

ACCESS GUIDE FOR SNOWMOBILING ON PRIVATE AND PUBLIC LANDS

Part 2: Appendix of Resources



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APPENDIX – TABLE OF CONTENTS

APPENDIX 1: State Recreational Use Statutes	4
ALASKA	4
CALIFORNIA	4
COLORADO	6
CONNECTICUT	8
IDAHO	9
ILLINOIS	10
INDIANA	11
IOWA	12
MAINE	13
MASSACHUSETTS	14
MICHIGAN	14
MINNESOTA	15
MONTANA	16
NEBRASKA	17
NEVADA	18
NEW HAMPSHIRE	19
NEW YORK	19
NORTH DAKOTA	20
OHIO	21
OREGON	22
PENNSYLVANIA	24
SOUTH DAKOTA	24
UTAH	25
VERMONT	27
WASHINGTON	28
WISCONSIN	29
WYOMING	32
APPENDIX 2: Sample Motorized Land Trust – Articles of Incorporation and By-Laws, Snow Country Trails Conservancy (Michigan snowmobile example)	33
Articles of Incorporation	33
By-Laws	36
Magazine Article	46
APPENDIX 3: Sample Motorized Land Trust – Policies and Operating Plans, Connecticut Open Access Land Trust, Inc. (COALT) [OHV example]	47
COALT Policy on Property Management Plans	47
COALT Land Monitoring Committee (LMC) Guidelines	48
COALT Land Monitoring Report	49
COALT Form for Pre-Assessment of Property	50
APPENDIX 4: Minnesota Forests for the Future Program – Authorizing State Legislation	51
APPENDIX 5: The National Environmental Policy Act of 1969 (as amended)	53
APPENDIX 6: U.S. Forest Service – Service-Wide MOU with Snowmobile Associations . . .	59
APPENDIX 7: Off-Road Vehicles Executive Orders and NPS Snowmobile Regulation 36 CFR 2.18	62

Executive Order 11644 – Use of off-road vehicles on the public lands	62
Executive Order 11989 – (Amendment to E.O. 11644)	64
National Park Service Regulation: 36 CFR 2.18 Snowmobiles	65
APPENDIX 8: Research Studies Related to Snowmobiling and OHV Impacts	66
INTRODUCTION	66
AIR QUALITY / EMISSIONS	66
ECONOMICS	71
PERSONAL EXPOSURE	73
RECREATION CONFLICTS	74
SNOW CONDITIONS	79
SOUND	81
VEGETATION AND SOIL/SNOW COMPACTION	87
General	88
Grasses	89
Soil and Snow	90
Winter Wheat	90
Woody Plants	90
WATER QUALITY	91
WILDLIFE	93
General / Wildlife and Nature	94
Birds / Eagles	99
Birds / Pheasants	100
Birds / Trumpeter Swans	100
Mammals / Deer	100
Mammals / Elk	104
Mammals / Gray Wolves	107
Mammals / Grizzly Bears	108
Mammals / Lynx	108
Mammals / Mid-Sized Carnivores	115
Mammals / Moose	116
Mammals / Mountain Goats	117
Mammals / Mountain Sheep	117
Mammals / Rabbits	118
Mammals / Reindeer	118
Mammals / Subnivean (under-the-snow)	119
Mammals / Wolverine	126

LIST OF TABLES

Page	Table Number	Table Description
84	Table A-1	Examples of Everyday Sound Levels
87	Table A-2	Pressure Exerted by Various Recreation Travel Modes
121	Table A-3	Pooled Percent of Subnivean Space for All Survey Locations for Each Type of Use

APPENDIX 1: State Recreational Use Statutes

ALASKA RECREATIONAL USE STATUTE

Alaska Statutes

Title 9. Code of Civil Procedure.

Chapter 65. Actions, Immunities, Defenses, and Duties.

Sec. 09.65.200 Tort immunity for personal injuries or death occurring on unimproved land.

(a) An owner of unimproved land is not liable in tort, except for an act or omission that constitutes gross negligence or reckless or intentional misconduct, for damages for the injury to or death of a person who enters onto or remains on the unimproved portion of land if

(1) the injury or death resulted from a natural condition of the unimproved portion of the land or the person entered onto the land for recreation; and

(2) the person had no responsibility to compensate the owner for the person's use or occupancy of the land.

(b) This section does not enhance or diminish rights granted under former 43 U.S.C. 932 (R.S. 2477).

(c) In this section, "unimproved land" includes land that contains

(1) a trail;

(2) an abandoned aircraft landing area; or

(3) a road built to provide access for natural resource extraction, but which is no longer maintained or used.

Title 34. Property.

Chapter 17. Uniform Conservation Easement Act.

Sec. 34.17.055 Tort immunity from personal injuries or death arising out of the use of land subject to a conservation easement.

(a) In addition to the immunity provided by AS 09.65.200, an owner of land, a portion of which is subject to a conservation easement that is 50 feet or less in width, that has been granted to and accepted by the state or a municipality, and that provides public access for recreational purposes on the land subject to the conservation easement is not liable in tort, except for an act or omission that constitutes gross negligence or reckless or intentional misconduct, for damages to a person who uses the easement to enter onto or remain on the land if

(1) the person had no responsibility to compensate the owner for the person's use of the easement or the land; and

(2) the damages arise out of the person's use of the easement for recreational purposes on the land.

(b) The immunity under (a) of this section extends to the grantee of the conservation easement providing public access to the land for recreational purposes.

Enacted in 1980, last amended in 1999.

<http://touchngo.com/iglcntr/akstats/Statutes/Title09/Chapter65/Section200.htm>

and <http://touchngo.com/iglcntr/akstats/Statutes/Title34/Chapter17/Section055.htm>

CALIFORNIA RECREATIONAL USE STATUTE

CIVIL CODE

DIVISION 2. Property

PART 2. Real or Immovable Property

TITLE 3. Rights and Obligations of Owners

CHAPTER 2. Obligations of Owners

Section 846 Permission to enter for recreational purposes. An owner of any estate or any other interest in real property, whether possessory or nonpossessory, owes no duty of care to keep the premises safe for entry or use by others for any recreational purpose or to give any warning of hazardous conditions, uses of, structures, or activities on such premises to persons entering for such purpose, except as provided in this section.

A "recreational purpose," as used in this section, includes such activities as fishing, hunting, camping, water sports, hiking, spelunking, sport parachuting, riding, including animal riding, snowmobiling, and all other types of vehicular riding, rock collecting, sightseeing, picnicking, nature study, nature contacting, recreational gardening, gleaning, hang gliding, winter sports, and viewing or enjoying historical, archaeological, scenic, natural, or scientific sites.

An owner of any estate or any other interest in real property, whether possessory or nonpossessory, who gives permission to another for entry or use for the above purpose upon the premises does not thereby (a) extend any assurance that the premises are safe for such purpose, or (b) constitute the person to whom permission has been granted the legal status of an invitee or licensee to whom a duty of care is owed, or (c) assume responsibility for or incur liability for any injury to person or property caused by any act of such person to whom permission has been granted except as provided in this section.

This section does not limit the liability which otherwise exists (a) for willful or malicious failure to guard or warn against a dangerous condition, use, structure or activity; or (b) for injury suffered in any case where permission to enter for the above purpose was granted for a consideration other than the consideration, if any, paid to said landowner by the state, or where consideration has been received from others for the same purpose; or (c) to any persons who are expressly invited rather than merely permitted to come upon the premises by the landowner.

Nothing in this section creates a duty of care or ground of liability for injury to person or property.

Section 846.1. (a) Except as provided in subdivision (c), an owner of any estate or interest in real property, whether possessory or nonpossessory, who gives permission to the public for entry on or use of the real property pursuant to an agreement with a public or nonprofit agency for purposes of recreational trail use, and is a defendant in a civil action brought by, or on behalf of, a person who is allegedly injured or allegedly suffers damages on the real property, may present a claim to the California Victim Compensation and Government Claims Board for reasonable attorney's fees incurred in this civil action if any of the following occurs:

(1) The court has dismissed the civil action upon a demurrer or motion for summary judgment made by the owner or upon its own motion for lack of prosecution.

(2) The action was dismissed by the plaintiff without any payment from the owner.

(3) The owner prevails in the civil action.

(b) Except as provided in subdivision (c), a public entity, as defined in Section 831.5 of the Government Code that gives permission to the public for entry on or use of real property for a recreational purpose, as defined in Section 846, and is a defendant in a civil action brought by, or on behalf of, a person who is allegedly injured or allegedly suffers damages on the real property, may present a claim to the California Victim Compensation and Government Claims Board for reasonable attorney's fees incurred in this civil action if any of the following occurs:

(1) The court has dismissed the civil action upon a demurrer or motion for summary judgment made by this public entity or upon its own motion for lack of prosecution.

(2) The action was dismissed by the plaintiff without any payment from the public entity.

(3) The public entity prevails in the civil action.

(c) An owner of any estate or interest in real property, whether possessory or nonpossessory, or a public entity, as defined in Section 831.5 of the Government Code, that gives permission to the public for entry on, or use of, the real property for a recreational purpose, as defined in Section 846, pursuant to an agreement with a public or nonprofit agency, and is a defendant in a civil action brought by, or on behalf of, a person who seeks to restrict, prevent, or delay public use of that property, may present a claim to the California Victim Compensation and Government Claims Board for reasonable attorney's fees incurred in the civil action if any of the following occurs:

(1) The court has dismissed the civil action upon a demurrer or motion for summary judgment made by the owner or public entity or upon its own motion for lack of prosecution.

(2) The action was dismissed by the plaintiff without any payment from the owner or public entity.

(3) The owner or public entity prevails in the civil action.

(d) The California Victim Compensation and Government Claims Board shall allow the claim if the requirements of this section are met. The claim shall be paid from an appropriation to be made for that purpose. Reasonable attorney's fees, for purposes of this section, may not exceed an hourly rate greater than the rate charged by the Attorney General at the time the award is made, and may not exceed an aggregate amount of twenty-five thousand dollars (\$25,000). This subdivision shall not apply if a public entity has provided for the defense of this civil action pursuant to Section 995 of the Government Code. This subdivision shall also not apply if an owner or public entity has been provided a legal defense by the state pursuant to any contract or other legal obligation.

(e) The total of claims allowed by the board pursuant to this section shall not exceed two hundred thousand dollars (\$200,000) per fiscal year.

Enacted in 1963, last amended in 1988.

<http://www.leginfo.ca.gov/cgi-bin/displaycode?section=civ&group=00001-01000&file=840-848>

COLORADO RECREATIONAL USE STATUTE

TITLE 33. WILDLIFE AND PARKS AND OUTDOOR RECREATION

RECREATIONAL AREAS AND SKI SAFETY

ARTICLE 41. OWNERS OF RECREATIONAL AREAS - LIABILITY

33-41-101. Legislative declaration

The purpose of this article is to encourage owners of land to make land and water areas available for recreational purposes by limiting their liability toward persons entering thereon for such purposes.

33-41-102. Definitions

As used in this article, unless the context otherwise requires:

(1) "Charge" means a consideration paid for entry upon or use of the land or any facilities thereon or adjacent thereto; except that, in a case of land leased to a public entity or in which a public entity has been granted an easement or other rights to use land for recreational purposes, any consideration received by the owner for such lease, easement, or other right shall not be deemed a charge within the meaning of this article nor shall any consideration received by an owner from any federal governmental agency for the purposes of admitting any person constitute such a charge.

(2) "Land" also means roads, water, watercourses, private ways, and buildings, structures, and machinery or equipment thereon, when attached to real property.

(3) "Owner" includes, but is not limited to, the possessor of a fee interest, a tenant, lessee, occupant, the possessor of any other interest in land, or any person having a right to grant permission to use the land, or any public entity as defined in the "Colorado Governmental Immunity Act", article 10 of title 24, C.R.S., which has an interest in land.

(4) "Person" includes any individual, regardless of age, maturity, or experience, or any corporation, government or governmental subdivision or agency, business trust, estate, trust, partnership, or association, or any other legal entity.

(4.5) "Public entity" means the same as defined in section 24-10-103(5), C.R.S.

(5) "Recreational purpose" includes, but is not limited to, any sports or other recreational activity of whatever nature undertaken by a person while using the land, including ponds, lakes, reservoirs, streams, paths, and trails appurtenant thereto, of another and includes, but is not limited to, any hobby, diversion, or other sports or other recreational activity such as: Hunting, fishing, camping, picnicking, hiking, horseback riding, snowshoeing, cross country skiing, bicycling, riding or driving motorized recreational vehicles, swimming, tubing, diving, spelunking, sight-seeing, exploring, hang gliding, rock climbing, kite flying, roller skating, bird watching, gold panning, target shooting, ice skating, ice fishing, photography, or engaging in any other form of sports or other recreational activity.

33-41-103. Limitation on landowner's liability

(1) Subject to the provision of section 33-41-105, an owner of land who either directly or indirectly invites or permits, without charge, any person to use such property for recreational purposes does not thereby:

(a) Extend any assurance that the premises are safe for any purpose;

(b) Confer upon such person the legal status of an invitee or licensee to whom a duty of care is owed;

(c) Assume responsibility or incur liability for any injury to person or property or for the death of any person caused by an act or omission of such person.

(2) (a) To the extent liability is found, notwithstanding subsection (1) of this section, the total amount of damages that may be recovered from a private landowner who leases land or a portion thereof to a public entity for recreational purposes or who grants an easement or other rights to use land or a portion thereof to a public entity for recreational purposes for injuries resulting from the use of the land by invited guests for recreational purposes shall be:

(I) For any injury to one person in any single occurrence, the amount specified in section 24-10-114 (1) (a), C.R.S.;

(II) For an injury to two or more persons in any single occurrence, the amount specified in section 24-10-114 (1) (b), C.R.S.

(b) The limitations in this subsection (2) shall apply only when access to the property is limited, to the extent practicable, to invited guests, when the person injured is an invited guest of the public entity, when such use of the land by the injured person is for recreational purposes, and only during the term of such lease, easement, or other grant.

(c) Nothing in this subsection (2) shall limit, enlarge, or otherwise affect the liability of a public entity.

(d) In order to ensure the independence of public entities in the management of their recreational programs and to protect private landowners of land used for public recreational purposes from liability therefore, except as otherwise agreed by the public entity and a private landowner, a private landowner shall not be liable for a public entity's management of the land or portion thereof which is used for recreational purposes.

(e) For purposes of this subsection (2) only, unless the context otherwise requires:

(I) "Invited guests" means all persons or guests of persons present on the land for recreational purposes, at the invitation or consent of the public entity, and with or without permit or license to enter the land, and all persons present on the land at the invitation or consent of the public entity or the landowner for business or other purposes relating to or arising from the use of the land for recreational purposes if the public entity receives all of the revenues, if any, which are collected for entry onto the land. "Invited guests" does not include any such persons or guests of any person present on the land for recreational purposes at the invitation or consent of the public entity or the landowner if the landowner retains all or a portion of the revenue collected for entry onto the land or if the landowner shares the revenue collected for entry onto the land with the public entity. For the purposes of this subparagraph (I), "revenue collected for entry" does not include lease payments, lease-purchase payments, or rental payments.

(II) "Land" means real property, or a body of water and the real property appurtenant thereto, or real property that was subject to mining operations under state or federal law and that has been abandoned or left in an inadequate reclamation status prior to August 3, 1977, for coal mining operations, or July 1, 1976, for hard rock mining operations, which is leased to a public entity or for which an easement or other right is granted to a public entity for recreational purposes or for which the landowner has acquiesced to public use of existing trails that have historically been used by the public for recreational purposes. "Land", as used in this subsection (2), does not include real property, buildings, or portions thereof which are not the subject of a lease, easement, or other right of use granted to a public entity; except that land on which a landowner has acquiesced to public use of existing trails that have historically been used by the public for recreational purposes need not be subject to a lease, easement, or other right of use granted to a public entity. Nothing in this subparagraph (II) shall be construed to create a prescriptive easement on lands on which a landowner has acquiesced to public use of existing trails that have historically been used by the public for recreational purposes. The incidental use of such private property for recreational purposes shall not establish or presume facts to support land use classification or zoning.

(II.5) "Lease" or "leased" includes a lease-purchase agreement containing an option to purchase the property. Any lease in which a private landowner leases land or a portion thereof to a public entity for recreational purposes shall contain a disclosure advising the private landowner of the right to bargain for indemnification from liability for injury resulting from use of the land by invited guests for recreational purposes.

(II.7) "Management" means the entire range of activities, whether undertaken or not by the public entity, associated with controlling, directing, allowing, and administering the use, operation, protection, development, repair, and maintenance of private land for public recreational purposes.

(III) "Recreational purposes" includes, but is not limited to, any sports or other recreational activity of whatever nature undertaken by an invited guest while using the land, including ponds, lakes, reservoirs, streams, paths, and trails appurtenant to, of another and includes, but is not limited to, any hobby, diversion, or other sports or other recreational activity such as: Fishing, picnicking, hiking, horseback riding, snowshoeing, cross country skiing, bicycling, swimming, tubing, diving, sight-seeing, exploring, kite flying, bird watching, gold panning, ice skating, ice fishing, photography, or engaging in any other form of sports or other recreational activity, as well as any activities related to such sports or recreational activities, and any activities directly or indirectly resulting from such sports or recreational activity.

(f) Nothing in this subsection (2) shall limit the protections provided, as applicable, to a landowner under section 13-21-115, C.R.S.

33-41-104. When liability is not limited

(1) Nothing in this article limits in any way any liability which would otherwise exist:

(a) For willful or malicious failure to guard or warn against a known dangerous condition, use, structure, or activity likely to cause harm;

(b) For injury suffered by any person in any case where the owner of land charges the person who enters or goes on the land for the recreational use thereof; except that, in case of land leased to a public entity or in which a public entity has been granted an easement or other rights to use land for recreational purposes any consideration received by the owner for such lease, easement, or other right shall not be deemed a charge within the meaning of this article nor shall any consideration received by an owner from any federal governmental agency for the purpose of admitting any person constitute such a charge;

(c) For maintaining an attractive nuisance; except that, if the property used for public recreational purposes contains mining operations that were abandoned or left in an inadequate reclamation status as provided in section 33-41-103 (2) (e) (II) or was constructed or is used for or in connection with the diversion, storage, conveyance, or use of water, the property and the water or abandoned mining operations within such property shall not constitute an attractive nuisance;

(d) For injury received on land incidental to the use of land on which a commercial or business enterprise of any description is being carried on; except that in the case of land leased to a public entity for recreational purposes or in which a public entity has been granted an easement or other rights to use land for recreational

purposes, such land shall not be considered to be land upon which a business or commercial enterprise is being carried on.

33-41-105. Article not to create liability or relieve obligation

(1) Nothing in this article shall be construed to:

(a) Create, enlarge, or affect in any manner any liability for willful or malicious failure to guard or warn against a known dangerous condition, use, structure, or activity likely to cause harm, or for injury suffered by any person in any case where the owner of land charges for that person to enter or go on the land for the recreational use thereof;

(b) Relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of this article to exercise care in his use of such land and in his activities thereon or from the legal consequences of failure to employ such care;

(c) Limit any liability of any owner to any person for damages resulting from any occurrence which took place prior to January 1, 1970.

33-41-105.5. Prevailing party--attorney fees and costs

The prevailing party in any civil action by a recreational user for damages against a landowner who allows the use of the landowner's property for public recreational purposes shall recover the costs of the action together with reasonable attorney fees as determined by the court.

Enacted in 1970, last amended in 2006.

<http://www.michie.com/colorado/lpext.dll?f=templates&fn=main-h.htm&cp=>

CONNECTICUT RECREATIONAL USE STATUTE

GENERAL STATUTES OF CONNECTICUT

TITLE 52: CIVIL ACTIONS

CHAPTER 557: LANDOWNER LIABILITY FOR RECREATIONAL USE OF LAND

52-557f. Landowner liability for recreational use of land. Definitions

As used in sections 52-557f to 52-557i, inclusive:

(1) "Charge" means the admission price or fee asked in return for invitation or permission to enter or go upon the land;

(2) "Land" means land, roads, water, watercourses, private ways and buildings, structures, and machinery or equipment when attached to the realty;

(3) "Owner" means the possessor of a fee interest, a tenant, lessee, occupant or person in control of the premises;

(4) "Recreational purpose" includes, but is not limited to, any of the following, or any combination thereof: Hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, nature study, water skiing, snow skiing, ice skating, sledding, hang gliding, sport parachuting, hot air ballooning and viewing or enjoying historical, archaeological, scenic or scientific sites.

52-557g. Liability of owner of land available to public for recreation; exceptions

(a) Except as provided in section 52-557h, an owner of land who makes all or any part of the land available to the public without charge, rent, fee or other commercial service for recreational purposes owes no duty of care to keep the land, or the part thereof so made available, safe for entry or use by others for recreational purposes, or to give any warning of a dangerous condition, use, structure or activity on the land to persons entering for recreational purposes.

(b) Except as provided in section 52-557h, an owner of land who, either directly or indirectly, invites or permits without charge, rent, fee or other commercial service any person to use the land, or part thereof, for recreational purposes does not thereby:

(1) Make any representation that the premises are safe for any purpose;

(2) confer upon the person who enters or uses the land for recreational purposes the legal status of an invitee or licensee to whom a duty of care is owed; or

(3) assume responsibility for or incur liability for any injury to person or property caused by an act or omission of the owner.

(c) Unless otherwise agreed in writing, the provisions of subsections (a) and (b) of this section shall be deemed applicable to the duties and liability of an owner of land leased to the state or any subdivision thereof for recreational purposes.

52-557h. Owner liable, when

Nothing in sections 52-557f to 52-557i, inclusive, limits in any way the liability of any owner of land which otherwise exists:

- (1) For willful or malicious failure to guard or warn against a dangerous condition, use, structure or activity;
- (2) for injury suffered in any case where the owner of land charges the person or persons who enter or go on the land for the recreational use thereof, except that, in the case of land leased to the state or a subdivision thereof, any consideration received by the owner for the lease shall not be deemed a charge within the meaning of this section.

52-557i. Obligation of user of land

Nothing in sections 52-557f to 52-557i, inclusive, shall be construed to relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of said sections to exercise care in his use of such land and in his activities thereon, or from the legal consequences of failure to employ such care.

Enacted in 1971, last amended in 1990. http://asci.uvm.edu/equine/law/recreate/ct_rec.htm

IDAHO RECREATIONAL USE STATUTE

IDAHO CODE

GENERAL LAWS

TITLE 36. FISH AND GAME

CHAPTER 16. RECREATIONAL TRESPASS -- LANDHOLDER LIABILITY LIMITED

36-1604. LIMITATION OF LIABILITY OF LANDOWNER.

(a) Statement of Purpose. The purpose of this section is to encourage owners of land to make land, airstrips and water areas available to the public without charge for recreational purposes by limiting their liability toward persons entering thereon for such purposes.

(b) Definitions. As used in this section:

1. "Airstrips" means either improved or unimproved landing areas used by pilots to land, park, take off, unload, load and taxi aircraft. Airstrips shall not include landing areas which are or may become eligible to receive federal funding pursuant to the federal airport and airway improvement act of 1982 and subsequent amendments thereto.

2. "Land" means private or public land, roads, airstrips, trails, water, watercourses, irrigation dams, water control structures, headgates, private or public ways and buildings, structures, and machinery or equipment when attached to or used on the realty.

3. "Owner" means the possessor of a fee interest, a tenant, lessee, occupant or person in control of the premises.

4. "Recreational purposes" includes, but is not limited to, any of the following activities or any combination thereof: hunting, fishing, swimming, boating, rafting, tubing, camping, picnicking, hiking, pleasure driving, the flying of aircraft, bicycling, running, playing on playground equipment, skateboarding, athletic competition, nature study, water skiing, animal riding, motorcycling, snowmobiling, recreational vehicles, winter sports, and viewing or enjoying historical, archeological, scenic, geological or scientific sites, when done without charge of the owner.

(c) Owner Exempt from Warning. An owner of land owes no duty of care to keep the premises safe for entry by others for recreational purposes, or to give any warning of a dangerous condition, use, structure, or activity on such premises to persons entering for such purposes. Neither the installation of a sign or other form of warning of a dangerous condition, use, structure, or activity, nor any modification made for the purpose of improving the safety of others, nor the failure to maintain or keep in place any sign, other form of warning, or modification made to improve safety, shall create liability on the part of an owner of land where there is no other basis for such liability.

(d) Owner Assumes No Liability. An owner of land or equipment who either directly or indirectly invites or permits without charge any person to use such property for recreational purposes does not thereby:

1. Extend any assurance that the premises are safe for any purpose.

2. Confer upon such person the legal status of an invitee or licensee to whom a duty of care is owed.

3. Assume responsibility for or incur liability for any injury to person or property caused by an act of omission of such persons.

(e) Provisions Apply to Leased Public Land. Unless otherwise agreed in writing, the provisions of this section shall be deemed applicable to the duties and liability of an owner of land leased to the state or any subdivision thereof for recreational purposes.

(f) Provisions Apply to Land Subject to a Conservation Easement. Unless otherwise agreed in writing, the provisions of this section shall be deemed applicable to the duties and liability of an owner of land subject to a conservation easement to any governmental entity or nonprofit organization.

(g) Owner Not Required to Keep Land Safe. Nothing in this section shall be construed to:

1. Create a duty of care or ground of liability for injury to persons or property.

2. Relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of this section to exercise care in his use of such land and in his activities hereon, or from legal consequences or failure to employ such care.

3. Apply to any person or persons who for compensation permit the land to be used for recreational purposes.
(h) User Liable for Damages. Any person using the land of another for recreational purposes, with or without permission, shall be liable for any damage to property, livestock or crops which he may cause while on said property.

Enacted in 1976, last amended in 2006. <http://www3.state.il.us/cgi-bin/newidst?setid=360160004.K>

ILLINOIS RECREATIONAL USE STATUTE

ILLINOIS COMPILED STATUTES CHAPTER 745. CIVIL IMMUNITIES RECREATIONAL USE OF LAND AND WATER AREAS ACT

745 ILCS 65/1. [Short title; purpose]

Sec. 1. This Act shall be known and may be cited as the "Recreational Use of Land and Water Areas Act". The purpose of this Act is to encourage owners of land to make land and water areas available to any individual or members of the public for recreational or conservation purposes by limiting their liability toward persons entering thereon for such purposes.

745 ILCS 65/2. [Definitions]

Sec. 2. As used in this Act, unless the context otherwise requires:

- (a) "Land" includes roads, water, watercourses, private ways and buildings, structures, and machinery or equipment when attached to the realty, but does not include residential buildings or residential property.
- (b) "Owner" includes the possessor of any interest in land, whether it be a tenant, lessee, occupant, the State of Illinois and its political subdivisions, or person in control of the premises.
- (c) "Recreational or conservation purpose" means entry onto the land of another to conduct hunting or recreational shooting or a combination thereof or any activity solely related to the aforesaid hunting or recreational shooting.
- (d) "Charge" means an admission fee for permission to go upon the land, but does not include: the sharing of game, fish or other products of recreational use; or benefits to or arising from the recreational use; or contributions in kind, services or cash made for the purpose of properly conserving the land.
- (e) "Person" includes any person, regardless of age, maturity, or experience, who enters upon or uses land for recreational purposes.

745 ILCS 65/3. [Landowner's duty of care; duty to warn of dangerous conditions]

Sec. 3. Except as specifically recognized by or provided in Section 6 of this Act, an owner of land owes no duty of care to keep the premises safe for entry or use by any person for recreational or conservation purposes, or to give any warning of a natural or artificial dangerous condition, use, structure, or activity on such premises to persons entering for such purposes.

745 ILCS 65/4. [Effect of invitation or permission to use premises]

Sec. 4. Except as specifically recognized by or provided in Section 6 of this Act, an owner of land who either directly or indirectly invites or permits without charge any person to use such property for recreational or conservation purposes does not thereby:

- (a) Extend any assurance that the premises are safe for any purpose.
- (b) Confer upon such person the legal status of an invitee or licensee to whom a duty of care is owed.
- (c) Assume responsibility for or incur liability for any injury to person or property caused by an act or omission of such person or any other person who enters upon the land.
- (d) Assume responsibility for or incur liability for any injury to such person or property caused by any natural or artificial condition, structure or personal property on the premises.

745 ILCS 65/5. [Application to lands leased to State or subdivisions thereof]

Sec. 5. Unless otherwise agreed in writing, the provisions of Sections 3 and of this Act are applicable to the duties and liability of an owner of land leased to the State or any subdivision thereof for recreational or conservation purposes.

745 ILCS 65/6. [Limits of immunity; willful and wanton failure to guard or warn; lands subject to user fees]

Sec. 6. Nothing in this Act limits in any way any liability which otherwise exists:

- (a) For willful and wanton failure to guard or warn against a dangerous condition, use, structure, or activity.
- (b) For injury suffered in any case where the owner of land charges the person or persons who enter or go on the land for the recreational use thereof, except that in the case of land leased to the State or a subdivision thereof, any consideration received by the owner for such lease is not a charge within the meaning of this Section.

745 ILCS 65/7. [Construction]

Sec. 7. Nothing in this Act shall be construed to:

- (a) Create a duty of care or ground of liability for injury to persons or property.

(b) Relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of this Act to exercise care in his use of such land and in his activities thereon, or from the legal consequences of failure to employ such care.

Enacted in 1965, last amended in 2005.

<http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=2081&ChapAct=745%26nbsp%3BILCS%26nbsp%3B65%2F&ChapterID=58&ChapterName=CIVIL+IMMUNITIES&ActName=Recreational+Use+of+Land+and+Water+Areas+Act%2E>

INDIANA RECREATIONAL USE STATUTE

BURNS INDIANA STATUTES

TITLE 14. NATURAL AND CULTURAL RESOURCES

ARTICLE 22. FISH AND WILDLIFE

CHAPTER 10. WILDLIFE REGULATION

14-22-10-2 Restrictions on land-owner liability to recreational users

Sec. 2. (a) As used in this section and section 2.5 of this chapter, "governmental entity" means any of the following:

- (1) The government of the United States of America.
- (2) The state of Indiana.
- (3) A county.
- (4) A city.
- (5) A town.
- (6) A township.
- (7) The following, if created by the Constitution of the United States, the Constitution of the State of

Indiana, a statute, an ordinance, a rule, or an order:

- (A) An agency.
- (B) A board.
- (C) A commission.
- (D) A committee.
- (E) A council.
- (F) A department.
- (G) A district.
- (H) A public body corporate and politic.

(b) As used in this section and section 2.5 of this chapter, "monetary consideration" means a fee or other charge for permission to go upon a tract of land. The term does not include:

- (1) the gratuitous sharing of game, fish, or other products of the recreational use of the land;
- (2) services rendered for the purpose of wildlife management; or
- (3) contributions in kind made for the purpose of wildlife management.

(c) As used in this section and section 2.5 of this chapter, "owner" means a governmental entity or another person that:

- (1) has a fee interest in;
- (2) is a tenant, a lessee, or an occupant of; or
- (3) is in control of;

a tract of land.

(d) A person who goes upon or through the premises, including caves, of another:

- (1) with or without permission; and
- (2) either:

- (A) without the payment of monetary consideration; or
- (B) with the payment of monetary consideration directly or indirectly on the person's behalf

by an agency of the state or federal government; for the purpose of swimming, camping, hiking, sightseeing, or any other purpose (other than the purposes described in section 2.5 of this chapter) does not have an assurance that the premises are safe for the purpose.

(e) The owner of the premises does not:

- (1) assume responsibility; or
- (2) incur liability;

for an injury to a person or property caused by an act or failure to act of other persons using the premises.

(f) This section does not affect the following:

- (1) Existing Indiana case law on the liability of owners or possessors of premises with respect to

the following:

- (A) Business invitees in commercial establishments.
- (B) Invited guests.
- (2) The attractive nuisance doctrine.
- (g) This section does not excuse the owner or occupant of premises from liability for injury to a person or property caused by a malicious or an illegal act of the owner or occupant.

Enacted in 1969, last amended in 1998. <http://www.ialegis.gov/legislative/ic/code/title14/ar22/ch10.html#IC14-22-10-2>

IOWA RECREATIONAL USE STATUTE

CODE OF IOWA

TITLE XI NATURAL RESOURCES

SUBTITLE 2 LANDS AND WATERS

CHAPTER 461C PUBLIC USE OF PRIVATE LANDS AND WATERS

461C.1 Purpose

The purpose of this chapter is to encourage private owners of land to make land and water areas available to the public for recreational purposes and for urban deer control by limiting their liability toward persons entering thereon for such purposes.

461C.2 Definitions

As used in this chapter, unless the context otherwise requires:

1. "Charge" means any consideration, the admission price or fee asked in return for invitation or permission to enter or go upon the land.
2. "Holder" means the possessor of a fee interest, a tenant, lessee, occupant or person in control of the premises; provided, however, holder shall not mean the state of Iowa, its political subdivisions, or any public body or any agencies, departments, boards or commissions thereof.
3. "Land" means private land located in a municipality including abandoned or inactive surface mines, caves, and land used for agricultural purposes, including marshlands, timber, grasslands and the privately owned roads, water, water courses, private ways and buildings, structures and machinery or equipment appurtenant thereto.
4. "Municipality" means any city or county in the state.
5. "Recreational purpose" means the following or any combination thereof: Hunting, trapping, horseback riding, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, motorcycling, nature study, water skiing, snowmobiling, other summer and winter sports, and viewing or enjoying historical, archaeological, scenic, or scientific sites while going to and from or actually engaged therein.
6. "Urban deer control" means deer hunting with a bow and arrow on private land in a municipality, without charge, as authorized by a municipal ordinance, for the purpose of reducing or stabilizing an urban deer population in the municipality.

461C.3 Liability of owner limited

Except as specifically recognized by or provided in section 461C.6, an owner of land owes no duty of care to keep the premises safe for entry or use by others for recreational purposes or urban deer control, or to give any warning of a dangerous condition, use, structure, or activity on such premises to persons entering for such purposes.

461C.4 Users not invitees or licensees

Except as specifically recognized by or provided in section 461C.6, a holder of land who either directly or indirectly invites or permits without charge any person to use such property for recreational purposes or urban deer control does not thereby:

1. Extend any assurance that the premises are safe for any purpose.
2. Confer upon such person the legal status of an invitee or licensee to whom the duty of care is owed.
3. Assume responsibility for or incur liability for any injury to person or property caused by an act or omission of such persons.

461C.5 Duties and liabilities of owner of leased land

Unless otherwise agreed in writing, the provisions of sections 461C.3 and 461C.4 shall be deemed applicable to the duties and liability of an owner of land leased, or any interest or right therein transferred to, or the subject of any agreement with, the United States or any agency thereof, or the state or any agency or subdivision thereof, for recreational purposes or urban deer control.

461C.6 When liability lies against owner

Nothing in this chapter limits in any way any liability which otherwise exists:

1. For willful or malicious failure to guard or warn against a dangerous condition, use, structure, or activity.
2. For injury suffered in any case where the owner of land charges the person or persons who enter or go on the land for the recreational use thereof or for deer hunting, except that in the case of land or any interest or right therein,

leased or transferred to, or the subject of any agreement with, the United States or any agency thereof or the state or any agency thereof or subdivision thereof, any consideration received by the holder for such lease, interest, right or agreement, shall not be deemed a charge within the meaning of this section.

461C.7 Construction of law

Nothing in this chapter shall be construed to:

1. Create a duty of care or ground of liability for injury to persons or property.
2. Relieve any person using the land of another for recreational purposes or urban deer control from any obligation which the person may have in the absence of this chapter to exercise care in the use of such land and in the person's activities thereon, or from the legal consequences of failure to employ such care.
3. Amend, repeal or modify the common law doctrine of attractive nuisance.

Enacted in 1967, last amended in 2006.

<http://coolice.legis.state.ia.us/Cool-ICE/default.asp?category=billinfo&service=IowaCode&input=461C.2>

MAINE RECREATIONAL USE STATUTE

MAINE REVISED STATUTES TITLE 14. COURT PROCEDURE; CIVIL PART 1. GENERAL PROVISIONS CHAPTER 7. DEFENSES GENERALLY

159-A. Limited liability for recreational or harvesting activities

1. Definitions. As used in this section, unless the context indicates otherwise, the following terms have the following meanings.

A. "Premises" means improved and unimproved lands, private ways, roads, any buildings or structures on those lands and waters standing on, flowing through or adjacent to those lands.

B. "Recreational or harvesting activities" means recreational activities conducted out-of-doors, including, but not limited to, hunting, fishing, trapping, camping, environmental education and research, hiking, sight-seeing, operating snow- traveling and all-terrain vehicles, skiing, hang-gliding, dog sledding, equine activities, boating, sailing, canoeing, rafting, biking, picnicking, swimming or activities involving the harvesting or gathering of forest, field or marine products. It includes entry of, volunteer maintenance and improvement of, use of and passage over premises in order to pursue these activities. "Recreational or harvesting activities" does not include commercial agricultural or timber harvesting.

2. Limited duty. An owner, lessee, manager, holder of an easement or occupant of premises does not have a duty of care to keep the premises safe for entry or use by others for recreational or harvesting activities or to give warning of any hazardous condition, use, structure or activity on these premises to persons entering for those purposes. This subsection applies regardless of whether the owner, lessee, manager, holder of an easement or occupant has given permission to another to pursue recreational or harvesting activities on the premises.

3. Permissive use. An owner, lessee, manager, holder of an easement or occupant who gives permission to another to pursue recreational or harvesting activities on the premises does not thereby:

A. Extend any assurance that the premises are safe for those purposes;

B. Make the person to whom permission is granted an invitee or licensee to whom a duty of care is owed; or

C. Assume responsibility or incur liability for any injury to person or property caused by any act of persons to whom the permission is granted

4. Limitations on section. This section does not limit the liability that would otherwise exist:

A. For a willful or malicious failure to guard or to warn against a dangerous condition, use, structure or activity;

B. For an injury suffered in any case where permission to pursue any recreational or harvesting activities was granted for a consideration other than the consideration, if any, paid to the following:

(1) The landowner or the landowner's agent by the State; or

(2) The landowner or the landowner's agent for use of the premises on which the injury was suffered, as long as the premises are not used primarily for commercial recreational purposes and as long as the user has not been granted the exclusive right to make use of the premises for recreational activities; or

C. For an injury caused, by acts of persons to whom permission to pursue any recreational or harvesting activities was granted, to other persons to whom the person granting permission, or the owner, lessee, manager, holder of an easement or occupant of the premises, owed a duty to keep the premises safe or to warn of danger.

5. No duty created. Nothing in this section creates a duty of care or ground of liability for injury to a person or property.

6. Costs and fees. The court shall award any direct legal costs, including reasonable attorneys' fees, to an owner, lessee, manager, holder of an easement or occupant who is found not to be liable for injury to a person or property pursuant to this section.

Enacted in 1979, last amended in 2007. <http://janus.state.me.us/legis/statutes/14/title14sec159-A.html>

MASSACHUSETTS RECREATIONAL USE STATUTE

**MASSACHUSETTS GENERAL LAWS
PART I. ADMINISTRATION OF THE GOVERNMENT
TITLE II. EXECUTIVE AND ADMINISTRATIVE OFFICERS OF THE COMMONWEALTH
CHAPTER 21. DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF WATER RESOURCES**

§ 17C. Public use of land for recreational, conservation, scientific educational and other purposes; landowner's liability limited; exception

(a) Any person having an interest in land including the structures, buildings, and equipment attached to the land, including without limitation, wetlands, rivers, streams, ponds, lakes, and other bodies of water, who lawfully permits the public to use such land for recreational, conservation, scientific, educational, environmental, ecological, research, religious, or charitable purposes without imposing a charge or fee therefore, or who leases such land for said purposes to the commonwealth or any political subdivision thereof or to any nonprofit corporation, trust or association, shall not be liable for personal injuries or property damage sustained by such members of the public, including without limitation a minor, while on said land in the absence of willful, wanton, or reckless conduct by such person. Such permission shall not confer upon any member of the public using said land, including without limitation a minor, the status of an invitee or licensee to whom any duty would be owed by said person.

(b) The liability of any person who imposes a charge or fee for the use of his land by the public for the purposes described in subsection (a) shall not be limited by any provision of this section. The term "person" as used in this section shall be deemed to include the person having an interest in the land, his agent, manager, or licensee and shall include without limitation, any governmental body, agency or instrumentality, nonprofit corporation, trust or association, and any director, officer, trustee, member, employee or agent thereof. A contribution or other voluntary payment not required to be made to use such land shall not be considered a charge or fee within the meaning of this section.

Enacted in 1972, last amended in 1998. <http://www.mass.gov/legis/laws/mgl/21-17c.htm>

MICHIGAN RECREATIONAL USE STATUTE

**MICHIGAN COMPILED LAWS
CHAPTER 324. NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT
ARTICLE III. NATURAL RESOURCES MANAGEMENT
CHAPTER 4. RECREATION
SUBCHAPTER 1. RECREATION
RECREATIONAL TRESPASS
PART 733. LIABILITY OF LANDOWNERS**

324.73301. Liability of landowner, tenant, or lessee for injuries to persons on property for purpose of outdoor recreation or trail use, using Michigan trailway or other public trail, gleaning agricultural or farm products, fishing or hunting, or picking and purchasing agricultural or farm products at farm or "u-pick" operation; definition.

