush by providing suitable structure and a buffer. Bicknell's Thrush will use these areas for foraging, perching, and for cover when moving about and crossing trails. VINS has also documented occasional nesting in narrow buffers covered with low, dense fir-spruce along ski trails.

On 18 May 1999, Okemo Mountain Resort, the Vermont Department of Fish and Wildlife (VDFW), the Vermont Dept. of Forest, Parks and Recreation (VDFPR), and VINS conducted a site visit to determine which ski trails would be appropriate to manage for Bicknell's Thrush. Based on discussions during this site visit and the combined expertise of VINS, Okemo Mountain and Agency of Natural Resources professionals, the following preliminary management plan was developed. Minor revisions have been made since 1999.

Vegetation Management

1) Management of ski trail vegetation for Bicknell's Thrush will be done only in areas that will not interfere with skier safety.

2) Ski trails to be managed for Bicknell's Thrush will be 3000 feet in elevation and above, with the exception of areas above 2700 feet that support appropriate vegetation (see #3 below).

3) Vegetation management is warranted mainly in areas where the adjacent forest is fir-spruce dominated and characterized by a high stem density in the understory, often forming a dense thicket. Taller (>5 m) trees may be present, but these are often damaged by wind and/or insects and do not form a complete canopy, thus promoting understory growth. In these areas, which may include only one (usually the wind-exposed) side of a ski trail, low fir-spruce will be allowed to extend along the edge outward for 10-20 feet (or wider) at heights of 1-3 feet (or higher). An attempt should be made to "feather" such vegetation at the edge of ski trails, i.e., gradually decreasing tree height from the forest to the grassy trail edge. This would appear similar to a 'half pipe' for snowboarders, but composed of fir trees. When these areas are cut back, there will be an attempt to maintain woody vegetation at heights of one foot or more. Also, regeneration cuts will be made as infrequently as possible to maximize habitat availability and continuity.

4) Management of gladed skiing trails for Bicknell's Thrush is important to maintain habitat integrity within ski areas. To minimize adverse impacts to Bicknell's Thrush, existing gladed trails in suitable habitat should be kept as narrow as possible. Patches of low, dense fir-spruce should be left intact or minimally altered, while still allowing the trails to function for their intended recreational purpose. Annual maintenance should ensure that some tree saplings are retained, so there is continual recruitment to older age classes. This will help to prevent tree mortality events that could cause the longer-term conversion of gladed trails to completely open trails. Concerted efforts should be made to prohibit any unauthorized gladed trail establishment or maintenance, or unauthorized habitat alteration (i.e., cutting) of any kind. The proliferation of trails illicitly cut by recreational, off-trail skiers, and recently documented by VINS on some Vermont ski areas, must be actively discouraged.

5) Another potential habitat enhancement for Bicknell's Thrush involves islands of trees in ski trails. Islands often have a low, dense fir-spruce component and provide crossing points for Bicknell's Thrushes, which tend to avoid wide crossings of open ski trails. Maximizing the size of islands between ski trails will benefit movements of Bicknell's Thrush between patches of suitable habitat and may reduce "edge effects" such as increased predation of nests. In situations where one or more islands can be combined into a single, larger island, Bicknell's Thrush habitat will be improved.

6) In instances of habitat removal or alteration for ski trail establishment or expansion, a minimum 1:1 mitigation process is recommended, such that an area of currently developed habitat equal to (or greater than) that to be altered will be actively restored or passively allowed to recover to conditions suitable for Bicknell's Thrush occupancy.

7) The timing of vegetation management in areas of Bicknell's Thrush breeding habitat is important and should be delayed until after August 1, when the majority of nesting activities are complete.

8) Trail areas that are appropriate for thrush habitat management should be maintained by the ski area. The plan and map should be reviewed annually by the ski area maintenance supervisor and those who will be doing on-the-ground management.

9) The most current plan and map of Bicknell's Thrush and its habitats will be presented to the District Forester of VDFPR as part of an annual review of vegetation management on the mountain. VDFPR will coordinate with VDFW's Nongame and Natural Heritage Program on the Bicknell's Thrush portion of the plan. VDFW will in turn seek input from VINS research staff when appropriate.