(1) Except as otherwise provided in this section, a cause of action shall not arise for injuries to a person who is on the land of another without paying to the owner, tenant, or lessee of the land a valuable consideration for the purpose of fishing, hunting, trapping, camping, hiking, sightseeing, motorcycling, snowmobiling, or any other outdoor recreational use or trail use, with or without permission, against the owner, tenant, or lessee of the land unless the injuries were caused by the gross negligence or willful and wanton misconduct of the owner, tenant, or lessee.

(2) A cause of action shall not arise for injuries to a person who is on the land of another without paying to the owner, tenant, or lessee of the land a valuable consideration for the purpose of entering or exiting from or using a Michigan trailway as designated under part 721 or other public trail, with or without permission, against the owner, tenant, or lessee of the land unless the injuries were caused by the gross negligence or willful and wanton misconduct of the owner, tenant, or lessee. For purposes of this subsection, a Michigan trailway or public trail may be located on land of any size including, but not limited to, urban, suburban, subdivided, and rural land.

(3) A cause of action shall not arise against the owner, tenant, or lessee of land or premises for injuries to a person who is on that land or premises for the purpose of gleaning agricultural or farm products, unless that person's injuries were caused by the gross negligence or willful and wanton misconduct of the owner, tenant, or lessee.

(4) A cause of action shall not arise against the owner, tenant, or lessee of a farm used in the production of agricultural goods as defined by section 35(1)(h) of the former single business tax act, 1975 PA 228, or by section 207(1)(d) of the Michigan business tax act, 2007 PA 36, MCL 208.1207, for injuries to a person who is on that farm and has paid the owner, tenant, or lessee valuable consideration for the purpose of fishing or hunting, unless that person's injuries were caused by a condition which involved an unreasonable risk of harm and all of the following apply:

(a) The owner, tenant, or lessee knew or had reason to know of the condition or risk.

(b) The owner, tenant, or lessee failed to exercise reasonable care to make the condition safe, or to warn the person of the condition or risk.

(c) The person injured did not know or did not have reason to know of the condition or risk.

(5) A cause of action shall not arise against the owner, tenant, or lessee of land or premises for injuries to a person, other than an employee or contractor of the owner, tenant, or lessee, who is on the land or premises for the purpose of picking and purchasing agricultural or farm products at a farm or "u-pick" operation, unless the person's injuries were caused by a condition that involved an unreasonable risk of harm and all of the following apply:

(a) The owner, tenant, or lessee knew or had reason to know of the condition or risk.

(b) The owner, tenant, or lessee failed to exercise reasonable care to make the condition safe, or to warn the person of the condition or risk.

(c) The person injured did not know or did not have reason to know of the condition or risk.

(6) As used in this section, "agricultural or farm products" means the natural products of the farm, nursery, grove, orchard, vineyard, garden, and apiary, including, but not limited to, trees and firewood.

Enacted in 1995, last amended in 2007.

[http://www.legislature.mi.gov/\(S\(5gqa5q3ghm45sojkdcaowkbw\)\)/mileg.aspx?page=getObject&objectName=mcl-324-73301&highlight=73301](http://www.legislature.mi.gov/(S(5gqa5q3ghm45sojkdcaowkbw))/mileg.aspx?page=getObject&objectName=mcl-324-73301&highlight=73301)

MINNESOTA RECREATIONAL USE STATUTE

MINNESOTA STATUTES

CHAPTER 604A TORT LIABILITY; GOOD SAMARITANS; CHARITABLE AND PUBLIC BENEFIT ACTIVITIES

PUBLIC BENEFIT OR FUNCTION ACTIVITIES

604A.20. Policy

It is the policy of this state, in furtherance of the public health and welfare, to encourage and promote the use of land owned by a municipal power agency and privately owned lands and waters by the public for beneficial recreational purposes, and the provisions of sections 604A.20 to 604A.27 are enacted to that end.

604A.21. Recreational land use; definitions

Subdivision 1. **General.** For the purposes of sections [604A.20](#) to [604A.27](#), the terms defined in this section have the meanings given them, except where the context clearly indicates otherwise.

Subd. 2. **Charge.** "Charge" means any admission price asked or charged for services, entertainment, recreational use, or other activity or the offering of products for sale to the recreational user by a commercial for profit enterprise directly related to the use of the land.

Subd. 2a. **Dedicated.** "Dedicated" means made available by easement, license, permit, or other authorization.

Subd. 3. **Land.** "Land" means any of the following which is privately owned or leased or in which a municipal power agency has rights: land, easements, rights-of-way, roads, water, watercourses, private ways and buildings, structures, and other improvements to land, and machinery or equipment when attached to land.

Subd. 4. **Owner.** "Owner" means the possessor of a fee interest or a life estate, tenant, lessee, occupant, holder of a utility easement, or person in control of the land.

Subd. 5. **Recreational purpose.** "Recreational purpose" includes, but is not limited to, hunting; trapping; fishing; swimming; boating; camping; picnicking; hiking; rock climbing; cave exploring; bicycling; horseback riding; firewood gathering; pleasure driving, including snowmobiling and the operation of any motorized vehicle or conveyance upon a road or upon or across land in any manner, including recreational trail use; nature study; water skiing; winter sports; and viewing or enjoying historical, archaeological, scenic, or scientific sites. "Rock climbing" means the climbing of a naturally exposed rock face. "Cave exploring" means the planned exploration of naturally occurring cavities in rock, including passage through any structures placed for the purpose of safe access, access control, or conservation, but does not include the exploration of other manmade cavities such as tunnels, mines, and sewers.

Subd. 6. **Recreational trail use.** "Recreational trail use" means use on or about a trail, including but not limited to, hunting, trapping, fishing, hiking, bicycling, skiing, horseback riding, snowmobile riding, and motorized trail riding.

604A.22 Owner's duty of care or duty to give warnings

Except as provided in section 604A.25, an owner who gives written or oral permission for the use of the land for recreational purposes without charge:

- (1) owes no duty of care to render or maintain the land safe for entry or use by other persons for recreational purpose;
- (2) owes no duty to warn those persons of any dangerous condition on the land, whether patent or latent;
- (3) owes no duty of care toward those persons except to refrain from willfully taking action to cause injury; and
- (4) owes no duty to curtail use of the land during its use for recreational purpose.

604A.23 Owner's liability

An owner who gives written or oral permission for the use of the land for recreational purposes without charge does not by that action:

- (1) extend any assurance that the land is safe for any purpose;
- (2) confer upon the person the legal status of an invitee or licensee to whom a duty of care is owed; or
- (3) assume responsibility for or incur liability for any injury to the person or property caused by an act or omission of the person.

604A.24. Liability; leased land, water-filled mine pits; municipal power agency land

Unless otherwise agreed in writing, sections 604A.22 and 604A.23 also apply to the duties and liability of an owner of the following land:

- (1) land leased to the state or any political subdivision for recreational purpose; or
- (2) idled or abandoned, water-filled mine pits whose pit walls may slump or cave, and to which water the public has access from a water access site operated by a public entity; or
- (3) land of which a municipal power agency is an owner and that is used for recreational trail purposes, and other land of a municipal power agency which is within 300 feet of such land if the entry onto such land was from land that is dedicated for recreational purposes or recreational trail use.

604A.25 Owner's liability; not limited

Except as set forth in this section, nothing in sections 604A.20 to 604A.27 limits liability that otherwise exists:

- (1) for conduct which, at law, entitles a trespasser to maintain an action and obtain relief for the conduct complained of; or
- (2) for injury suffered in any case where the owner charges the persons who enter or go on the land for the recreational purpose, except that in the case of land leased to the state or a political subdivision, any consideration received from the state or political subdivision by the owner for the lease is not considered a charge within the meaning of this section.

Except for conduct set forth in section 604A.22, clause (3), a person may not maintain an action and obtain relief at law for conduct referred to by clause (1) if the entry upon the land is incidental to or arises from access granted for the recreational trail use of land dedicated, leased, or permitted by the owners for recreational trail use.

604A.26 Land user's liability

Nothing in sections 604A.20 to 604A.27 relieves any person using the land of another for recreational purpose from any obligation that the person may have in the absence of sections 604A.20 to 604A.27 to exercise care in use of the land and in the person's activities on the land, or from the legal consequences of failure to employ that care.

604A.27 Dedication; easement

No dedication of any land in connection with any use by any person for a recreational purpose takes effect in consequence of the exercise of that use for any length of time except as expressly permitted or provided in writing by the owner, nor shall the grant of permission for the use by the owner grant to any person an easement or other property right in the land except as expressly provided in writing by the owner.

Enacted in 1961, last amended in 2005.

http://ros.leg.mn/bin/getpub.php?pubtype=STAT_CHAP&year=2006§ion=604A#stat.604A.20.0

MONTANA RECREATIONAL USE STATUTE

MONTANA CODE

TITLE 70 PROPERTY

CHAPTER 16 RIGHTS AND OBLIGATIONS INCIDENTAL TO OWNERSHIP IN REAL PROPERTY

Part 3 Gratuitous Permittee for Recreation

70-16-301. Recreational purposes defined.

"Recreational purposes", as used in this part, includes hunting, fishing, swimming, boating, waterskiing, camping, picnicking, pleasure driving, biking, winter sports, hiking, touring or viewing cultural and historical sites and monuments, spelunking, or other pleasure expeditions. The term includes the private, noncommercial flying of aircraft in relation to private land.

70-16-302. Restriction on liability of landowner.

(1) A person who uses property, including property owned or leased by a public entity, for recreational purposes, with or without permission, does so without any assurance from the landowner that the property is safe for any purpose if the person does not give a valuable consideration to the landowner in exchange for the recreational use of the property. The landowner owes the person no duty of care with respect to the condition of the property, except that the landowner is liable to the person for any injury to person or property for an act or omission that constitutes willful or wanton misconduct. For purposes of this section, valuable consideration does not include the state land recreational use license fee imposed under [77-1-802](#).

(2) As used in this part, the following definitions apply:

(a) (i) "Airstrip" means either improved or unimproved landing areas on private land used by pilots to land, park, take off, unload, load, and taxi aircraft.

(ii) The term does not include municipal airports governed under Title 67, chapter 10, part 1.

(b) "Flying of aircraft" means the operation of aircraft, including but not limited to landing, parking, taking off, unloading, loading, and taxiing of aircraft at an airstrip.

(c) "Landowner" means a person or entity of any nature, whether private, governmental, or quasi-governmental, and includes the landowner's agent, tenant, lessee, occupant, grantee of conservation easement, water users' association, irrigation district, drainage district, and persons or entities in control of the property or with an agreement to use or occupy property.

(d) "Property" means land, roads, airstrips, water, watercourses, and private ways. The term includes any improvements, buildings, structures, machinery, and equipment on property.

(3) The department of fish, wildlife, and parks, when operating under an agreement with a landowner or tenant to provide recreational snowmobiling opportunities, including but not limited to a snowmobile area, subject to the provisions of subsection (1), on the landowner's property and when not also acting as a snowmobile area operator on the property, does not extend any assurance that the property is safe for any purpose, and the department, the landowner, or the landowner's tenant may not be liable to any person for any injury to person or property resulting from any act or omission of the department unless the act or omission constitutes willful or wanton misconduct.

Enacted in 1965, last amended in 2007. http://data.opi.state.mt.us/bills/mca_toc/70_16_3.htm

NEBRASKA RECREATIONAL USE STATUTE

REVISED STATUTES

CHAPTER 37 GAME AND PARKS

ARTICLE 7. RECREATIONAL LANDS.

(D) RECREATION LIABILITY

§ 37-729. Terms, defined.

For purposes of sections 37-729 to 37-736:

(1) Land includes roads, water, watercourses, private ways, and buildings, structures, and machinery or equipment thereon when attached to the realty;

(2) Owner includes tenant, lessee, occupant, or person in control of the premises;

(3) Recreational purposes includes, but is not limited to, any one or any combination of the following: Hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, nature study, waterskiing, winter sports, and visiting, viewing, or enjoying historical, archaeological, scenic, or scientific sites, or otherwise using land for purposes of the user; and

(4) Charge means the amount of money asked in return for an invitation to enter or go upon the land.

§ 37-730. Limitation of liability; purpose of sections.

The purpose of sections 37-729 to 37-736 is to encourage owners of land to make available to the public land and water areas for recreational purposes by limiting their liability toward persons entering thereon and toward persons who may be injured or otherwise damaged by the acts or omissions of persons entering thereon.

§ 37-731. Landowner; duty of care.

Subject to section 37-734, an owner of land owes no duty of care to keep the premises safe for entry or use by others for recreational purposes or to give any warning of a dangerous condition, use, structure, or activity on such premises to persons entering for such purposes.

§ 37-732. Landowner; invitee; permittee; liability; limitation.

Subject to section 37-734, an owner of land who either directly or indirectly invites or permits without charge any

person to use such property for recreational purposes does not thereby (1) extend any assurance that the premises are safe for any purpose, (2) confer upon such persons the legal status of an invitee or licensee to whom a duty of care is owed, or (3) assume responsibility for or incur liability for any injury to person or property caused by an act or omission of such persons.

§ 37-733. Land leased to state; duty of landowner.

Unless otherwise agreed in writing, an owner of land leased to the state for recreational purposes owes no duty of care to keep that land safe for entry or use by others or to give warning to persons entering or going upon such land of any hazardous conditions, uses, structures, or activities thereon. An owner who leases land to the state for recreational purposes shall not by giving such lease (1) extend any assurance to any person using the land that the premises are safe for any purpose, (2) confer upon such persons the legal status of an invitee or licensee to whom a duty of care is owed, or (3) assume responsibility for or incur liability for any injury to person or property caused by an act or omission of a person who enters upon the leased land. The provisions of this section shall apply whether the person entering upon the leased land is an invitee, licensee, trespasser, or otherwise.

§ 37-734. Landowner; liability.

Nothing in sections 37-729 to 37-736 limits in any way any liability which otherwise exists (1) for willful or malicious failure to guard or warn against a dangerous condition, use, structure, or activity or (2) for injury suffered in any case where the owner of land charges the person or persons who enter or go on the land.

§ 37-735. Sections, how construed.

Nothing in sections 37-729 to 37-736 creates a duty of care or ground of liability for injury to person or property.

§ 37-736. Obligation of person entering upon and using land.

Nothing in sections 37-729 to 37-736 limits in any way the obligation of a person entering upon or using the land of another for recreational purposes to exercise due care in his or her use of such land in his or her activities thereon.

Enacted in 1965, last amended in 2005. <http://uniweb.legislature.ne.gov/legaldocs/view.php?page=s3707029000>

NEVADA RECREATIONAL USE STATUTE

NEVADA REVISED STATUTES

TITLE 3. REMEDIES; SPECIAL ACTIONS AND PROCEEDINGS

CHAPTER 41. ACTIONS AND PROCEEDINGS IN PARTICULAR CASES CONCERNING PERSONS

LIABILITY OF OWNERS, LESSEES AND OCCUPANTS OF PREMISES TO PERSONS USING

PREMISES FOR RECREATIONAL PURPOSES

NRS 41.510 Limitation of liability; exceptions for malicious acts if consideration is given or other duty exists.

1. Except as otherwise provided in subsection 3, an owner of any estate or interest in any premises, or a lessee or an occupant of any premises, owes no duty to keep the premises safe for entry or use by others for participating in any recreational activity, or to give warning of any hazardous condition, activity or use of any structure on the premises to persons entering for those purposes.

2. Except as otherwise provided in subsection 3, if an owner, lessee or occupant of premises gives permission to another person to participate in recreational activities, upon his premises:

(a) He does not thereby extend any assurance that the premises are safe for that purpose or assume responsibility for or incur liability for any injury to person or property caused by any act of persons to whom the permission is granted.

(b) That person does not thereby acquire any property rights in or rights of easement to the premises.

3. This section does not:

(a) Limit the liability which would otherwise exist for:

(1) Willful or malicious failure to guard, or to warn against, a dangerous condition, use, structure or activity.

(2) Injury suffered in any case where permission to participate in recreational activities was granted for a consideration other than the consideration, if any, paid to the landowner by the State or any subdivision thereof. For the purposes of this subparagraph, the price paid for a game tag sold pursuant to [NRS 502.145](#) by an owner, lessee or manager of the premises shall not be deemed consideration given for permission to hunt on the premises.

(3) Injury caused by acts of persons to whom permission to participate in recreational activities was granted, to other persons as to whom the person granting permission, or the owner, lessee or occupant of the premises, owed a duty to keep the premises safe or to warn of danger.

(b) Create a duty of care or ground of liability for injury to person or property.

4. As used in this section, "recreational activity" includes, but is not limited to:

(a) Hunting, fishing or trapping;

(b) Camping, hiking or picnicking;

(c) Sightseeing or viewing or enjoying archaeological, scenic, natural or scientific sites;

- (d) Hang gliding or paragliding;
- (e) Spelunking;
- (f) Collecting rocks;
- (g) Participation in winter sports, including cross-country skiing, snowshoeing or riding a snowmobile, or water sports;
- (h) Riding animals, riding in vehicles or riding a road or mountain bicycle;
- (i) Studying nature;
- (j) Gleaning;
- (k) Recreational gardening; and
- (l) Crossing over to public land or land dedicated for public use.

Enacted in 1963, amended in 2007. <http://www.leg.state.nv.us/NRS/NRS-041.html#NRS041Sec510>

NEW HAMPSHIRE RECREATIONAL USE STATUTE

NEW HAMPSHIRE REVISED STATUTES

TITLE XVIII. FISH AND GAME

CHAPTER 212. PROPAGATION OF FISH AND GAME LIABILITY OF LANDOWNERS

212:34. Duty of Care

I. An owner, lessee or occupant of premises owes no duty of care to keep such premises safe for entry or use by others for hunting, fishing, trapping, camping, horseback riding, water sports, winter sports, snowmobiling, or OHRVs as defined in RSA 215-A, hiking, sightseeing, or removal of fuel wood, or to give any warning of hazardous conditions, uses of, structures, or activities on such premises to persons entering for such purposes, except as provided in paragraph III hereof.

II. An owner, lessee or occupant of premises who gives permission to another to hunt, fish, trap, camp, ride horseback, hike, use snowmobiles as defined in RSA 215-C, use OHRVs as defined in RSA 215-A, sightsee upon, or remove fuel wood from, such premises, or use said premises for water sports, or winter sports does not thereby:

- (a) Extend any assurance that the premises are safe for such purpose, or
- (b) Constitute the person to whom permission has been granted the legal status of an invitee to whom a duty of care is owed, or
- (c) Assume responsibility for or incur liability for an injury to person or property caused by any act of such person to whom permission has been granted except as provided in paragraph III hereof.

III. This section does not limit the liability which otherwise exists:

- (a) For willful or malicious failure to guard or warn against a dangerous condition, use, structure or activity; or
- (b) For injury suffered in any case where permission to hunt, fish, trap, camp, ride horseback, hike, use for water sports, winter sports, use of snowmobiles as defined in RSA 215-C, or use of OHRVs as defined in RSA 215-A, sightsee, or remove fuel wood was granted for a consideration other than the consideration, if any, paid to said landowner by the state; or
- (c) The injury caused by acts of persons to whom permission to hunt, fish, trap, camp, ride horseback, hike, use for water sports, winter sports, use of snowmobiles as defined in RSA 215-C, or use of OHRVs as defined in RSA 215-A, sightsee, or remove fuel wood was granted, to third persons as to whom the person granting permission, or the owner, lessee or occupant of the premises, owed a duty to keep the premises safe or to warn of danger.

IV. Except as provided in paragraph III, a person using the premises as provided in paragraph I or given permission as provided in paragraph II, shall not maintain an action against the owner, occupant, or lessee of the premises for any injury which resulted while on the premises.

Enacted in 1961, last amended in 2006. <http://www.gencourt.state.nh.us/rsa/html/XVIII/212/212-34.htm>

NEW YORK RECREATIONAL USE STATUTE

New York Consolidated Laws GENERAL OBLIGATIONS LAW ARTICLE 9 Obligations of Care TITLE 1 Conditions on Real Property

9-103. No duty to keep premises safe for certain uses; responsibility for acts of such users

- 1. Except as provided in subdivision two,
 - a. an owner, lessee or occupant of premises, whether or not posted as provided in section 11-2111 of the environmental conservation law, owes no duty to keep the premises safe for entry or use by others for hunting,

fishing, organized gleaning as defined in section seventy-one-y of the agriculture and markets law, canoeing, boating, trapping, hiking, cross-country skiing, tobogganing, sledding, speleological activities, horseback riding, bicycle riding, hang gliding, motorized vehicle operation for recreational purposes, snowmobile operation, cutting or gathering of wood for non-commercial purposes or training of dogs, or to give warning of any hazardous condition or use of or structure or activity on such premises to persons entering for such purposes;

b. an owner, lessee or occupant of premises who gives permission to another to pursue any such activities upon such premises does not thereby (1) extend any assurance that the premises are safe for such purpose, or (2) constitute the person to whom permission is granted an invitee to whom a duty of care is owed, or (3) assume responsibility for or incur liability for any injury to person or property caused by any act of persons to whom the permission is granted.

c. an owner, lessee or occupant of a farm, as defined in section six hundred seventy-one of the labor law, whether or not posted as provided in section 11-2111 of the environmental conservation law, owes no duty to keep such farm safe for entry or use by a person who enters or remains in or upon such farm without consent or privilege, or to give warning of any hazardous condition or use of or structure or activity on such farm to persons so entering or remaining. This shall not be interpreted, or construed, as a limit on liability for acts of gross negligence in addition to those other acts referred to in subdivision two of this section.

2. This section does not limit the liability which would otherwise exist

a. for willful or malicious failure to guard, or to warn against, a dangerous condition, use, structure or activity; or

b. for injury suffered in any case where permission to pursue any of the activities enumerated in this section was granted for a consideration other than the consideration, if any, paid to said landowner by the state or federal government, or permission to train dogs was granted for a consideration other than that provided for in section 11-0925 of the environmental conservation law; or

c. for injury caused, by acts of persons to whom permission to pursue any of the activities enumerated in this section was granted, to other persons as to whom the person granting permission, or the owner, lessee or occupant of the premises, owed a duty to keep the premises safe or to warn of danger.

3. Nothing in this section creates a duty of care or ground of liability for injury to person or property.

Enacted in 1963. <http://public.leginfo.state.ny.us/menugetf.cgi?COMMONQUERY=LAWS>

NORTH DAKOTA RECREATIONAL USE STATUTE

NORTH DAKOTA CENTURY CODE

TITLE 53. SPORTS AND AMUSEMENTS

CHAPTER 53-08. LIABILITY LIMITED FOR OWNER OF RECREATION LANDS

53-08-01. Definitions.

In this chapter, unless the context or subject matter otherwise requires:

1. "Charge" means the amount of money asked in return for an invitation to enter or go upon the land.
2. "Land" includes all public and private land, roads, water, watercourses, and ways and buildings, structures, and machinery or equipment thereon.
3. "Owner" includes tenant, lessee, occupant, or person in control of the premises.
4. "Recreational purposes" includes any activity engaged in for the purpose of exercise, relaxation, pleasure, or education.

53-08-02. Duty of care of landowner.

Subject to the provisions of section 53-08-05, an owner of land owes no duty of care to keep the premises safe for entry or use by others for recreational purposes or to give any warning of a dangerous condition, use, structure, or activity on such premises to persons entering for such purposes.

53-08-03. Not invitee or licensee of landowner.

Subject to the provisions of section 53-08-05, an owner of land who either directly or indirectly invites or permits without charge any person to use such property for recreational purposes does not thereby:

1. Extend any assurance that the premises are safe for any purpose;
2. Confer upon such persons the legal status of an invitee or licensee to whom a duty of care is owed; or
3. Assume responsibility for or incur liability for any injury to person or property caused by an act or omission of such persons.

53-08-04. Leased land to state or political subdivisions.

Unless otherwise agreed in writing, an owner of land leased to the state or its political subdivisions for recreational purposes owes no duty of care to keep that land safe for entry or use by others or to give warning to persons entering or going upon such land of any hazardous conditions, uses, structures, or

activities thereon. An owner who leases land to the state or its political subdivisions for recreational purposes does not by giving such lease:

1. Extend any assurance to any person using the land that the premises are safe for any purpose;
2. Confer upon such persons the legal status of an invitee or licensee to whom a duty of care is owed; or
3. Assume responsibility for or incur liability for any injury to person or property caused by an act or omission of a person who enters upon the leased land.

The provisions of this section apply whether the person entering upon the leased land is an invitee, licensee, trespasser, or otherwise.

53-08-05. Failure to warn against dangerous conditions - Charge to enter.

This chapter does not limit in any way any liability that otherwise exists for:

1. Willful and malicious failure to guard or warn against a dangerous condition, use, structure, or activity; or 2. Injury suffered in any case in which the owner of land:

- a. Charges the person for entry onto the land other than the amount, if any, paid to the owner of the land by the state; and
- b. The total charges collected by the owner in the previous calendar year for all recreational use of land under the control of the owner are more than:
 - (1) Twice the total amount of property taxes imposed on the land for the previous calendar year; or
 - (2) In the case of agricultural land, four times the total amount of property taxes imposed on the land for the previous calendar year.

53-08-06. Duty of care or liability for injury. Nothing in this chapter may be construed as creating a duty of care or grounds of liability for injury to person or property. Nothing herein limits in any way the obligation of a person entering upon or using the land of another for recreational purposes to exercise due care in that person's use of such land and in that person's activities thereon.

Enacted in 1965, amended in 1995. <http://www.legis.nd.gov/cencode/t53c08.pdf>

OHIO RECREATIONAL USE STATUTE

OHIO REVISED CODE

**TITLE XV [15] CONSERVATION OF NATURAL RESOURCES
CHAPTER 1533: HUNTING; FISHING [RECREATIONAL USER]**

1533.18 Recreational User Definitions

As used in sections 1533.18 and 1533.181 of the Revised Code:

(A) "Premises" means all privately owned lands, ways, and waters, and any buildings and structures thereon, and all privately owned and state-owned lands, ways, and waters leased to a private person, firm, or organization, including any buildings and structures thereon.

(B) "Recreational user" means a person to whom permission has been granted, without the payment of a fee or consideration to the owner, lessee, or occupant of premises, other than a fee or consideration paid to the state or any agency of the state, or a lease payment or fee paid to the owner of privately owned lands, to enter upon premises to hunt, fish, trap, camp, hike, or swim, or to operate a snowmobile, all-purpose vehicle, or four-wheel drive motor vehicle, or to engage in other recreational pursuits.

(C) "All-purpose vehicle" has the same meaning as in section 4519.01 of the Revised Code.

1533.181 Immunity

(A) No owner, lessee, or occupant of premises:

- (1) Owes any duty to a recreational user to keep the premises safe for entry or use;
- (2) Extends any assurance to a recreational user, through the act of giving permission, that the premises are safe for entry or use;
- (3) Assumes responsibility for or incurs liability for any injury to person or property caused by any act of a recreational user.

(B) Division (A) of this section applies to the owner, lessee, or occupant of privately owned, nonresidential premises, whether or not the premises are kept open for public use and whether or not the owner, lessee, or occupant denies entry to certain individuals.

Enacted in 1963, last amended in 2007. <http://codes.ohio.gov/orc/1533.18>

OREGON RECREATIONAL USE STATUTE

**OREGON REVISED STATUTES
TITLE 10. PROPERTY RIGHTS AND TRANSACTIONS
CHAPTER 105. PROPERTY RIGHTS
PUBLIC USE OF LANDS**

105.672 Definitions for ORS 105.672 to 105.696. As used in ORS 105.672 to 105.696:

(1) "Charge":

(a) Means the admission price or fee requested or expected by an owner in return for granting permission for a person to enter or go upon the owner's land.

(b) Does not mean any amount received from a public body in return for granting permission for the public to enter or go upon the owner's land.

(2) "Harvest" has that meaning given in ORS 164.813.

(3) "Land" includes all real property, whether publicly or privately owned.

(4) "Owner" means the possessor of any interest in any land, including but not limited to possession of a fee title. "Owner" includes a tenant, lessee, occupant or other person in possession of the land.

(5) "Recreational purposes" includes, but is not limited to, outdoor activities such as hunting, fishing, swimming, boating, camping, picnicking, hiking, nature study, outdoor educational activities, waterskiing, winter sports, viewing or enjoying historical, archaeological, scenic or scientific sites or volunteering for any public purpose project.

(6) "Special forest products" has that meaning given in ORS 164.813.

(7) "Woodcutting" means the cutting or removal of wood from land by an individual who has obtained permission from the owner of the land to cut or remove wood. [1995 c.456 §1; 2007 c.372 §1]

Note: Section 2, chapter 372, Oregon Laws 2007, provides:

Sec. 2. The amendments to ORS 105.672 by section 1 of this 2007 Act apply to an entry or going upon land by the public on or after the effective date of this 2007 Act [June 12, 2007], regardless of whether the owner in return receives an amount from a public body before, on or after the effective date of this 2007 Act. [2007 c.372 §2]

105.676. Public policy.

The Legislative Assembly hereby declares it is the public policy of the State of Oregon to encourage owners of land to make their land available to the public for recreational purposes, for woodcutting and for the harvest of special forest products by limiting their liability toward persons entering thereon for such purposes and by protecting their interests in their land from the extinguishment of any such interest or the acquisition by the public of any right to use or continue the use of such land for recreational purposes, woodcutting or the harvest of special forest products.

105.682. Liabilities of owner of land used by public for recreational purposes, woodcutting or harvest of special forest products.

(1) Except as provided by subsection (2) of this section, and subject to the provisions of ORS 105.688, an owner of land is not liable in contract or tort for any personal injury, death or property damage that arises out of the use of the land for recreational purposes, woodcutting or the harvest of special forest products when the owner of land either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest of special forest products. The limitation on liability provided by this section applies if the principal purpose for entry upon the land is for recreational purposes, woodcutting or the harvest of special forest products, and is not affected if the injury, death or damage occurs while the person entering land is engaging in activities other than the use of the land for recreational purposes, woodcutting or the harvest of special forest products.

(2) This section does not limit the liability of an owner of land for intentional injury or damage to a person coming onto land for recreational purposes, woodcutting or the harvest of special forest products.

105.688. Applicability of immunities from liability for owner of land; restrictions.

(1) Except as specifically provided in ORS 105.672 to 105.696, the immunities provided by ORS 105.682 apply to:

(a) All public and private lands, including but not limited to lands adjacent or contiguous to any bodies of water, watercourses or the ocean shore as defined by ORS 390.605;

(b) All roads, bodies of water, watercourses, rights of way, buildings, fixtures and structures on the lands described in paragraph (a) of this subsection; and

(c) All machinery or equipment on the lands described in paragraph (a) of this subsection.

(2) The immunities provided by ORS 105.682 apply only if:

(a) The owner makes no charge for permission to use the land;

(b) The owner transfers an easement to a public body to use the land; or

(c) The owner charges no more than \$75 per cord for permission to use the land for woodcutting.

105.692. No right to continued use of land if owner of land permits use of land; no presumption of dedication or other rights.

(1) An owner of land who either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest of special forest products does not give that person or any other person a right to continued use of the land for those purposes without the consent of the owner.

(2) The fact that an owner of land allows the public to use the land for recreational purposes, woodcutting or the harvest of special forest products without posting, fencing or otherwise restricting use of the land does not raise a presumption that the landowner intended to dedicate or otherwise give over to the public the right to continued use of the land.

(3) Nothing in this section shall be construed to diminish or divert any public right to use land for recreational purposes acquired by dedication, prescription, grant, custom or otherwise existing before October 5, 1973.

(4) Nothing in this section shall be construed to diminish or divert any public right to use land for woodcutting acquired by dedication, prescription, grant, custom or otherwise existing before October 3, 1979.

105.696. No duty of care or liability created; exercise of care still required of person using land.

ORS 105.672 to 105.696 do not:

(1) Create a duty of care or basis for liability for personal injury, death or property damage resulting from the use of land for recreational purposes, for woodcutting or for the harvest of special forest products.

(2) Relieve a person using the land of another for recreational purposes, woodcutting or the harvest of special forest products from any obligation that the person has to exercise care in use of the land in the activities of the person or from the legal consequences of failure of the person to exercise that care.

105.699. Rules applicable to state lands.

The State Forester, under the general supervision of the State Board of Forestry, may adopt any rules considered necessary for the administration of the provisions of ORS 105.672 to 105.696 on state land.

105.700. Prohibiting public access to private land; notice requirements; damages.

(1) In addition to and not in lieu of any other damages that may be claimed, a plaintiff who is a landowner shall receive liquidated damages in an amount not to exceed \$1,000 in any action in which the plaintiff establishes that:

(a) The plaintiff closed the land of the plaintiff as provided in subsection (2) of this section; and

(b) The defendant entered and remained upon the land of the plaintiff without the permission of the plaintiff.

(2) A landowner or an agent of the landowner may close the privately owned land of the landowner by posting notice as follows:

(a) For land through which the public has no right of way, the landowner or agent must place a notice at each outer gate and normal point of access to the land, including both sides of a body of water that crosses the land wherever the body of water intersects an outer boundary line. The notice must be placed on a post, structure or natural object in the form of a sign or a blaze of paint. If a blaze of paint is used, it must consist of at least 50 square inches of fluorescent orange paint, except that when metal fence posts are used, approximately the top six inches of the fence post must be painted. If a sign is used, the sign:

(A) Must be no smaller than eight inches in height and 11 inches in width;

(B) Must contain the words "Closed to Entry" or words to that effect in letters no less than one inch in height; and

(C) Must display the name, business address and phone number, if any, of the landowner or agent of the landowner.

(b) For land through which or along which the public has an unfenced right of way by means of a public road, the landowner or agent must place:

(A) A conspicuous sign no closer than 30 feet from the center line of the roadway where it enters the land, containing words substantially similar to "PRIVATE PROPERTY, NO TRESPASSING OFF ROAD NEXT ___ MILES"; or

(B) A sign or blaze of paint, as described in paragraph (a) of this subsection, no closer than 30 feet from the center line of the roadway at regular intervals of not less than one-fourth mile along the roadway where it borders the land, except that a blaze of paint may not be placed on posts where the public road enters the land.

(3) Nothing contained in this section prevents emergency or law enforcement vehicles from entering upon the posted land.

(4) An award of liquidated damages under this section is not subject to ORS 18.535, 18.537 or 18.540.

(5) Nothing in this section affects any other remedy, civil or criminal, that may be available for a trespass described in this section.

Enacted in 1971, last amended in 2007. <http://www.leg.state.or.us/ors/105.html>

PENNSYLVANIA RECREATIONAL USE STATUTE

PENNSYLVANIA STATUTES TITLE 68. REAL AND PERSONAL PROPERTY CHAPTER 11. USES OF PROPERTY RECREATION USE OF LAND AND WATER

477-1. Purpose; liability

The purpose of this act is to encourage owners of land to make land and water areas available to the public for recreational purposes by limiting their liability toward persons entering thereon for such purposes.

477-2. Definitions

As used in this act:

- (1) "LAND" means land, roads, water, watercourses, private ways and buildings, structures and machinery or equipment when attached to the realty.
- (2) "OWNER" means the possessor of a fee interest, a tenant, lessee, occupant or person in control of the premises.
- (3) "Recreational purpose" includes, but is not limited to, any of the following, or any combination thereof: hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, nature study, water skiing, water sports, cave exploration and viewing or enjoying historical, archaeological, scenic, or scientific sites.
- (4) "CHARGE" means the admission price or fee asked in return for invitation or permission to enter or go upon the land.

477-3. Duty to keep premises safe; warning

Except as specifically recognized or provided in section 6 of this act, an owner of land owes no duty of care to keep the premises safe for entry or use by others for recreational purposes, or to give any warning of a dangerous condition, use, structure, or activity on such premises to persons entering for such purposes.

477-4. Assurance of safe premises; duty of care; responsibility, liability

Except as specifically recognized by or provided in section 6 of this act, an owner of land who either directly or indirectly invites or permits without charge any person to use such property for recreational purposes does not thereby:

- (1) Extend any assurance that the premises are safe for any purpose.
- (2) Confer upon such person the legal status of an invitee or licensee to whom a duty of care is owed.
- (3) Assume responsibility for or incur liability for any injury to persons or property caused by an act of omission of such persons.

477-5. Land leased to State or subdivision

Unless otherwise agreed in writing, the provisions of sections 3 and 4 of this act shall be deemed applicable to the duties and liability of an owner of land leased to the State or any subdivision thereof for recreational purposes.

477-6. Liability not limited

Nothing in this act limits in any way any liability which otherwise exists:

- (1) For willful or malicious failure to guard or warn against a dangerous condition, use, structure, or activity.
- (2) For injury suffered in any case where the owner of land charges the person or persons who enter or go on the land for the recreational use thereof, except that in the case of land leased to the State or a subdivision thereof, any consideration received by the owner for such lease shall not be deemed a charge within the meaning of this section.

477-7. Construction of act

Nothing in this act shall be construed to:

- (1) Create a duty of care or ground of liability for injury to persons or property.
- (2) Relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of this act to exercise care in his use of such land and in his activities thereon, or from the legal consequences of failure to employ such care.

Enacted in 1965. <http://members.aol.com/StatutesP1/68.Cp.11.html>

SOUTH DAKOTA RECREATIONAL USE STATUTE

SOUTH DAKOTA CODIFIED LAWS TITLE 20. PERSONAL RIGHTS AND OBLIGATIONS CHAPTER 20-9. LIABILITY FOR TORTS

20-9-12. Definition of terms

Terms used in ss 20-9-12 to 20-9-18, inclusive, mean:

- (1) "Charge," the admission price or fee asked in return for invitation or permission to enter or go upon the land. Any nonmonetary gift to an owner that is less than one hundred dollars in value may not be construed to be a charge;
- (2) "Land," land, trails, water, watercourses, private ways and agricultural structures, and machinery or equipment if attached to the realty;
- (3) "Outdoor recreational purpose," includes, but is not limited to, any of the following activities, or any combination thereof: hunting, fishing, swimming other than in a swimming pool, boating, canoeing, camping, picnicking, hiking, biking, off road driving, nature study, water skiing, winter sports, snowmobiling, viewing or enjoying historical, archaeological, scenic or scientific sites;
- (4) "Owner," the possessor of a fee interest, a tenant, lessee, occupant or person in control of the premises.

20-9-13. Landowner not obligated to keep land safe for use by others for outdoor recreational purposes or to give warning -- Exception

Except as provided in s 20-9-16, an owner of land owes no duty of care to keep the land safe for entry or use by others for outdoor recreational purposes, or to give any warning of a dangerous condition, use, structure, or activity on his land to persons entering for outdoor recreational purposes.

20-9-14. Liability of landowner for invitation to use property for outdoor recreational purposes -- Exception

Except as provided in s 20-9-16, an owner of land who either directly or indirectly invites or permits without charge any person to use his property for outdoor recreational purposes, including any person who is on the property pursuant to s 41-9-8, does not thereby:

- (1) Extend any assurance that the land is safe for any purpose;
- (2) Confer upon any person the legal status of an invitee or licensee to whom a duty of care is owed; or
- (3) Assume responsibility for, or incur liability for, any injury to persons or property caused by an act of omission of the owner as to maintenance of the land.

20-9-15. Liability of owner of land leased to state for outdoor recreational purposes

Unless otherwise agreed in writing, the provisions of ss 20-9-13 and 20-9-14 apply to the duties and liability of an owner of land leased to the state or any political subdivision thereof for outdoor recreational purposes.

20-9-16. Liability of landowner for gross negligence or injury suffered where consideration charged or law violated

Nothing in ss 20-9-12 to 20-9-18, inclusive, limits in any way any liability which otherwise exists:

- (1) For gross negligence or willful or wanton misconduct of the owner;
- (2) For injury suffered in any case where the owner of land charges any person who enters or goes on the land for the outdoor recreational use thereof, except that in the case of land leased to the state or a political subdivision thereof, any consideration received by the owner for such lease may not be deemed a charge within the meaning of this section nor may any incentive payment paid to the owner by the state or federal government to promote public access for outdoor recreational purposes be considered a charge; or
- (3) For injury suffered in any case where the owner has violated a county or municipal ordinance or state law which violation is a proximate cause of the injury.

20-9-17. Liability for injury to persons or property or failure to exercise care in use of land for outdoor recreational purposes

Sections 20-9-12 to 20-9-18, inclusive, may not be construed to create a duty of care or ground of liability for injury to persons or property, or relieve any person using the land of another for outdoor recreational purposes from any obligation which he may have in the absence of ss 20-9-12 to 20-9-18, inclusive, to exercise care in his use of such land and in his activities thereon, or from the legal consequences of failure to employ such care.

20-9-18. Doctrine of attractive nuisance not affected

Sections 20-9-12 to 20-9-18, inclusive, does not affect the doctrine of attractive nuisance or other legal doctrines relating to liability arising from artificial conditions highly dangerous to children.

Enacted in 1987, last amended in 1991.

<http://legis.state.sd.us/statutes/DisplayStatute.aspx?Type=Statute&Statute=20-9>

UTAH RECREATIONAL USE STATUTE

UTAH CODE

TITLE 57. REAL ESTATE

CHAPTER 14. LIMITATION OF LANDOWNER LIABILITY -- PUBLIC RECREATION

57-14-1. Legislative purpose

The purpose of this act is to encourage public and private owners of land to make land and water areas available to the public for recreational purposes by limiting the owners' liability toward persons entering the land and water areas for those purposes.

57-14-2. Definitions.

As used in this chapter:

- (1) (a) "Land" means any land within the territorial limits of Utah.
(b) "Land" includes roads, railway corridors, water, water courses, private ways and buildings, structures, and machinery or equipment when attached to the realty.
- (2) "Owner" includes the possessor of any interest in the land, whether public or private land, a tenant, a lessor, a lessee, and an occupant or person in control of the premises.
- (3) "Recreational purpose" includes, but is not limited to, any of the following or any combination thereof:
 - (a) hunting;
 - (b) fishing;
 - (c) swimming;
 - (d) skiing;
 - (e) snowshoeing;
 - (f) camping;
 - (g) picnicking;
 - (h) hiking;
 - (i) studying nature;
 - (j) waterskiing;
 - (k) engaging in water sports;
 - (l) engaging in equestrian activities;
 - (m) using boats;
 - (n) mountain biking;
 - (o) riding narrow gauge rail cars on a narrow gauge track that does not exceed 24 inch gauge;
 - (p) using off-highway vehicles or recreational vehicles; and
 - (q) viewing or enjoying historical, archaeological, scenic, or scientific sites.
- (4) "Charge" means the admission price or fee asked in return for permission to enter or go upon the land.
- (5) "Person" includes any person, regardless of age, maturity, or experience, who enters upon or uses land for recreational purposes.

57-14-3. Owner owes no duty of care or to give warning -- Exceptions

Except as specifically provided in Subsections 57-14-6 (1) and (2), an owner of land owes no duty of care to keep the premises safe for entry or use by any person entering or using the premises for any recreational purpose, or to give any warning of a dangerous condition, use, structure, or activity on those premises to that person.

57-14-4. Owner's permitting another to use land without charge -- Effect

Except as specifically provided in Subsection 57-14-6 (1), an owner of land who either directly or indirectly invites or permits without charge or for a nominal fee of not more than \$1 per year any person to use the land for any recreational purpose does not thereby:

- (1) make any representation or extend any assurance that the premises are safe for any purpose;
- (2) confer upon the person the legal status of an invitee or licensee to whom a duty of care is owed;
- (3) assume responsibility for or incur liability for any injury to persons or property caused by an act or omission of the person or any other person who enters upon the land; or
- (4) owe any duty to curtail his use of his land during its use for recreational purposes.

57-14-5. Land leased to state or political subdivision for recreational purposes

Unless otherwise agreed in writing, Sections 57-14-3 and 57-14-4 are applicable to the duties and liability of an owner of land leased to the state or any subdivision of the state for recreational purposes.

57-14-6. Liability not limited where willful or malicious conduct involved or admission fee charged

- (1) Nothing in this chapter shall limit any liability which otherwise exists for:
 - (a) willful or malicious failure to guard or warn against a dangerous condition, use, structure, or activity;
 - (b) deliberate, willful, or malicious injury to persons or property; or
 - (c) an injury suffered where the owner of land charges a person to enter or go on the land or use the land for any recreational purpose.
- (2) For purposes of Subsection (1)(c), if the land is leased to the state or a subdivision of the state, any consideration received by the owner for the lease is not a charge within the meaning of this section.
- (3) Any person who hunts upon a cooperative wildlife management unit, as authorized by Title 23, Chapter 23, Cooperative Wildlife Management Units, is not considered to have paid a fee within the meaning of this section.
- (4) Owners of a dam or reservoir who allow recreational use of the dam or reservoir and its surrounding area and do

not themselves charge a fee for that use, are considered not to have charged for that use within the meaning of Subsection (1)(c), even if the user pays a fee to the Division of Parks and Recreation for the use of the services and facilities at that dam or reservoir.

(5) The state or a subdivision of the state that owns property purchased for a railway corridor is considered not to have charged for use of the railway corridor within the meaning of Subsection (1)(c), even if the user pays a fee for travel on a privately owned rail car that crosses or travels over the railway corridor if the state or a subdivision of the state:

- (a) allows recreational use of the railway corridor and its surrounding area; and
- (b) does not charge a fee for that use.

57-14-7. Person using land of another not relieved from duty to exercise care

This chapter may not be construed to relieve any person, using the land of another for recreational purposes, from any obligation which the person may have in the absence of this act to exercise care in use of the land and in activities thereon, or from the legal consequences of failure to employ care.

Enacted in 1971, last amended in 2005. http://le.utah.gov/~code/TITLE57/57_10.htm

VERMONT RECREATIONAL USE STATUTE

VERMONT STATUTES ANNOTATED

TITLE TWELVE. Court Procedure

CHAPTER 203. Limitations on Landowner Liability

§ 5791 Purpose

The purpose of this chapter is to encourage owners to make their land and water available to the public for no consideration for recreational uses by clearly establishing a rule that an owner shall have no greater duty of care to a person who, without consideration, enters or goes upon the owner's land for a recreational use than the owner would have to a trespasser.

§ 5792 Definitions

As used in this chapter:

(1) "Consideration" means a price, fee or other charge paid to or received by the owner in return for the permission to enter upon or to travel across the owner's land for recreational use. Consideration shall not include:

- (A) compensation paid to or a tax benefit received by the owner for granting a permanent recreational use easement;
- (B) payment or provision for compensation to be paid to the owner for damage caused by recreational use; or
- (C) contributions in services or other consideration paid to the owner to offset or insure against damages sustained by an owner from the recreational use or to compensate the owner for damages from recreational use.

(2) (A) "Land" means:

- (i) open and undeveloped land, including paths and trails;
- (ii) water, including springs, streams, rivers, ponds, lakes and other water courses;
- (iii) fences; or
- (iv) structures and fixtures used to enter or go upon land, including bridges and walkways.

(B) "Land" does not include:

- (i) areas developed for commercial recreational uses,
- (ii) equipment, machinery or personal property, and
- (iii) structures and fixtures not described in subdivision (2)(A)(iii) or (iv) of this section.

(3) "Owner" means a person who owns, leases, licenses or otherwise controls ownership or use of land, and any employee or agent of that person.

(4) "Recreational use" means an activity undertaken for recreational, educational or conservation purposes, and includes hunting, fishing, trapping, guiding, camping, biking, in-line skating, jogging, skiing, swimming, diving, water sports, rock climbing, hang gliding, caving, boating, hiking, riding an animal or a vehicle, picking wild or cultivated plants, picnicking, gleaning, rock collecting, nature study, outdoor sports, visiting or enjoying archeological, scenic, natural, or scientific sites, or other similar activities. "Recreational use" also means any noncommercial activity undertaken without consideration to create, protect, preserve, rehabilitate or maintain the land for recreational uses.

§ 5793 Liability limited

(a) Land. An owner shall not be liable for property damage or personal injury sustained by a person who, without consideration, enters or goes upon the owner's land for a recreational use unless the damage or injury is the result of

the willful or wanton misconduct of the owner.

(b) Equipment, fixtures, machinery or personal property.

(1) Unless the damage or injury is the result of the willful or wanton misconduct of the owner, an owner shall not be liable for property damage or personal injury sustained by a person who, without consideration and without actual permission of the owner, enters or goes upon the owner's land for a recreational use and proceeds to enter upon or use:

(A) equipment, machinery or personal property; or

(B) structures or fixtures not described in subdivision 5792(2)(A)(iii) or (iv) of this title.

(2) Permission to enter or go upon an owner's land shall not, by itself, include permission to enter or go upon structures or to go upon or use equipment, fixtures, machinery or personal property.

§ 5794 Landowner protection

(a) The fact that an owner has made land available without consideration for recreational uses shall not be construed to:

(1) limit the property rights of owners;

(2) limit the ability of an owner and a recreational user of the land to enter into agreements for the recreational use of the land to vary or supplement the duties and limitations created in this chapter;

(3) support or create any claim or right of eminent domain, adverse possession or other prescriptive right or easement or any other land use restriction;

(4) alter, modify or supersede the rights and responsibilities under chapters 191, animal control, and 193, domestic pet or wolf-hybrid control, of Title 20; under chapters 29, snowmobiles, and 31, all-terrain vehicles, of Title 23; under chapter 23, bicycle routes, of Title 19; and under chapter 20, Vermont trail system, of Title 10;

(5) extend any assurance that the land is safe for recreational uses or create any duty on an owner to inspect the land to discover dangerous conditions;

(6) relieve a person making recreational use of land from the obligation the person may have in the absence of this chapter to exercise due care for the person's own safety in the recreational use of the land.

(b) Nothing in this chapter shall create any presumption or inference of permission or consent to enter upon an owner's land for any purpose.

(c) For the purposes of protecting landowners who make land available for recreational use to members of the public for no consideration pursuant to this chapter, the presence of one or more of the following on land does not by itself preclude the land from being "open and undeveloped": posting of the land, fences, or agricultural or forestry related structures.

§ 5795 Exceptions

This chapter shall not apply to lands owned by a municipality or the state.

Enacted in 1967, last amended in 1997. <http://www.leg.state.vt.us/statutes/sections.cfm?Title=12&Chapter=203>

WASHINGTON RECREATIONAL USE STATUTE

REVISED CODE

TITLE 4. CIVIL PROCEDURE

CHAPTER 4.24. SPECIAL RIGHTS OF ACTION AND SPECIAL IMMUNITIES

4.24.200. Liability of owners or others in possession of land and water areas for injuries to recreation users -- Purpose

The purpose of RCW 4.24.200 and 4.24.210 is to encourage owners or others in lawful possession and control of land and water areas or channels to make them available to the public for recreational purposes by limiting their liability toward persons entering thereon and toward persons who may be injured or otherwise damaged by the acts or omissions of persons entering thereon.

4.24.210. Liability of owners or others in possession of land and water areas for injuries to recreation users -- Limitation

(1) Except as otherwise provided in subsection (3) or (4) of this section, any public or private landowners or others in lawful possession and control of any lands whether designated resource, rural, or urban, or water areas or channels and lands adjacent to such areas or channels, who allow members of the public to use them for the purposes of outdoor recreation, which term includes, but is not limited to, the cutting, gathering, and removing of firewood by private persons for their personal use without purchasing the firewood from the landowner, hunting, fishing, camping, picnicking, swimming, hiking, bicycling, skateboarding or other nonmotorized wheel-based activities, hanggliding, paragliding, rock climbing, the riding of horses or other animals, clam digging, pleasure driving of off-road vehicles, snowmobiles, and other vehicles, boating, nature study, winter or water sports, viewing or enjoying historical, archaeological, scenic, or scientific sites, without charging a fee of any kind therefore, shall

not be liable for unintentional injuries to such users.

(2) Except as otherwise provided in subsection (3) or (4) of this section, any public or private landowner or others in lawful possession and control of any lands whether rural or urban, or water areas or channels and lands adjacent to such areas or channels, who offer or allow such land to be used for purposes of a fish or wildlife cooperative project, or allow access to such land for cleanup of litter or other solid waste, shall not be liable for unintentional injuries to any volunteer group or to any other users.

(3) Any public or private landowner, or others in lawful possession and control of the land, may charge an administrative fee of up to twenty-five dollars for the cutting, gathering, and removing of firewood from the land.

(4) Nothing in this section shall prevent the liability of a landowner or others in lawful possession and control for injuries sustained to users by reason of a known dangerous artificial latent condition for which warning signs have not been conspicuously posted. A fixed anchor used in rock climbing and put in place by someone other than a landowner is not a known dangerous artificial latent condition and a landowner under subsection (1) of this section shall not be liable for unintentional injuries resulting from the condition or use of such an anchor. Nothing in RCW 4.24.200 and 4.24.210 limits or expands in any way the doctrine of attractive nuisance. Usage by members of the public, volunteer groups, or other users is permissive and does not support any claim of adverse possession.

(5) For purposes of this section, the following are not fees:

(a) A license or permit issued for statewide use under authority of chapter 79A.05 RCW or Title 77 RCW; and

(b) A daily charge not to exceed twenty dollars per person, per day, for access to a publicly owned ORV sports park, as defined in RCW 46.09.020, or other public facility accessed by a highway, street, or nonhighway road for the purposes of off-road vehicle use.

Enacted in 1967, last amended in 2006. <http://apps.leg.wa.gov/RCW/default.aspx?cite=4.24.200>

WISCONSIN RECREATIONAL USE STATUTE

WISCONSIN STATUTES

PROVISIONS COMMON TO ACTIONS AND PROCEEDINGS IN ALL COURTS

CHAPTER 895. MISCELLANEOUS GENERAL PROVISIONS

895.52 Recreational activities; limitation of property owners' liability

(1) Definitions. In this section:

(a) "Governmental body" means any of the following:

1. The federal government.

2. This state.

3. A county or municipal governing body, agency, board, commission, committee, council, department, district or any other public body corporate and politic created by constitution, statute, ordinance, rule or order.

4. A governmental or quasi-governmental corporation.

5. A formally constituted subunit or an agency of subd. 1., 2., 3. or 4.

(b) "Injury" means an injury to a person or to property.

(c) "Nonprofit organization" means an organization or association not organized or conducted for pecuniary profit.

(d) "Owner" means either of the following:

1. A person, including a governmental body or nonprofit organization, that owns, leases or occupies property.

2. A governmental body or nonprofit organization that has a recreational agreement with another owner.

(e) "Private property owner" means any owner other than a governmental body or nonprofit organization.

(f) "Property" means real property and buildings, structures and improvements thereon, and the waters of the state, as defined under s. 281.01(18).

(g) "Recreational activity" means any outdoor activity undertaken for the purpose of exercise, relaxation or pleasure, including practice or instruction in any such activity. "Recreational activity" includes hunting, fishing, trapping, camping, picnicking, exploring caves, nature study, bicycling, horseback riding, bird-watching, motorcycling, operating an all-terrain vehicle, ballooning, hang gliding, hiking, tobogganing, sledding, sleigh riding, snowmobiling, skiing, skating, water sports, sight-seeing, rock-climbing, cutting or removing wood, climbing observation towers, animal training, harvesting the products of nature, sport shooting and any other outdoor sport, game or educational activity. "Recreational activity" does not include any organized team sport activity sponsored by the owner of the property on

which the activity takes place.

(h) "Recreational agreement" means a written authorization granted by an owner to a governmental body or nonprofit organization permitting public access to all or a specified part of the owner's property for any recreational activity.

(i) "Residential property" means a building or structure designed for and used as a private dwelling accommodation or private living quarters, and the land surrounding the building or structure within a 300-foot radius.

(2) No duty; immunity from liability. (a) Except as provided in subs. (3) to (6), no owner and no officer, employee or agent of an owner owes to any person who enters the owner's property to engage in a recreational activity:

1. A duty to keep the property safe for recreational activities.
2. A duty to inspect the property, except as provided under s. 23.115(2).
3. A duty to give warning of an unsafe condition, use or activity on the property.

(b) Except as provided in subs. (3) to (6), no owner and no officer, employee or agent of an owner is liable for the death of, any injury to, or any death or injury caused by, a person engaging in a recreational activity on the owner's property or for any death or injury resulting from an attack by a wild animal.

(3) Liability; state property. Subsection (2) does not limit the liability of an officer, employee or agent of this state or of any of its agencies for either of the following:

(a) A death or injury that occurs on property of which this state or any of its agencies is the owner at any event for which the owner charges an admission fee for spectators.

(b) A death or injury caused by a malicious act or by a malicious failure to warn against an unsafe condition of which an officer, employee or agent knew, which occurs on property designated by the department of natural resources under s. 23.115 or designated by another state agency for a recreational activity.

(4) Liability; property of governmental bodies other than this state. Subsection (2) does not limit the liability of a governmental body other than this state or any of its agencies or of an officer, employee or agent of such a governmental body for either of the following:

(a) A death or injury that occurs on property of which a governmental body is the owner at any event for which the owner charges an admission fee for spectators.

(b) A death or injury caused by a malicious act or by a malicious failure to warn against an unsafe condition of which an officer, employee or agent of a governmental body knew, which occurs on property designated by the governmental body for recreational activities.

(5) Liability; property of nonprofit organizations. Subsection (2) does not limit the liability of a nonprofit organization or any of its officers, employees or agents for a death or injury caused by a malicious act or a malicious failure to warn against an unsafe condition of which an officer, employee or agent of the nonprofit organization knew, which occurs on property of which the nonprofit organization is the owner.

(6) Liability; private property. Subsection (2) does not limit the liability of a private property owner or of an employee or agent of a private property owner whose property is used for a recreational activity if any of the following conditions exist:

(a) The private property owner collects money, goods or services in payment for the use of the owner's property for the recreational activity during which the death or injury occurs, and the aggregate value of all payments received by the owner for the use of the owner's property for recreational activities during the year in which the death or injury occurs exceeds \$2,000. The following do not constitute payment to a private property owner for the use of his or her property for a recreational activity:

1. A gift of wild animals or any other product resulting from the recreational activity.
2. An indirect nonpecuniary benefit to the private property owner or to the property that results from the recreational activity.
3. A donation of money, goods or services made for the management and conservation of the resources on the property.
4. A payment of not more than \$5 per person per day for permission to gather any product of nature on an owner's property.
5. A payment received from a governmental body.
6. A payment received from a nonprofit organization for a recreational agreement.

(b) The death or injury is caused by the malicious failure of the private property owner or an employee or agent of the private property owner to warn against an unsafe condition on the property, of which the private property owner knew.

(c) The death or injury is caused by a malicious act of the private property owner or of an employee or agent of a private property owner.

(d) The death or injury occurs on property owned by a private property owner to a social guest who has

been expressly and individually invited by the private property owner for the specific occasion during which the death or injury occurs, if the death or injury occurs on any of the following:

1. Platted land.
2. Residential property.
3. Property within 300 feet of a building or structure on land that is classified as commercial or manufacturing under s. 70.32(2)(a)2. or 3.

(e) The death or injury is sustained by an employee of a private property owner acting within the scope of his or her duties.

(7) No duty or liability created. Except as expressly provided in this section, nothing in this section or s. 101.11 nor the common law attractive nuisance doctrine creates any duty of care or ground of liability toward any person who uses another's property for a recreational activity.

895.525. Participation in recreational activities

(1) Legislative purpose. The legislature intends by this section to establish the responsibilities of participants in recreational activities in order to decrease uncertainty regarding the legal responsibility for deaths or injuries that result from participation in recreational activities and thereby to help assure the continued availability in this state of enterprises that offer recreational activities to the public.

(2) Definition. In this section, "recreational activity" means any activity undertaken for the purpose of exercise, relaxation or pleasure, including practice or instruction in any such activity. "Recreational activity" includes hunting, fishing, trapping, camping, bowling, billiards, picnicking, exploring caves, nature study, dancing, bicycling, horseback riding, horseshoe-pitching, bird-watching, motorcycling, operating an all-terrain vehicle, ballooning, curling, throwing darts, hang gliding, hiking, tobogganing, sledding, sleigh riding, snowmobiling, skiing, skating, participation in water sports, weight and fitness training, sight-seeing, rock-climbing, cutting or removing wood, climbing observation towers, animal training, harvesting the products of nature, sport shooting and any other sport, game or educational activity.

(3) Appreciation of risk. A participant in a recreational activity engaged in on premises owned or leased by a person who offers facilities to the general public for participation in recreational activities accepts the risks inherent in the recreational activity of which the ordinary prudent person is or should be aware. In a negligence action for recovery of damages for death, personal injury or property damage, conduct by a participant who accepts the risks under this subsection is contributory negligence, to which the comparative negligence provisions of s. 895.045 shall apply.

(4) Responsibilities of participants. (a) A participant in a recreational activity engaged in on premises owned or leased by a person who offers facilities to the general public for participation in recreational activities is responsible to do all of the following:

1. Act within the limits of his or her ability.
2. Heed all warnings regarding participation in the recreational activity.
3. Maintain control of his or her person and the equipment, devices or animals the person is using while participating in the recreational activity.
4. Refrain from acting in any manner that may cause or contribute to the death or injury to himself or herself or to other persons while participating in the recreational activity.

(b) A violation of this subsection constitutes negligence. The comparative negligence provisions of s. 895.045 apply to negligence under this subsection.

(4m) Liability of contact sports participants. (a) A participant in a recreational activity that includes physical contact between persons in a sport involving amateur teams, including teams in recreational, municipal, high school and college leagues, may be liable for an injury inflicted on another participant during and as part of that sport in a tort action only if the participant who caused the injury acted recklessly or with intent to cause injury.

(b) Unless the professional league establishes a clear policy with a different standard, a participant in an athletic activity that includes physical contact between persons in a sport involving professional teams in a professional league may be liable for an injury inflicted on another participant during and as part of that sport in a tort action only if the participant who caused the injury acted recklessly or with intent to cause injury.

(5) Effect on related provision. Nothing in this section affects the limitation of property owners' liability under s. 895.52.

Enacted in 1983, last amended in 1997.

<http://nxt.legis.state.wi.us/nxt/gateway.dll?f=templates&fn=default.htm&vid=WI:Default&d=stats&jd=895.52>

WYOMING RECREATIONAL USE STATUTE

WYOMING STATUTES

TITLE 34. PROPERTY, CONVEYANCES AND SECURITY TRANSACTIONS
CHAPTER 19. LIABILITY OF OWNERS OF LAND USED FOR RECREATION PURPOSES

34-19-101. Definitions

(a) As used in this act:

(i) "Land" means land, including state land, roads, water, watercourses, private ways and buildings, structures, and machinery or equipment when attached to the realty;

(ii) "Owner" means the possessor of a fee interest, a tenant, lessee, including a lessee of state lands, occupant or person in control of the premises;

(iii) "Recreational purpose" includes, but is not limited to, any one (1) or more of the following: hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, nature study, water skiing, winter sports and viewing or enjoying historical, archaeological, scenic or scientific sites;

(iv) "Charge" means the admission price or fee asked in return for invitation or permission to enter or go upon the land;

(v) "This act" means W.S. 34-19-101 through 34-19-106.

34-19-102. Landowner's duty of care or duty to give warnings

Except as specifically recognized by or provided in W.S. 34-19-105, an owner of land owes no duty of care to keep the premises safe for entry or use by others for recreational purposes, or to give any warning of a dangerous condition, use, structure or activity on such premises to persons entering for recreational purposes.

34-19-103. Limitations on landowner's liability

(a) Except as specifically recognized by or provided in W.S. 34-19-105, an owner of land who either directly or indirectly invites or permits without charge any person to use the land for recreational purposes or a lessee of state lands does not thereby:

(i) Extend any assurance that the premises are safe for any purpose;

(ii) Confer upon the person using the land the legal status of an invitee or licensee to whom a duty of care is owed;

(iii) Assume responsibility for or incur liability for any injury to person or property caused by an act of omission of the person using the land.

34-19-104. Application to land leased to state or political subdivision thereof

Unless otherwise agreed in writing W.S. 34-19-102 and 34-19-103 shall be deemed applicable to the duties and liability of an owner of land leased to the state or any subdivision of this state for recreational purposes.

34-19-105. When landowner's liability not limited

(a) Nothing in this act limits in any way any liability which otherwise exists:

(i) For willful or malicious failure to guard or warn against a dangerous condition, use, structure, or activity, except an owner whose land is adjacent to a national scenic trail designated by the United States congress and who has conveyed an easement across his lands for purposes of a designated national scenic trail shall owe no duty of care to keep the adjacent lands safe or to give any warning of a dangerous condition, use, structure or activity on the adjacent lands. The installation of a sign, other form of warning or modification made to improve safety shall not create liability on the part of an owner of the adjacent land if there is no other basis for liability;

(ii) For injury suffered in any case where the owner of land charges the persons who enter or go on the land for recreational purposes, except that in the case of land leased to the state or a subdivision of this state, any consideration received by the owner for the lease shall not be deemed a charge within the meaning of this section.

34-19-106. Duty of care, not created; duty of care of persons using land

(a) Nothing in this act shall be construed to:

(i) Create a duty of care or ground of liability for injury to persons or property;

(ii) Relieve any person using the land of another for recreational purposes from any obligation which he may have in the absence of this act to exercise care in his use of the land and in his activities on the land, or from the legal consequences of failure to employ such care.

34-19-107. User liability for damages.

Any person using the land of another for recreational purposes, with or without permission, shall be liable for any damage to property, livestock or crops which may be caused by the person while on the property.

Enacted in 1965, last amended in 2005. <http://legisweb.state.wy.us/statutes/compress/title34.doc>

***APPENDIX 2: Sample Motorized Land Trust –
Articles of Incorporation and By-Laws, Snow Country
Trails Conservancy (Michigan snowmobile example)***

ARTICLES OF INCORPORATION

For use by Domestic Nonprofit Corporations

Pursuant to the provisions of Act 162, Public Acts of 1982, the undersigned corporation executes the following Articles:

ARTICLE I

The name of the corporation is: Snow Country Trails Conservancy.

ARTICLE II

The purpose or purposes for which the corporation is organized are: This Corporation is organized for educational and charitable purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code of 1981, as amended, which purposes shall include, without limitation, the enhancement of the State of Michigan snowmobile trail system for use by the general public by promoting and facilitating the expansion and improvement of the existing State of Michigan snowmobile trail system with permanent snowmobile trails, and to do all other things not expressly noted above to promote and encourage the charitable and educational purpose of the Corporation. Notwithstanding any other provision of these Articles, the Corporation shall not carry on any other activities not permitted to be carried on by a corporation exempt from federal income taxation under Section 501(c)(3) of the Internal Revenue Code of 1986, or by a corporation, contributions to which are deductible under Section 170(c)(2) of the Internal Revenue Code of 1986.

ARTICLE III

1. The corporation is organized upon a Nonstock basis.
(Stock or Nonstock)
2. If organized on a stock basis, the total number of shares which the corporation has authority to issue is _____. If the shares are, or are to be, divided into classes, the designation of each class, the number of shares in each class, and the relative rights, preferences and limitations of the shares of each class are as follows:
 3. a. If organized on a nonstock basis, the description and value of its real property assets are: (if none, insert "none") None
 - b. The description and value of its personal property assets are: (if none, insert "none") None
 - c. The corporation is to be financed under the following general plan: Contributions from the general public and grants from governmental and nonprofit and tax exempt organizations
 - d. The corporation is organized on a Directorship basis.
(Membership or Directorship)

ARTICLE IV

1. The address of the registered office is: 5363 Plainfield N. E. Grand Rapids , Michigan 49525
2. The mailing address of the registered office if different than above:
3. The name of the resident agent at the registered office is: William D. Manson, Jr.

ARTICLE V

The name(s) and address(es) of the incorporator(s) is (are) as follows: William D. Manson, Jr., 5363 Plainfield N.E., Grand Rapids, MI 49525

ARTICLE VI

In the event of dissolution or final liquidation of the Corporation, the board of directors shall, after paying or making provision for the payment of all the lawful debts and liability of the Corporation, distribute all the assets of the Corporation to one or more of the following categories of recipients as the board of directors of the Corporation shall determine:

(a) a nonprofit organization or organization that may have been created to succeed the Corporation, as long as such organization shall then qualify as a governmental Unit under section 170(c) of the Internal Revenue Code of 1986 or as an organization exempt from federal income taxation under section 501(a) of such Code as an organization described in section 501(c)(3) of such Code; and/or

(b) a nonprofit organization or organization having similar aims and objects as the Corporation and which may be selected as an appropriate recipient of such assets, as long as such organization shall then qualify as a governmental unit under section 170(c) of the Internal Revenue Code of 1986 or as an organization exempt from federal income taxation under section 501 (a) of such Code as an organization described in section 501 (c)(3) of such Code.

Any assets not disposed of in accordance with this provision shall be disposed of by the circuit court of the county in which the principal office of the Corporation is then located, exclusively for such purposes or to such organization or organizations that the court shall determine and that are organized and operated exclusively for such purposes.

ARTICLE VII

When a compromise, an arrangement, or a plan of reorganization is proposed between this Corporation and its creditors, a court of equity jurisdiction within this state may order a meeting of the affected creditors. The Corporation, a creditor or a receiver appointed for the Corporation may apply to the court for a meeting. The meeting shall be summoned in such manner as the court directs, if a majority in number representing 3/4 in value of the affected creditors agree to a compromise or arrangement, the compromise, arrangement, or reorganization of the Corporation resulting from the compromise or arrangement, if approved by the court, shall be binding on all the creditors and also on this Corporation.

ARTICLE VIII

No member of the board of directors of the Corporation who is a volunteer director, as that term is defined in the Michigan Nonprofit Corporation Act (the "Act"), or a volunteer officer shall not be personally liable to this Corporation for monetary damages for a breach of the director's or officer's fiduciary duty, provided, however, that this provision shall not eliminate or limit the liability of a director or officer for any of the following:

1. a breach of the director's or officer's duty of loyalty to the Corporation;
2. acts Or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;
3. a violation of section 551(1) of the Act;
4. a transaction from which the director or officer derived an improper personal benefit; or
5. an act or omission occurring before the effective date of the provision granting limited liability
6. an act or omission that is grossly negligent.

The Corporation assumes all liability to any person, other than the Corporation, for all acts or omissions of a director who is a volunteer director, as defined in the Act, or a volunteer officer incurred in the good faith performance of the director's or officer's duties. However, the Corporation shall not be

considered to have assumed any liability to the extent that such assumption is inconsistent with the status of the Corporation as an organization described in IRC 501(c)(3) or the corresponding section of any future federal tax code or any state law regulating equine activities.

If the Act is amended after the filing of these Articles of Incorporation to authorize the further elimination or limitation of the liability of directors or officers of nonprofit Corporations, then the liability of members of the board of directors or officers, in addition to that described in this article VIII, shall be assumed by the Corporation or eliminated or limited to the fullest extent permitted by the Act as so amended. Such an elimination, limitation, or assumption of liability is not effective to the extent that it is inconsistent with the status of the Corporation as an organization described in IRC 501(c)(3) or corresponding section of any future federal tax code or any state law regulating equine activities.

ARTICLE IX

The Corporation assumes the liability for all acts or omissions of a volunteer director, volunteer officer and other volunteers, if all of the following conditions are met:

1. The volunteer was acting or reasonably believed he or she was acting within the scope of his or her authority.
2. The volunteer was acting in good faith.
3. The volunteer's conduct did not amount to gross negligence or willful and wanton misconduct.
4. The volunteer's conduct was not an intentional tort.
5. The volunteer's conduct was not a tort arising out of the ownership, maintenance, or use of a motor vehicle for which tort liability may be imposed as provided in section 3135 of the Insurance Code of 1956, Act No. 218 of the Public Acts of 1956, being section 500.3135 of the Michigan Compiled Laws.

However, the Corporation may not be considered to have assumed any liability to the extent that such assumption is consistent with the status of the Corporation as an organization described in section 501 (c)(3) of the Internal Revenue Code of 1986 or corresponding section of any subsequent tax code.

ARTICLE X

The Corporation may indemnify each director and officer, employee, non-director volunteer or agent of the Corporation for all attorney fees, judgments, penalties, fines, settlements and reasonable expenses incurred for acts or omissions to the fullest extent allowed under the Act, provided, however, that the indemnification is consistent with the status of the Corporation as an organization described in section 501(c)(3) of the Internal Revenue Code of 1986 or corresponding section of any subsequent tax code.

Dated: June 26, 2003

William D. Manson, Jr.
Incorporator

SNOW COUNTRY TRAILS CONSERVANCY
a Michigan nonprofit corporation

BY-LAWS

ARTICLE I
OFFICE

Section 1.01 Principal Office. The principal office of the Corporation shall be 5181 Plainfield N.E., Suite C, Grand Rapids, Michigan 49505.

Section 1.02 Other Offices. The Corporation may also have an office or offices in such other place or places as, the business of the Corporation may require and the Board of Directors may from time to time appoint.

ARTICLE II
PURPOSE

Section 2.01 General Purpose. This Corporation is organized for educational and charitable purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code of 1986, as amended, which purposes shall include, without limitation, the enhancement of the State of Michigan snowmobile trail system for use by the general public by promoting and facilitating the expansion and improvement of the existing State of Michigan snowmobile trail system with permanent snowmobile trails and to do all other things not expressly noted above to promote and encourage the charitable and educational purpose of the Corporation.

Section 2.02 Specific Purpose. The snowmobile trail system for the State of Michigan will be expanded and improved by such methods and in such manner as determined by the Board of Directors of the Corporation from time to time, but in all events consistent with, and in furtherance of, the charitable non-profit purpose of the Corporation, including:

- (1) Acquiring title to land that may or may not be existing snowmobile trails and permanently dedicating that land for use as snowmobile trails by the general public;
- (2) Acquiring permanent easements over land that may or may not be under existing temporary easements for snowmobile trails and permanently dedicating those easements for use as snowmobile trails by the general public; and
- (3) Improving signage, intersection infrastructure, safety and funding other capital improvements for existing and new snowmobile trails.

Section 2.03 Use by General Public. All snowmobile trails established by the Corporation, whether by acquiring legal title or the grant of permanent easements, may be donated or dedicated to the State of Michigan, or other organizations tax exempt under Section 501(c)(3) of the Internal Revenue Code, provided that any such donation or dedication shall require the use of the donated snowmobile trails for the benefit of the general public.

ARTICLE III
CORPORATION DIRECTOR BASED

Section 3.01 No Members. The Corporation shall be a non-stock director based nonprofit corporation within the meaning of the Michigan Non-Profit Corporation Act. It shall not have members.

ARTICLE IV DIRECTORS AND LIAISONS

Section 4.01 General Powers. The property and business of the Corporation shall be managed under the direction of the Board of Directors of the Corporation. The Board of Directors shall consist of Directors elected or appointed in accordance with these Bylaws.

Section 4.02 Number and Qualification. The number of Directors shall be not less than five (5) nor more than nine (9). The number of Directors may be increased or decreased by resolution of the Directors. All new Directors shall be appointed by those remaining duly qualified Directors. Persons who would be described in Section 4946(a)(A) or (C) through (G) of the Internal Revenue Code of 1986, as now enacted or as hereafter amended, if this Corporation were a "private Foundation" as defined in Section 509(a) of the Internal Revenue Code of 1986, or as hereafter amended, shall never constitute more than one-third of the Directors of this Corporation; and such persons, together with representatives of banks or trust companies which serve as Directors, investment advisors, custodians, or agents for or with respect to funds of or held for the benefit of this Corporation, shall never constitute more than one-half of the Directors of this Corporation.

Section 4.03 Nomination and Election of Directors. The Board may appoint a Nominating Committee which, if appointed, shall decide upon a slate of proposed Directors to replace vacancies, and shall propose such slate to the Board of Directors at the annual meeting each year. Any Director at the meeting when the nominees are considered may nominate additional person(s) for consideration by the Board of Directors. The Directors shall vote in accordance with Section 4.10 to appoint or not to appoint each person named on the slate of proposed Directors at the annual meeting, or the next convenient meeting.

Section 4.04 Filling of Vacancies. In the case of any vacancy in the Board of Directors through death, resignation, disqualification, removal, or other cause, the vacancy shall be filled for the un-expired portion of the term of the Director whose place is vacant by the recommendation of the Nominating Committee and a proper resolution of the Board of Directors at the next regular meeting of the Directors or at a duly called special meeting for such purpose.

In the event of the replacement of a Director, or if the number of Directors is being increased as provided in these Bylaws, the replacement or additional Directors shall hold office for the balance of the term designated by the Board of Directors.

Section 4.05 Removal. Any Director may be removed from office with or without cause by the affirmative vote of a majority of all Directors then holding office. Such vote shall be taken at a special meeting of Directors properly called for that purpose.

Section 4.06 Place of Meeting. The Board of Directors may hold their meetings and have one or more offices, and shall keep the books of the Corporation, at such place or places as they may from time to time determine by resolution of the Board of Directors. The Board of Directors may hold their meetings by conference telephone or other similar electronic communications equipment in accordance with the provisions of the Michigan Non-Profit Corporation Act.

Section 4.07 Regular Meetings. Regular meetings of the Board of Directors may be held without notice at such time and place as shall from time to time be determined by resolution of the Board, provided that notice of every resolution of the Board fixing or changing the time or place for the holding of regular meetings of the Board shall be given in person with at least three (3) days notice, or may be mailed to each Director at least ten (10) days before the first meeting held pursuant thereto. Any business may be transacted at any regular meeting of the Board of Directors

Section 4.08 Special Meetings. Special meetings of the Board of Directors shall be held whenever called by the President of the Board of Directors or by any three (3) Directors. The Secretary shall give notice of each special meeting of the Board of Directors in person with three (3) days notice or by mailing the same at least ten (10) days prior to the meeting to each Director. Only that business as disclosed in the notice may be transacted at any special meetings. Any Director may in writing waive notice of the time, place, and objectives of any special meeting.

Section 4.09 Quorum. One-half (1/2) of the total number of Directors then in office shall constitute a quorum for the transaction of business at all meetings of the Board of Directors, but, if at any meeting less than a quorum shall be present, a majority of those present may adjourn the meeting from time to time, and the act of a majority of the Directors present at any meeting at which there is a quorum shall be the act of the Board of Directors, except as may be otherwise specifically provided by law or by the Articles of the Corporation or by these Bylaws.

Section 4.10 Voting. All Directors shall be entitled to vote as Directors. An affirmative vote of a majority of the Directors present and entitled to vote at a properly called meeting at which a quorum is present shall be necessary for the passage of any resolution.

Section 4.11 Compensation of Directors. Directors shall not receive any compensation for their services.

Section 4.12 Term Limits. Each duly elected Director will serve a term of three (3) years. Directors may be nominated and elected to serve a maximum of two (2) terms. Directors who are officers or chairperson of a committee may be nominated and elected for a third term.

ARTICLE V OFFICERS AND EXECUTIVE DIRECTOR

Section 5.01 Election, Tenure, and Compensation. The Corporation shall have a President, a Vice President, a Secretary, and a Treasurer, and such other officers, including one or more assistants to the foregoing officers, as the Board of Directors from time to time may consider necessary for the proper conduct of the business of the Corporation. All officers shall be members of the Board of Directors. The officers shall be appointed by the Board of Directors at its June meeting, or at the next convenient monthly meeting.

All officers will serve a two (2) year term. Officers may be re-nominated for a second two (2) year term. Officers will serve for one (1) year term as an Ex-Officio at the end of their final term to facilitate the transition to the new Officer. The Ex-Officio term may be served concurrently with a different Officer term (e.g. Ex-Officio VP-first term President).

Section 5.02 Powers and Duties of the President. The President shall be the chief executive officer of the Corporation and shall have general charge and control of all its business affairs and properties. The President shall preside at all meetings of the Directors. The President may sign and execute all authorized bonds, contracts, or other obligations in the name of the Corporation. The President shall have the general powers and duties of supervision and management usually vested in the office of president of a non-profit corporation. The President shall be ex-officio a member of all committees. The President shall report directly to the Board of Directors.

Section 5.03 General Powers and Duties of the Vice-President. The Board of Directors shall appoint a Vice President and may appoint additional vice presidents. Each Vice-President may sign and execute all authorized bonds, contracts, or other obligations in the name of the Corporation upon proper resolution of the Board, and shall have such other powers and shall perform such other duties as may be

assigned to him or her by the Board of Directors or by the President from time to time. In case of the absence or disability of the President, the duties of that office shall be performed by the Vice-President.

Section 5.04 Secretary. The Secretary shall give, or cause to be given, notice of all meetings of Directors and all other notices required by law or by these Bylaws, and in case of the Secretary's absence or refusal or neglect to do so, any such notice may be given by any person thereunto directed by the President, or by the Directors upon whose written request the meeting is called as provided in these Bylaws. The Secretary shall record all the proceedings of the meetings of the Directors in books provided for that purpose, and shall perform such other duties as may be assigned by the Board of Directors. The Secretary shall perform all other duties generally incident to the office of Secretary, subject to the control of the Board of Directors.

Section 5.05 Treasurer. The Treasurer shall have custody of all the funds and securities of the Corporation, and the Treasurer shall keep full and accurate account of receipts and disbursements in books belonging to the Corporation. The Treasurer shall deposit all moneys and other valuables in the name and to the credit of the Corporation in such depository or depositories as may be designated by the Board of Directors.

(1) The Treasurer shall disburse the funds of the Corporation as may be ordered by the Board of Directors, taking proper vouchers for such disbursements. The Treasurer shall render to the President and the Board of Directors, whenever either of them so requests, an account of all the transactions as Treasurer and of the financial condition of the Corporation.