Summary: We have an important opportunity to work in partnership to manage existing ski trails to minimize impacts of ski area management on available habitat of Bicknell's Thrush, and to enhance habitat whenever possible. This will help promote the conservation of this Species of Special Concern in Vermont.

Additional Information on Bicknell's Thrush: Rimmer, C.C., K.P. McFarland, W.G. Ellison, and J.E. Goetz. 2001. Bicknell's Thrush *(Catharus bicknelli)*. *In* The Birds of North America, No. 592 (A. Poole & F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Residents' Committee to Protect the Adirondacks

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What the past has entrusted to us, let the future inherit from us.

Clean Water
Sustainable Forestry
Healthy Communities
Wildlands

December 6, 2002

Mr. Ted Blazer, Executive Director
NYS ORDA
Olympic Arena
Lake Placid, NY 12946

Re: WHITEFACE MOUNTAIN UMP UPDATE and DRAFT EIS

Dear Mr. Blazer,

The Residents Committee to Protect the Adirondacks (RCPA) has the following comments on the August 2002 Whiteface Mountain Ski Area Draft Environmental Impact Statement (DEIS) and Unit Management Plan Update. We will also communicate these comments to the Adirondack Park Agency and appropriate officials in the Governor's office and State Legislature.

General Comments

As residents, taxpayers and neighbors who care about the Adirondacks, the RCPA hopes the Whiteface Mountain Ski Area managed by the Olympic Regional Development Authority (ORDA) prospers and is successful in the coming decade. The area needs the jobs and the terrific skiing opportunities you provide residents and visitors of all ages. However, the RCPA fears your proposed expansion will be highly vulnerable to challenge if you proceed based on the skimpy documentation in this DEIS.

Where RCPA would expect to see large numbers of environmental issues discussed in a DEIS dealing with a project as vast, complex and controversial as this, our review surfaced perhaps a dozen issues that we believe are insufficiently analyzed or not touched on at all. Due to the complexity of this project and large gaps in this DEIS we will not furnish detailed page-by-page comments, but will make comments more of a scoping nature to point out issues which we believe should be included in your DEIS.

What is a DEIS and what is it expected to do? DEIS's are expected to completely disclose environmental implications of a project so the public can work for changes, improvements, mitigations and compromises to make sure the project has as benign an impact as humanly possible. Planners who are serious about insulating a project from legal challenge, disclose and even over disclose all possible negative consequences in great detail. This is because adverse impacts are generally not sufficient to stop a project, but an EIS that fails to fully disclose would certainly provide grounds to do so. Paradoxically, a project where the EIS fully discloses every conceivable environmental impact is less vulnerable to challenge than one that hides or glosses them over. In short, this DEIS seems more a promotional vehicle for ORDA's expansion plans to generate public excitement than a real DEIS.

Last, from the RCPA's vantage point, ORDA was not created to make Gore Mountain and Whiteface Mountain into Vails, Telurides, Killington's. Built on Forest Preserve lands, the two ski centers are to provide New Yorkers and others with quality skiing experiences at affordable family prices. As such these facilities augment the range of outdoor experiences for the public in the Adirondack Park. Because the ground upon which Whiteface Mountain Ski Area is built is Forest Preserve, environmental protection must be predominant in ORDA's planning and decision making. It's apparent from this DEIS that this is not the case.

Specific comments on the DEIS

1. **Alpine Krummholz Issues:** In the 1995 UMP pgs. 40, 49 there was discussion of what that UMP called the "highly significant" Alpine Krummholz zone. The discussion said this unusual forest condition is found at elevations above 4429 feet. The project does not plan to cut any trees on the 7 acres classified as Krummholz, but we would still like to see a simple statement in the plan that none of the 55,000 trees to be cut are considered "Krummholz. We would also like to know how far away the cutting of trees is from Krummholz and a clear buffer zone established.

2. **Summit Lodge Issues:** We associate ourselves with the comments of the Adirondack Council and the Adirondack Mountain Club (ADK). Particularly the Council's concerns that you are creating a light emitting beacon in violation of the APA's "substantial invisibility" standard with your proposed summit restaurant. Further, we are aware of strong concern from businesses and residents on Lake Placid from potential light pollution, both during the day from sunlight glare and at night from interior and exterior illumination, caused by the new summit lodge.