(2) The Treasurer shall give the Corporation a bond, if required by the Board of Directors, in a sum, and with one or more sureties, satisfactory to the Board of Directors, for the faithful performance of the duties of the office and for the restoration to the Corporation in case of death, resignation, retirement, or removal from office of all books, papers, vouchers, moneys, and other properties of whatever kind in the Treasurer's possession or control belonging to the Corporation.

(3) The Treasurer shall perform all other duties generally incident to the office of the Treasurer, subject to the control of the Board of Directors.

(4) The Treasurer of the Corporation will be responsible for the financial books and records, the Corporation's relationship with its accountants, banks and financial institutions, applicable insurance, payables and all other activities relating to the financial operations of the Corporation. The Treasurer will present a monthly statement of the Corporation's cash flow, fund balances and grants payable to each regularly scheduled meeting of the Board. In addition the Treasurer will be responsible for coordinating the annual review of the Corporation's books and records and their presentation to the Board of Directors.

Section 5.06 Executive Director. The Board of Directors may appoint an Executive Director. The Executive Director shall not be a Director nor an officer of the Corporation, but shall be an employee of the Corporation. The primary duty of the Executive Director shall be to assist all officers of the Corporation in the performance of their duties to the Corporation, and shall also perform such other duties and responsibilities as may be assigned by the President from time to time. The Executive Director shall report directly to the President.

Section 5.07 Resignations. Any officer may resign at any time by giving written notice of his or her resignation to the Board of Directors, to the President or the Secretary of the Corporation. Any such resignation shall take effect at the time specified therein; and, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

Section 5.08 Removal. Any officer may be removed, with or without cause, by resolution of the Board of Directors at a regularly scheduled meeting of the Board, or at a special meeting called for that purpose, and such purpose shall be stated in the notice of such special meeting.

Section 5.09 Vacancies. A vacancy in any office because of death, resignation, removal or any other cause shall be filled for the unexpired portion of the term by resolution of the Board of Directors.

Section 5.10 Other Officers. The Corporation may have such other officers and agents as may be deemed necessary by the Board of Directors, who shall be appointed in such manner, have such duties and hold their offices for such terms as may be determined by resolution of the Board of Directors.

Section 5.11 Other Agents. The Board of Directors may establish a body of other agents to assist in the development and operation of the Corporation. The agents may be appointed by the Board of Directors in any number the Directors may from time to time deem necessary. The agents shall not be Directors, shall have no vote in Corporation matters and shall have no authority to effect Corporation policy.

ARTICLE VI COMMITTEES

Section 6.01 Committees. The Board of Directors may, by proper resolution, designate one or more committees, each committee to consist of one or more of the Directors of the Corporation and such other persons as selected by the Board, which, to the extent provided in the resolution, shall have and may exercise the powers of the Board of Directors. The Board of Directors shall establish by resolution the scope of responsibilities for each committee and each such committee shall at all times be subject to the direction of the Board of Directors, provided that no committee shall have the power to:

- (1) Amend the articles of incorporation;
- (2) Adopt an agreement of merger or consolidation;
- (3) Amend the bylaws of the Corporation; or
- (4) Fill vacancies on the Board.

Section 6.02 Nominating Committee. The President may recommend to the Board of Directors the members of the Nominating Committee, all of which shall be Directors. The President shall be a standing member of the Nominating Committee. The Nominating Committee shall not exceed three (3) persons and each (other than the President) shall serve a three (3) year staggered term. The Nominating Committee shall have the responsibility to establish criteria for nomination (each criterion to be approved by resolution of the Board), and to nominate all Directors, officers and chairperson of all committees. The Nominating Committee shall be selected by the Board of Directors at a regular meeting of the Board of Directors.

Section 6.03 Miscellaneous. A member of the Board of Directors shall sit as the chairperson of each committee. Individuals other than Directors may be members of committees. The chairman of each committee may establish the time for its regular meetings and may change that time as he or she deems advisable. Special meetings of any committee of this Corporation may be called by the chairperson of that committee or by the President. Notice thereof shall be given in accordance with these Bylaws. At all meetings of any committee of this Corporation each committee member thereof shall be entitled to cast one vote on any question coming before such meeting. The presence of one-third of the membership of any committee of this Corporation shall constitute a quorum at any meeting thereof but the members of a committee present at any of such committee meeting, although less than a quorum, may adjourn the

meeting. A majority vote of the members of a committee of the Corporation present at any meeting thereof, if there be a quorum, shall be sufficient for the transaction of the business of such committee. All action of committees shall be subject to the approval of the Board of Directors.

ARTICLE VII POLICIES WITH RESPECT TO ASSETS AND RELATED MATTERS

Section 7.01 No Self-Dealing. It shall be the policy of the Corporation that the Corporation shall not engage in any act which would constitute "self-dealing" as defined in Section 4941 (d) of the Internal Revenue Code of 1986, as now enacted or as hereafter amended, if the Corporation were a "private foundation" as defined in Section 509(a) of the Internal Revenue Code of 1986, as now enacted or as hereafter amended.

Section 7.02 No Jeopardy Investments. It shall be the policy of the Corporation to assure that no funds, whether title thereto is vested in the Corporation or is vested in a Director of a trust for the benefit of the Corporation, are invested or reinvested in such a manner as to jeopardize this carrying out the purposes for which the Corporation is organized.

Section 7.03 Expenditure Responsibility. It shall be the policy of the Corporation that the Corporation, through its Board of Directors, will exercise "expenditure responsibility", as defined in Section 4945(h)(1) and (2) of the Internal Revenue Code of 1986, as now enacted or as hereafter amended, with respect to all grants and distributions made by the Corporation which would otherwise constitute a "taxable expenditure" as defined in Section 4945(d)(4) of the Internal Revenue Code of 1986, as now enacted or as hereafter amended, if the Corporation were a "private foundation".

ARTICLE VIII BOOKS OF RECORD, AUDIT, FISCAL YEAR, NOTICE

Section 8.01 Fiscal Year. The fiscal year of the Corporation shall end as of December 31 of each calendar year.

Section 8.02 Notices. Whenever, under the provisions of these Bylaws, notice is required to be given to any Director, officer, or member, unless otherwise provided, it shall not be construed to mean personal notice, but such notice shall be given in writing, by mail, by depositing the same in a post office or letter box, in a postpaid sealed wrapper, addressed to each member officer or Director at such address as appears on the books of the Corporation, or in default of any other address, to such Director, officer or member at the general post office in the City of Grand Rapids, Michigan, and such notice shall be deemed to be given at the time the same shall be thus mailed. Any member, Director or officer may waive any notice required to be given under these Bylaws. Whenever any notice whatsoever is required to be given by these Bylaws or any of the corporate laws of the State of Michigan, such notice may be waived in writing, signed by the person or persons entitled to said notice, whether before, at, or after the time stated therein, or before, or at the meeting.

Section 8.03 Books and Records. The Board of Directors of the Corporation shall cause to be kept:

- (1) records of all proceedings of Directors, and Committees; and
- (2) such other records and books of account as shall be necessary and appropriate to the conduct of the corporate business.

Section 8.04 Documents Kept at Registered Office. The Board of Directors shall cause to be kept at the registered office of the Corporation originals or copies of:

- (1) records of all proceedings of Directors, and committees;
- (2) all financial statements of the Corporation; and
- (3) Articles of Incorporation and Bylaws of this and all amendments thereto and restatements thereof.

Section 8.05 Audit and Publication. The Board of Directors may, in its discretion, cause the records and books of account of the Corporation to be reviewed or audited at least once in each fiscal year in such a manner as may be deemed necessary or appropriate, and also shall make such inquiry as the Board of Directors deems necessary and advisable into the condition of all trusts and funds held by any Director, agent, or custodian for the benefit of the Corporation, and shall retain such person or firm for such purposes as it may deem appropriate. No later than six (6) months after the close of each fiscal year of the Corporation, the Board of Directors of the Corporation shall, if determined necessary or appropriate by the Board of Directors, cause its financial statement to be published in one or more local newspapers having general circulation and distribution, as may be selected by the Board of Directors.

ARTICLE IX EARNINGS TO BENEFIT CORPORATION, DISSOLUTION OF CORPORATION

Section 9.01 Earning Inure to the Benefit of the Purpose of the Corporation. No part of the net earnings of the Corporation shall inure to the benefit or be distributable to, its members, Directors, officers, or other private persons except that the Corporation shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distribution in furtherance of the purpose as set forth in Article II hereof. No substantial part of the activities of the Corporation shall be the carrying on of propaganda or otherwise attempting to influence legislation, and the Corporation shall not participate in, or intervene in (including the publishing or distribution of statements) any political campaign on behalf of any candidate for public office. Notwithstanding any other provision of these Articles, the Corporation shall not carry on any other activities not permitted to be carried on by (1) a corporation exempt from Federal income tax under Section 501(c)(3) of the Internal Revenue Code or any corresponding future section, or (2) by a corporation, contributions to which are deductible under Section 170(c)(2) of the Internal Revenue Code or any corresponding future section.

ARTICLE X INDEMNIFICATION

10.01 Nonderivative Actions. Subject to all of the other provisions of this Article, the Corporation shall indemnify any person who was or is a party, or is threatened to be made a party to, any threatened, pending, or completed action, suit, or proceeding. This includes any civil, criminal, administrative, or investigative proceeding, whether formal or informal (other than an action by or in the right of the Corporation). Such indemnification shall apply only to a person who was or is a director or officer of the Corporation or is or was serving at the request of the Corporation as a director, officer, partner or trustee of another foreign or domestic corporation, business corporation, partnership, joint venture, trust or other enterprise, whether for profit or not for profit. The person shall be indemnified and held harmless against expenses (including attorney fees), judgments, penalties, fines, and amounts paid in settlement actually and reasonably incurred by the person in connection with such action, suit, or proceeding, if the person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the Corporation. With respect to any criminal action or proceeding, the person must have had no reasonable cause to believe his or her conduct was unlawful. The termination of any action, suit, or proceeding by judgment, order, settlement, or conviction or on a plea of nolo contendere or its equivalent, shall not by itself create a presumption that (a) the person did not act in good

faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the Corporation, or (b) with respect to any criminal action or proceeding, the person had reasonable cause to believe that his or her conduct was unlawful.

10.02 Derivative Actions. Subject to all of the provisions of this Article, the Corporation shall indemnify any person who was or is a party to, or is threatened to be made a party to, any threatened, pending, or completed action or suit by or in the right of the corporation to procure a judgment in its favor because (a) the person was or is a director or officer of the Corporation, or is or was serving at the request of the Corporation as director, officer, partner or trustee of another foreign or domestic corporation, business corporation, partnership, joint venture, trust or other enterprise whether for profit or not. The person shall be indemnified and held harmless against expenses (including actual and reasonable attorney fees) and amounts paid in settlement incurred by the person in connection with such action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the Corporation. However, indemnification shall not be made for any claim, issue, or matter in which the person has been found liable to the Corporation unless and only to the extent that the court in which such action or suit was brought has determined on application that, despite the adjudication of liability but in view of all circumstances of the case, the person is fairly and reasonably entitled to indemnification for the expenses that the court considers proper.

10.03 Expenses of Successful Defense. To the extent that a person has been successful on the merits or otherwise in defense of any action, suit, or proceeding referred to in Sections 10.01 or 10.02 of this Article, or in defense of any claim, issue, or matter in the action, suit, or proceeding, the person shall be indemnified against expenses (including actual and reasonable attorney fees) incurred in connection with the action and in any proceeding brought to enforce the mandatory indemnification provided by this Article.

10.04 Contract Right; Limitation on Indemnity. The right to indemnification conferred in this Article shall be a contract right and shall apply to services of a director or officer as an employee or agent of the Corporation as well as in such person's capacity as a director or officer. Except as provided in Section 10.03 of this Article, the Corporation shall have no obligations under this Article to indemnify any person in connection with any proceeding, or part thereof, initiated by such person without authorization by the Board.

10.05 Determination That Indemnification Is Proper. Any indemnification under Sections 10.01 or 10.02 of this Article (unless ordered by a court) shall be made by the corporation only as authorized in the specific case. The Corporation must determine that indemnification of the person is proper in the circumstances because the person has met the applicable standard of conduct set forth in Sections 10.01 or 10.02, whichever is applicable. Such determination shall be made in any of the following ways:

- (1) By a majority vote of a quorum of the Board consisting of Directors who were not parties to such action, suit, or proceeding.
- (2) If the quorum described in clause (a) above is not obtainable, then by a committee of Directors who are not parties to the action. The committee shall consist of not less than two disinterested Directors.
- (3) By independent legal counsel in a written opinion.

10.06 Proportionate Indemnity. If a person is entitled to indemnification under Sections 10.01 or 10.02 of this Article for a portion of expenses, including attorney fees, judgments, penalties, fines, and amounts paid in settlement, but not for the total amount, the corporation shall indemnify the person for

the portion of the expenses, judgments, penalties, fines, or amounts paid in settlement for which the person is entitled to be indemnified.

10.07 Expense Advance. Expenses incurred in defending a civil or criminal action, suit, or proceeding described in Sections 10.01 or 10.02 of this Article may be paid by the corporation in advance of the final disposition of the action, suit, or proceeding, on receipt of an undertaking by or on behalf of the person involved to repay the expenses, if it is ultimately determined that the person is not entitled to be indemnified by the Corporation. The undertaking shall be an unlimited general obligation of the person on whose behalf advances are made, but need not be secured.

10.08 Nonexclusivity of Rights. The indemnification or advancement of expenses provided under this Article is not exclusive of other rights to which a person seeking indemnification or advancement of expenses may be entitled under a contractual arrangement with the Corporation. However, the total amount of expenses advanced or indemnified from all sources combined shall not exceed the amount of actual expenses incurred by the person seeking indemnification or advancement of expenses.

10.09 Indemnification of Employees and Agents of the Corporation. The Corporation may, to the extent authorized from time to time by the Board, grant rights to indemnification and to the advancement of expenses to any employee or agent of the Corporation to the fullest extent of the provisions of this Article with respect to the indemnification and advancement of expenses of directors and officers of the Corporation.

10.10 Former Directors and Officers. The indemnification provided in this Article continues for a person who has ceased to be a director or officer and shall inure to the benefit of the heirs, executors, and administrators of that person.

10.11 Insurance. The Corporation may purchase and maintain insurance on behalf of any person who (a) was or is a director, officer, employee, or agent of the Corporation, or (b) was or is serving at the request of the Corporation as a director, officer, employee, or agent of another corporation, partnership, joint venture, trust, or other enterprise. Such insurance may protect against any liability asserted against the person and incurred by him or her in any such capacity or arising out of his or her status as such, whether or not the Corporation would have power to indemnify against such liability under this Article or the laws of the state of Michigan.

10.12 Changes in Michigan Law. If there are any changes in the Michigan statutory provisions applicable to the Corporation and relating to the subject matter of this Article, then the indemnification to which any person shall be entitled shall be determined by such changed provisions, but only to the extent that any such change permits the Corporation to provide broader indemnification rights than such provisions permitted the Corporation to provide before any such change.

ARTICLE XI AMENDMENTS

The Board of Directors may amend the Corporation's Articles of Incorporation, as amended or restated from time to time, and these Bylaws, as amended or restated from time to time, to include or omit any provision that could be lawfully included or omitted at the time the amendment is made. Any number of amendments, or an entire revision or restatement of the Articles of Incorporation or Bylaws, either may be submitted for discussion purposes at any regular or special meeting called for that purpose. The amendment or amendments may be voted upon at the next regular or special meeting of the Board of Directors provided however that no such meeting be had sooner than two (2) weeks after the amendments are presented for discussion. No amendment may be presented and voted upon in a single meeting.

Amendments shall be adopted at a meeting of the Board of Directors, a quorum being present, upon receiving the affirmative vote of not less than two-thirds of the whole number of Directors of the Corporation or may be adopted, by a writing signed by all of the Directors of the Corporation; provided, however, that no amendment of Article II of the Articles of Incorporation shall be made if such amendment would cause the Corporation to lose its tax exempt status under Section 501(c)(3) of the Internal Revenue Code of 1986, as amended.

CERTIFICATE OF ADOPTION

The undersigned is the President of the Snow Country Trails Conservancy and hereby certifies that these Bylaws were duly adopted by an appropriate majority vote of the Board of Directors present at a duly called meeting of the Board of Directors.

Dated: June 26, 2003

William D. Manson, Jr., President

Attention Snowmobilers Everywhere ... and All the Ships at Sea

by Jim Duke



Last year, (L to R) Bill Manson received a \$20,000 check from Brad Potter on behalf of the Flat River Snowmobile Club. The club has now issued a challenge to all snowmobilers. The club will match up to \$32,000 in donations made to the Snow Country Trails Conservancy.

It has long been the dream of snowmobilers everywhere to have a permanent trail system that was not subject to reroutes every year because of timber sales, the loss of easements from private property owners or any number of other reasons. Regardless of the cause, the result is always the same. Your current maps are no longer valid. Your travel time and distance is altered, and usually your snowmobiling experience is less enjoyable because of it.

Several years ago, various organized snowmobile groups united under the name of Snow Country Trails Conservancy (SCTC). The SCTC has been feverishly laboring to remedy the situation. Some progress has been made, but there's still much yet to do. There have been several instances where large tracts of land became available for sale and the possibility of purchasing permanent corridors through them, prior to the total sale was discussed. Unfortunately, when the SCTC coffers are near empty and the demand for "cash up front" is the only avenue, negotiations break down and these corridors are lost. Many times, there are designated trails crossing these tracts and, once sold, those trails are lost as well.

Money Talks

What can we as individual snowmobilers, clubs or councils do about it? We can come to the aid of the Conservancy with financial contributions. It is a proven fact that money talks. These days it seems that every other organization in the national has their hand out for donations while offering you little in return.

Well, SCTC is also looking for contributions, but they are offering the possibility of permanent trails for your hard earned donations. Thanks to the positive donation, \$20,000 from the Flat River Snowmobile Club (FRSC), and their challenge to all snowmobilers everywhere, the SCTC has a bright future ahead.

A Challenge Issued

Here's the challenge. For a limited time only, the Flat River Snowmobile Club will match every donation to the SCTC, dollar for dollar, up to \$32,000. Why are they being so generous? Well, FRSC

Here's the challenge. For a limited time only, the Flat River Snowmobile Club will match every donation to the SCTC, dollar for dollar, up to \$32,000.

directors Brad Potter and Ed Marshall explained it in this way. Due to the declining membership and the increasing age of those members still active, it was decided to dissolve the Flat River Snowmobile Club. Those wishing to continue to enjoy snowmobiling can join other local clubs. The club's 501 (c) (3) status requires that, upon dissolution, all assets be distributed to other nonprofit organizations.

Because of their enthusiasm for snowmobile activities and the many friendships they've fostered during the club's existence, members unanimously voted to consider the snowmobiler's needs first. Their pledge to match donations from other snowmobilers — clubs and councils — dollar for dollar will provide the means for all snowmobilers who ride Michigan trails to take

advantage of this generous offer and effectively "double" their donation. Whether it's \$10 or a \$100, they have pledged to match up to \$32,000.

Flat River Snowmobile Club officials haven't placed a firm time limit on the length of this offer, but have indicated that all club transactions must be completed prior to the end of the year. They also indicated that if there is no interest shown by snowmobilers to accept their challenge, there are many other worthy organizations in need that will be considered.

Recognizing the Flat River Snowmobile Club

The Snow Country Trails Conservancy and the Michigan Snowmobile Association wish to extend a huge thank you to all the members of the Flat River Snowmobile Club for last year's generous \$20,000 contribution and the opportunity for all snowmobilers to take part in the procurement of permanent snowmobile trails through the FRSC Challenge.

SCTC President Bill Manson would like to remind everyone that all donations are tax deductible and that checks should be made payable to the SCTC or Snow Country Trails Conservancy. Donations can be mailed to SCTC President Bill Manson at the MSA office, 4336 Plainfield Ave., N.E. Suite F, Grand Rapids, MI 49525. *

APPENDIX 3: Sample Motorized Land Trust – Policies and Operating Plans, Connecticut Open Access Land Trust, Inc. (COALT) [OHV example]

Connecticut Open Access Land Trust, Inc. (COALT) Policy on Property Management Plans

(Adopted October 24, 2006)

1. Completion of **Pre-Assessment of Property Form** shall be a prerequisite of any management plan for COALT property.
2. Whenever possible, professional and technical input shall be sought commensurate with COALT’s resources, mission, and the particular needs of the property.
3. Each COALT parcel shall have a **Land Manager**. The “Duties of a COALT Land Manager” document shall be incorporated into this Policy.
4. Each COALT parcel shall have a Land Monitoring Committee (LMC). The “Land Monitoring Committee Guidelines” shall be incorporated into this Policy.
4. The **Property Management Plan** proposal shall consist of the following:
 - a. **Potential uses** of the property.
 - b. **Specific needs** (prioritized in some manner).
 - c. An **Action Plan** and recommended **Timetable** for completion.
 - d. **Asset requirements** (money, labor, tools, resources, specialists, etc. needed).
5. Each **Property Management Plan** proposal shall be submitted in timely fashion to the COALT Board of Directors for review and a final decision. When approved by the Board, the **Property Management Plan** shall be the guidance document for that COALT property.
6. The COALT Board shall coordinate through the **Land Manager** several **Action Plans** including timetables and resource allocations. Reports on monitoring activities shall be communicated to the Board in a timely fashion and entered periodically into the COALT minutes.
7. **Property Management Plans** shall be reviewed every two years by the Board of Directors at its last meeting of the fiscal year.

Duties of a COALT Land Manger

The COALT Board of Directors shall appoint all Land Managers.

Managers shall serve indefinitely, unless replaced or removed by the Board with or without cause or by resignation.

In selecting a Manager, the COALT Board shall consider:

- The proximity of the person’s home to the property; and
- The person’s enthusiasm, willingness and ability to serve as Manager.

The COALT Board may appoint co-Managers and/or assistant Managers as necessary. Managers shall form their own Land Monitoring Committees (LMC) and shall serve as Chair of the LMC.

The following are the General Duties of a Land Manager:

1. Become familiar with the particular parcel of land.
2. Prepare a Land Monitoring Report at the end of each season.
3. Recommend and/or make improvements such as clearing, cutting trails, logging, surveying, etc.
4. Recommend to the Board the acquisition of abutting parcels of property.

5. Coordinate special events such as clean-ups, brush removal, cuts, maintenance, etc.
6. Coordinate and present to the Board short-term use of the property by individuals or groups.
7. Recommend to the Board establishment of a long term use or lease of the property.
8. Establish good relationships with the Town, neighbors, and abutting landowners. Maintain regular and open conversation.
9. Recommend changes of this document and related documents and/or forms to the Board.

If you are interested in becoming a Land Manager, please contact the Land Use, Management and Legislative Director by email at LUdirector@coalt.org.

**Connecticut Open Access Land Trust, Inc. (COALT)
Land Monitoring Committee (LMC)
Guidelines**

(Board approved October 2006)

1. There shall be a LMC for each COALT property. A Land Manager shall be appointed by the Board to serve as Chair of the LMC. Land Managers shall report to the Land Use, Management and Legislative Director.
2. Each LMC shall consist of at least one member who lives near the property, preferably the Land Manager.
3. The purpose of the LMC shall be to pre-assess and monitor the property and prepare a Property Management Plan, ensure the property's condition is in keeping with COALT's mission and meets the standard of Tread Lightly!® principles or another similar organization. The LMC shall review the condition of the property at the end of each season and complete a Land Monitoring Report for the COALT Board of Directors. The Board of Directors will then consider and decide if a course of action is warranted.
4. The content of the Pre-Assessment of Property Form and the Land Monitoring Report Forms shall be reviewed from time to time by the Board but shall include the date, time, personnel involved and the path the walk-around took and what was observed. In particular any changes from previous observations or reports shall be noted. Any recommendations for the property such as remediation or future uses shall be made where appropriate. Use of maps, plot plans, GPS devices, and photographs should be encouraged.
5. Records from the COALT Archives shall be duplicated and given to the LMC whenever possible such as: previous LMC reports, maps, plot plans, deeds, aerial photos, topographical maps, GPS data, and photographs so that the LMC may make clear and valid data comparisons and meaningful observations.

**Connecticut Open Access Land Trust, Inc. (COALT)
Land Monitoring Report**

Property Name/Description: _____

Land Manager: _____

Are signs and boundary markers posted and in good condition? Yes ___ No ___

Does the general public frequent the property? (Estimate usage) _____

Are trails cleared and marked? Yes _____ No _____

Did you see any problems or evidence of the following and describe where:

_____ Hunting _____

_____ Vandalism _____

_____ Erosion, Flooding _____

_____ Litter, Trash, Dumping _____

_____ Camping, Partying, Fires _____

_____ Safety Hazards _____

_____ Other (Explain) _____

Monitor Comments and Observations: _____

Suggestions for improvements: _____

Monitor Name: _____ Date of Inspection: _____

Return to: COALT, Land Use Director, PO Box 118, Woodbridge, CT 06798-0118

Connecticut Open Access Land Trust, Inc. (COALT)
Form for *Pre-Assessment of Property*

1. Property reviewed: _____
2. Date: _____ Time: _____
Weather conditions: _____ Name: _____
3. COALT volunteers involved: _____

4. Describe the area and any evidence of recreational, illegal, or dumping activity. Were boundary markers evident?

5. Was there any evidence of damage from natural events? Do you have any recommendations for the COALT Board to consider? _____

6. Based upon observed natural resources and conditions of the property what is the best use of this property in the future? _____

7. What was the specific focus of this assessment and what is your recommendation? _____

8. Did you meet with any neighbors and if so, did they have any concerns or have they observed anyone or any animals on the property? _____

9. Any other remarks you feel are pertinent or you want to make? _____

APPENDIX 4: Minnesota Forests for the Future Program – Authorizing State Legislation

(Note: A report with additional information about the Forests for the Future Program can be found at <http://www.dnr.state.mn.us/forestlegacy/index.html>.)

Section 1. **[84.66] MINNESOTA FORESTS FOR THE FUTURE PROGRAM.**

Subdivision 1. **Purpose.** The Minnesota forests for the future program identifies and protects private, working forest lands for their timber, scenic, recreational, fish and wildlife habitat, threatened and endangered species, and other cultural and environmental values.

Subd. 2. **Definitions.** For the purpose of this section, the following terms have the meanings given:

- (1) "forest land" has the meaning given under section 89.001, subdivision 4;
- (2) "forest resources" has the meaning given under section 89.001, subdivision 8;
- (3) "guidelines" has the meaning given under section 89A.01, subdivision 8;
- (4) "riparian land" has the meaning given under section 103F.511, subdivision 8a; and
- (5) "working forest land" means land that provides a broad range of goods and services, including forest products, recreation, fish and wildlife habitat, clean air and water, and carbon sequestration.

Subd. 3. **Establishment.** The commissioner shall establish and administer a Minnesota forests for the future program. Land selected for inclusion in the program shall be evaluated on the land's potential for:

- (1) producing timber and other forest products;
- (2) maintaining forest landscapes;
- (3) providing public recreation; and
- (4) providing ecological, fish and wildlife habitat, other cultural 2.1 and environmental values, and values consistent with working forest lands.

Subd. 4. **Land eligibility.** Land may be placed in the Minnesota forests for the future program if it:

- (1) is:
 - (i) forest land;
 - (ii) desirable land adjacent to forest land, as determined by the commissioner; or
 - (iii) beneficial to forest resource protection;
- (2) is at least five acres in size, except for a riparian area or an area providing access to state forest land; and
- (3) is not set aside, enrolled, or diverted under another federal or state program, unless enrollment in the Minnesota forests for the future program would provide additional conservation benefits or a longer enrollment term than under the current federal or state program.

Subd. 5. **Land interests.** The commissioner may acquire permanent interests in lands by fee title, easement acquisition, gift, or donation. An acquired easement shall require a forestry management plan unless such requirement is waived or modified by the commissioner. The plan will guide forest management activities consistent with the purposes and terms of the easement and shall incorporate guidelines and other forest management practices as determined by the commissioner to provide perpetuation of the forest. The plan shall be developed in accordance with the guidelines.

Subd. 6. **Application.** The commissioner shall accept applications from owners of eligible lands at such time, in such form, and containing such information as the commissioner may prescribe. If the number of applications exceeds the ability to fund them all, priority shall be given to those applications covering lands providing the greatest public benefits for timber productivity, public access, and ecological and wildlife values.

Subd. 7. **Landowner responsibilities.** The commissioner may enroll eligible land in the program by signing an easement in recordable form with a landowner in which the landowner agrees to:

(1) convey to the state a permanent easement that is not subject to any prior title, lien, or encumbrance; and

(2) manage the land in a manner consistent with the purposes for which the land was selected for the program and not convert the land to other uses.

Subd. 8. **Correction of easement boundary lines.** To correct errors in legal descriptions for easements that affect the ownership interests in the state and adjacent landowners, the commissioner may, in the name of the state, convey without consideration, interests of the state necessary to correct legal descriptions of boundaries. The conveyance must be by quitclaim deed or release in a form approved by the attorney general.

Subd. 9. **Terminating or changing an easement.** The commissioner may terminate an easement, with the consent of the property owner, if the commissioner determines termination to be in the public interest. The commissioner may modify the terms of an easement if the commissioner determines that modification will help implement the Minnesota forests for the future program or facilitate the program's administration.

Subd. 10. **Payments.** Payments to landowners under the Minnesota forests for the future program shall be made in accordance with law and Department of Natural Resources acquisition policies, procedures, and other funding requirements.

Subd. 11. **Monitoring, enforcement, and damages.** (a) The commissioner shall establish a long-term program for monitoring and enforcing Minnesota forests for the future easements.

(b) A landowner who violates the terms of an easement under this section or induces, assists, or allows another to do so is liable to the state for damages due to the loss of timber, scenic, recreational, fish and wildlife habitat, threatened and endangered species, and other cultural and environmental values.

(c) Upon request of the commissioner, the attorney general may commence an action for specific performance, injunctive relief, damages, including attorney's fees, and any other appropriate relief to enforce this section in district court in the county where all or part of the violation is alleged to have been committed or where the landowner resides or has a principal place of business.

Subd. 12. **Rulemaking exemption.** Easements agreed to under this section are not subject to the rulemaking provisions of chapter 14 and section 14.386 does not apply.

APPENDIX 5: The National Environmental Policy Act of 1969 (NEPA), as amended

(Public Law 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982)

An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,
That this Act may be cited as the "National Environmental Policy Act of 1969."

Purpose

Sec. 2 [42 USC § 4321]. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

CONGRESSIONAL DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

Sec. 101 [42 USC § 4331].

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Sec. 102 [42 USC § 4332]. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

(i) the State agency or official has statewide jurisdiction and has the responsibility for such action,

(ii) the responsible Federal official furnishes guidance and participates in such preparation,

(iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts, prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this Act; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by title II of this Act.

Sec. 103 [42 USC § 4333]. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

Sec. 104 [42 USC § 4334]. Nothing in section 102 [42 USC § 4332] or 103 [42 USC § 4333] shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

Sec. 105 [42 USC § 4335]. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

Sec. 201 [42 USC § 4341]. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

Sec. 202 [42 USC § 4342]. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President

shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, aesthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

Sec. 203 [42 USC § 4343].

(a) The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

(b) Notwithstanding section 1342 of Title 31, the Council may accept and employ voluntary and uncompensated services in furtherance of the purposes of the Council.

Sec. 204 [42 USC § 4344]. It shall be the duty and function of the Council --

- a. to assist and advise the President in the preparation of the Environmental Quality Report required by section 201 [42 USC § 4341] of this title;
- a. to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;
- a. to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;
- a. to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;
- a. to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;
- a. to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;
- a. to report at least once each year to the President on the state and condition of the environment; and
- a. to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

Sec. 205 [42 USC § 4345]. In exercising its powers, functions, and duties under this Act, the Council shall --

1. consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order No. 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and
2. utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

Sec. 206 [42 USC § 4346]. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates [5 USC § 5313]. The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates [5 USC § 5315].

Sec. 207 [42 USC § 4346a]. The Council may accept reimbursements from any private nonprofit organization or from any department, agency, or instrumentality of the Federal Government, any State, or local government, for the reasonable travel expenses incurred by an officer or employee of the Council in connection with his attendance at any conference, seminar, or similar meeting conducted for the benefit of the Council.

Sec. 208 [42 USC § 4346b]. The Council may make expenditures in support of its international activities, including expenditures for: (1) international travel; (2) activities in implementation of international agreements; and (3) the support of international exchange programs in the United States and in foreign countries.

Sec. 209 [42 USC § 4347]. There are authorized to be appropriated to carry out the provisions of this chapter not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

The Environmental Quality Improvement Act, as amended (Pub. L. No. 91- 224, Title II, April 3, 1970; Pub. L. No. 97-258, September 13, 1982; and Pub. L. No. 98-581, October 30, 1984.

42 USC § 4372.

(a) There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality (hereafter in this chapter referred to as the "Office"). The Chairman of the Council on Environmental Quality established by Public Law 91-190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate.

(b) The compensation of the Deputy Director shall be fixed by the President at a rate not in excess of the annual rate of compensation payable to the Deputy Director of the Office of Management and Budget.

(c) The Director is authorized to employ such officers and employees (including experts and consultants) as may be necessary to enable the Office to carry out its functions ;under this chapter and Public Law 91-190, except that he may employ no more than ten specialists and other experts without regard to the provisions of Title 5, governing appointments in the competitive service, and pay such specialists and experts without regard to the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates, but no such specialist or expert shall be paid at a rate in excess of the maximum rate for GS-18 of the General Schedule under section 5332 of Title 5.

(d) In carrying out his functions the Director shall assist and advise the President on policies and programs of the Federal Government affecting environmental quality by --

1. providing the professional and administrative staff and support for the Council on Environmental Quality established by Public Law 91- 190;
2. assisting the Federal agencies and departments in appraising the effectiveness of existing and proposed facilities, programs, policies, and activities of the Federal Government, and those specific major projects designated by the President which do not require individual project authorization by Congress, which affect environmental quality;
3. reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;
4. promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encouraging the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;
5. assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;
6. assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established throughout the Federal Government;
7. collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation.

(e) The Director is authorized to contract with public or private agencies, institutions, and organizations and with individuals without regard to section 3324(a) and (b) of Title 31 and section 5 of Title 41 in carrying out his functions.

42 USC § 4373. Each Environmental Quality Report required by Public Law 91-190 shall, upon transmittal to Congress, be referred to each standing committee having jurisdiction over any part of the subject matter of the Report.

42 USC § 4374. There are hereby authorized to be appropriated for the operations of the Office of Environmental Quality and the Council on Environmental Quality not to exceed the following sums for the following fiscal years which sums are in addition to those contained in Public Law 91- 190:

- (a) \$2,126,000 for the fiscal year ending September 30, 1979.
- (b) \$3,000,000 for the fiscal years ending September 30, 1980, and September 30, 1981.
- (c) \$44,000 for the fiscal years ending September 30, 1982, 1983, and 1984.
- (d) \$480,000 for each of the fiscal years ending September 30, 1985 and 1986.

42 USC § 4375.

(a) There is established an Office of Environmental Quality Management Fund (hereinafter referred to as the "Fund") to receive advance payments from other agencies or accounts that may be used solely to finance --

- 1. study contracts that are jointly sponsored by the Office and one or more other Federal agencies; and
- 2. Federal interagency environmental projects (including task forces) in which the Office participates.

(b) Any study contract or project that is to be financed under subsection (a) of this section may be initiated only with the approval of the Director.

(c) The Director shall promulgate regulations setting forth policies and procedures for operation of the Fund.

APPENDIX 6: U.S. Forest Service – Service-Wide MOU with Snowmobile Associations

SERVICE-WIDE MEMORANDUM OF UNDERSTANDING
among
UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE
and
AMERICAN COUNCIL OF SNOWMOBILE ASSOCIATIONS
INTERNATIONAL ASSOCIATION OF SNOWMOBILE ADMINISTRATORS
and the
INTERNATIONAL SNOWMOBILE MANUFACTURERS ASSOCIATION

-MOU- FS Agreement # 05-SU-11132424-192 -

This Service-wide Memorandum of Understanding (MOU) is made and entered into between the United States Department of Agriculture Forest Service, hereinafter referred to as FS, and the American Council of Snowmobile Associations (ACSA), International Association of Snowmobile Administrators (IASA), and the International Snowmobile Manufacturers Association (ISMA), hereinafter referred to by their initials or collectively as "Cooperators."

A. PURPOSE

There is a need to actively promote public-private partnerships that encourage responsible use of public lands by visitors participating in snowmobile travel and recreational activities. The purpose of this MOU is to establish a general framework of cooperation upon which mutually beneficial programs, work projects, and snowmobile activities may be planned and accomplished on National Forest System lands. Such programs, projects, and activities complement the FS mission and are in the best interests of the public.

B. INTRODUCTION

The FS is a land management organization dedicated to the wise management of the Nation's natural resources for a variety of uses and activities, including outdoor recreation, and is interested in providing snowmobile opportunities that are environmentally sensitive, educational, enjoyable, and provide economic stimulus.

The Cooperators represent the organized snowmobiling public/industry and are recognized leaders in establishing snowmobile ethics, safety standards, volunteerism, and fostering appropriate land use management on Federal and non-Federal lands. The Cooperators may desire to use National Forest System lands for recreational purposes, provide support, and volunteer labor to the FS for accomplishment of mutually beneficial projects or activities.

In consideration of the above premises, the parties agree as follows:

C. THE FS WILL:

1. Provide the Cooperators information regarding the development and presentation of training materials related to snowmobile safety and ethics, and the availability of snowmobiling opportunities on National Forest System lands.
2. Encourage local FS officials to participate with snowmobile clubs and associations in the development of mutually beneficial work projects, educational activities, and snowmobile opportunities.

3. Make National Forest System lands available for the furtherance of this MOU, subject to applicable Federal laws, regulations, Forest plans, and other management direction.
4. Provide information on completing Job Hazard Analyses and conducting safety training sessions for Cooperator project activities on National Forest System lands.

D. THE COOPERATORS WILL:

1. Provide technical assistance to land managers and communities involved in work projects, educational activities, and snowmobile opportunities.
2. Encourage its members to work with local FS officials to discuss and identify opportunities for cooperative work on mutually beneficial projects or activities.
3. Promote Tread Lightly! ethics by providing training and instruction to its members.
4. Use the name "USDA Forest Service" when referring to the Forest Service and submit to the Forest Service for approval, prior to production, the final layout of all promotional materials which use the Forest Service's name and insignia, any employee by name or title, or this agreement, as requested by the Trails Coordinator, Recreation, Heritage, and Wilderness Resources staff.
5. Not publicize, or otherwise circulate, material (such as advertisements, sales brochures, press releases, speeches, still and motion pictures, articles, manuscripts or other publications, including world wide web sites) which states or implies Governmental, Departmental, Agency, or Government employee endorsement of a Cooperator product, service, or position. No release of information relating to this agreement may state or imply that the Government considers a specific Cooperator's work product or service to be superior to other products and services.
6. Complete Job Hazard Analyses for Cooperator project activities on National Forest System lands and conduct safety training sessions prior to each individual project activity. These sessions will review hazards anticipated and measure that should be taken to reduce the hazard.

E. IT IS MUTUALLY AGREED AND UNDERSTOOD BY AND BETWEEN THE SAID PARTIES THAT:

1. FREEDOM OF INFORMATION ACT (FOIA). Any information furnished to the Forest Service under this instrument is subject to the Freedom of Information Act (5 U.S.C. 552).
2. PARTICIPATION IN SIMILAR ACTIVITIES. This instrument in no way restricts the Forest Service or the Cooperator(s) from participating in similar activities with other public or private agencies, organizations, and individuals.
3. COMMENCEMENT/EXPIRATION/TERMINATION. This MOU takes effect upon the signatures of the Department of Agriculture and Cooperators and shall remain in effect for five years from the date of execution. This MOU may be extended or amended upon written request of either the Department of Agriculture or the Cooperators and the subsequent written concurrence of the other(s). Either the Department of Agriculture or each of the Cooperators may withdraw from this MOU with a 60-day written notice to the other(s).
4. RESPONSIBILITIES OF PARTIES. The Department of Agriculture and the Cooperators and their respective agencies and office will handle their own activities and utilize their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party will carry out its separate activities in a coordinated and mutually beneficial manner.

5. PRINCIPAL CONTACT. The principal administrative and project contacts for this instrument are:

Jim Miller	Christine Jourdain
Dispersed Recreation Program Manager	Executive Director
USDA Forest Service	American Council of Snowmobile
Recreation and Heritage Resources	Associations
1400 Independence Ave, S.W.	271 Woodland Pass
Washington, D.C. 20250-1125	East Lansing, MI 48823
202-205-1313	517-351-4362

Ross Antworth	Ed Klim
Chairman	President
International Association of Snowmobile	International Snowmobile Manufacturers
Administrators	Association
147 Houlton, Ste. B	1640 Haslett Road, Suite 170
Woodstock, New Brunswick, E7M1Y4	Haslett, MI 48840
506-325-2625	517-339-7788

The local contact persons for FS are District Rangers, who may enter into subsequent agreements and partnerships as needed at the local levels to accomplish portions of this MOU.