   One of the great benefits of living in the Adirondacks is our dark skies at night. This is especially true of our High Peak summits. The proposed summit lodge seems unnecessary and seems impossible to design and build to prevent high elevation light pollution.

   The RCPA questions the necessity of this lodge given the mid-station lodge. Further, while the RCPA is not in the restaurant business, we do use both Whiteface and Gore Mountain Ski Areas regularly, and we question whether the thought process at ORDA that supervises how hamburgers are currently served (and we

encourage you all to go into Whiteface or Gore and order a hamburger, French fries, a brownie and drink and see what you get) can manage a supposed world class restaurant facility as the proposed summit lodge is reputed to be.

3. **Bicknells Thrush:** We support ADK's concerns about habitat for the Bicknells Thrush. The RCPA questions the inventorying that was done to date of the trees to be removed. The project proposes to cut 54,941 trees, some under 4" in diameter. At these altitudes small diameter trees may nevertheless be very old so the DEIS should include age-class information. Also, we encourage you to display more detail on diameters not just lump 37,000 trees into a single category of over 4 inches. (Pg. V12.) Given the harsh growing conditions at high elevations above 3,000 feet, it may be that even relatively small diameter trees could be old growth. This information is of absolute necessity. ORDA's stewardship of Whiteface Mountain includes stewardship of one of the rare, high elevation floral communities and its associated wildlife habitats. The impacts on this community must be part of the data analysis and will certainly affect planning. We urge that ORDA seek out additional scientific and ornithological assessments to appraise these impacts.

4. **Impacts on the West Branch of the Au Sable River:** The weakest point in the DEIS is the failure to adequately inventory the current state of the West Branch of the Au Sable River. Due to a general lack of baseline data, the various assessments and analyses of potential impacts are weak. Just as ORDA has stewardship responsibility over the summit and high elevation areas of Whiteface Mountain, ORDA also has a responsibility for the West Branch, a river often referred to as one of the great fly fishing rivers and whitewater canoeing rivers in the East.

   Snowmaking and the dam on the West Branch: The RCPA associates ourselves with the concerns that New York Rivers United (NYRU) has voiced about the dam constructed on the West Branch of the Au Sable River for "monitoring" purposes. The DEIS should clearly state the role that this dam will play in ORDA's snowmaking operations.

   Fish populations: On page II-25 the DEIS states that the quality of the West Branch of the Au Sable fishery is lower than might be expected. Why? The plan mentions in passing that wild fish are not in the abundance one might expect and fisheries have declined since the 1960's. The 1960's were the decade in which the ski area expanded to the top when lift F was completed (pg. I-8). Are existing ski operations in any way responsible for the decline in wild fish? The RCPA understands that the river is popular with anglers, but this is probably due to stocking. Is stocking masking a fisheries decline for which low abundance of wild fish is an indicator? The plan should analyze water withdrawals on the river, compare habitat and abundance above and below the water intake, and examine past and future sediment run-off on habitat quality. (Perhaps the East Branch of the Au Sable could be a benchmark indicator for the West Branch. If both branches have the same poor wild fish quality or if the habitat above and below Whiteface is similar in quality then presumably you are not impacting water quality and fish habitat.)

Sand and salt impacts: Is the sand and salt used in snow removal perhaps responsible for poor fish quality in the West Branch of the Au Sable? If so, would increased visitors use or parking lot construction exacerbate the situation? If not, why? If so, by how much? How much sand and salt is being used, where does it go? If this is a problem can you ameliorate it in some way? Frankly, we are more concerned about sand than salt impacts.

Water quality monitoring: The RCPA also cites the 1995 Gore Mountain UMP as an example for ORDA to emulate at Whiteface. That plan included an extensive water quality-monitoring program for North Creek to assess potential impacts from run-off and sedimentation from construction of new ski slopes as well as impacts from construction and operation of big, new parking lots. The RCPA encourages ORDA to undertake the same kind of water quality analysis on the West Branch; only it should be larger and more comprehensive given the larger level of development, operation, and size of the river.