6. NON-FUND OBLIGATING DOCUMENT: Nothing in this MOU shall obligate either the Department of Agriculture or the Cooperators to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the Department of Agriculture and the Cooperators will require execution of separate agreements and be contingent upon the availability of appropriated funds. Such activities must be independently authorized by appropriate statutory authority. This MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statutes and regulations.

7. ESTABLISHMENT OF RESPONSIBILITY. This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or any person.

8. AUTHORIZED REPRESENTATIVES. By signature below, the cooperator certifies that the individuals listed in this document are representatives of the cooperator and are authorized to act in their respective areas for matters related to this agreement.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the last written date below.

<u>/s/Gail van der Bie</u>	<u>July 22, 2005</u>
GAIL VAN DER BIE	Date
Acting Director, Recreation and Heritage Resources, Forest Service	

<u>/s/ Jim Duke</u>	<u>August 15, 2005</u>
JIM DUKE	Date
President, American Council of Snowmobile Associations	

<u>/s/Ross Antworth</u>	<u>August 9, 2005</u>
ROSS ANTWORTH	Date
Chairman, International Association of Snowmobile Administrators	

<u>/s/Ed Klim</u>	<u>August 11, 2005</u>
ED KLIM	Date
President, International Snowmobile Manufacturers Association	

APPENDIX 7: Off-Road Vehicles Executive Orders and NPS Snowmobile Regulation 36 CFR 2.18

EXECUTIVE ORDER 11644--Use of off-road vehicles on the public lands

Source: The provisions of Executive Order 11644 of Feb. 8, 1972, appear at 37 FR 2877, 3 CFR, 1971-1975 Comp., p. 666, unless otherwise noted.

An estimated 5 million off-road recreational vehicles--motorcycles, mini-bikes, trail bikes, snowmobiles, dune-buggies, all-terrain vehicles, and others--are in use in the United States today, and their popularity continues to increase rapidly. The widespread use of such vehicles on the public lands--often for legitimate purposes but also in frequent conflict with wise land and resource management practices, environmental values, and other types of recreational activity--has demonstrated the need for a unified Federal policy toward the use of such vehicles on the public lands.

NOW, THEREFORE, by virtue of the authority vested in me as President of the United States by the Constitution of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (42 U.S.C. 4321), it is hereby ordered as follows:

Section 1. Purpose. It is the purpose of this order to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.

Section 2. Definitions. As used in this order, the term:

- (1) "public lands" means (A) all lands under the custody and control of the Secretary of the Interior and the Secretary of Agriculture, except Indian lands, (B) lands under the custody and control of the Tennessee Valley Authority that are situated in western Kentucky and Tennessee and are designated as "Land Between the Lakes," and (C) lands under the custody and control of the Secretary of Defense;
- (2) "respective agency head" means the Secretary of the Interior, the Secretary of Defense, the Secretary of Agriculture, and the Board of Directors of the Tennessee Valley Authority, with respect to public lands under the custody and control of each;
- (3) "off-road vehicle" means any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that such term excludes (A) any registered motorboat, (B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract; and
- (4) "official use" means use by an employee, agent, or designated representative of the Federal Government or one of its contractors in the course of his employment, agency, or representation.

[Sec. 2 amended by Executive Order 11989 of May 24, 1977, 42 FR 26959, 3 CFR, 1977 Comp., p. 120]

Section 3. Zones of Use. (a) Each respective agency head shall develop and issue regulations and administrative instructions, within six months of the date of this order, to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted, and set a date by which such designation of all public lands shall be completed. Those regulations shall direct that the designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands. The regulations shall further require that the designation of such areas and trails shall be in accordance with the following--

- (1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.
- (2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.
- (3) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
- (4) Areas and trails shall not be located in officially designated Wilderness Areas or Primitive Areas. Areas and trails shall be located in areas of the National Park system, Natural Areas, or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, or scenic values.

(b) The respective agency head shall ensure adequate opportunity for public participation in the promulgation of such regulations and in the designation of areas and trails under this section.

(c) The limitations on off-road vehicle use imposed under this section shall not apply to official use.

Section 4. *Operating Conditions.* Each respective agency head shall develop and publish, within one year of the date of this order, regulations prescribing operating conditions for off-road vehicles on the public lands. These regulations shall be directed at protecting resource values, preserving public health, safety, and welfare, and minimizing use conflicts.

Section 5. *Public Information.* The respective agency head shall ensure that areas and trails where off-road vehicle use is permitted are well marked and shall provide for the publication and distribution of information, including maps, describing such areas and trails and explaining the conditions on vehicle use. He shall seek cooperation of relevant State agencies in the dissemination of this information.

Section 6. *Enforcement.* The respective agency head shall, where authorized by law, prescribe appropriate penalties for violation of regulations adopted pursuant to this order, and shall establish procedures for the enforcement of those regulations. To the extent permitted by law, he may enter into agreements with State or local governmental agencies for cooperative enforcement of laws and regulations relating to off-road vehicle use.

Section 7. *Consultation.* Before issuing the regulations or administrative instructions required by this order or designating areas or trails as required by this order and those regulations and administrative instructions, the Secretary of the Interior shall, as appropriate, consult with the Secretary of Energy and the Nuclear Regulatory Commission.

[Sec. 7 amended by Executive Order 12608 of Sept. 9, 1987, 52 FR 34617, 3 CFR, 1987 Comp., p. 245]

Section 8. *Monitoring of Effects and Review.* (a) The respective agency head shall monitor the effects of the use of off-road vehicles on lands under their jurisdictions. On the basis of the information gathered, they shall from time to time amend or rescind designations of areas or other actions taken pursuant to this order as necessary to further the policy of this order.

(b) The Council on Environmental Quality shall maintain a continuing review of the implementation of this order.

Section 9. *Special Protection of the Public Lands.* (a) Notwithstanding the provisions of Section 3 of this Order, the respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future

recurrence.

(b) Each respective agency head is authorized to adopt the policy that portions of the public lands within his jurisdiction shall be closed to use by off-road vehicles except those areas or trails which are suitable and specifically designated as open to such use pursuant to Section 3 of this Order.

[Sec. 9 added by Executive Order 11989 of May 24, 1977, 42 FR 26959, 3 CFR, 1977 Comp., p. 120]

EXECUTIVE ORDER 11989

DATE: May. 24, 1977

(Amendment to E.O. 11644)

Off-Road Vehicles on Public Lands

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in order to clarify agency authority to define zones of use by off-road vehicles on public lands, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), Executive Order No. 11644 of February 8, 1972, is hereby amended as follows:

Section 1. Clause (B) of Section 2 (3) of Executive Order No. 11644, setting forth an exclusion from the definition of off-road vehicles, is amended to read "(B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and".

Section 2. Add the following new Section to Executive Order No. 11644:

"Section 9. Special Protection of the Public lands.

(a) Notwithstanding the provisions of Section 3 of this Order; the respective-agency- head shall, whenever he determines that the-use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence."

"(b) Each respective agency head is authorized to adopt the policy that portions of the public lands within his jurisdiction shall be closed to use by off-road vehicles except those areas or trails which are suitable and specifically designated as open to such use pursuant to Section 3 of this order."

NATIONAL PARK SERVICE REGULATION: 36 CFR 2.18 Snowmobiles

- a. Notwithstanding the definition of vehicle set forth in § 1.4 of this chapter, the provisions of §§ 4.4, 4.12, 4.13, 4.14, 4.20, 4.21, 4.22 and 4.23 of this chapter apply to the operation of a snowmobile.
- b. Except as otherwise provided in this section, the laws of the State in which the exterior boundaries of a park area or a portion thereof is located shall govern equipment standards and the operation of snowmobiles. Non-conflicting State laws are adopted as a part of these regulations.
- c. The use of snowmobiles is prohibited, except on designated routes and water surfaces that are used by motor vehicles or motorboats during other seasons. Routes and water surfaces designated for snowmobile use shall be promulgated as special regulations. Snowmobiles are prohibited except where designated and only when their use is consistent with the park's natural, cultural, scenic and aesthetic values, safety considerations, park management objectives, and will not disturb wildlife or damage park resources.
- d. The following are prohibited:
 - (1) Operating a snowmobile that makes excessive noise. Excessive noise for snowmobiles manufactured after July 1, 1975 is a level of total snowmobile noise that exceeds 78 decibels measured on the A-weighted scale measured at 50 feet. Snowmobiles manufactured between July 1, 1973 and July 1, 1975 shall not register more than 82 decibels on the A-weighted scale at 50 feet. Snowmobiles manufactured prior to July 1, 1973 shall not register more than 86 decibels on the A-weighted scale at 50 feet. All decibel measurements shall be based on snowmobile operation at or near full throttle.
 - (2) Operating a snowmobile without a lighted white headlamp and red taillight from one half-hour after sunset to one half-hour before sunrise, or when persons and vehicles are not clearly visible for a distance of 500 feet.
 - (3) Operating a snowmobile that does not have brakes in good working order.
 - (4) Racing, or operating a snowmobile in excess of 45 mph, unless restricted in accordance with § 4.22 of this chapter or otherwise designated.
- e. Except where State law prescribes a different minimum age or qualification for the person providing direct supervision and accompaniment, the following are prohibited:
 - (1) The operation of a snowmobile by a person under 16 years of age unless accompanied and supervised within line of sight by a responsible person 21 years of age or older;
 - (2) The operation of a snowmobile by a person under 12 years of age, unless accompanied on the same machine by a responsible person 21 years of age or older; or
 - (3) The supervision by one person of the operation of snowmobiles by more than one person under 16 years of age.

[48 FR 30282, June 30, 1983, as amended at 52 FR 10683, Apr. 2, 1987]

APPENDIX 8: Research Studies Related to Snowmobiling and OHV Impacts

INTRODUCTION

There are many issues that can sometimes be barriers to landowners granting permission for snowmobiling access on the lands they control. This can include concerns about impacts from snowmobiles to the environment, wildlife, other recreationists, or their local community. This appendix provides summaries (abstracts) from a wide range of studies related to snowmobiling and OHV impacts. While some are old and some are new, all still have relevance to present day concerns and discussions about snowmobile impacts. And while all studies will not apply to every local situation, a variety of them can be extrapolated for use where local situations may be similar.

Many of the studies which exist in respect to snowmobiling impacts date back to the 1970s and 1980s – when snowmobiling was fairly new, growing rapidly in popularity, and concerns by land managers and citizens were high. Study after study either disproved many of the concerns or showed that impacts were less than had been feared. Since funding for research is generally sparse and increasingly hard to come by for researchers – and previous research showed snowmobiling impacts to be low – the focus of scientific research in subsequent years turned to other subjects where society’s concerns were larger.

Renewed interest in snowmobile impacts surfaced in the late 1990s with the public debate over continued snowmobiling access to Yellowstone and Grand Teton National Parks. During the same time period ATV use was exploding, which created an interest in (and subsequently funding for) ATV/OHV impact studies. While Yellowstone is different from many/most snowmobiling areas, and ATV/OHVs have distinctly different operational characteristics than snowmobiles, they have driven the most recent body of scientific studies regarding motorized recreation impacts. And while different, there can often still be enough similarities to make it okay to use newer data to make informed inferences. The standard is referred to as “best available information” – so make use of the best information you have to combat unsubstantiated claims from opponents to snowmobiling access.

The abstracts and summaries compiled in this Appendix are direct cites from their respective studies and authors. This information is organized alphabetical by impact topic, and then listed from the most recent to the oldest studies for each impact topic with key findings highlighted.

Snowmobiling and OHV Impact Topics with Abstracts of Related Studies

AIR QUALITY / EMISSIONS

1. **Air quality at a snowmobile staging area and snow chemistry on and off trail in a Rocky Mountain subalpine forest, Snowy Range, Wyoming.** Musselman, R.C. & Korfmacher, J.L. (2007). USDA Forest Service Region 2 Rocky Mountain Research Station, Fort Collins, CO.

Abstract and Conclusions: A study was begun in the winter of 2000–2001 and continued through the winter of 2001–2002 to examine air quality at the Green Rock snowmobile staging area at 2,985 m elevation in the Snowy Range of Wyoming. The study was designed to evaluate the effects of winter recreation snowmobile activity on air quality at this high elevation site by measuring levels of nitrogen oxides (NO_x, NO), carbon monoxide (CO), ozone (O₃) and particulate matter (PM₁₀ mass). Snowmobile numbers were higher weekends than weekdays, but numbers were difficult to quantify with an infrared sensor. Nitrogen oxides and carbon monoxide were significantly higher weekends than weekdays. Ozone and particulate matter were not significantly different during the weekend compared to weekdays. Air quality data during the summer was also compared to the winter data. Carbon monoxide levels at the site were significantly higher during the winter than during the summer. Nitrogen oxides and particulates

were significantly higher during the summer compared to winter. Nevertheless, air pollutants were well dispersed and diluted by strong winds common at the site, and it appears that snowmobile emissions did not have a significant impact on air quality at this high elevation ecosystem. Pollutant concentrations were generally low both winter and summer. In a separate study, water chemistry and snow density were measured from snow samples collected on and adjacent to a snowmobile trail. Snow on the trail was significantly denser and significantly more acidic with significantly higher concentrations of sodium, ammonium, calcium, magnesium, fluoride, and sulfate than in snow off the trail. Snowmobile activity had no effect on nitrate levels in snow.

Specific conclusions of this study include: 1) It was evident that more snowmobiles were present at the site weekends than weekdays, but the infrared counter proved inadequate for providing accurate snowmobile counts. (2) There were significant differences in air quality between weekends and weekdays. Data show significantly higher concentrations on weekends in winter when more snowmobiles were present for CO, NO₂, NO, and NO_x, but not for O₃. Concentrations of CO and NO were also higher weekends than weekdays during summer. Mean daily maxima of NO, NO₂, and NO_x occurred weekends during the winter. The data suggest that although NO_x concentrations were generally low, increased weekend concentrations resulted from snowmobile activity. (3) Seasonal differences were evident in air chemistry, specifically for CO, NO₂, and NO_x, but not for NO or O₃. NO₂ and NO_x were higher in summer than winter, while CO concentrations were higher in winter than summer. Nevertheless, air pollutant concentrations were generally low both winter and summer, and were considerably lower than exceedence levels of NAAQS. (4) PM₁₀ was lower in winter than summer, and there were no significant weekend/weekday differences. (5) CO and O₃ concentrations were higher, and NO_x and NO₂ were lower, when the wind was from the south. The monitoring was conducted just north of the roadway. O₃ was lower and NO₂ and NO_x were higher when wind velocities were lower. The data suggest that under prevailing wind conditions air pollutant concentrations on the roadway were likely higher than those detected by our monitoring sensors. Nevertheless, an air pollution signal was detected that could be related to snowmobile activity; but the pollutant concentrations were low and not likely to cause significant air quality impacts even at this high snowmobile activity site. (6) Wind speed and physical site characteristics are probably the most important determinants of pollutant concentrations at the level of use described in most existing studies of snowmobile pollutants. There was greater dispersion of pollutants with high winds. The open, high elevation Snowy Range site with high winds may be much less likely to experience pollutant levels at or near exceedence criteria than a (relatively) low-altitude site with somewhat restricted terrain and low wind speeds, (e.g., West Yellowstone). (7) Snow chemistry was significantly different between on and off trail for some analytes when sampling was designed to collect from areas with or without snowmobile activity. Na⁺, Ca²⁺, Mg²⁺, NH₄⁺, F⁻ and SO₂ appeared to be higher on the trail than off, especially early in the season. The trail followed a roadway, which may have affected on-trail snow chemistry concentrations. There were no differences in NO₃ on or off the trail. Snow density was higher on the trail than off.

2. **Portable Emission Measurements of Snowcoaches and Snowmobiles in Yellowstone National Park.** Bishop, G. A., Stadtmuller, R., Stedman, D.H. & Ray, J.D. (2007) University of Denver – Department of Chemistry and Biochemistry and National Park Service Air Resources Division.

Executive Summary: The University of Denver carried out a ten day, winter emissions collection program in Yellowstone National Park that concentrated on measuring the in-use emissions from commercial snowcoaches and snowmobiles operating out of the town of West Yellowstone, MT. Between January 25 and February 3, 2006 we instrumented ten snowcoaches and two snowmobiles with a portable emissions analyzer and collected approximately 22 hours of emissions and vehicle activity data. This report and all of the data sets collected are available for download at www.feat.biochem.du.edu.

- Snowcoach carbon monoxide (CO), hydrocarbon (HC) and nitrogen dioxide (NO₂) emissions from the ten coaches tested this year were 60%, 83% and 54% less than the nine coaches measured in

2005. The average age of this year's fleet was nearly 5 years newer, 9 out of 10 snowcoaches in 2006 were port fuel injected (only 4 out of 9 were in 2005) and the route driven less demanding.

- When combined with the previous year's data, emission trends generally decrease with decreasing age. Carbureted engines produce more excess emissions than throttle body injected engines which produce more emissions than port fuel injected engines. Emissions continue to decrease with age among the port fuel injected engines as the newest models continue to improve on capping the extent of excess emissions during power enrichment excursions.
- As observed during last year's testing the carbureted vintage Bombardier had the highest overall emissions and a Bombardier that had been upgraded to a modern port fuel injected engine had the lowest overall emissions. However, this year's carbureted Bombardier did not exhibit the huge HC emissions that were observed previously.
- Despite driving all of the snowcoaches over the same route and with the same passenger loading large variations in CO and HC emissions were still observed. For one set of five nearly identical snowcoaches (same make, engine and track system) CO emissions varied from 310 grams/mile to 12 grams/mile and HC emissions varied from 2.4 grams/mile to 0.3 grams/mile. We believe that the large variation in readings is most likely a result of load differences produced by changes in the snow conditions.
- Passenger loading appears to be only a minor influence on the overall CO and HC emissions of a snowcoach. More important factors are snow conditions, fuel injection technology, power to weight ratio of the vehicle and the overall surface area of the track and ski system.
- We successfully instrumented two snowmobiles a 2006 Arctic Cat T660 and a 2004 Ski Doo Legend GT and drove them over the same road course as the snowcoaches. Observed emissions validated emission trends observed with the remote sensing and PEMS measurements collected in 2005. **The smaller, higher revving Arctic Cat engine had lower CO emissions but higher HC and NOx emissions than the larger, lower revving Ski Doo engine.** Measured fuel economies from these two snowmobiles were 25.1 and 28.3mpg, much higher than either the previous measurement or estimates used previously.
- **The transient emissions behavior of these two snowmobiles is quite different with the Ski Doo snowmobile's higher CO emissions being a result of power enrichment excursions during accelerations.** These higher transient emissions are probably not observed during BAT certification testing since it is a steady state test.
- Through two seasons of testing we have found that **emissions variability is much greater among the snowcoach fleet** where even modern coaches with advanced emissions control equipment have days with very large excess emissions. **The 4-stroke snowmobiles have very high power to weight ratios and do not appear to experience these emission extremes.** When comparing this years snowmobile and snowcoach PEMS measurements the 4-stroke snowmobiles had on average lower gram/mile emissions for all species and lower gram/mile/person emissions for CO and HC than the average snowcoach.

3. **Winter Air Quality in Yellowstone National Park 2005-2006.** Ray, J.D. (2007) National Park Service Air Resources Division.

Executive Summary: The air quality in Yellowstone National Park was monitored at two locations as part of the adaptive management program on the use of over-snow winter motor vehicles. The leading indicators used were ambient concentrations of carbon monoxide (CO) and particulate matter of 2.5 micrometers or less (PM_{2.5}). Emission measurements in the last two years have indicated that **snowmobiles and snowcoaches may have approximately equal contributions to the concentrations of CO.** Detailed entry counts of each type of vehicle at the west entrance were used in the analysis. The West Entrance near the town of West Yellowstone, MT is the primary indicator for overall air quality and the relationship to traffic, because detailed entry counts could be obtained at that site. Old Faithful is a destination for most of the winter use vehicles; they are present mid-day and that area represents the highest density of winter vehicles.

This report is an update to prior air quality and emission studies. The notable findings this year are:

- Air quality at both locations is good during the winter and is now well below the national ambient air quality standards.
- The CO concentrations were about the same as last year despite an increase in the total number of winter vehicle entries (over last year's shorter season) at the west entrance.
- Even though summer traffic volumes are nearly 60 times higher than winter traffic volumes, the highest hourly CO concentrations at both locations occur during the winter. However, the mean CO concentrations in winter have decreased over the last several years to be less than a factor of 2 higher than the summer concentrations.
- PM concentrations now correlate only weakly to traffic counts at the West Entrance and not at all at Old Faithful. This reflects lower emissions by winter vehicle although other local sources remain.
- The combination of reduced winter vehicle entries to the park and reduced emissions by the snowmobiles, using Best Available Technology (BAT), has greatly reduced the CO concentrations. Air quality has been stable or improving over the last three winters when the BAT requirement has been in effect.

Recommendations:

- Monitoring could be reduced. The particulate monitoring measures more PM_{2.5} from summer wildfires than from motor vehicles. The PM_{2.5} and meteorological measurements at Old Faithful could be reduced to just winter-time CO without compromising the adaptive management metrics.
- The question of how much CO concentrations will increase if snowmobile traffic is allowed to increase up to the winter use plan limit is unresolved. It is recommended that the monitoring at the West Entrance continue and better vehicle counting and identification methods be used.
- Efforts should continue to keep the amount of vehicle queuing at the West Entrance to a minimum and to spread out the entry of vehicles. The direct emissions testing indicates that older snowcoaches are now more polluting than BAT snowmobiles. Some effort should be made to equalize the snowcoach emissions (such as a snowcoach BAT) and to take advantage of the lower emissions that are possible as observed with newer snowcoaches or those retrofitted with new engines.

4. **Results from Yellowstone National Park Winter Air Quality Study 2004-2005.** Ray, J.D. (2005) National Park Service, U.S. Department of Interior Air Resources Division.

Summary of Results: Ambient monitoring during the winter activity season was conducted at Old Faithful and at the West Entrance for the air pollutants, carbon monoxide (CO) and fine particulate matter (PM_{2.5}). Summertime measurements at the West Entrance and vehicle entrance counts were used to compare to the winter season. Results from the ambient monitoring and a closely related emissions study are presented:

- CO was lower during the winter 2004-2005 season than in previous years at both monitoring stations and well below the level of the national standard.
- PM_{2.5} was also lower this season than in previous years at the West Entrance. Both locations are below the level of the standard.
- The historical decreasing trend in the number of snowmobiles is mimicked by decreasing CO concentrations and is the primary reason for the lower ambient CO concentrations.
- Sources of PM_{2.5} other than snowmobiles are contributing to the observed PM at Old Faithful. The greatest amount of PM_{2.5} at Old Faithful is now from Snow Lodge and from the uncontrolled wood stoves in the warming huts.
- Summer traffic with wheeled-vehicles contributes a much smaller amount of CO and PM than winter activity with snowmobiles and snowcoaches, despite much greater numbers of vehicles in summer.

5. **In-Use Emission Measurements of Snowmobiles and Snowcoaches in Yellowstone National Park.** Bishop, G. A., Burgard, D.A., Dalton, T.T., & Stedman, D.H. (2006) University of Denver – Department of Chemistry and Biochemistry and the National Park Service.

Executive Summary: The University of Denver conducted a twelve day, winter, emissions measurement program in Yellowstone National Park that involved the collection of emissions data from in-use snowcoaches and snowmobiles between February 7 and February 18, 2005. In all more than 34 hours and 500 miles of mass emissions data were collected from nine snowcoaches and more than 960 snowmobile measurements were made. This report and all of the data sets collected are available for download from www.feat.biochem.du.edu.

- Both snowcoaches and 4-stroke snowmobiles have lower emissions per person than the 2-stroke snowmobiles. 4-stroke snowmobile emissions reductions averaged 61% for CO and greater than 96% for hydrocarbons compared to 2-strokes.
- 4-stroke snowmobiles have lower emissions per person than the measured mix of snowcoaches for CO. However, newer coaches with modern pollution controls have lower per person emissions than the current 4-stroke snowmobiles.
- The reduction in 4-stroke snowmobile hydrocarbons was significant (< 96%) and readily observed. Visible exhaust plumes and odor were greatly reduced. The greater engine efficiency is reflected in an improved gas mileage by the 4-stroke snowmobiles.
- Among 4-stroke snowmobiles, the average CO emissions varied by a factor of 3 between manufacturers. The ration of CO/NO emissions varied greatly based on the engine tuning by the manufacturer.
- The Arctic Cat and Polaris 4-stroke snowmobiles emitted roughly half as much CO and HC as the Ski Doo snowmobiles. No statistically significant difference in emissions was observed by model year.
- Higher CO and HC emissions were observed from the guide snowmobiles that had been turned off and restarted at the entrance gate.
- Snowmobile emissions were NOT observed to increase with speed on a gm/mile basis. Emissions are greatest during initial startup and idling, especially when the engine is cold.
- The mean snowmobile emissions measured in the gate area appear to provide a representative average emissions value for overall park snowmobile emissions.
- The conversion vans operate often in off-cycle engine mode when much greater pollutants are emitted. The time weighted off-cycle operations for all the coaches averaged 20% of the time for the inbound trips and 29% for outbound. This is primarily caused by the high load on the engine and underpowered coaches that causes the transmission to shift up and down. Newer vans with larger engines were found to have lower emissions.
- The Bombardier snowcoach with an uncontrolled carbureted engine had the highest CO and HC emissions and operated in this high region 98% of the time. Extremely high CO emissions were also observed at the west entrance from several additional vintage Bombardiers. Vans and coaches with efficient fuel-injected engines and catalytic converters can be nearly as clean as modern wheeled passenger vehicles.

6. **Laboratory Testing of Snowmobile Emissions.** Lela, C.C. & White, J.J. (2002) Southwest Research Institute (SwRI 08.05486) for the National Park Service and Montana Department of Environmental Quality.

Executive Summary: Snowmobile engine emissions are of concern in environmentally-sensitive areas, such as Yellowstone National Park. A program was undertaken to measure emissions from commercially-available four-stroke snowmobiles, as well as student-designed snowmobiles, and to compare their emissions to two-stroke sleds. Test vehicles included a 2002 Arctic Cat 4-Stroke Touring snowmobile, a 2002 Polaris Frontier 4-stroke engine, and two 4-stroke snowmobiles that competed in the 2002 SAE Clean Snowmobile Challenge (CSC). Fuels used were a reference gasoline and E10/gasohol (10 percent ethanol). For comparison, one of the student-designed snowmobiles was also tested on E85 (85 percent ethanol) to examine potential emission benefits with this fuel.

Emission were measured using three different test protocols including the five-mode ISMA/SwRI snowmobile engine dynamometer test cycle, a four-mode chassis dynamometer cycle, and at snowmobile speeds of 15, 25, 35, and 45 mph, as well as top speed on the chassis dynamometer. Emissions measured

included hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), carbon dioxide (CO₂), and particulate matter (PM). Selected Arctic Cat engine tests also determined individual hydrocarbon species (C₁-C₁₂), including ketones, aldehydes, and alcohols. The following observations were made:

- **Commercially-available 4-stroke snowmobiles are significantly cleaner than 2-stroke sleds.** Compared to previously tested 2-strokes, these 4-stroke sleds emit 98 – 95 percent less HC, 85 percent less CO, and 90 – 96 percent less PM. Four-stroke snowmobile NO_x, however, is considerably higher than from a 2-stroke, being increased by a factor of seven to twelve.
- **The commercially-available 4-stroke snowmobiles emit roughly 90 percent less toxic hydrocarbons, such as 1,3-butadiene, benzene, formaldehyde, and acetaldehyde, than 2-strokes.**
- Four-stroke snowmobiles achieve approximately 40 percent better fuel economy than 2-stroke sleds.
- Use of a catalyst can further reduce snowmobile emissions. The University of Idaho CSC 2002 sled, that incorporates a 4-stroke, closed-loop controlled engine with catalyst, generated the lowest emissions of all sleds tested. Compared to the 4-stroke Arctic Cat sled, the Idaho sled emitted 64 percent less HC, 29 percent less CO, 99 percent less NO_x, and 36 percent less PM.
- Operation on E10 generally produced lower HC and CO emissions, but higher NO_x emissions, compared to reference gasoline.

ECONOMICS

Snowmobilers in the United States and Canada spend over \$28 billion on snowmobiling each year according to the International Snowmobile Manufacturers Association (ISMA). This includes expenditures on equipment, clothing, accessories, snowmobiling vacations, etc. Surveys show that, on average, snowmobilers taking overnight trips (24% of those surveyed) take three to five trips per year, spending two nights per trip away from home.

Snowmobiling is responsible for "spin-off" economic benefits such as:

- Jobs for tens of thousands of people; jobs which enable those people to further stimulate the economy through additional expenditures on goods and services; jobs which provide significant income tax revenues to State and Federal treasuries and dramatically reduce unemployment and welfare payments.
- Millions of dollars in tax revenues derived from snowmobile-related businesses (including, but not limited to manufacturers, suppliers, distributors, dealers, resort and hotel facilities, restaurants, service stations, insurance agencies, hardware stores, banks, credit unions, etc.).
- Millions of dollars in winter tourism.
- Spending which support local Snowbelt economies.
- Millions of dollars in local and State sales and gas tax revenues.
- Snowmobiling has rejuvenated the economies of many communities.

Because of the economic benefits of snowmobiling to local communities, State and local travel bureaus and tourism agencies are now actively promoting snowmobile tourism through such means as the production of snowmobile information guides and trail maps and the establishment of toll free numbers with information on snowmobiling opportunities and conditions.

The economic benefits of snowmobiling to local communities and States are very significant. Many States have commissioned studies to determine specific economic impacts, which can be an extremely beneficial tool when working for snowmobiling access and favorable snowmobiling legislation.

Economic benefits may vary from State-to-State or region-to-region within States based upon ratios of local/resident riders (lower total spending) versus levels of non-resident and non-area riders (higher total trip expenditures). Results may also vary based upon research study methodologies and how local spending multipliers are applied to survey results. It is also important to recognize that visitor spending typically has grown quickly (rising costs of fuel, lodging, equipment, etc.), so studies should be regularly updated every five to ten years to remain valid. A sampling of State survey results includes:

Alaska: The economic impact of snowmobiling in the Anchorage and Mat-Su Borough was found to be over \$35 million annually, according to a study conducted by the Anchorage Economic Development Corp., which was released in May 2000.

Iowa: Iowa State University completed an Economic Impact report in 2005 on snowmobiling in Iowa. Their report shows snowmobiling generated \$65.4 million in economic activity resulting in 899 jobs.

Maine: In 1998 the University of Maine and the Maine Snowmobile Association conducted a study showing the economic impact of snowmobiling on Maine to be \$261 million.

Massachusetts: The University of Massachusetts found the economic impact of snowmobiling to be \$54.7 million annually in a study conducted in 2003. View this report at www.sledmass.com/economicimpact.asp.

Michigan: Michigan State University completed an assessment of snowmobiling impacts in the State of Michigan for the Michigan Department of Parks and Recreation in February 1998. The survey showed that the average snowmobiler in Michigan spends \$4,218 annually on snowmobiling activity, equipment, and vacationing within the state of Michigan. Additionally, over \$1 billion in economic impact is generated and over 6,455 full time jobs are created by snowmobiling in Michigan.

Minnesota: The University of Minnesota Tourism Center completed an analysis of the snowmobile industry in Minnesota in 2005 and reported the snowmobile industry generates substantial tax revenues at the state and local level. Over \$51 million in taxes were paid at the local and State level directly related to snowmobiling activity.

New Hampshire: Plymouth State University and New Hampshire Snowmobile Association conducted a study in 2004 showing the economic impact of snowmobiling in the State of New Hampshire to be \$1.2 billion annually.

New York: The New York State Snowmobile Association, in cooperation with SUNY Potsdam, performed an economic impact analysis in 1998 showing that the economic impact of snowmobiling in New York State is estimated to be \$476.2 million. In 2003 the State of New York surveyed snowmobilers in New York and calculated the economic impact of snowmobiling in New York had increased to \$875 million annually - an increase of 84% in 5 years! View the 2003 report at www.nyssnowassoc.org/impactstudy2003.pdf.

Pennsylvania: The Lebanon Valley College of Pennsylvania, in cooperation with the Pennsylvania State Snowmobile Association, conducted an updated economic impact study in 2000 showing the annual economic impact of snowmobiling in Pennsylvania to be approximately \$161 million.

Utah: A 2001 Economic and Social Assessment of snowmobiling in Utah conducted by Utah State University determined the following: total annual expenditures resulting from snowmobiling in Utah are about \$52.6 million; 31% of Utah riders have college or technical training and an additional 31% have a B.A. or Graduate degree; and about 87% of Utah riders have not experienced any conflicts with other types of winter recreationists. Visit www.snowut.com/econ_study.htm for additional information.

Vermont: The economic significance that the sport of snowmobiling has on the State of Vermont exceeded \$600 million annually, according to a study by Johnson State College compiled in 2003.

Washington: In 2001 Washington State University and the Washington State Snowmobile Association conducted a snowmobile usage study that concluded the annual economic impact of snowmobiling in Washington was \$92.7 million.

Wyoming: The Wyoming Department of Commerce, in conjunction with the University of Wyoming, prepared a report on snowmobiling in the State in 1995. After analyzing monies spent on items like equipment, gasoline, service, lodging, and food, the study concluded that snowmobiling is responsible for \$189.5 million in economic impact and "is extremely important to the economy of the State of Wyoming." Another study was conducted in 2000-2001 by the Wyoming Department of State Parks and Cultural Resources, the University of Wyoming, and the Wyoming State Snowmobile Association which concluded that snowmobiling-related spending totaled more than \$234.3 million – a 24% increase in just five years. Of this amount, about forty percent was by nonresidents, forty percent was from residents, and nearly twenty percent was attributed to snowmobiling outfitter's clients. This spending directly or indirectly supported over 3,800 jobs and generated over \$50.2 million in labor income and over \$10 million in government taxes and revenue. View results of the entire 2000-2001 study at <http://wyotrails.state.wy.us/snow/resources.htm>, scrolling to the title "Snowmobile Survey," and then selecting the respective Executive Summary, Resident, Nonresident, or Outfitter Client reports.

PERSONAL EXPOSURE

While not typically a concern to private landowners, the 'personal exposure' of snowmobilers and employees to 'toxic fumes' caused by snowmobile exhausts is sometimes raised by snowmobiling opponents in public lands planning processes. Like most other recent snowmobile-related issues, this topic has been addressed during the lengthy Yellowstone National Park Winter Use planning efforts. The most recent study is summarized below.

1. **Yellowstone Winter Use Personal Exposure Monitoring.** Spear, T.M., Hart, J., & Stephenson, D.J. (2006) Rocky Mountains Cooperative Ecosystem Studies Unit; Montana Tech of the University of Montana and Boise State University.

Executive Summary: In January 2006, the National Park Service contracted with Montana Tech of The University of Montana and Boise State University to evaluate employee exposure to air contaminants and noise associated with snowmobile operations in Yellowstone National Park. The exposure evaluations were performed at the Park's West Entrance during the 2006 President's Day three-day weekend (February 18, 19, and 20). Further noise evaluations were also performed in Mammoth on February 27, 2006.

The employee exposure evaluations were performed during anticipated peak levels of snowmobile use in an attempt to obtain worst-case measurements during winter use work activities. Personal and area air sampling and noise monitoring were performed on Yellowstone National Park's West Entrance personnel and a park ranger. Personal and area air samples were collected for the following contaminants:

- Aldehyde screen
- BETX (benzene, ethyl benzene, toluene, and xylenes)
- Total hydrocarbons
- Volatile organic compounds (VOCs)
- Carbon Monoxide
- Respirable particulate matter (2.5 um, 4.0 um, and 10 um)
- Noise

With the exception of VOCs, the results of the current study were compared to established occupational exposure limits. These limits include permissible exposure limits (PELs) established by the Occupational Safety and Health Administration (OSHA), threshold limit values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH), and recommended exposure limits (RELs) established by the National Institute of Occupational Health (NIOSH). VOC results were compared to Minimal Risk Levels (MRL) established by the Agency for Toxic Substance and Disease Registry (ATSDR). **All employee exposures to the above air contaminants and noise were well below established occupational limits and MRLs except two short term benzene samples.** The benzene samples were above

the intermediate-duration inhalation exposure of 0.006 ppm, but below the acute-duration inhalation exposure of 0.009 ppm. The intermediate- duration is used for exposures from 14-364 days per year and the acute- duration is for exposure of less than 14 days per year.

The results from the current study were also compared with the 2005 study to evaluate trends in Park Service personnel exposure to winter use vehicle emissions. Comparison of the 2005 study results with previous studies showed a general decrease in exposure to aldehydes, BETX, VOCs, and respirable particulate matter.

RECREATION CONFLICTS

1. **Winter Recreation on Western National Forest Lands – A Comprehensive Analysis of Motorized and Non-Motorized Opportunity and Access**, published July 2006 by Winter Wildlands Alliance and available at www.winterwildlands.org/resources/reports/WWA_WinterRecreation.pdf.

This report is an effort by Winter Wildlands Alliance (WWA), a national organization for human-powered snow sports enthusiasts (primarily active in the West) that advocates for solitude, “to provide data to Forest Service officials and other public land managers to help them better address the issue of equitable opportunity and access for quality recreation on national forest lands.” The introduction alleges “untenable conditions on forest lands” caused by “taxing natural resources” and “escalating conflict” between snowmobilers and human-powered users like cross-country skiers and snowshoers.

The basis of this report is data collected from national forests in the West through Freedom of Information Act (FOIA) requests between 2003 and 2005. Raw data was gathered from national forests which “receive regular snowfall” in California, Colorado, Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming. WWA also used Forest Service National Visitor Monitoring Program (NVUM) data regarding annual visitor numbers for cross-country skiing, snowshoeing, and snowmobiling for this report. WWA then manipulated this information to support its position that there is a “disparity between motorized and non-motorized opportunity and access” across national forests in the Western United States.

Unfortunately many facts have been distorted and twisted by WWA to arrive at its desired conclusions and ‘findings.’ Since these allegations could adversely affect snowmobiling access to these national forest lands if not challenged, the following responses have been prepared by ACSA to represent snowmobiling’s perspective.

Specific WWA ‘findings’ and snowmobilers’ responses to place this misinformation in the proper context are as follows:

- a) **WWA: Of the winter trails reported on Forest Service lands in the West, “only 1,681 miles (8%) of the estimated 20,389 total groomed miles are designated as nonmotorized.” The balance is open to snowmobiles.**

Response: 1) First and foremost, there are over 18,000 miles of groomed snowmobile trails on national forests in the West because snowmobilers have chosen to tax themselves through State snowmobile registrations, user fees, and gasoline taxes they pay to fund the grooming of these trails. In no instance is the Forest Service paying for the grooming of snowmobile trails with Forest Service funds. In contrast, the grooming that occurs on the majority of the 1,681 miles of nonmotorized trails on these forests is either funded by the Forest Service or subsidized with State Recreational Trails Program (RTP) grant funds, which are derived from the Federal fuel tax paid by snowmobilers and other motorized recreational vehicle users. If nonmotorized winter recreationists want more miles of groomed trails, then they need to bring their own funding to the table as the snowmobilers have done.

2) A large percentage of cross-country skiers and snowshoers do not desire or require groomed trails for their backcountry recreational experience – so the perceived demand and accompanying shortage is substantively overstated by WWA.

3) A snowmobiler requires significantly more miles of trail for a typical / ‘daily average’ outing than what a nonmotorized recreationist does. The WWA report itself, on page 8, states that, “...the average distance traveled by a snowmobiler in a day ranges between 127 and 367 miles. By comparison, a skier or snowshoer will be hard pressed to cover more than five to ten miles on ungroomed snow in a day.” First of all, in the interest of accuracy and proper disclosure, the ‘127 and 367 miles’ cited by WWA comes from a University of Minnesota report – Midwest statistics improperly applied to a Western setting. And while ‘127 miles’ may be accurate for a Midwest average, ‘367 miles’ vastly overstates an ‘average’ snowmobiling outing – anywhere. Comparable studies from several Western states show that the average distance traveled in a day by a snowmobile rider in the West actually ranges from 70 to 120 miles. Additionally, national forest planners across the West commonly use a ‘3-mile radius (6 mile round trip) from a trailhead’ as the distance traveled ‘by the average skier or snowshoer’ during a day-trip outing. Therefore, snowmobilers require 7 to 24 times more miles of trail and open riding area than what cross-country skiers and snowshoers do for an ‘average’ daily outing.

- b) **WWA: Of the 116 million acres of national forest lands within these 11 states, approximately 81 million acres (70%) are open to snowmobiles. And of the remaining 35 million acres which are designated as ‘non-motorized,’ more than two-thirds lie within designated wilderness areas – which WWA decries since “distances from plowed parking areas and trailheads make the vast majority of wilderness areas inaccessible to skiers and snowshoers.”**

Response: 1) It is misleading to frame this in the perspective that ‘81 million acres are open to snowmobiles’ since a significant amount of these acres do not have consistent snowcover at a depth which would support snowmobiling traffic. While the exact number of acres on these forests without dependable snow cover is unavailable, it is substantive and could be as great as 25 to 50 percent of the total national forest area in these 11 states. As a result, the total acres open to snowmobiles is greatly overstated. On the other hand, cross-country skiing and snowshoeing can occur with less snow depth than what is required for the safe operation of a snowmobile, so this factor does not similarly limit nonmotorized opportunities.

2) WWA inappropriately included some forests to purposely inflate the ‘acres open to snowmobiling’ numbers. There are several examples of this flawed methodology. The most extreme example of this is the inclusion of the 1.1 million acres that comprise the Nebraska National Forest – which is actually a collection of national grasslands in central South Dakota and central to northern Nebraska, along with two small national forest units in central and northern Nebraska. None of these lands are in the ‘West’ and none are in the Snowbelt. Additionally, the State of Nebraska has zero miles of groomed snowmobile trails, so there is no useful purpose in including Nebraska in this report other than to intentionally use these acres to inflate numbers.

Another example is the Custer National Forest in Montana. Most of its 1.3 million acres is actually national grasslands in North and South Dakota (out of the Snowbelt, out of the ‘West,’ and no miles of groomed trails), so including the forest in its entirety severely misconstrues what is actually available for winter recreation on the ground.

Inclusion of the Humboldt-Toiyabe National Forest, which consists of all of Nevada and the far eastern edge of California, is another example of using questionable national forest areas to purposely inflate raw numbers for this WWA exercise. The Humboldt-Toiyabe consists of over 6.3 million acres of land, over 5.3 million acres which are supposedly ‘open to snowmobiles’ – even though much of this forest/state is not in the Snowbelt and is actually classified as desert. And there

are only 46 miles of groomed snowmobile trails and 2 miles of groomed nonmotorized trails in the whole state – so if the area was really in the Snowbelt, there would certainly at least be more miles of snowmobile trails. Additionally, NVUM shows zero annual cross-country ski, snowshoe, and snowmobile visits on the forest. While actual use numbers are likely somewhat higher than zero, the fact remains, as a whole, this is not a prime winter sports forest and should not have been included in this report's calculations.

When one looks at the report's State Summaries, from California to Wyoming and every state in between, WWA's raw data particular to individual forests has been skewed across the board to include lands that do not meet the definition of being realistically useable for winter recreation, and in particular, useable for snowmobiling.

3) Just because WWA deems two-thirds of the '35 million acres' designated as nonmotorized as 'inaccessible' because it is remote wilderness, does not justify WWA advocating for more areas of the forests to be closed to snowmobiling. The fact remains that these lands have been removed from motorized access, so the nonmotorized community needs to pursue ways to make better use of lands they already have exclusive use of – versus being quick to say we can't access them easily so we want other areas set aside for us. To a large degree, all lands greater than a three-mile radius from a plowed parking area are equally 'inaccessible,' irrespective as to whether they are within a designated wilderness area or not, since they would be too far to access under human-power. Therefore, WWA's push for more nonmotorized areas is really more of a smokescreen based upon principled-based set-asides (which realistically would be used by none or very few) versus set-asides that are logical and practical for nonmotorized recreation access, i.e. within 3 miles of a trailhead.

c) WWA: NVUM data shows 5.6 million cross-country skier and snowshoer visits and 4.4 million snowmobile visits on these forests annually.

Response: Yes, there are slightly (12%) more nonmotorized visits (56% of total) than snowmobile visits (44% of total), primarily because it is much less expensive to participate in nonmotorized recreation. Snowmobiling requires a substantial investment of tens of thousands of dollars for a snowmobile, clothing, trailer, and a tow vehicle – along with higher daily trip costs for fuel, oil, repair parts, user fees, and other associated trip expenditures like food and oftentimes lodging. On the other hand, cross-country skiers and snowshoers can get started in their sport for as little as one or two hundred dollars – and even the most advanced technology gear is thousands of dollars less than a \$10,000 snowmobile commonly used in the West – and daily trip costs are next to nil compared to a snowmobilers.

d) WWA: “Despite the fact that NVUM surveys show 28% more cross-country skier and snowshoe visits than snowmobile visits, more than twice as many “backcountry” forest acres are designated motorized (multi-use) as non-motorized in winter. When difficult-to-access wilderness areas are taken out of the equation the disparity becomes more severe, with designated motorized acreage outnumbering non-motorized, non-wilderness acreage by more than seven times.”

Response: 1) WWA has not used “28%” in the proper context for this discussion – which is about equity in ‘dividing up the national forest pie’ amongst user groups. NVUM surveys show there were a total of 10,033,576 winter visits on these national forests. A total of 4,391,317 visits (44%) were by snowmobiles, while the other 5,642,259 visits (56%) were by cross-country skiers and snowshoers. Snowmobiles represent slightly less than half the visits while nonmotorized uses represent slightly more than half of the visits. This is a difference of 12%, not 28%, in respect to the division of the total national forest ‘visitation pie.’

2) As discussed above in WWA Finding b), WWA has improperly framed the actual useable acres open to snowmobiles on these national forests, which in turn leads to an imprecise conclusion that there are 'more than twice as many backcountry acres designated motorized.' When one discounts unusable acres (because of snow cover, terrain, dense timber, etc.), there is likely only less than 40 million acres usable for snowmobiling on these forests – which is less than half of what is professed by WWA. The reality is that, in terms of just raw acres, there is actually little disparity.

3) As discussed above in WWA Finding Number 1, the average snowmobiler requires substantively more area (average daily outing: 70 to 120 miles) for an outing than what an average skier or snowshoer does for a day-trip (average daily outing: 5 to 10 miles). This means that snowmobilers require 7 to 24 times more area than what skiers and snowshoers do for a successful outing. So, in reality, snowmobilers are being shorted on space needed for a quality recreational outing – not skiers and snowshoers.

- e) **WWA: “There are 11 times more groomed trails open to snowmobiles than there are groomed trails designated as nonmotorized. This results in a ratio of 14 times more skier and snowshoer visits per nonmotorized mile than snowmobile visits per motorized mile.”**

Response: 1) There are more miles of groomed snowmobile trails because snowmobilers tax themselves to fund grooming their own trails. Nonmotorized users typically do not. Additionally, there is a greater need for snowmobile trail grooming than ski trail grooming due to the heavier moguling effect of snowmobile traffic.

2) A large percentage of cross-country skiers and snowshoers do not desire or require groomed trails for their backcountry recreational experience. Therefore, the perceived demand and accompanying shortage is substantially overstated by WWA.

3) The purpose of snowshoes is to provide flotation for travel across the top of uncompacted snow, so a groomed trail is not needed for this recreational activity. Therefore the inclusion of snowshoes in this discussion about groomed/compacted trails is inappropriate and was done only to improperly inflate the number of overall nonmotorized trail users.

4) It is wrong for WWA to assume that all 5.6 million cross-country skier and snowshoer visits to national forests occur on groomed trails. Rather, off-trail backcountry visits constitute a very large percentage of overall nonmotorized winter visits on these Western national forests. Therefore actual on-trail visits by skiers is exponentially smaller, which would also result in 'nonmotorized visits per mile of groomed trail' being exponentially smaller than what has been alleged by WWA.

5) Again, snowmobilers require 7 to 24 times the number of groomed miles than what skiers and snowshoers do for a quality recreational experience.

- f) **WWA contends “that in most cases the designation “multi-use” is a misnomer and is de facto single use motorized” because “the opportunity for a quality human-powered recreation experience is lost on forest lands designated as multi-use because those lands are in fact dominated by motorized use.”**

Response: 1) Concerns about multi-use and single-use cut both ways. Even though snowmobilers pay 100% of the cost to groom their trails, they typically allow them to be used for other “multi-uses” including the nonmotorized activities of cross-country skiing, snowshoeing, and dog sledding. Without the generosity of snowmobilers’ allowing the multiple-use of their trails, there would often be no groomed trail opportunities for nonmotorized trail users since they usually don’t favor taxing themselves to pay their own way. On the other hand, as nonmotorized trail users continually try to

whittle away at snowmobiling access, a growing number of snowmobilers are starting to advocate for single-use (snowmobiles-only) on groomed snowmobile trails. The real issue is self-generated funding – or the lack thereof in respect to skiers.

2) In respect to acres/areas designated as nonmotorized/closed to snowmobiles: any such closure that extends farther than a 3- to 5-mile radius from a trailhead/plowed parking area and is in a non-wilderness setting is for all intents and purposes unnecessarily closed to all uses since it is too remote to be used by most cross-country skiers and snowshoers. The result is a de facto wilderness / ‘no use’ area. The focus for nonmotorized use needs to be within these 3- to 5-mile zones – but beyond that distance multiple use or even ‘domination’ by snowmobiles should be okay since no one else will likely be there.

g) WWA: “Motorized use impacts the human-powered winter recreation experience in a number of ways: noise, exhaust and air pollution, safety concerns, and tracks.”

***Response:** Noise – first, several of the examples of noise issues cited by WWA were inappropriately from Canada, New Hampshire, and Wisconsin. All of these areas are outside the West (supposedly the focus of this report) and examples of conflicts that are due to much higher population densities than what are found in snowmobiling areas in the West. WWA also misquotes studies done in Yellowstone National Park, where the truth is, sound levels have decreased dramatically and (contrary to claims by WWA) noise standards are not being exceeded. Additionally, WWA inappropriately downplays the role four-stroke engines and other changes driven by EPA regulation of snowmobiles have brought to the industry. Today’s snowmobile is much quieter than sleds of old.*

Exhaust and air pollution – again, sleds of today are cleaner than sleds of the past due to EPA’s regulation of snowmobile engines – a fact wrongly trivialized by WWA in its report. The report erroneously makes generalized and unjustified statements about snowmobile emissions ‘across the United States.’ This is improper since this report is supposedly a look at conditions on national forests in the West. And since registered snowmobiles in the nine real ‘Western States’ (Nebraska and South Dakota are Midwest States) represent only 15% of all snowmobiles in the United States, any attempt to extrapolate national emissions data to Western forests is ill-founded since the West’s snowmobile density is profoundly less than what it is in the balance of the country. WWA also makes inappropriate comparisons between snowmobile engines and personal watercraft engines – they are simply not the same. The report also fails to recognize that new four-stroke engines, direct and semi-direct engine technology, and the use of low-emission synthetic engine oils have all made dramatic improvements which have substantially eliminated these issues from days gone by.

Safety concerns – the report states that “excessive speed, alcohol, reckless driving, and inexperience (underage driving) are the most commonly issued citations and causes of accidents involving snowmobiles.” But the source of this ‘statistic’ is the Minnesota DNR – a Midwestern State where snowmobiling is distinctly different than it is in the wide-open spaces of the West. The truth is that these issues are not common in the West and that similar statistics do not exist in respect to Western States. This is just one more example of WWA improperly using non-western data in an attempt to manufacture ‘statistics’ to justify its preconceived positions. But if WWA is strongly concerned about the “vulnerability of self-powered recreationists,” maybe it’s time to get them off the groomed snowmobile trails and let them find ways to pay for grooming their own exclusive-use trails.

Tracks – the report illogically states that, “Due to snowmobilers traveling freely on the vast majority of national forest lands, pristine terrain for skiers and snowshoers is rapidly disappearing under the tracks of snowmobiles.” But since the vast majority of skiers and snowshoers never get beyond a ‘3- to 5-mile radius’ from where they parked their car – what difference does it really make if the ‘vast majority of national forest lands’ beyond that zone are tracked up or not? This area close to parking areas should be the focus of efforts to balance uses, while the balance of forests, outside of

wilderness areas and sensitive habitats, that are largely inaccessible to most nonmotorized users should be left open to multiple uses which includes snowmobiling access. This section of the report, again, makes improper reference to snowmobiler characteristics in Minnesota. The long and the short of it is that untracked terrain is important to motorized and nonmotorized winter recreationists alike – so education directed at both groups as to how to ‘share the powder’ is likely to gain more ground than misdirected efforts to enact wholesale closures to snowmobiling on national forests.

- h) **WWA: “The data documented in this report supports WWA’s position that, in every applicable national forest, sizeable and accessible areas should be closed or remain closed to over the snow vehicles to insure a quality recreation experience for human-powered winter recreationists.”**

***Response:** The data, applied in the proper context, does NOT support WWA’s position. Rather, what has really been documented by this report is the fact that WWA has inappropriately applied global statistics to issues that are best considered at the local level. While there are always localized situations where motorized and nonmotorized recreationists can benefit from working together to resolve concerns, the situation on national forest lands in the West is not as bleak or as one-sided as what WWA depicts. The authors of this report misrepresented several facts which resulted in numerous flawed conclusions – aimed at justifying their predetermined positions. The bottom line is that there are no credible reasons to support additional broad closures to over-snow vehicles on these Western national forests.*

SNOW CONDITIONS

Having adequate snow cover is essential to limiting impacts from snowmobiles to the natural environment – as well as preventing damage to snowmobiles and personal injuries to riders. Therefore the ‘season of use’ often enters into discussions regarding appropriate time periods and snow cover for snowmobiling access.

While snowfall can be sporadic from year to year in some areas based upon local weather patterns, one good planning indicator for snow cover is SNOTEL data compiled in western States by the National Resources Conservation Service (NRCS), a U.S. Department of Agriculture agency. This data includes historic snow depths and snow water equivalent information for their extensive snow course network and is extremely helpful to determine accurate long-term snow patterns for an area. This data is available at www.wcc.nrcs.usda.gov/snow/ . Other sources of historic snowfall planning information include the United States Snow Climatology data provided by the National Oceanic and Atmospheric Administration’s (NOAA) National Climate Data Center at www.ncdc.noaa.gov/ussc/mainpage.html and the National Snow Analyses provided by the National Weather Service’s National Operational Hydrologic Remote Sensing Center (also a division of NOAA) at www.noahrs.noaa.gov/ .

While scientific studies on this topic are almost nonexistent, the study listed below was completed in 2005 for the Yellowstone National Park Winter Use Plan and is a good example as to how local areas could similarly be analyzed if there is a need for a scientific look at this issue.

1. **Historical Snow Water Equivalent and Temperature Data for Oversnow Vehicle Travel Areas in Grand Teton and Yellowstone National Parks.** Farnes, P.E. & Hansen, K. (2005) Montana State University – Department of Earth Sciences.

Executive Summary: The objective of this report is to quantify the historic snow water equivalent and temperatures for stations in Grand Teton and Yellowstone National Parks, compare snow water equivalent with opening and closing dates of oversnow vehicle travel, and provide estimated opening and closing dates that would have been possible over the historic period of record.

Snowpack and climate data have been collected at many locations in Grand Teton and Yellowstone National Parks. Measurements of climatic variables have been taken since the late 1800s at Mammoth. Other stations were started in the early 1900s up to the late 1970s. Snow courses have been measured since the mid 1930s and SNOTEL (SNOW survey TELEmetry) stations were generally started in the early 1980s. Four telemetered weather stations were installed in the upper Snake River drainage in the early 1990s.

Daily data from these stations have been analyzed for their period of record to determine the coldest temperature for each winter, when the snowpack starts to accumulate, maximum snow water equivalent (SWE) and date of maximum SWE, date snowpack melts, and various threshold values of SWE needed to sustain oversnow vehicle travel. Monthly average maximum, minimum, and average temperature and monthly precipitation have been summarized and are available on the data CD (see page 3).

There is considerable variability in how the snowpack develops and melts over the span of many years. In order to establish realistic opening and closing dates for use of oversnow vehicles on park roads, it is important to understand this variability. Using historical snow and climate measurements at locations along these travel routes can provide an insight to this variability and to the dates that OSV travel would have been possible over this historic record.

Recently, the criteria for opening the roads to the public for over snow vehicle (OSV) travel has been to open them on the Wednesday before the weekend before Christmas, usually around December 15 (thereafter, the targeted opening date). Closure typically occurred no later than the first Monday in March for the Mammoth to Norris, Norris to Madison, and Norris to Canyon roads (hereafter, generally considered to be March 4). The National Park Service closes the remaining roads on the second Monday in March (hereafter, March 11).

By comparing historical opening dates with SWE on those dates, about 25mm or 1 inch of SWE (about 250 – 300 mm or 10-12 inches accumulated snow depth) was needed for administrative OSV travel and 1.5 inches SWE was needed to open the roads to the public. This amounts to about 380 – 460 mm or 15 to 18 inches of cumulative snowfall needed for opening to the public. The threshold levels at Mammoth are less than for other areas as the point for starting oversnow travel is at higher elevation than the Mammoth (Yellowstone Park) weather station. Historically, administrative travel south from Mammoth to Norris has occurred when the SWE at Mammoth reached about 12 mm or one-half inch SWE and public travel was permitted when SWE reached about 25 mm or one inch SWE.

Some areas of the park road system accumulate less snow than others and are more critical to opening the park roads to OSV's. For example, snowpack at Madison Junction dictates when the road can be opened between West Yellowstone and Old Faithful and West Yellowstone, Norris Junction and Canyon. Snow accumulation at Old Faithful and Lake dictate when traffic can be permitted from the South Entrance to those areas. The freeze-up of Yellowstone Lake determines when Mary Bay becomes safe for visitor travel (although the NPS often opens it before freeze-up, in part because relatively few visitors travel this route). Mammoth must have adequate snowpack to access the interior of the park from the North Entrance via Norris Junction. Moran 5 WNW at Jackson Dam and Glade Creek are critical in determining when OSV's can use local roads in Grand Teton National Park and the road from Flagg Ranch into Idaho via Grassy Lake.

Using SWE data and estimated road openings from 1949-2005, it appears that roads would have been opened to the public about 7 days after they were opened to administrative travel for the West Yellowstone-Old Faithful-Lake-Canyon-Norris-West Yellowstone loop (hereafter the "Lower Loop and West Entrance Road"). In 8 of the 57 years, roads would not have been open to administrative travel by December 15. In 16 years out of 57, public access would have been delayed until after the current opening date of December 15.

Spring closure dates closely match the date at which snowpack becomes isothermal (same temperature throughout the snowpack), which is the beginning of spring melt. Road closures due to snowmelt in the spring would have occurred earlier than March 4 in about 7 of those 57 years. Madison Junction is again a critical point for snowmobile travel on the Lower Loop and West Entrance Road; snowmelt starts there about 18 days before it begins at West Yellowstone.

For the road between East Entrance and Lake, Yellowstone Lake needs to be frozen before snow starts to accumulate in the Mary Bay area (Pers. Comm. M. Yochim). This is typically about a month after there is adequate snow on other portions of the road based on the SWE accumulation at the Lake Yellowstone station. Based on SWE and estimated road openings from 1949-2005, administrative travel would have been possible by December 15 on 55 of the past 57 years. Public travel would have been possible by Dec. 15 on 50 of the past 57 years. For the past 57 years, snowmelt has always started after March 11.

The Mammoth to Norris section would have been open to administrative travel on 34 of the 57 years (based on 12 mm SWE at Mammoth) by December 15 while only 14 out of 57 years would have been open to public travel by December 15 (based on 25 mm SWE at Mammoth). Melt would close the roads before March 4 in 24 of the 57 years.

Access from the South Entrance (Snake River Station) to Grant Village would have been open to administrative travel by December 15 in all but 3 years over the past 57 years based on criteria shown above. Public access would have been possible in 49 of the past 57 years by December 15. Melt would have closed the roads by March 4 in only one of the past 57 years.

At Madison Junction, there is neither a weather station or snow course. However, winter maximum and minimum daily temperatures and daily snow depths and snowfall have been recorded for the majority of days between the time the snow starts to accumulate and when it melts. SWE was estimated on the first of the month using snow depths from Madison Junction and densities from West Yellowstone, Old Faithful and Norris Basin snow courses. Daily data were extrapolated using daily SWE from the West Yellowstone snow pillow (a device that measures snow water equivalent by measuring the weight of accumulated snow). Norris Basin has only a snow course. The daily SWE for the Norris Basin location was estimated using the Canyon snow pillow data to estimate the SWE distribution between the monthly measurements.

Mid-winter melt can be a problem for maintaining snow on the roadways. Days between December 15 and March 1 when daily minimum temperatures remained at or above 0 degrees C or 32 degrees F and whether or not precipitation was observed, were analyzed for all sites. Some mid-winter melt occurs almost every year. In over one-half of the cases, rain was recorded. The events were fairly well distributed across the period indicating that warm minimum temperatures with or without rain can occur at most anytime during the winter. Lower elevation sites, such as Mammoth, have more frequent occurrences of mid-winter melt and rain-on-snow events than do higher elevations sites.

SOUND

Sound levels for snowmobiles have been reduced 94% since inception. Pre-1969 snowmobiles were noisy. At full throttle, these machines emitted sound levels as high as 102 dB(A) at a distance of 50 feet.

Snowmobiles produced since February 1, 1975 and certified by the Snowmobile Safety and Certification Committee's independent testing company emit no more than 78 dB(A) from a distance of 50 feet while traveling at full throttle when tested under the Society of Automotive Engineers (SAE) J192 procedures. Additionally, those produced after June 30, 1976 and certified by the Snowmobile Safety and Certification Committee's independent testing company emit no more than 73 dB(A) at 50 feet while traveling at 15 mph when tested under SAE J1161 procedures.

For comparison purposes, normal conversation at three feet produces approximately 70 dB(A). It would take 256 78 dB(A) snowmobiles operating together at wide open throttle to equal the noise level of just one of the pre-1969 snowmobiles.

Problems with excessive noise levels do occur when irresponsible snowmobilers modify the snowmobile exhaust system or substitute the factory system with an after-market racing exhaust. In most States this practice is illegal and grossly misrepresents the sport.

The Basics of Sound and Noise: Every kind of sound is produced by vibration. The sound source may be a violin, an automobile horn, or a barking dog. Whatever it is, some part of it is vibrating while it is producing sound. The vibrations from the source disturb the air in such a way that sound waves are produced. These waves travel out in all directions, expanding in balloon like fashion from the source of the sound. If the waves happen to reach someone's ear, they set up vibrations that are perceived as sound.

Sound then depends on three things. There must be: 1) a vibrating source to set up sound waves, 2) a medium such as air to carry the waves, and 3) a receiver to detect them.

Noise is defined as unwanted sound, a definition that includes both the psychological and physical nature of the sound. The term "sound" and "noise" are often interchangeable.

How Sound is Produced and Carried: It is easy to detect the vibrations of many sources of sound. A radio loudspeaker, for example, vibrates strongly, especially when the volume is turned up. If you lightly touch the speaker cone, you can feel its vibrations as a kind of tickling sensation in your fingertips.

Sound waves are often compared with water waves but are actually a very different sort of wave. What they are can be seen by considering what happens when an object vibrates in the air. Suppose someone strikes a gong, as the gong vibrates, it bends outward and inward very rapidly. This movement pushes and pulls at the air next to the surface of the metal. Air is made up of tiny molecules, and when the metal gong bends inward and outward, it creates a wave. The wave travels outward from the gong, becoming weaker and weaker until it dies away.

The Speed of Sound: Sound waves travel at a constant speed, regardless of the loudness or softness of a sound. Temperature, however, does affect their speed. At room temperature sound travels in air at a speed of 1,130 feet per second. Sound waves travel one mile in about five seconds. At freezing (32 degrees F), sound waves travel at 1,087 feet per second or one mile in about 5 seconds.

Some sounds are high and others are low; some are loud and others barely audible; some are pleasant and others harsh. The three basic properties of any pure sound are its pitch, its intensity, and its quality.

The Pitch of Sounds: Pitch is simply the rate at which vibrations are produced. Another way to define the pitch of a tone is to find its wavelength. The wavelength of a particular tone is equal to the velocity of sound divided by the frequency of the tone.

Intensity and Tone Quality: The intensity of a sound has nothing to do with its pitch. Intensity depends upon the strength of the vibrations producing the sound. The loudness of sounds is measured in decibels (dB).

Reflecting and Forcing Sound Waves: Like light waves, sound waves can be reflected and focused. An echo is simply a reflection of sound. A flat surface, like that of a cliff or wall, reflects sound better than an irregular surface, like a tree, which tends to break up sound waves.

Specific snowmobiling related sound studies include:

1. **Natural Soundscape Monitoring in Yellowstone National Park December 2005 – March 2006.**
Burson, S. (2006) National Park Service – Grand Teton National Park, Division of Science and Resource Management.

Abstract: Sounds associated with oversnow vehicles (snowmobiles and snowcoaches) are an important management concern at Yellowstone National Park. Acoustical standards and thresholds have been defined in park planning documents for the winter use season. The primary purpose of this study was to monitor the impact of oversnow vehicles on the natural soundscape. These data were then compared to the impact definition thresholds in the 2004 Yellowstone and Grand Teton National Park Temporary Winter Use Plans Environmental Assessment. Acoustical data were collected at five primary sites in Yellowstone National Park during the winter use season, 21 December 2005-12 March 2006.

Oversnow vehicles were audible in the Old Faithful developed area an average of 67% of the day between 8 am and 4 pm. Oversnow vehicles were audible 35% (Old Faithful Upper Basin) and 62% (West Thumb Geyser Basin) of the day within geyser basins adjacent to developed areas. Along travel corridors the percent time audible was 34% (Spring Creek) and 55% (Madison Junction 2.3). The maximum sound levels for oversnow vehicles exceeded 70 dB(A) at Old Faithful, along the groomed travel corridor between Madison Junction and the West Yellowstone entrance (Madison Junction 2.3) and between West Thumb and Old Faithful (Spring Creek). Sounds from both visitor and administrative oversnow vehicles were included in this study. Acoustic data from previous years is included for comparison.

Although on average snowmobiles were audible for more time than snowcoaches, snowcoaches in general had higher sound levels, especially at higher speeds. The overall impact on the natural soundscape from oversnow vehicles was similar to the past two seasons, although there was increased audibility at two locations. The number of oversnow vehicles that entered the park increased slightly. Consistent with acoustic data collected during the previous three winter seasons, the sound level and the percent time oversnow vehicles were audible remained substantially lower than during the 2002-2003 winter use season. The reduced sound and audibility levels were largely explained by fewer snowmobiles, the change from two to four-stroke engine technology, and the guided group requirements. The value of this monitoring study increases with each additional year because trends can begin to emerge in addition to detailed information about specific winters and locations.

2. **Natural Soundscape Monitoring in Yellowstone National Park December 2004 – March 2005.**
Burson, S. (2005) National Park Service – Grand Teton National Park, Division of Science and Resource Management.

Abstract: Sounds associated with oversnow vehicles (snowmobiles and snowcoaches) are an important management concern at Yellowstone National Park. Acoustical standards and thresholds have been defined in park planning documents for the winter use season. The primary purpose of this study was to determine the impact of oversnow vehicles on the natural soundscape. These data were then compared to the impact definition thresholds in the 2004 Yellowstone and Grand Teton National Park Temporary Winter Use Plans Environmental Assessment. Acoustical data were collected at seven sites in Yellowstone National Park during the winter use season 15 December 2004 – 13 March 2005.

Oversnow vehicles were audible in the Old Faithful developed area an average of 69% of the day between 8 am and 4 pm. Oversnow vehicles were audible 29% (Old Faithful Upper Basin) and 47% (West Thumb Geyser Basin) of the day within geyser basins adjacent to developed areas. Along travel corridors the percent time audible ranged from 55% (West Yellowstone 3.1) to 61% during Presidents Day weekend (Madison Junction 2.3). The percent time audible in backcountry areas ranged from 4% (Lone Star Geyser) to 26% (Mary Mountain 8K). Sounds from oversnow vehicles were audible at least one mile adjacent to the main motorized routes at Mary Mountain 8K and Lone Star Geyser. Oversnow vehicles operating in the Gallatin National Forest on the west boundary of Yellowstone National Park were often audible at the West Yellowstone 3.1 monitoring site, three miles away. The maximum sound levels for

oversnow vehicles exceeded 70 dB(A) at Old Faithful, along the groomed travel corridor between Madison Junction and the West Yellowstone entrance (Madison Junction 2.3 and West Yellowstone 3.1).

Oversnow vehicle use was restricted on some road segments due to inadequate snowcover early and late in the winter use season. Consistent with acoustic data collected the previous winter season, **the sound level and percent time oversnow vehicles were audible remained substantially lower than oversnow vehicle sounds from the 2002-2003 winter use season.** The reduced sound and audibility levels were largely explained by the fewer numbers of snowmobiles used, the change from two to four-stroke engine technology, and the guided group requirement.

3. **Comparing Sound Emissions of Snowmobiles to those of Road Vehicles.** Davis, G. & Marietta, N. (2005) Michigan Technological University.

Abstract, Conclusion and Table: The focus of this paper was to examine and compare sound emissions of production trail-riden snowmobiles to that of other everyday vehicles that travel by road such as passenger cars, motorcycles, and semi tractor/trailers. The paper outlines the standard test used by the Society of Automotive Engineers (SAE) that all production snowmobiles must pass before they can be sold to the public, and compares these numbers to actual test data of noise emissions produced by standard road vehicles.

Conclusion: **It is clearly seen that snowmobiles in fact do not make a great deal more noise than standard road vehicles. In many cases, snowmobiles are noticeably quieter.** A snowmobile under full throttle emits the same sound level as a truck pulling a camper or an off-road Jeep traveling at constant highway speeds applying very little throttle. So if you refer to a worst-case scenario, a snowmobile leaving a stop sign and applying full throttle, the noise produced is still about the same as a very common vehicle simply cruising down the road.

Now if we look at the worst-case scenario in the opposite sense, a Harley Davidson motorcycle accelerating and applying nearly full throttle produces nearly six times the noise to your ear that a snowmobile driving the same way produces. In a more common example, a logging truck pulling a loaded trailer down the highway traveling at 45 mph will produce twice the noise of a snowmobile applying full throttle.

It has been demonstrated here that the common snowmobile is simply not allowed under law to produce the sound levels, under any type of driving conditions, that common road vehicles produce every day. It is illegal for a snowmobile being driven under full throttle to be as loud as a semi tractor/trailer cruising down the highway each and every day.

Table A1: Examples of Every Day Sound Levels

Sound Source	Sound Level dB(A)
75-piece orchestra	130
Car horn, snow blower	110
Blow dryer, diesel truck	100
Electric shaver, lawn mower	85
Garbage disposal, vacuum cleaner	80
Snowmobile (full throttle at 50 feet; maximum allowed by law)	78
Alarm clock, city traffic	70
Dishwasher	60
Leaves rustling, refrigerator	40

4. **Supplemental Over-Snow Vehicle Sound Level Measurements.** Daily, J.G. and Raap, K. (February 2002) Jackson Hole Scientific Investigations and Wyoming Department of State Parks and Cultural Resources. SAE Technical Paper Number 2002-01-2766.

Abstract: This study of over-snow vehicle sound levels was conducted to provide supplemental and additional information for preparation of the Winter Use Plan Supplemental Environmental Impact Statement (SEIS) for Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway. The tests conducted in this study resulted from the analysis of previous tests conducted in September 2001. The September tests were done on a grass surface, which is permissible under SAE standards. In order to get the best data possible, these February tests were done on snow under typical winter trail conditions.

The pass-by sound level of a variety of over-snow vehicles was measured at operational speeds that would be experienced under normal use of the vehicles while in the national park units. The pass-by testing included three different types of snow coaches, two commercially available four-stroke snowmobile models, a groomer, and various two-stroke snowmobiles. All testing was conducted on the same day in the same location with the same terrain and background conditions.

Conclusion: The loudest stock over-snow vehicle at a steady state speed was a Bombardier snow coach with high exhaust, which generated 78.4 dB(A) at 30 mph. The loudest stock snowmobile was a Polaris two-stroke 500cc Wide Track, which had a peak reading of 76.8 dB(A) at 45 mph. A modified Polaris RMK 800 was the loudest vehicle tested overall, with a peak average reading of 79.7 dB(A) at 45 mph. It recorded 84.9 dB(A) under full throttle acceleration.

The quietest over-snow vehicle tested was the Polaris Frontier touring snowmobile at 20 mph. Its lowest average reading at this speed was 65.0 dB(A). Four-stroke snowmobiles averaged 65.8 dB(A) at 20 mph, while the two-stroke snowmobiles averaged 70.7 dB(A) at 20 mph. The snow coaches averaged 69.6 dB(A) at 20 mph. The Ford two-track conversion van snow coach had a low average reading at 20 mph of 65.4 dB(A), making it the quietest of the snow coaches at this speed.

These data show the sound levels of many late model snowmobiles overlap or are quieter than snow coaches under the same or similar testing conditions. The quietest snowmobile at 20 mph produced less sound than any of the snow coaches at the same speed.

The lowest average reading for a snowmobile at 35 mph was the Polaris Frontier four-stroke, with a sound level of 70.3 dB(A). The lowest average reading for a snowmobile at 45 mph was 71.6 dB(A) by both the Polaris Frontier and the Arctic Cat Four-Stroke.

The lowest average reading for a snow coach at a nominal 30 mph was 69.5 dB(A) by the Ford two-track conversion van.

For comparison, the Kettering University entry in the Clean Snowmobile Challenge (CSC) 2001 competition recorded a sound level of 72 dB(A) during the maximum acceleration event. This is on par with the levels generated by the production four-stroke snowmobiles in this testing.

Quiet snowmobiles already exist, as shown by these data. The technology is improving to make these machines even quieter than they are now. Work will need to be done not only with engine sound levels, but also with the mechanical sound generated by the track and skis, regardless of whether the over-snow vehicle is a snowmobile or a snow coach. This work is going forward with the CSC as well as by the various snowmobile manufacturers. The production sleds tested in this evaluation are showing major improvements in the control of sound emissions compared to snowmobiles of just a few years ago.

The technology appears to exist to require that over-snow vehicles meet reasonable sound regulations. However, any regulations written should reasonably consider that over-snow vehicle sound levels are not attributable to just engine sounds must also must factor in the other mechanical sounds associated with tracked vehicles. These data show clearly the best available technology for reducing sound emissions from over-snow vehicles lie with the new technology four-stroke snowmobiles. The average sound emission from the production four-stroke snowmobiles at 45 mph is 72.5 dB(A), while the average sound emission at 30 mph of the snow coaches is 74 dB(A).

5. **Over-Snow Vehicle Sound Level Measurements.** Daily, J.G. and Raap, K. (September 2001) Jackson Hole Scientific Investigations and Wyoming Department of State Parks and Cultural Resources. SAE Technical Paper Number 2002-01-1656.

Abstract: This study of over-snow vehicle sound levels was conducted to provide new and additional information for preparation of the Winter Use Plan Supplemental Environmental Impact Statement (SEIS) for Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway. The pass-by sound level of a variety of over-snow vehicles was measured at operational speeds that would be experienced under normal use of the vehicles while in the national park units. The pass-by testing included four different types of snow coaches and various models of snowmobiles. All testing was conducted on the same day (in September on grass due to time constraints) in the same location with the same terrain and background conditions. Two additional 4-stroke snowmobiles were tested in January 2002 in Yellowstone National Park under typical winter conditions.

Conclusion: The loudest stock over-snow vehicle was a Ford two-track conversion van, which registered an average peak of 81.3 dB(A). The loudest stock snowmobile was a Ski Doo Summit 700, which had a peak reading of 79.8 dB(A) at 45 mph. A modified Polaris RMK 800 was the loudest vehicle overall, with a peak average reading of 81.9 dB(A).

The quietest over-snow vehicle tested during September was the Arctic Cat Four-Stroke Touring snowmobile at 20 mph. Its lowest average reading at this speed was 67.3 dB(A). Several other snowmobiles were in this range of the high 60's to low 70's at the 20 mph speed. The Bombardier snow coach had a low average reading at 20 mph of 69.9 dB(A), making it the quietest of the snow coaches at this speed.

The Polaris Frontier tested during January had an average pass-by sound level at 20 mph of 66.7 dB(A), which makes it the quietest over-snow vehicle run during this series of tests.

These data show the sound levels of many late model snowmobiles overlap or are quieter than snowcoaches under the same or similar testing conditions. The quietest snowmobile at 20 mph produced less sound than any of the snow coaches at the same speed. None of the over-snow vehicles were as quiet as the wheeled road vehicles tested, although the Dodge diesel pickup was near the lower level of the snowmobile sound envelope.

The Arctic Cat Four-Stroke tested in September was subjectively considerably quieter at 20 mph than any other over-snow vehicle tested at that time. This may be due to the fewer exhaust pulses at a given RPM as well as the clutching engagement tailored to the four-cycle engine. As the testing speed increased for this snowmobile, the mechanical sound of the track and under-dampened skis overcame the engine sound level. One observation is that this higher level of track and ski noise may be generated because of: 1) the blow-molded plastic skis on this particular snowmobile model versus a thinner profile plastic ski which appeared to generate less sound on other models, and 2) more noise and vibration emanating from the track, perhaps due to track tension, lug height, or other factors associated with track noise. Because of this, the Arctic Cat Four-Stroke was not the quietest snowmobile at speeds of 35 and 45 mph.

The lowest average reading for a snowmobile at 35 mph and 45 mph was the Polaris Frontier, with average sound levels of 70.7 dB(A) and 72.1 dB(A) respectively. As an aside, the sound level recorded during normal conversation after the September testing was 78 dB(A).

For comparison, the Kettering University entry in the Clean Snowmobile Challenge (CSC) 2001 competition recorded a sound level of 72 dB(A) during the maximum acceleration event. We would expect its sound level during steady state operation to be considerably lower than this.

Quiet snowmobiles already exist, as shown by these data. However, work to reduce overall sound levels even further needs to be done. Sound comes from the engine as well as mechanical components such as the clutch, track and skis, regardless whether the over-snow vehicle is a snowmobile or a snow coach.

The technology appears to exist to require that over-snow vehicles meet reasonable sound regulations. With the advent of four-stroke technologies for snowmobiles, sound level restrictions can be more stringent, especially in environmentally sensitive areas such as Yellowstone National Park. However, any regulations written should reasonably consider that over-snow vehicle sound levels are not attributable just to engine sounds but also must factor in other mechanical sounds associated with tracked vehicles.

6. **Factors affecting response to noise in outdoor recreational environments.** Kariel, H. G. (1990). *The Canadian Geographer*, 34(2), 142-149.

Abstract: Analyzes the relation between various sound sources in the outdoor environment and people's evaluations of them. Concludes that sound level alone is not a good predictor of annoyance; randomness, listener's subjective associations, and inconsistencies with expected environment were far greater factors in whether noise was considered a nuisance. Paper includes an itemized list of the decibel level of approximately 60 normally encountered activities when camping or picnicking.

VEGETATION AND SOIL/SNOW COMPACTION

Everything we do has some effect on the environment. When a hiker steps on a flower, he or she affects the environment. When land is paved over for a bicycle path, it affects the environment. Many of the foot paths man has used for centuries still exist and are clearly visible throughout the world.

It's a fact however that a snowmobile and rider exert dramatically less pressure on the earth's surface than other recreational activities (i.e., just one-tenth the pressure of a hiker and one-sixteenth the pressure of a horseback rider). Table A2 below shows the average pounds of pressure per square inch exerted on earth's surface by various recreation travel modes (All vehicle weights include an estimated weight of 210 pounds for one person and his/her gear.).

Table A2: Pressure Exerted by Various Recreation Travel Modes

Object	Pounds of Pressure exerted per square inch
Four-Wheel Drive Vehicle	30
Horse	8
Man (hiking)	5
All-Terrain Vehicle	1.5
Snowmobile	0.5

Moreover, the snowmobile's one-half pound of pressure is further reduced by an intervening blanket of snow.

In many States snowmobiles are not classified as off-road vehicles. By both definition and management

policies, these States have completely separated snowmobiles from off-road vehicles. Given adequate snowfall and responsible operation, all evidence of snowmobile operation disappears when the season changes and the snow melts.

A U.S. Department of the Interior environmental impact statement concluded: "A major distinction is warranted between snowmobiles and other types of off-road vehicles. Snowmobiles operated on an adequate snow cover have little effect on soils – and hence cause less severe indirect impacts on air and water quality, and on soil-dependent biotic communities, than other ORVs do." It further stated that, "Where snowmobiles are used exclusively over snow on roads and trails, the impact on vegetation is indeed virtually nil."

A University of Wisconsin study found that snowmobile traffic had no effect on grain yield of winter wheat, alfalfa, red clover plots, or grass legume. Species of turf grass showed slightly reduced yields at first harvest, but were not negatively affected in subsequent harvests.

Research undertaken by the University of Maine concluded that "compaction by snowmobiling does not alter the grain weight yields of alfalfa in Maine."

A Utah Water Resource Laboratory study found that snow compaction, caused by snowmobile tracks, does not damage wheat crops. Instead, the compaction increases the yield and eliminates snow mold. Erosion is also reduced.