No recent fish surveys: It has also come to the attention of the RCPA that there have been no recent fish surveys of the West Branch of the Au Sable. The RCPA encourages ORDA to work with the DEC to schedule meaningful fish surveys in the summer of 2003 to get solid information about fish populations in the river. It is entirely appropriate for projects of this scale to fund regular fish surveys and water quality monitoring; this might be a good idea given recent problems with upstream municipal wastewater.

Flow monitoring and water rights: The 1996 UMP provided for flow monitoring. The results of this monitoring should be discussed and provided. What water rights does Whiteface have, what effect on water quality and over wintering fish would occur if the resort exercised all available water to which it has rights? We would also like to see some background and rationale about the chronology of water right increases in terms of flows.

5. **New Ski Slopes:** The SLMP pg. 34 states "...Whiteface should be modernized to the extent physical and biological resources allow." The areas scheduled for the new runs "Three Island Pod" and the new "extreme" skiing area are to be built on what appear to be slopes of the highest instability. Building new runs and their supportive infrastructure may likely cause soil disturbance so this should be disclosed in the DEIS. Some minimal architectural cross sections of any construction particularly any that involve unstable slopes or wetlands disturbance would be in order. Whiteface Mountain has very visible slides, thus a history of soil instability. How will the very steep extreme ski slopes impact soil structures and stability? This issue is not adequately assessed in the DEIS. In order for erosion control systems to function, a minimal soil depth is required. The DEIS needs to be more specific about soil depths. The suggestions and guidelines in the current NY State handbook "Best Management Practices for Water Quality" for controlling erosion from tree cutting don't even discuss erosion control on slopes this steep as it is assumed that no one would ever cut down trees on slopes like this.

In fact it appears from aerial maps that the "Extreme" ski area requires no tree cutting because it uses old landslides.

6. **No-action alternative needs to be expanded:** Presently the section "No–action" alternative" is a scant paragraph that discusses the economic impacts rather than environmental impacts of not doing this expansion. Where is that data to support the assertions of negative economic impacts? Who will stop using Whiteface without the proposed improvements? Who are Whiteface users now and why will they stop coming? We remind that this is an Environmental Impact Statement, not a business impact statement so the pros and cons of a "no-action" alternative should be discussed in terms of the environmental impacts. When the plan is rewritten to include alternatives and discloses the soil, water, sewage, fish and other impacts the "no change" alternative section should be easy to write. It would display the sum of all the negatives caused by construction minus the current problems like sewage issues eliminated by completing the preferred alternative. In any case the plan should contain several alternatives that it does not.

7. **Sewage treatment facilities:** The plan envisions improving and expanding sewage treatment facilities, so it should include a review of all impacts of current and future sewage treatment. Members report to us that people sometimes smell raw sewage at Whiteface. If this has ever been true for any place, at any time, then it should be covered in the EIS. Has Whiteface been promptly reporting any spills or plant failures to appropriate monitoring authorities? Copies of such reports should be provided in an appendix. It seems perfectly logical that on days when the ski area is full, that the sewage system could be overtaxed? What is the current potential of the system and how many people will it accommodate and at what level of use? Can the system as designed, or as improved, accommodate the maximum number of people that have used Whiteface Ski Area over a 1 – 3 day period?

8. **Environmental impacts of snowmaking:** What are the environmental impacts of making snow on the massive scale you do? What does the current literature say? What are impacts from oil or diesel residues on snow? (At Gore Mountain, brochures about "Black Pollen" are handed out to allay concerns about contamination of snow during snowmaking. Is this the case at Whiteface?)

9. **DEIS maps:** The DEIS has some good maps, but we would like to have them recreated so as to overlay, for example, the "new runs" map upon the soil stability map. In fact the DEIS should probably include such a combined map in the needed section. In short, mapping needs to be improved.

10. **Wetland disturbances:** The plan proposes to build a dam on Stag Brook, which will flood a wetland. New roads and new ski runs cross several streams and wetlands. The RCPA expects urges more information about any and all wetlands impacts from submergence, fill, or other disturbances.