There is no evidence that snow compaction caused by snowmobiling, ski-touring, or snowshoeing has a significant impact on the population of small burrowing animals. Since these recreations take place over a minuscule portion of the total land area, the ecosystems of burrowing animals tend to be overwhelmingly affected by natural forces such as wind-induced compaction, early and late snowfalls, temperature fluctuations resulting in thaws and freezes, etc.

Specific studies related to vegetation, soil, and snow compaction include:

General

1. **Effects of Winter Recreation on Vegetation.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 119-121.

Potential Effects: There is little information available describing the ecological effects of snowmobiling and other winter recreational activities on vegetation. Research cited was completed in the 1970s and focused on assessing the impacts of snowmobile use on vegetation and snow characteristics in Minnesota and Canada. Effects could potentially include impacts on snow compaction, soil temperature, vegetation, and erosion.

Management Guidelines: Adverse effects to vegetation are the result of cumulative factors. **The impact of snowmobile activities on the physical environment varies with winter severity, the depth of snow accumulation, the intensity of snowmobile traffic, and the susceptibility of the organism to injury** (Wanek 1973). Activities occurring on roadbeds and (most likely) trails are probably having little affect on vegetation as the areas are already compacted or disturbed. Effects of snowmobile activities on off-trail vegetation should be assessed at a landscape level.

Management or restriction of snowmobile activities should be considered in areas where forest regeneration is being encouraged as deformation patterns was observed in conifers where leaders had been removed by snowmobile activities (Neumann and Merriman 1972). Management or restrictions

should also be considered in fragile or unique communities, such as riparian and wetland habitats, thermal areas, sensitive plant species habitat, and areas of important wildlife habitat, in order to preserve these habitats.

2. **Snowmobile Impact on Old Field and Marsh Vegetation in Nova Scotia, Canada: An Experimental Study.** Keddy, P.A., Spavold, A.J., & Keddy, C.J. Department of Biology – Dalhousie University, Halifax, Nova Scotia. (1979) *Environmental Management*, Vol. 3, No. 5, 409-415.

Abstract: A study was carried out in Nova Scotia, Canada, to experimentally assess the effect of snowmobiles on old field and marsh vegetation. Snowmobile treatments ranging from a single pass to 25 passes (five passes on five separate days) were administered. The first pass by a snowmobile caused the greatest increase in snow compaction – roughly 75% of that observed after five sequential passes. Snowmobile treatment resulted in highly significant increases in snow retention in spring. Frequency was more important than intensity in this regard.

Standing crop and species composition were measured the following summer. Standing crop in the field showed a significant reduction with increasing snowmobile use; frequency of treatment ($p < 0.01$) was more important than intensity ($p = 0.125$). *Stellaria graminea*, *Aster corifolius*, *Ranunculus repens*, and *Equisetum arvense* all showed significant ($p < 0.05$) differences in percent cover resulting from the treatment. Marginally significant changes were observed in *Agrostis tenuis* and *Phleum pretense*. Marsh vegetation showed no significant effects of snowmobile treatment. This may have been because of solid ice cover during the winter.

Grasses

1. **Effects of snowmobile traffic on bluegrass.** Foresman, C.L., Ryerson, D.K., Walejko, R.N., Pendleton, J.W., & Paulson, W.H. (1976). *Journal of Environmental Quality* 5(2): 129-130.

Abstract: Result of staged snowmobile passes, compared with undisturbed plots. Early growth was slower but late summer yields were the same. No soil compaction was detected in the treated plots. The researchers concluded that snowmobiling would adversely affect only the plots intended for early harvest. Report includes a brief bibliography.

2. **Effects of Snowmobile Traffic on Non-Forest Vegetation and Grasses.** (1974) Proceedings of the 1973 snowmobile and Off the Road Vehicle Research Symposium., Michigan State University, East Lansing, MI

Abstract: The main objective of this study was to determine the effect of varying degrees of snowmobile traffic on non-forest vegetation and grasses found in open field areas and farms throughout the Snow Belt states. The results revealed that: where snow cover exceeded 3 inches in depth there were no detrimental effects on grass or vegetation stands, their vigor, or yield; high-grade grasses recover naturally from heavy snowmobile traffic; and snowmobile traffic caused no stand reductions, but did cause a slower recovery in early spring.

3. **Snowmobile Impact on Three Alpine Tundra Plant Communities.** Greller, A.M., Goldstein, M., & Marcus, L. (1974) *Environmental Conservation*, Volume 1, No. 2, 101-110.

Summary: The study observed snowmobile travel on a route located on Niwot Ridge in the Front Range of the Colorado Rocky Mountains, between two weather stations operated by the Institute of Arctic and Alpine Research – University of Colorado, from November 1968 to May 1969 and from November 1969 to May 1970. General conclusions included: 1) In communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, and to relatively prominent, rigid cushion-plants. Part of

the damage to these communities in the present study may have been due to the manual removal of rocks, necessary for the operation of snowmobiles in snow-free areas. 2) *Kobresia*, present in isolated tussocks in a cushion-plant community, absorbed the major portion of snowmobile impact. As *Kobresia* is thought to form the climatic climax community in this ecosystem, differential damage to it should seriously retard succession. 3) Snowmobile travel in uniform, closed *Kobresia* meadows inflicted much less damage to most plants, including *Kobresia* itself, than did similar travel on a sparsely vegetated community. 4) Plants best able to survive the heaviest snowmobile impact were those with small stature and little woodiness, or with buds well-protected at or below the soil surface. 5) Snowmobile traffic should be carefully restricted to snow-covered areas. Whenever this is not feasible, the least destructive and easiest alternative is travel on mature, well-vegetated *Kobresia* meadows or similar well-drained plant communities.

It should be noted that the snowmobile damage to vegetation on Niwot Ridge was probably of greater severity than would be expected from undirected recreational travel. Recreational drivers would be expected to avoid snow-free areas whenever possible, thus reducing, considerably, the impact on vegetation. Also, it is unlikely that large numbers of stones would be removed by random travel on those snow-free areas.

Soil and Snow

1. **Effect of snow compaction on frost penetration and soil temperature under natural conditions in central Maine.** Wentworth, D. S. (1972).

Abstract: The effect of snow compaction in relation to frost penetration and soil temperatures was studied on eight sample plots. Multiple linear regression analysis was used to develop regressions of three environmental variables, as well as time, upon soil temperature. **Compaction of the snow cover had little effect on average soil temperature under the different treatment areas.**

Winter Wheat

1. **Effects of snowmobile traffic on several forage species and winter wheat.** Ryerson, D. K., Schlough, D. A., Foresman, C. L., Tenpas, G. H., & Pendelton, J. W. (1977). *Agronomy*, 69(Sept.-Oct.), 769-772.

Abstract: Attempted to identify conditions under which OSV use would cause plant damage; this was not accomplished because each winter had unique and unpredictable characteristics. Six common species were studied for 3 years. 4 species showed no detrimental effects; winter wheat yields were not reduced below the check (control) areas; 1 species was significantly reduced during one year but unaffected during the next year **Concluded that trail use (rather than open uncontrolled use) would be most appropriate in crop vegetation environs.** Paper includes a bibliography.

Woody Plants

1. **A continuing study of the ecological impact of snowmobiling in Northern Minnesota.** Wanek, W., & Schumacher, L. H. (1975) The Center for Environmental Studies, Bemidji State University, Bemidji, MN.

Abstract: Five years of research have shown conclusively that snowmobiles have an impact on the physical environment and plant communities of northern Minnesota. The impact may vary from year to year due to differing temperature extremes and snowfall. **The extent of plant injury often depends on the intensity of snowmobile traffic and the susceptibility of each species to physical or cold temperature damage.** The environment beneath the snow compacted by snowmobiles is substantially colder than that under natural snow cover. This can cause damage to herbs and perennials. Many woody plants are

particularly vulnerable to physical damage by snowmobiles.

The damage to plant communities reported during this study should not be considered maximal. In all cases snowmobile traffic began after six inches of snow had accumulated – a condition which is usually not met during normal snowmobiling activity.

2. **The ecological impact of snowmobiling in Northern Minnesota.** Wanek, W. (1973) The Center for environmental studies-Bemidji State College Bemidji, Minnesota.

Abstract: Snowmobiles have an impact on the physical environment and biota of northern Minnesota. The impact varies with the severity of the winter, the depth of snow accumulation, the intensity of snowmobile traffic, and the susceptibility of the organism to injury, caused by cold temperatures or physical contact.

Temperatures beneath the snow compacted by snowmobiles are considerably colder than those under undisturbed snow cover. The growth of early spring flowers is retarded, and reproductive success is reduced where snowmobiles travel. Many herbs with massive underground storage organs (alfalfa included) are winterkilled in the modified environment under snowmobile tracks. Woody plants are particularly vulnerable to physical damage by snowmobiles. Snowmobile traffic can be beneficial by reducing the stature of woody vegetation in area where it needs to be controlled. However, traffic is unwise in places where forest regeneration is being encouraged, or where the esthetic or economic value of fragile communities necessitates their preservation.

WATER QUALITY

Winter recreation could affect aquatic organisms mainly by indirect impacts due to water pollution. Some believe two-stroke snowmobile engines can deposit contaminants on snow, leading to ground and surface water quality degradation, which subsequently may impact aquatic life. The following information rebuffs those claims:

1. **Effects of Snowmobile Emissions on the Chemistry of Snowmelt Runoff in Yellowstone National Park.** Arnold, J.L., & Koel, T.M. (2006) Yellowstone National Park, Center for Resources – Fisheries and Aquatic Sciences Section.

Executive Summary: Created in 1872, Yellowstone National Park forms the core of the Greater Yellowstone Ecosystem, and is arguably the largest intact naturally functioning ecosystem remaining in the lower 48 United States. The park was created to protect the unique geothermal features and headwaters of the Madison, Snake, and Yellowstone rivers, while providing for the enjoyment of this unique environment by visitors. Approximately 44,000 hectares of lakes and 4,300 kilometers of streams exist in Yellowstone National Park, all which are classified as Outstanding Natural Resource Waters (Class I), meaning they must receive a very high level of protection against degradation.

More than three million people visit the park each year to engage in a wide range of recreational activities. Throughout the winter season (December–March), most park roads are closed to vehicular travel and are groomed and maintained for oversnow transportation. As a result, many visitors during winter months travel by snowmobiles. A significant increase in use of these machines was first documented in the late 1980s, when the numbers had increased nearly tenfold over that in 1968. By the mid-1990s the number of snowmobiles entering the park had increased to nearly 75,000 per year. During this time most snowmobiles had two-stroke engines, known to burn fuel inefficiently. Consequently, the steady increase in snowmobile use within the park was a concern to resource managers because of the potential that the increase in fossil-fuel combustion could result in greater levels of emissions entering the pristine surface waters of the park.

During late March through mid-April of 2003 and 2004 snowmelt runoff samples were collected from four sites along the heavily used road corridor between Yellowstone National Park's West Entrance at

West Yellowstone, Montana, and the Old Faithful visitors area. Three of these sites were located immediately adjacent to the roadway in the vicinity of the West Entrance, Madison Junction, and Old Faithful. The remaining site was used as a control, located near Madison Junction approximately 100 meters from the roadway and away from the effects of snowmobiles. Each site was visited on 9–10 different days during the spring sampling period, with visits dependent on having a daily temperature >5°C and good potential to obtain snowmelt runoff. In situ water quality measurements (i.e., water temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected. Snowmelt runoff samples were analyzed for nine volatile organic compounds (VOCs), including benzene, ethylbenzene, ethyl tert-butyl ether, isopropyl ether, meta and para-xylene (m- and p-xylene), methyl tert-butyl ether, ortho-xylene (o-xylene), tert-pentyl methyl ether, and toluene. Of these nine compounds, only five were detected during any one sampling event. The detected compounds included benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene.

All in situ water quality measurements were within acceptable limits. The VOCs were most prevalent at the Old Faithful site, which receives extremely high use by snowmobiles each year. Fortunately, the concentrations of all VOCs detected each year were considerably below the U.S. Environmental Protection Agency's (USEPA) water quality criteria and guidelines for VOCs targeted in this study. During the course of the study, VOC concentrations of snowmelt runoff in Yellowstone National Park were below levels that would adversely impact aquatic systems. However, future research in Yellowstone National Park on snowmobile emissions should address the potential for another group of harmful chemicals known as the polycyclic aromatic hydrocarbons (PAH). The PAH tend to be more capable of persisting in the environment for longer periods than VOCs and are suspected at the Old Faithful site as it received runoff from a paved parking area.

2. **Impacts of Two-Stroke Engines on Aquatic Resources.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 145-149.

Summary: Impacts to aquatic species that can be attributed to atmospheric deposition from snowmobiles have not been well studied. Field studies are extremely difficult to conduct because atmospheric deposition rates could be affected by numerous factors, including temperature, proximity to water, and combustion efficiency of individual snowmobiles. Tremendous uncertainty accompanies this topic with reference to affects on aquatic resources of the Greater Yellowstone Area.

In situations where snowmobiling occurs over open water, obvious impacts will include direct discharge into aquatic habitats. Appreciable contamination from emissions from backcountry snowmobiling probably occurs less frequently.

3. **Effects of Snowmobiling across Open Water on Fish and Wildlife.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 161-162.

Summary: Snowmobiling on open water involves a daring or, in some cases, intoxicated snowmobiler with a powerful machine who attempts to either make it across open water or to take a round trip on open water without submerging the snowmobile. Snowmobiling on open water has the potential to affect water quality; aquatic species, such as invertebrates and trout; and riparian-dependant wildlife, specifically moose, furbearers, waterfowl, and bald eagles.

Snowmobiling on open water has the potential to pollute the water with snowmobile exhaust and spilled oil and/or gas, to stir up sediments on the bottom, to disturb winter-stressed fish and other aquatic

wildlife, and to displace wildlife from important winter habitat. A literature search produced little information on the effects of snowmobiling on open water.

Agency managers need to be aware of the potential for snowmobile use on open water and that there are possible effects to water quality, fish, and wildlife. This activity is in defiance of common sense, and agencies should prohibit it on public land to avoid impacts to water quality, aquatic species, and riparian-dependant wildlife.

WILDLIFE

A wide range of studies, dating back to the 1970s, have been done regarding the impacts of snowmobiles on wildlife. Generally, most studies have concluded that impacts are minimal or can at least be managed and that snowmobilers and wildlife can coexist very well and have done so for many years.

Even though many studies are twenty or thirty years old, their results are still applicable if not even substantially less (lower levels of impact) given the significant decrease in snowmobile sounds and exhaust emissions compared to 1970- and 1980-era snowmobiles. While most recent studies have been related to the Yellowstone National Park Winter Plan or to the growing ATV use (similar to the 'growing snowmobile use' that triggered many of the 1970s and 1980s era snowmobile studies), many have applicability and can be extrapolated for use in other areas. General snowmobile related findings include:

A University of Wisconsin study on the effects of snowmobile sound levels on deer and cottontail rabbits concluded that "only minor reactions were noted in the movements of cottontail rabbits and white-tailed deer to moderate and intensive snowmobiling activity" and that it had not been possible to determine sound levels at which there is a clear reaction on the part of the deer "because snowmobiles must be so close to deer to generate the higher levels that other factors such as visible presence...are likely to be more important." This study also compared the reaction of deer to the presence of cross-country skiers and found that when cross-country skiers replaced snowmobiles on the test trail systems, the deer moved away from the trail more frequently.

A study by the State of Maine concluded that, "Deer consistently bedded near snowmobile trails and fed along them even when those trails were used for snowmobiling several times daily. In addition, fresh deer tracks were repeatedly observed on snowmobile trails shortly after machines had passed by, indicating that deer were not driven from the vicinity of these trails." It also found that "the reaction of deer to a man walking differed markedly from their reaction to a man on a snowmobile. This decided tendency of deer to run with the approach of a human on foot, in contrast to their tendency to stay in sight when approached by a snowmobiler, suggests that deer responded to a machine and not to the person riding it."

A study conducted on the White Mountain National Forest in New Hampshire monitored snowmobile operations and deer movement and concluded that deer travel patterns were not affected by periodically heavy snowmobile use. In addition, continued use of established snowmobile trails was recommended.

The University of Minnesota study found no meaningful difference in deer's home range during periods of snowmobile use and non-use.

Addressing the subject of snowmobile operations in Yellowstone National Park, former Superintendent Jack Anderson commented, "We found that elk, bison, moose, even fawns, wouldn't move away unless a machine was stopped and a person started walking. As long as you stayed on a machine and the machine was running, they never paid any attention. If you stopped the machine, got off and started moving, that was a different story. The thing that seemed to be disturbing to them was a man walking on foot."

Voyageurs National Park reopened eleven bays located in the park to snowmobiling in 2001 as the result

of a study that found there was no significant correlation between wolf activity and human use on these bays which had been closed to snowmobiling in 1992.

The Michigan DNR reported in 2005 that the gray wolf population in Michigan's Upper Peninsula (U.P.) rose from 360 to 400 this past year – hand-in-hand with the growth of snowmobiling in the U.P. – and that they were proposing to remove the wolf from the "endangered species" list. At the same time, the number of gray wolves in the Northern Rockies has surpassed 1,000 – just a decade after wolves were reintroduced to Yellowstone National Park – and concurrent with snowmobiling growth in the Rockies.

General and specific species-related wildlife studies related to snowmobiling or OHVs include:

General / Wildlife and Nature

1. **Behavioral Responses of Wildlife to Snowmobiles and Coaches in Yellowstone.** White, P.J., Davis, T., Borkowski, J.J., Garrott, R.A., Reinhart, D.P., & McClure, D.C. (2006) National Park Service, Yellowstone National Park, Wyoming and Montana State University, Bozeman, Montana.

Abstract: Managers of Yellowstone National Park are charged with protecting some of our nation's most important natural resources, while providing for their use and enjoyment by visitors. Over 100,000 visitors entered the park by over-snow, motorized means on snowmobiles (94%) or coaches (6%) during 2003-2006. Most vehicles toured the central portion of the park where bald eagles (*Haliaeetus leucocephalus*), bison (*Bison bison*), coyotes (*Canis latrans*), elk (*Cervus elaphus*), and trumpeter swans (*Olor buccinator*) wintered in areas close to roads. We sampled 5,688 interactions between groups of these species and groups of snowmobiles and coaches during 2003-2006 and used multinomial logit models, odds ratios, and predicted probabilities to identify conditions leading to behavioral responses. Bison responded less frequently (20%) to snowmobiles and coaches than swans (43%), elk (52%), coyotes (61%), or bald eagles (83%) due to fewer vigilance responses. However, the frequency of higher-intensity movement responses was similar among species (8-10%), with the exception of coyotes (24%). The likelihood of vigilance and movement responses by these species increased significantly if animals were on or near roads, animals groups were smaller, humans approached animals on foot, interaction time increased, or the numbers of snowmobiles and coaches in a group increased. There were thresholds on the odds of eliciting a response by wildlife for several of these covariates. We did not detect significant increases or decreases in the odds of movement responses for any wildlife species as cumulative over-snow vehicle traffic increased through the winter. However, the likelihood of a vigilance response by bison decreased within the winter having the largest visitation, suggesting some habituation to snowmobiles and coaches. In contrast, there was a significant increase in the odds of vigilance responses by elk as the cumulative visitation increased through the winter. Human disturbance did not appear to be a primary factor influencing the distribution and movements of the wildlife species we studied. The risk of vehicle-related mortality from snowmobiles was quite low and observed behavioral responses were apparently short-term changes that were later reversed. Bison, elk, and swans in Yellowstone used the same core winter ranges during the past three decades despite large winter-to-winter variability in cumulative exposure to OSVs. There was no evidence that snowmobile use during the past 35 years adversely affected the demography or population dynamics of bald eagles, bison, elk, or trumpeter swans (no data was available for coyotes). Thus, we suggest regulations restricting levels and travel routes of OSVs were effective at reducing disturbances to these wildlife species below a level that would cause measurable fitness effects. We recommend park managers consider maintaining OSV traffic levels at or below those observed during our study. Regardless, differing interpretations of the behavioral and physiological response data will continue to exist because of the diverse values and beliefs of the many constituencies of Yellowstone.

2. **Wildlife Responses to Motorized Winter Recreation in Yellowstone.** White, P.J., Davis, T., & Borkowski, J. (2005) Yellowstone Center for Resources & Montana State University.

Abstract: This study monitored the behavioral responses of bison (*Bison bison*), elk (*Cervus elaphus*), and trumpeter swans (*Olor buccinator*) to motorized winter recreation by repeatedly surveying seven groomed or plowed road segments in Yellowstone National Park during December 2004 through March 2005. The study sampled >2,100 interactions between vehicles and wildlife groups and used multinomial logit models to identify conditions leading to behavioral responses. Responses by these wildlife species to over-snow vehicles were relatively infrequent, short in duration, and of minor to moderate intensity, with >81% categorized as no apparent response or look/resume activities, 9% attention/alarm, 7% travel, and 3% flight or defense. Analyses of similar data collected during 1999-2004 indicated the likelihood of active responses by wildlife increased significantly if (1) wildlife were on or near roads, (2) more vehicles were in a group, (3) wildlife groups were smaller, (4) ungulates were in meadows instead of forest or geothermal habitats, (5) interaction times increased, (6) wildlife were traveling instead of resting, and (7) humans dismounted vehicles and/or approached wildlife. The likelihood of an active response by bison or elk decreased as cumulative visitation increased, suggesting that these ungulates habituated somewhat to motorized recreation. There was no evidence of population-level effects to ungulates from motorized winter use because estimates of abundance either increased or remained relatively stable during three decades of motorized recreation prior to wolf colonization in 1998. Thus, we suggest that the debate regarding the effects of motorized recreation on wildlife is largely a social issue as opposed to a wildlife management issue. The likelihood of active responses by wildlife can be diminished by (1) restricting travel to predictable routes and times, (2) reducing the number of vehicles in groups, (3) reducing the number and length of stops to observe wildlife, (4) stopping vehicles at distances >100 meters, and (5) preventing human activities away from vehicles.

3. **Wildlife Road Survey and Human Interactions On and Off Road: Final Report.** Jaffe, R., Elwood, D., Dimmick, A., Davis, T., & McClure, C. (2003) Yellowstone National Park – West District Resource Management.

Introduction: Studies were conducted in Yellowstone National Park to examine the effects of winter recreation on wildlife by Aune (1981) and Hardy (2001), and the effects of road grooming on bison by Bjornlie and Garrott (2001). Monitoring wintering wildlife distribution and wildlife-human interactions along the road corridor between West Yellowstone and Old Faithful was initiated during the 2001-2002 winter as part of the effort to reduce resource impacts and improve visitor safety and enjoyment in Yellowstone National Park. Methods from Hardy (2001) were expanded so this year's monitoring could be compared to results from her study.

Three biological technicians were hired for winter monitoring efforts beginning on December 11. The first three weeks were used for training, protocol testing, and project development. A total of 170 road surveys were conducted on 74 days, December 27 through March 10, with an average duration of 2.4 hours and 3,498 wildlife groups documented, and a total of 510 site-specific human-wildlife interaction events were recorded during the study. Staff logged over 9,000 miles on two snowmobiles. The two primary objectives of these surveys were to (1) document seasonal and diurnal wildlife distribution and activity, and (2) document human behavior in relation to wildlife and wildlife responses to human behavior associated with snowmobile and snowcoach use.

Results: The total number of animals counted during road surveys was 25,173. Bison, elk, swans, bald eagles, and coyotes were the most numerous species counted and are summarized below. Less common species sighted during surveys, which included moose, mule deer, muskrat, wolf, golden eagle, and double-crested cormorant, were excluded from the summary tables.

Eighty-seven percent (n=21,936) of the total number of animals observed during road surveys has no visible response to over-snow vehicles (OSVs). Of the 13% (n=3,263) of total animals counted that exhibited an observable response, 68% looked directly at the people viewing them and resumed their activity. Thirty-two percent of the responses were more active, including walk/swim away, rise from bed, attention/alarm, flight, agitate (buck, kick, bison tail-raise), jump snow berm, and charge. Of the 17,209

animals counted within 100m of the road, 17% (n=2,966) showed an observable response to the presence of OSVs that stopped, while 3% (n=297) of 7,924 animals counted further than 100m from the road showed a visible response

4. **Record of the Snowmobile Effects on Wildlife: Monitoring Protocols Workshop, Volume One.** Graves, T. & Reams, V. (2001) National Park Service – Biological Resource Management Division.

Abstract: This workshop included experts from federal agencies, state agencies, and universities and was held in Denver, Colorado on April 10-12, 2001 to summarize the state-of-science on monitoring the effects of snowmobiles on wildlife in national parks and surrounding lands. Volume 1 summarizes: 1) the presentations made during the plenary session of the workshop, 2) results of the electronic survey, 3) discussions and conclusions of the work groups, and 4) research recommendations. Discussion and Conclusions from this workshop include:

Primary Issues and Species: The primary issues raised in this study naturally pertained to wildlife impacts. The large majority of these issues related to immediate individual-level effects such as increased energy expenditure or behavioral changes. Concerns about snowmobile impacts on denning animals were also a significant issue. However, many of the wildlife issues raised dealt with larger-scale, complex processes, such as the indirect effects snowmobile use might have through its effects on predators or moving populations of animals into different territories.

The primary species of concern were carnivores, especially lynx, wolverines, and wolves. It is important to remember that respondents to this research were drawn from across the United States, and generally responded pertaining to the species with which they work. Therefore, the relative importance of each guild and species is certainly influenced by the people who chose to participate.

Conclusions about monitoring: The wide range of information needs identified by experts in the field present a significant challenge to those attempting to develop a uniform package of possible monitoring techniques. Information needs to appear to be guild or species-specific.

Respondents generally feel that population-level effects are most important or useful to study, followed by individual behavioral effects. The primary exception to this is for threatened or endangered species; respondents apparently believe that identifying any adverse individual level effects would be sufficient grounds for making management decisions. Unfortunately, it appears that most of the limited evidence available to date pertains to individual effects; a significant need therefore exists for basic research and monitoring of population-level effects.

Need for Monitoring or Need for Basic Research: Experts in the field of wildlife (and wildlife reactions to disturbance) are uncomfortable passing judgments on whether snowmobiles adversely (or, for that matter, positively) affect wildlife. Even under circumstance with the best available information, the question of when an impact becomes serious enough to warrant taking action is a subjective value judgment, and many respondents recognized this. But the majority felt that insufficient data exist to even begin to understand the issue. Only for ungulates are some scientists willing to say data are adequate, but even for these commonly studied species, most respondents have serious concerns.

This raises the question about whether monitoring is the place to focus agency efforts. Clearly, more basic research is needed. It is difficult to know what the best monitoring protocols would be when it is not clear about what effects should be monitored. Nevertheless, the NPS is under a mandate to develop monitoring protocols, and we feel it is important to begin monitoring, however basic, as early as possible. Too often monitoring is left until problems become severe; at that point it is quite difficult to discern the extent to which conditions have changed in the absence of baseline data. Therefore, we encourage researchers and managers to move forward with the development of monitoring protocols, and to continue to refine them as more information becomes warranted.

5. **Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment.** Olliff, T., Legg, K. & Kaeding, B. (1999) Greater Yellowstone Coordinating Committee, Yellowstone National Park. 303 p.

Summary: This publication is a compilation of papers submitted by resource managers and biologists in the Greater Yellowstone Area from the Forest Service, Park Service, the states of Montana, Idaho, and Wyoming, and private organizations. The chapters cover bighorn sheep, bison, elk, gray wolves, grizzly bears, lynx, mid-sized carnivores, moose, mountain goats, subnivean fauna, bald eagles, trumpeter swans, and vegetation. **The purpose of this document is to provide guidelines for managing winter recreational use in the context of preserving wildlife populations.** Several topics are discussed, including the current population status and trend of the individual species, relevant life history data, information on winter habitat use, summaries of studies on the influence of human activities on individual species in the winter, and the potential effects of specific winter recreational uses on those species.

6. **Winter Recreation Effects on Wildlife.** Caslick, J. & E. (1997) Natural Resources YCR, Yellowstone National Park.

Abstract: Numerous studies have concluded that wildlife is a major component of the Yellowstone experience, and a major economic “draw” to the area. As increasing pressures for development of visitor facilities and new modes of transportation evolve, early consideration of their potential effects on wildlife (including individual animals, animal populations, and associated ecological processes) become ever more important, if wildlife resources are to continue to be a major feature of Yellowstone. **The purpose of this report is to briefly summarize and evaluate the published research on winter recreation impacts on wildlife,** particularly as they apply to Yellowstone, and to provide recommendations. This may have immediate application in decision-making during the trade-off processes that inevitably must occur when balancing resource conservation with visitor enjoyment.

7. **Wildlife and recreationists: Coexistence through management and research.** Knight, R. L., & Gutzwiuer, K. J. (1995) Island Press Covelo, CA.

Abstract: Wildlife recreationists define and clarify the issues surrounding the conflict of outdoor recreationists and wildlife. It is a synthesis of what is known concerning wildlife and recreation and addresses both research needs and **management options to minimize conflicts.**

8. **Impacts of winter recreationist on wildlife in a portion of Yellowstone National Park, Wyoming.** Aune, K. E. (1981) M.S. Thesis, Montana State University, Bozeman.: 111pp.

Abstract: General responses of wildlife to winter recreationists in Yellowstone National Park were attention or alarm, flight, and rarely aggression. Responses varied with the species involved, nature of the disturbance, and time of season. **Winter recreation activity was not a major factor influencing wildlife distributions, movements, or population sizes,** although minor displacement of wildlife from areas adjacent to trails was observed. Management recommendations are presented.

9. **Impacts of snowmobiles on wildlife.** Bury, R. L. (1978) Transactions of the North American Wildlife and Natural Resources Conference.

Abstract: **The major effects of snowmobiles on wildlife appear to be in changes of the animals' daily routine, rather than direct mortality.** This seems to be the case with regard to elk, rabbits, and small subnivean animals. Other animals such as deer seem to be more tolerant of snowmobiles. In general, snowmobiles created little effect on large animals, moderate effects were observed on medium-sized animals, and small animals over wintering in sub-snow environments were drastically effected.

10. **Snowmobiles, animals, and man: Interactions and management issues.** McCool, S. F. (1978) Paper presented at the Transactions of the North American Wildlife and Natural Resources Conference.

Abstract: Decisions regarding the opening, closing, or restricting of lands to snowmobile and other off-road vehicle use appears to be more a function of intuitive managerial expertise and judgment and political pressure than a direct result of systematic problem-driven research. Existing research on snowmobile-wildlife impacts has been unable to produce a consensus on the impacts of the activity on a wildlife population. The snowmobile problem results from human behavior and the way humans use snowmobiles. Understanding why humans use snowmobiles, perhaps even to the point of finding effective and acceptable recreational experiences.

11. **Human-wildlife interactions in the Gallatin Range, Yellowstone National Park.** Chester, J. M. (1976) Montana State University, Bozeman.

Abstract: The relationships between the intensity and kinds of human use and the distribution, movements, and behavior of seven species of wildlife in the backcountry areas of the Gallatin Range in Yellowstone National Park were investigated in 1973 and 1974. Except for minor shifts in elk distribution around campsites, variation in the intensity of human use did not appear to be responsible for shifts in wildlife distribution. Wildlife encounters most commonly occurred at distances between 100 and 300 feet. Encounter distances were shortest for mule deer and moose and greatest for bears.

Except for deer and coyotes, which were usually alert or running, all species were most commonly feeding when first observed. In response to knowledge of human presence, the moose was most likely to stand its ground, while bears were the least likely. Wildlife belligerency toward humans was rare. When it did occur, bear and moose were usually involved. Groups of four or more persons experienced lower observation frequencies than smaller groups. Parties of two or less were most likely to encounter grizzly bears. The use of noise did not appear to affect the frequency of wildlife observations or encounters.

12. **Snowmobile tracks and animal mobility.** Hubbe, M. (1973)

Abstract: Impact of snowmobile tracks on animal mobility was studied in Maine in January 1973. The supporting strength of snow and the resistance of snow to impact on/off snowmobile tracks were compared. It was found that the depth an animal sinks in powder snow is proportional to weight and inversely proportional to foot area. Evidence shows an animals ability to walk on crust is inversely related to the kinetic energy of its footfall and proportional to foot diameter. Snowmobile tracks were helpful.

13. **Wildlife-snowmobile interaction project: Preliminary report covering period November.** Huff, D. E. (1972) University of Minnesota and Minnesota Department of Natural Resources Cooperating.

Abstract: There is a strong relationship between numbers of tracks and specific cover types during the winter at Sherburne National Wildlife Refuge; in the most heavily used cover type, oak woods, significantly fewer tracks crossed the snowmobile trail than the snowshoe trail. Major cover types should be considered before constructing snowmobile trails in areas established for wildlife.

14. **Ecological Effects of Snowmobiles.** Neumann, P.W. & Merriam, H.G. – Department of Biology, Carleton University, Ottawa, Canada. (1972) The Canadian Field-Naturalist, Vol. 86, 207-212.

Abstract: Ecological impact of snowmobiles was studied in the Ottawa area. Snow structural changes by snowmobiles had significant effects on temperature gradients, water holding capacity, and melting rate. Snowshoe hare and red fox mobility and distribution also were affected. Snowmobile damage to

hardwood saplings and planted pines was significant. **Browsing was unaffected except on damaged saplings.**

Birds / Eagles

1. **Effects of Winter Recreation on Bald Eagles.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 103-111.

Potential Effects: **Vehicular activities along prescribed routes or within strict spatial limits and at relatively predictable frequencies are least disturbing to bald eagles** (McGarigal et al. 1991, Stangl 1994, GYBEWG 1996). However, slow-moving motor vehicles can disrupt eagle activities more than fast-moving motor vehicles (McGarigal et al. 1991). Snowmobiles may be especially disturbing, probably due to associated random movement, loud noise, and operators who are generally exposed (Walter and Garret 1981). **A review of literature revealed that research has not been completed to assess the effects of snowmobile or other winter recreational activities on bald eagle wintering or breeding habitat,** but some documents referenced potential effects of snowmobile activities (Shea 1973, Alt 1980, Harmata and Oakleaf 1992, Stangl 1994).

Management Guidelines: **Establish buffer zones** of 1,300 feet around high-use foraging areas with temporal restrictions from sunset to 10:00 a.m. in areas of high human use. If diurnal perching areas are separate, buffer zones of 650 to 1,300 feet around concentrated or high-use perches should be imposed, dependant on existing vegetative screening. Closures for autumn roosts should extend from 1 October to 1 January, for winter roosts from 15 October to 1 April, for vernal roosts from 1 March to 15 April, or as determined by actual residency patterns of local eagles.

2. **Responses of breeding bald eagles, *Haliaeetus Leucocephalis*, to human activities in North central Michigan.** Grubb, T. G., Bowerman, W.W., Giesy, G.P., & Dawson, G. A. (1992) Canadian Field Naturalist, 106, 443-453.

Abstract: To characterize disturbance and analyze eagle response, we recorded 714 events of potentially disturbing human activity near six pairs of Bald Eagles breeding in north central Michigan in 1990. **Vehicles and pedestrians elicited the highest response frequencies, but aircraft and aquatic activities were the most common. Magnitude of response was inversely proportional to median distance-to-disturbance.** Seventy-five percent of all alert and flight responses occurred when activity was within 500m and 200m, respectively. Adults responded more frequently than nestlings, and at greater distances to disturbance when perched away from nests. May was the peak month for human activity, most of which occurred on weekends and after noon. Classification tree models are used to assess disturbance-specific response frequencies and to formulate management considerations.

3. **Behavioral responses of wintering bald eagles to human activity on the Skagit River, Washington.** Skagen, S. K. (1980) Paper presented at the Proceedings of the Washington Bald Eagle Symposium.

Abstract: **Eagles were found to be more sensitive to disturbance while feeding on gravel bars than while perching, and to approaches by humans on foot and concealed than by people in vehicles.** A significant decrease in the proportion of eagles feeding was observed when human activity was present within 200m of the feeding area in the previous 30 minutes. A significant between-season variation occurred in the use of feeding areas relative to human presence, which correlated with food availability. Eagles appeared more tolerant to human activity in the season of low food availability.

4. **Effects of human disturbance on nesting of bald eagles.** Mathisen, E. (1976) *The Journal of Wildlife Management*, 32(1), 1-6.

Abstract: Known nests of bald eagles were divided into three groups reflecting degrees of isolation. The eagle nests under consideration were occupied 182 times from 1963-66. The rate of occupancy was essentially the same for each group. Nesting activity varied from 54% to 48% for the three groups. None of these differences are statistically significant, indicating that human activity is not an important source of disturbance and has no measurable effect on nesting success or nest occupancy.

Birds / Pheasants

1. **Effects of snowmobile activity on wintering pheasants and wetland vegetation in Northern Iowa marshes.** Sodja, R. J. (1978) M.S. Thesis. Iowa State University, Ames, IA: 67pp.

Abstract: Effects of dispersed snowmobile use on ring-necked pheasants and marsh vegetation were studied in Iowa. No effects of snowmobiling on pheasant movements or behavior were found. Observed vegetation changes did not appear to seriously alter wildlife.

Birds / Trumpeter Swans

1. **Effects of Winter Recreation on Trumpeter Swans.** (1999) *Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment.* Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 113-116.

Potential Effects: Aune (1981) found that swans appeared to become habituated to moving snowmobiles, but that they fly or swim away upon approach by foot or ski or when a snowmobiler stopped. Aune noted that, in general, animals function best in a predictable environment. Groomed routes, both for snowmobilers and skiers, create a more predictable environment.

Management Guidelines: Designating snowmobile and ski trails away from open waters used as winter habitat by swans can mitigate winter recreational impacts on the birds. Special restrictions may need to be implemented on open-water snowmobiling in areas that swans routinely use for feeding. Some concern has been raised about the effects of snowmobile noise on swans; however, at this time no information is available on this subject.

Mammals / Deer

1. **Ungulates effects of recreation on Rocky mountain wildlife: A review for Montana.** Canfield, J. E., Lyon, L.J., Michael, H.J. & Thompson, M.J. (1999) Montana Chapter of the Wildlife Society.

Abstract: Ungulates provide a large percentage of the recreational opportunities for wildlife enthusiasts in the State of Montana. Hunting, wildlife viewing, and photography generate economic benefits in excess of \$450 million annually. However, recreational activities have the potential not only to displace ungulates to private land where they may cause damage, but also to have negative direct and indirect effects to the populations themselves. During winter, many ungulates are seasonally confined to restricted geographic areas with limited forage resources. In these conditions, physiological adaptations and behavioral adaptations tend to reduce energy requirements. Despite lowered metabolic and activity rates, most wintering ungulates normally lose weight. Responses of ungulates to human recreation during this critical period range from apparent disinterest to flight, but every response has a cost in energy consumption. Snowmobiles have received the most attention compared to other wintertime disturbances, and the majority of reports dwell on negative aspects of snowmobile traffic.

However, snowmobiles appear less distressing than cross-country skiers, and for several ungulate species, the greatest negative responses were measured for unpredictable or erratic occurrences. In addition to increasing energy costs for wintering animals, recreational activity can result in displacement to less desirable habitats, or in some situations, to tolerance of urban developments. Tendencies to habituation vary by species, but habituated ungulates are almost always undesirable.

Managers can provide an important contribution to energy conservation by reducing or eliminating disturbance of wintering ungulates and restricting recreational use of spring ranges that are important for assuring recovery from winter weight loss. During summer, the biological focus for ungulates includes restoring the winter-depleted body condition and accumulating new fat reserves. In addition, females must support young of the year and males meet the energy demands of horn and antler growth. The potential for impacts increase and options for acquiring high quality nutrition, with the least possible effort, decline as the size of the area affected by recreationists expands to fill an increasing proportion of summer range. Disturbance of the highly productive seeps and wet sites may cause animals to withdraw to less productive areas. In addition, ungulates may be especially vulnerable to disturbance around special habitat features, such as salt licks. Persistently high levels of recreational use and the proximity to human population centers is predicted to impact reproductive performance of ungulate populations, but little direct research at this level of disturbance has been reported. Recreational traffic on and off roads has been linked with high rates of establishment and spread of noxious weeds in wildlife habitat.

The importance of summer range to most ungulate populations has gone unrecognized for many years. It is apparent, however, that managers can contribute substantially to the health, productivity, and survival of these populations by reducing human disturbances to summering animals. Big game hunting has more immediate effects on ungulate population densities and structures than any other recreational activity. Hunting season security and management affects short and long term hunting opportunities. Managers of public lands control only a few of the potential variables that contribute to security; including retention of important vegetative cover, travel management, and enforcement of travel regulations. There is a strong relationship between adequate security and predicted buck/bull carryover, but excessive hunter numbers will overwhelm any level of security. Hunting also has the potential to negatively affect herd productivity as mature males are lost from populations. Violations of ethical considerations including the concept of “fair chase” and the perception of the “sportsman” in the public mind, can increase ungulate vulnerability as well as influence social acceptance of the sport of hunting. Pursuit of pronghorns with ORVs and killing of trophy animals within game farm enclosures are presented as ethical violations.

2. **How off-highway vehicles affect deer.** Laing, M. E. (1992) National Off-Highway Vehicle Conservation Council: 1-4

Abstract: A NOHVCC Fact Sheet summarizing seven studies by different researchers in seven different sites. Habituation to predictable motor vehicle activity was a consistent finding.

3. **Rock Creek off-road vehicle/deer study.** Jones & Stokes Associates, Inc. (1991) Prepared for CA. Department of Fish and Game; CA. Department of Parks and Recreation and El Dorado National Forest, Sacramento, CA.

Abstract: The response of six to eight radio-collared deer to four levels of ORV use was determined by evaluating changes in the size of 2-day activity centers and foraging behavior. During low levels of use approximately 13 riders per day were in the study area; approximately 28 riders per day were present during moderate levels; and 47 riders per day were present during high levels of ORV use. No ORV use was used as a control.

No statistically significant differences were detected in the size of 2-day activity centers or the amount of feeding time along the different levels of ORV use. This study concluded that the deer at Rock Creek were not affected by the ORV's because no trends in the data existed to suggest otherwise. The total

amount of time that deer foraged and the daily cycle of feeding periods were similar to populations of deer that had not been disturbed by ORV's. There was a low probability of an ORV encountering a deer because of the low population densities and large home ranges in the study area. Hikers had a minimum amount of disturbance on deer mostly related to harassment by dogs. This was decreased with education of visitors. Further impacts can be reduced by moving ORV use out of deer critical habitat.

4. **Rock Creek Off-Road Vehicle/Deer study – Interim Report.** Jones & Stokes Associates, Inc. (1990) California Department of Fish and Game and California Department of Parks and Recreation and El Dorado National Forest.

Abstract: The study was conducted to determine the response of mule deer to off-road vehicle use and other forms of recreation. The interim report describes the work completed in 1990. The flight response of deer at Rock Creek suggests they were not as wary of people as other deer herds, and this may result from the difference in habitat types between study areas. Distribution of deer was not affected by hikers and equestrian/mountain bike riders. **Different recreation levels had no effect on deer.**

5. **Responses of black-tailed deer to off-highway vehicles in Hollister Hills State Vehicular Recreation Area Hollister, CA.** Ferns, R. M., & Kutieik, M.J. (1989) Department of Biological Sciences, San Jose State University: 42pp.

Abstract: The responses of black-tailed deer were studied at Hollister Hills State Vehicular Recreation area in Hollister, CA. Researchers captured 14 female deer and equipped them with radio-collars. Movements, habitat use, and activity levels were recorded for one year and compared with OHV levels. Home range sizes for deer living within the riding area were similar to those of previously studied deer populations living in similar habitats but were not exposed to OHV use. **No significant correlation was found between OHV activity levels and deer activity levels.** Deer generally avoided OHV riding areas during peak use but returned to their established home ranges after traffic levels subsided. **Studies have shown that animals reacted minimally to disturbances on established trails and roads but there were increased responses to disturbances where none had occurred before.** Researchers found that home-ranges of deer at Hollister Hills were centered around water and food supplies. It is recommended that future trails are developed away from major drainages and other preferred habitat types. An effort should also be made to educate trail users and encourage them to ride only on established trails.

6. **Responses of mule deer to disturbance by persons afoot and in snowmobiles.** Freddy, D. J., Bronaugh, W.M., & Fowler, M.C. (1986) Wildlife Society Bulletin, 14: 63-68.

Abstract: Controlled disturbance of mule deer occurred from mid-January until early March in 1979-1980 within a 3-km² portion of the Junction Butte State Wildlife Area in north-central Colorado. **The study found that mule deer were disturbed more by persons on foot than by snowmobiles.** Responses by deer to persons were longer in duration, involved more frequent running, and were greater in energy expenditure. Intensity of responses by deer was dependent upon distance between animals and disturbances. Minimizing all responses by deer would require persons afoot and snowmobiles to remain >334m and >470m from deer.

7. **Effects of disturbance by snowmobiles on heart rate of captive white-tailed deer.** Moen, A., N. (1982) New York Fish and Game Journal, 29(2), 176-186.

Abstract: **Captive white-tailed deer exhibited increased heart rates** in response to controlled tests of the effect of disturbance by snowmobiles conducted from December through March. Initial heart rate responses to the starting of a snowmobile and responses to its moving by indicated that deer can react to stimuli without changes in their overt behavior. When the snowmobile circled the pen, the deer showed greater heart rate and behavioral responses. Other deer in the yard also showed greater fright responses when snowmobiles approached them directly, versus when snowmobiles moved tangentially to their

activity area. Moen concluded that, the increase in heart rate and additional movements caused by encounters with snowmobiles increase rather than decrease energy expenditures by deer. Such increases have potential to affect productivity of individuals and, ultimately, of the population. Management should take into consideration the basic biological characteristics of wildlife species. It is evident that disturbance by snowmobiles is contrary to long-term energy-conservation adaptations of white-tailed deer.

8. **Snowmobile impacts on the natural environment.** Aasheim, R. (1980) R.L. Andrews and P.F. Nowak, (eds.) Off-road Vehicle Use: A management challenge conference. Ann Arbor, MI.

Abstract: Snowmobiling and its impacts on natural environments in Montana are described. Studies of impacts on deer and elk have produced conflicting results, but there is little doubt that additional stress on poor-condition animals in winter is undesirable. **Animals accustomed to humans are less affected by snowmobiles than animals in more remote areas.** Effects on small mammals and possible effects of packed snowmobile trails are discussed.

9. **Snowmobile effects on movements of white-tailed deer: A case study.** Eckstein, R. G., O'Brien, T.F., Rongstad, O.J., & Bollinger, J.G. (1979) Environmental Conservation, 6: 45-51.

Abstract: **Data showed that snowmobile activity had no significant effect on home-range size, habitat use, or daily activity patterns of white-tailed deer wintering in Wisconsin.** Snowmobile activity did cause some deer to leave the immediate vicinity of the snowmobile trail. Darkness appeared to decrease reaction to disturbance. **Deer appeared to react more to a person walking/skiing than on snowmobiles.**

10. **Response of white-tailed deer to snowmobiles and snowmobile trails in Maine.** Richens, V. B., & Lavigne, G. R. (1978) Canadian Field-Naturalist, 92(4), 334-344.

Abstract: **White-tailed deer response to snowmobiles seemed dependent on the deer's apparent security.** Animals in the open or in hardwood stands tended to run when approached by snowmobile. Deer in softwood stands, which provide more cover, showed a greater tendency to stay when approached. **A significantly greater number of deer ran from a person walking than from a person on snowmobile.**

11. **Winter response of deer to snowmobiles and selected natural factors.** Lavigne, G. R. (1976) University of Maine.

Abstract: Deer responses to snowmobiles and selected natural factors were studied during winters of 1972/73. Use of snowmobile trail was significantly correlated with deer density and winter severity. Most movements on snowmobile trails were for short distances. **Disturbance of deer by snowmobiles did not cause them to abandon preferred bedding and feeding sites. Snowmobile trails enhanced deer mobility and probably reduced their energy expenditure.**

12. **Effects of snowmobiles on white-tailed deer.** Dorrance, M., & Savage, P.J. (1975) Journal of Wildlife Management, 39(3): 563-569.

Abstract: The effects of snowmobiles on white tailed deer were studied in Minnesota during 1973 and 1974. Study areas were in St. Croix State Park, where numbers of snowmobiles per day averaged 10 on weekdays and 195 on weekends, and in Mille Lacs Wildlife Management Area, where snowmobiling was prohibited except by project personnel. Home range size, movement, and distance from radio-collared deer to the nearest trail increased with snowmobile activity at Mille Lacs, but remained unchanged at St. Croix. Numbers of deer along a 10-km trail decreased as snowmobile traffic increased at St. Croix. Light snowmobile traffic caused the displacement of deer from areas immediately adjacent to trails at St. Croix; thereafter, increased snowmobile traffic caused no additional response. **Deer returned to areas along trails within hours after snowmobiles ceased at St. Croix.** Deer responded to very low intensities of intrusion by man and vehicles.

13. **Effect of snowmobile noise and deer and rabbits in their natural habitat.** Bollinger, J. (1974)

Abstract: The behavioral patterns of deer and rabbits before, during, and after extensive snowmobile activities were studied. The data gathered was used to assess the noise wildlife levels associated with various behavior patterns, and to assess the noise levels generated by different snowmobile uses on various types of terrain. Additional objectives were to determine the effects snowmobile noise and activity had on the home range of deer and rabbits and their seasonal movements; to determine reactions these animals had to men in the area not using snowmobiles but equipped with skis and snowshoes; and to determine if there was a difference in predator behavior in areas where snowmobiles were used versus those where no vehicles were operated. The research team was unable to detect severe or negative animal reactions to the noise generated by the vehicles. **Conclusions of the study indicate that the deer and rabbits were not forced to move out of their normal home ranges, nor did they seek shelter or remain stationary with fright while snowmobiles were being operated.** The only negative effect determined was that the animals did increase their movement during extensive vehicle use periods. Researchers were unable to determine whether it was the noise, physical presence, or both that caused the disturbance.

14. **Effects of snowmobiles on the movements of white-tailed deer in Northern Wisconsin.** Eckstein, R. G., & Rongstad, O.J. (1973) Proceedings of the Midwest Fish and Wildlife Conference.

Abstract: Studies in northern Wisconsin evaluated the effects of snowmobile use on white-tailed deer in wintering yards. Movements and activities of tele-metered deer were compared between a yard receiving snowmobile use and one with no use. **Some deer showed avoidance of snowmobile trails while machines were present, but no significant changes in home range size or daily movement patterns were observed.**

Mammals / Elk

1. **Wildlife Responses to Motorized Winter Recreation in Yellowstone.** White, P.J., Davis, T., & Borkowski, J. (2005) Yellowstone Center for Resources & Montana State University.

Abstract: This study monitored the behavioral responses of bison (*Bison bison*), elk (*Cervus elaphus*), and trumpeter swans (*Olor buccinator*) to motorized winter recreation by repeatedly surveying seven groomed or plowed road segments in Yellowstone National Park during December 2004 through March 2005. The study sampled >2,100 interactions between vehicles and wildlife groups and used multinomial logit models to identify conditions leading to behavioral responses. Responses by these wildlife species to over-snow vehicles were relatively infrequent, short in duration, and of minor to moderate intensity, with >81% categorized as no apparent response or look/resume activities, 9% attention/alarm, 7% travel, and 3% flight or defense. Analyses of similar data collected during 1999-2004 indicated the likelihood of active responses by wildlife increased significantly if (1) wildlife were on or near roads, (2) more vehicles were in a group, (3) wildlife groups were smaller, (4) ungulates were in meadows instead of forest or geothermal habitats, (5) interaction times increased, (6) wildlife were traveling instead of resting, and (7) humans dismounted vehicles and/or approached wildlife. The likelihood of an active response by bison or elk decreased as cumulative visitation increased, suggesting that these ungulates habituated somewhat to motorized recreation. **There was no evidence of population-level effects to ungulates from motorized winter use because estimates of abundance either increased or remained relatively stable during three decades of motorized recreation prior to wolf colonization in 1998. Thus, we suggest that the debate regarding the effects of motorized recreation on wildlife is largely a social issue as opposed to a wildlife management issue.** The likelihood of active responses by wildlife can be diminished by (1) restricting travel to predictable routes and times, (2) reducing the number of vehicles in groups, (3) reducing the number and length of stops to observe wildlife, (4) stopping vehicles at distances >100 meters, and (5) preventing human activities away from vehicles.

2. **Bison and Elk Responses to Winter Recreation in Yellowstone National Park.** Hardy, A.R. (2001) Montana State University master's thesis.

Abstract: The National Park Service (NPS) is tasked with protecting wildlife and providing public access to parklands; winter recreation in Yellowstone National Park (YNP) has challenged NPS managers to balance this dual mandate. This study addresses bison and elk responses to winter recreation in the Upper Madison River drainage of YNP. Using data on weather; winter recreation activity; elk and bison distribution, behavior, abundance, and fecal stress hormone (glucocorticoid) levels collected during the winters of 1998 – 1999 and 1999 – 2000, I developed models to analyze if variables related to winter recreation contributed to bison and elk distribution, behavior, and stress hormone levels responses. As distance between human activities and bison and elk decreased, behavioral responses increased. **Both species behaviorally responded more often to people off-trail than to people on trails** ($P < 0.001$ for both species), and these activities prompted more behavioral responses than activities on roads. Elk were farther from the road ($P = 0.092$) after exposure to $> 7,500$ cumulative vehicles entering the West Yellowstone gate. Elk residing along the road segment with the greatest amount of oversnow vehicle (OSV) activity had higher stress levels (unknown elk: $P < 0.001$; collared cow elk: $P = 0.004$) and may have been displaced from habitat along the road (distance: $P < 0.001$; numbers sighted: $P = 0.082$) compared to elk residing along the less-traveled segment. Collared cow elk stress levels increased ($P = 0.057$) while the probability of bison and elk behaviorally responding to human activities on the road decreased ($P = 0.001$ for both species) as daily vehicles entering the West Yellowstone gate increased. **The predictability and frequency of OSV activities facilitated habituation to the majority of the winter recreation activities.** Abundance estimates indicated populations of wintering bison increased and wintering elk remained stable over 20 years. **Despite varying responses to increased winter visitation since the late 1970s, bison and elk return to winter in the same area each year, coexisting with winter recreation without incurring losses at the population level.**

3. **Effects of Winter Recreation on Elk.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 17-30.

Potential Effects: Groomed routes are likely to have impacts similar to those of primary transportation routes and scenic routes (particularly if they are located in low-elevation areas and along river corridors), depending on the level of human use. Groomed routes may provide an energy efficient travel route for elk, but may also do the same for predators of elk. Human activity in backcountry areas is likely to be less predictable than in other motorized recreation areas and, therefore, has more potential to create flight response in individual elk or groups of elk. Motorized use of these areas is likely to occur over a less-confined area than transportation routes, potentially increasing the area of disturbance or displacement of elk. This type of recreation usually occurs in higher elevation, deep-snow areas and so may impact only scattered groups of adult males.

Management Guidelines: **Avoid placing transportation and motorized routes in low-elevation, low-snow, riparian, and open habitats favored by elk. Where this is necessary, attempt to occasionally move the route away from those areas and through denser timber or areas with adequate hiding cover.** Avoid creating road-side barriers that may prevent elk from crossing roads or trails or that may trap animals along the route.

4. **Ungulates effects of recreation on Rocky mountain wildlife: A review for Montana.** Canfield, J. E., Lyon, L.J., Michael, H.J. & Thompson, M.J. (1999) Montana Chapter of the Wildlife Society.

Abstract: Ungulates provide a large percentage of the recreational opportunities for wildlife enthusiasts in the State of Montana. Hunting, wildlife viewing, and photography generate economic benefits in excess of \$450 million annually. However, recreational activities have the potential not only to displace ungulates to private land where they may cause damage, but also to have negative direct and indirect effects to the populations themselves. During winter, many ungulates are seasonally confined to restricted geographic areas with limited forage resources. In these conditions, physiological adaptations and behavioral adaptations tend to reduce energy requirements. Despite lowered metabolic and activity rates,

most wintering ungulates normally lose weight. Responses of ungulates to human recreation during this critical period range from apparent disinterest to flight, but every response has a cost in energy consumption. Snowmobiles have received the most attention compared to other wintertime disturbances, and the majority of reports dwell on negative aspects of snowmobile traffic.

However, snowmobiles appear less distressing than cross-country skiers, and for several ungulate species, the greatest negative responses were measured for unpredictable or erratic occurrences. In addition to increasing energy costs for wintering animals, recreational activity can result in displacement to less desirable habitats, or in some situations, to tolerance of urban developments. Tendencies to habituation vary by species, but habituated ungulates are almost always undesirable.

Managers can provide an important contribution to energy conservation by reducing or eliminating disturbance of wintering ungulates and restricting recreational use of spring ranges that are important for assuring recovery from winter weight loss. During summer, the biological focus for ungulates includes restoring the winter-depleted body condition and accumulating new fat reserves. In addition, females must support young of the year and males meet the energy demands of horn and antler growth. The potential for impacts increase and options for acquiring high quality nutrition, with the least possible effort, decline as the size of the area affected by recreationists expands to fill an increasing proportion of summer range. Disturbance of the highly productive seeps and wet sites may cause animals to withdraw to less productive areas. In addition, ungulates may be especially vulnerable to disturbance around special habitat features, such as salt licks. Persistently high levels of recreational use and the proximity to human population centers is predicted to impact reproductive performance of ungulate populations, but little direct research at this level of disturbance has been reported. Recreational traffic on and off roads has been linked with high rates of establishment and spread of noxious weeds in wildlife habitat.

The importance of summer range to most ungulate populations has gone unrecognized for many years. It is apparent, however, that managers can contribute substantially to the health, productivity, and survival of these populations by reducing human disturbances to summering animals. Big game hunting has more immediate effects on ungulate population densities and structures than any other recreational activity. Hunting season security and management affects short and long term hunting opportunities. Managers of public lands control only a few of the potential variables that contribute to security; including retention of important vegetative cover, travel management, and enforcement of travel regulations. There is a strong relationship between adequate security and predicted buck/bull carryover, but excessive hunter numbers will overwhelm any level of security. Hunting also has the potential to negatively affect herd productivity as mature males are lost from populations. Violations of ethical considerations including the concept of "fair chase" and the perception of the "sportsman" in the public mind, can increase ungulate vulnerability as well as influence social acceptance of the sport of hunting. Pursuit of pronghorns with ORVs and killing of trophy animals within game farm enclosures are presented as ethical violations.

5. **Elk responses to disturbance by cross country skiers in Yellowstone National Park.** Cassirer, E. F., Freddy, D.J. & Abies, E.D. (1992) Wildlife Society Bulletin 20: 375-381.

Abstract: Radio marked elk were intentionally disturbed by groups of people walking or skiing directly into their location. Disturbance resulted in displacement of elk and increased energy expenditure. Upon disturbance, distances moved were 1,675 m, and were related to distance to topographic barriers. The elk seemed to use ridges as primary cover and stands of trees secondarily, after they had gone over a ridge. Elk in this study had a low tolerance for disturbance by people on foot or skis. Disturbance caused temporary displacement of the elk.

Elk generally returned after people left the area, however, it is believed that this tendency may decline with repeated disturbances. The energy expended moving away from skiers represented approximately 5.5% of an estimated average daily expenditure of 6,035 kcal for elk in winter and is more than the normal estimated daily energy expenditure for movement.

Researchers believe that restricting cross-country skiers to locations >650m from elk wintering areas would probably minimize displacement of most non habituated elk. Skiers would likely have to remain at distances of >1,700m to completely avoid disturbing elk. The amount of winter range used by skiers and the number of days involved seemed to have more of an effect on elk than skier numbers. Therefore, when skier activity is located on elk wintering range it was recommended that concentrating use in sites with abundant topographic relief, and providing security areas in drainages adjacent to those where skiing occurs might minimize the added energy costs and displacement of elk.

6. **Influence of Nordic skiing on distribution of moose and elk in Elk Island National Park, Alberta.** Ferguson, M.A.D., & Langvatn, R. (1985) Canadian Field Naturalist, 96: 69-78.

Abstract: Effects of cross-country skiing on distribution of Moose and Elk during winter were studied on Elk Island National Park, Alberta. Aerial observations and track and pellet-group counts provided indices to distribution that could be related to trail location and/or use. Cross-country skiing influenced the general over winter distribution of Moose but not of Elk. Both species, however, tended to move away from areas near heavily-used trails during the ski season (January-March). Day to day movements away from trails occurred after the onset of skiing, but such displacement did not increase with the passage of additional skiers.

7. **Snowmobile impacts on the natural environment.** Aasheim, R. (1980) R.L. Andrews and P.F. Nowak, (eds.) Off-road Vehicle Use: A management challenge conference. Ann Arbor, MI.

Abstract: Snowmobiling and its impacts on natural environments in Montana are described. Studies of impacts on deer and elk have produced conflicting results, but there is little doubt that additional stress on poor-condition animals in winter is undesirable. Animals accustomed to humans are less affected by snowmobiles than animals in more remote areas. Effects on small mammals and possible effects of packed snowmobile trails are discussed.

8. **Telemetered heart rate of three Elk as effected by activity and human disturbance.** Ward, A. L., & Cupal, J. J. (1980) U.S. Forest Service, Fort Collins, Colorado.

Abstract: The effects of human disturbances on elk in Wyoming were studied during 1975/76. Two adult cows and one yearling male were fitted with heart rate monitors. Teams observed and encountered the elk 344 times to ascertain the effects of different stimuli. Positive heart and flight reactions were recorded. Elk responded most strongly to sonic booms, gunshots, and people on foot. Elk seldom reacted when approached by an OHV.

Mammals / Gray Wolves

1. **Effects of Winter Recreation on Gray Wolves.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 31-35.

Potential Effects: Conflicts could occur when routes groomed for snowmobiles bisect habitats used by wolves in the winter, affecting wolf movements and foraging patterns. Moreover, grooming of roads and trails may affect ungulate movements (Meagher 1993), and this may influence wolf movements as well. Areas of particular concern are ungulate concentration sites where winter-killed carcasses are available. These include both geothermally influenced and low-elevation sites. Wolf activity could be affected in ungroomed areas used by snowmobiles. Although areas of ungroomed snowmobile use typically occur at high elevations where wolves do not occupy winter habitats, there is potential for conflicts between wolves and recreationists if winter snowmobiling occurs on low-elevation or geothermally influenced ungulate winter range. Impacts would also occur if wolves were deliberately chased by recreationists on snowmobiles.

Management Guidelines: New groomed motorized routes should be located in areas that are not classified as ungulate winter range or important wolf habitat. Grooming and use of snowmobile roads and trails should end between March 15 and April 1, allowing wolves to use spring denning sites without harassment. Dispersed motorized use should not occur on or near ungulate winter range or on spring range after wolf denning begins, usually between March 15 and April 1.

Mammals / Grizzly Bears

1. **Effects of Winter Recreation on Grizzly Bears.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 37-47.

Potential Effects: Snowmobile traffic alone on highly and moderately groomed routes does not present a significant impact to bears during most of the winter months. This is because of the predictability of defined snowmobile corridors and because most snowmobile use occurs during the time that bears are in hibernation. Conflict could occur when snowmobile use coincides with spring bear emergence and foraging. Most use of ungroomed snowmobile areas should not conflict with bear activity because it coincides with bear hibernation. Moreover, areas of ungroomed snowmobile use typically occur at elevations above spring bear habitats. An exception is when over-wintered whitebark pine crops are available, and bear forage at high elevations in the spring. Another possible effect may occur because most backcountry snowmobile use occurs at higher elevations, where most bear denning is found. The potential for conflicts between bears and recreational users does exist when dispersed use occurs after bear emergence (between March 1 and March 15).

Management Guidelines: Grooming and use of snowmobile roads and trails should end by March 15 in areas where post-denning bear activity is high. Where winter use occurs in ungulate wintering areas, activity should end by March 15. In areas with whitebark pine forests, a primary issue is the displacement of bears. Because the presence of over-wintered pine nut crops is not consistent, this is an episodic and not an annual concern. Therefore travel restrictions should be addressed based on yearly monitoring rather than as a continuous restriction.

Mammals / Lynx

1. **Northern Rockies Lynx Management Direction Record of Decision.** USDA Forest Service (2007) National Forests in Montana and parts of Idaho, Wyoming, and Utah www.fs.fed.us/r1/planning/lynx/reports/rod/ROD_.pdf

Summary of the decision:

We have selected Alternative F, Scenario 2 as described in the Northern Rockies Lynx Management Direction Final Environmental Impact Statement (FEIS) (pp. 35 to 40), with modifications. We modified Alternative F, Scenario 2 and incorporated the U.S. Fish and Wildlife Service (FWS) Terms and Conditions (USDI FWS 2007), where applicable, into the management direction – see Attachment 1- hereafter called the *selected alternative*. We determined the selected alternative provides direction that contributes to conservation and recovery of Canada lynx in the Northern Rockies ecosystem, meets the Purpose and Need, responds to public concerns, and is consistent with applicable laws and policies. In the FEIS we analyzed six alternatives in detail and two scenarios for Alternative F. Of those, we determined Alternative F Scenario 2 is the best choice. With this decision, we are incorporating the goal, objectives, standards, and guidelines of the selected alternative into the existing plans of all National Forests in the Northern Rockies Lynx Planning Area – see Figure 1-1, FEIS, Vol. 1 Tables 1-1 and 1-2.

The direction applies to mapped lynx habitat on National Forest System land presently **occupied** by Canada lynx, as defined by the *Amended Lynx Conservation Agreement between the Forest Service and the FWS* (USDA FS and USDI FWS 2006). When National Forests are designing management actions in

unoccupied mapped lynx habitat they should consider the lynx direction, especially the direction regarding linkage habitat. If and when those National Forest System lands become occupied, based upon criteria and evidence described in the Conservation Agreement, the direction shall then be applied to those forests. If a conflict exists between this management direction and an existing plan, the more restrictive direction will apply.

The detailed rationale for our decision, found further in this document, explains how the selected alternative best meets our decision criteria. Those decision criteria are: 1) meeting the Purpose and Need to provide management direction that conserves and promotes the recovery of Canada lynx while preserving the overall multiple use direction in existing plans; 2) responding to the issues; and 3) responding to public concerns.

Management direction related to human uses: Over-the-snow winter recreation (pp. 22-25)

Lynx have very large feet in relation to their body mass, providing them a competitive advantage over other carnivores in deep snow. Various reports and observations have documented coyotes using high elevation, deep snow areas (Buskirk et al. 2000). Coyotes use open areas because the snow is more compacted there, according to research conducted in central Alberta (Todd et al. 1981). In another study in Alberta, coyotes selected hard or shallow snow more often than lynx did (Murray et al. 1994).

The LCAS recommended two objectives and two standards relating to winter dispersed recreation. These are reflected in Alternative B, Objectives HU O1 and HU O3, and Standards HU S1 and HU S3. In Alternative B, Standard HU S1 would maintain the existing level of groomed and designated routes. All action alternatives contain Objectives HU O1 and HU O3 that discourage expanding snow-compacting human activities. Alternatives B, C, and D contain Standard HU S1 that would allow existing over-the-snow areas to continue but not expand into new, un-compacted areas. Alternative E, the DEIS preferred alternative, contains Guideline HU G11 that discourages the expansion of designated over-the-snow routes and play areas into uncompacted areas. All alternatives would allow existing special use permits and agreements to continue.

In comments on the DEIS some people asked that no dispersed over-the-snow use be allowed off groomed or designated trails and areas, saying the no net increase in groomed or designated routes did not go far enough. Others said the management direction should be in the form of a standard, not a guideline.

Some people said standards related to over-the-snow use should be removed. They said there is no evidence to show that coyotes and other predators use packed snow trails to compete with lynx for prey, and the amount of compaction created by snowmobiles is insignificant compared to the compaction created naturally by the weather. They were particularly concerned that if such language was introduced into plans, it could be difficult to change, incrementally restricting the places where snowmobiling is allowed. Others wanted an allowance made to increase use. These comments were considered for management direction – see FEIS Vol. 1 pp. 90-93.

In their comments on the DEIS the FWS agreed it is prudent to maintain the status quo and restrict expansion of over-the-snow routes until more information is available because of the possibility that, over time, unregulated expansion could impair further conservation efforts. They also said current, ongoing research in Montana may shed some information on the effects of snow compaction on lynx. They suggested careful consideration of the most recent information and the reality of possible impairment of options for the future. They suggested considering language that could provide more guidance on conditions where the expansion of over-the-snow routes would be warranted and acceptable.

We reviewed the results of research conducted since the DEIS was released. In northwestern Montana (within the northern lynx core area) Kolbe et al. (in press) concluded there was “little evidence that compacted snowmobile trails increased exploitation competition between coyotes and lynx during winter on our study area.” Kolbe et al. (in press) suggested that compacted snow routes did not appear to

enhance coyotes' access to lynx and hare habitat, and so would not significantly affect competition for snowshoe hare. They found that coyotes used compacted snow routes for less than 8 percent of travel, suggesting normal winter snow conditions allowed access by coyotes, regardless of the presence or absence of compacted snow routes. Kolbe was able to directly measure relationships between coyotes, compacted snow routes and snowshoe hare in an area that also supports a lynx population (USDI FWS 2007). In this study coyotes primarily scavenged ungulate carrion that were readily available while snowshoe hare kills comprised only three percent of coyote feeding sites (Kolbe et al. in press).

In the Uinta Mountains of northeastern Utah and three comparative study areas (Bear River range in Utah and Idaho, Targhee NF in Idaho, Bighorn NF in Wyoming) Bunnell (2006) found that the presence of snowmobile trails was a highly significant predictor of coyote activity in deep snow areas. From track surveys it was determined the vast majority of coyotes (90 percent) stayed within 350 meters of a compacted trail and snow depth and prey density estimates (snowshoe hares and red squirrels) were the most significant variable in determining whether a coyote returned to a snowmobile trail (Bunnell 2006). Of the four study areas recent lynx presence has only been documented on the Targhee NF. Bunnell indicated that "circumstantial evidence" suggested the existence of competition.

To date, research has confirmed lynx and coyote populations coexist, despite dietary overlap and competition for snowshoe hare, the primary prey of lynx, and alternate prey species. In some regions and studies, coyotes were found to use supportive snow conditions more than expected, but none confirm a resulting adverse impact on lynx populations in the area. The best scientific information (Kolbe's study) is from an occupied core area within our planning area. Radio-collared lynx and coyotes were monitored in this study, unlike the Bunnell study. This area is occupied by both lynx and coyotes and the study concludes coyotes did not require compacted snow routes to access winter snowshoe hare habitat. Based on this information, we reevaluated management direction related to over-the-snow activities. An alternative to prohibit all snow-compacting activities or to limit dispersed use was evaluated, but not considered in detail because current research indicates this level of management direction is unwarranted (USDI FWS 2000a; FEIS, Vol. 1, Appendices O and P).

An alternative to drop all direction limiting snow compaction was not developed in detail because there is evidence competing predators use packed trails, suggesting a potential effect on individual lynx. We decided it was prudent to maintain status quo and not let over-the-snow routes expand. However, we also decided it was reasonable to retain the direction as a guideline in the selected alternative which can be used in project design. The intent is to follow management direction in guidelines. However, there may be some cases where expansion of over-the-snow routes would be warranted and acceptable, or where research indicates there would be no harm to lynx. Guidelines are better suited to adaptive management.

There is also no basis to establish any particular threshold of allowable increases. However, the selected alternative allows expanding winter recreation in some places where heavy public use existed in 1998, 1999, or 2000 – see Guideline HU G11.

The FWS concluded the Objectives HU O1 and O3, and Guideline HU G11 would be sufficient to maintain habitat effectiveness for lynx by limiting the expansion of compacted snow routes and this conclusion would be tested through monitoring required in this decision. The best information available has not indicated compacted snow routes increase competition from other species to levels that adversely affect lynx populations, and under the selected alternative the amount of areas affected by snow compacted routes would not substantially increase (USDI FWS 2007).

2. **Canada Lynx in the Great Lakes Region 2005 Annual Report.** Moen, R., Niemi, G., & Burdett, C.L. (2006) Report to the U.S.D.A. Forest Service, Minnesota Cooperative Fish and Wildlife Research Unit, and Minnesota Department of Natural Resources
http://www.nrri.umn.edu/lynx/publications/2005_MN_LynxReport_v2.pdf

Executive Summary: We summarize the third year of a project on Canada lynx ecology in the Great Lakes region. The project is designed to address four major questions about this population of Canada lynx: distribution, habitat use, abundance, and persistence. In the first 33 months of this project we captured and deployed radiotelemetry collars on 32 Canada lynx. Each animal was located approximately biweekly after being collared when logistically feasible.

GPS collars have been deployed on 12 of the lynx in this project. Over 12,000 locations were obtained from GPS collars at the end of 2005. GPS collar locations will be fundamental to understanding movements and habitat use of Canada lynx. Ambient temperature and animal activity level is recorded by the collars indicating daily patterns in activity, and also shows how active an animal was when each GPS location was obtained.

Radiocollared females have had kittens in 2004 and 2005, and at least 5 of the 12 kittens known from den visits in 2005 survived until December 2005. Of the 2004 litters, 1 and possibly 2 of the known offspring were alive at the end of 2005. Of the 32 lynx radiocollared by December 31, 2005, 2 died in 2003 and no animals were recovered dead in 2004. We recorded the deaths of 14 radiocollared animals in 2005, one of which had died in 2004.

We finished the third year of surveys for snowshoe hare, the major prey species of Canada lynx. Permanent pellet plots were established throughout the SNF for snowshoe hare. Plots were distributed based on stratified random, systematic, and selective site selection strategies. Many stratified random plots had few or no pellets. The highest pellet density over two years of pellet surveys occurred in young red pine and young upland black spruce cover types. A mark-recapture experiment will make it possible to estimate density of snowshoe hares from pellet plots.

We continue to use the project website (www.nrri.umn.edu/lynx) to provide information to biologists and the general public. The website gets over 1,000 page requests per day. This website is a historical record of the project, lists project goals and accomplishments, and gives information and pictures of each lynx. The annual reports and other publications on the project are or will be available for download. Trail camera images were added to the website in 2005.

We begin the report with a brief chronological summary of Canada Lynx ecology in the Great Lakes region. The project has been supported by several agencies with some common deliverables and some deliverables that varied among agencies. To produce a cohesive, logically organized annual report, we describe the project in its entirety, and we indicate specific deliverables in Appendix 1. We first describe Canada lynx trapping and the deployment of radiotelemetry collars. The radiotelemetry program is very important because each of the major deliverables depends on telemetry data. Next, we address progress made on each of the major questions: 1) distribution, 2) habitat use, 3) abundance, and 4) persistence. Prey species surveys and other aspects of the project are also summarized.

We conclude main sections with the current status and future plans for each topic. Some of the questions will require several years of data collection which was built into the project master plan. With the number of Canada lynx now radiocollared and the number of locations available, data collected on this project were used to assist in management decisions in 2005.

- 3. National Interagency Canada Lynx Detection Survey in Minnesota, Wisconsin, and Michigan.** Burdett, C., Lindquist, E., Moen, R., Niemi, J., & Route, B. (2006) Center for Water and Environment Natural Resources Research Institute – University of Minnesota, U.S.D.A. Forest Service – Superior National Forest, and Department of Interior National Park Service – Great Lakes Monitoring Network. http://www.nrri.umn.edu/lynx/publications/NRRI_TR-2006-29.pdf

Summary: A variety of non-invasive techniques including hair snagging, snow-tracking, and remote cameras can be used to monitor mammalian carnivores. The National Interagency Canada Lynx Detection

Survey (NLDS) was a survey designed to detect lynx with a hair-snagging protocol applied throughout the conterminous U.S. range of lynx. Hair-snagging stations consisted of a scent lure, a carpet piece with nails to snag hair, and a pie tin to attract the cat's attention. We applied NLDS protocol in Superior and Chippewa National Forests in Minnesota, the Chequamegon and Nicolet National Forests in Wisconsin, and the Ottawa National Forest in Michigan. Mammalian species detected included black bears (*Ursus americanus*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), ungulates, and other canids. **The NLDS did not detect lynx in the Great Lakes Geographic Area (GLGA) despite their likely presence on some of the Minnesota NLDS grids.** We also opportunistically set up hair snagging stations in areas in Minnesota where we knew lynx were present to further test the efficacy of hair-snagging stations. We had limited success using hair snares to selectively sample lynx despite placing snares in areas regularly used by lynx. We suspect the detection probability for lynx hair-snagging surveys in the GLGA may be low and other survey techniques may prove more useful, particularly for localized selective sampling for lynx presence.

4. **Lynx and Other Carnivore Surveys in Wisconsin in Winter 2003-2004.** Wydeven, A.P., Wiedenhoeft, J.E., Schultz, R.N., & Boles. S. (2004) Wisconsin DNR and U.S. Fish and Wildlife Services – Region 3 Endangered Species Grant Program.
<http://www.dnr.state.wi.us/org/land/er/publications/reports/pdfs/LynxandOtherCarnivoreSurveysinWisconsininwinter2003-2004.pdf>

Introduction: The Wisconsin DNR listed the Canada lynx (*Lynx canadensis*) as a state endangered species in 1973, but removed lynx from the list in 1997, due to lack of evidence of any potential for a breeding population within the state. The U.S. Fish and Wildlife Service listed the lynx as a threatened species within the contiguous United States on 24 April 2000. States that were thought to have lynx included Wisconsin, Michigan, Minnesota and 10 other states. **There has not been any evidence of a breeding population of lynx in Wisconsin in the 1900's** (Thiel 1987, Wydeven 1998). Lynx are occasionally observed in the state, and up to 1% of bobcat hunters and trappers reported lynx sign in Wisconsin (Wydeven 1998). Therefore there is a need to determine more precisely if lynx are occurring in Wisconsin, and if so, determine distribution and breeding status of lynx in the state.

The Wisconsin DNR has cooperated with the U.S. Fish and Wildlife Service to search for gray wolves (*Canis lupus*) using snow track surveys since 1979 (Wydeven et al 1995). These surveys have detected lynx in the past (Wydeven 1998, Wydeven et al 1995). Therefore these snow track surveys are being used to search for evidence of lynx in the state.

Results: A total of 3696.5 miles of track surveys were conducted by DNR trackers in 80 survey blocks in northern Wisconsin (Table 1, Figure 1). **Two sets of lynx tracks were detected in survey block 82, in Vilas County.** The most abundant carnivores were fisher (*Martes pennanti*) which was detected at a rate of 16.0 per 100 miles of survey. The 4 canids were the next most abundant carnivores including coyotes (*Canis latrans* 14.1 / 100 miles), gray wolf (*Canis lupus* 9.4 / 100 miles), fox (*Vulpes vulpes* & *Urocyon cinereoargenteus* 8.8 / 100 miles), and dog (*Canis familiaris* 8.0 / 100 miles). **Rates of track detection were lower than 2003 for most carnivores, except wolves had increased, otter were similar, and the first observation of lynx tracks in 5 years.**

Two probable lynx tracks were detected by Ron Schultz on 22 March 2004 in NW SW Section 36, T42N, R10E in Vilas County (Latitude 46.0753 / Longitude 89.1981). It appeared that 2 lynx were traveling together. Schultz followed the tracks for about 2.1 miles. Snow conditions allowed only one good measurement, consisting of a minimum outline of 6.5 cm length and 7.1 cm width. Measurement of variable outline was 9 cm long by 10.2 cm wide. Urine samples were collected from snow, but could not be verified as lynx. Attempts were made for follow-up surveys and consideration was given to attempt trapping, but snow melted soon afterwards. It could not be determined if these 2 represented a female and her kitten or a male following a female; in either case this may represent the possibility of breeding lynx. Felid track observations included 97 bobcat (*Lynx rufus*) or 2.6/ 100 miles, 5 cats (*Felis catus*) at 0.1 / 100 miles, and 2 Canada lynx 0.1/ 100 miles. No cougar (*Puma concolor*) tracks were found and none have

been detected during any previous years. Bobcat detection rate was less than 2003 (4.6 / 100 miles), but similar to 2002 (3.0/ 100 miles). Bobcat were detected in 41 survey blocks (51.2%).

More intense efforts to search for lynx were made in the Nicolet National Forest where lynx had been detected between 1993 and 1997 (Wydeven 1998). **Two lynx were detected along 572.2 miles of survey route at a rate of 0.3 lynx per 100 miles** (Table 2). This was the first detection of lynx in the Nicolet since 20 January 1997 (Wydeven 1998). Bobcats were detected at a rate of 6.1 bobcat / 100 miles, slightly higher than 2003, when 5.5 bobcat / 100 miles were found. Ratio of lynx:bobcat detection was 1:17.5.

Discussion: **The 2 lynx found this year in northeast Vilas County were the first lynx detected since 1999** (Figure 2), when one was detected in western Douglas County along the Minnesota border (Wydeven et al. 1999). Four observations were detected in the Nicolet National Forest between 1993-1997 including: 17 February 1993, 28 January 1995, 1 March 1996, and 20 January 1997 (Wydeven 1998). All these observations were tracks of single animals, and close to Alvin in Forest County. The lynx track observation in 2004 was just to the west of the Nicolet Forest, and about 20 miles west of the sightings near Alvin.

The presence of 2 lynx together might indicate possibility of breeding activity. Normally only adult females and their offspring travel together, or adult males and females travel together during breeding season, but sometimes adult lynx hunt together (Mowat et al. 2000). The detection in late winter did not allow many follow-up surveys. Additional surveys will be done in the area next winter, and if lynx continue to be found in the area, livetrapping and radiocollaring will be attempted.

5. **Southern Rockies Canada Lynx Amendment Draft Environmental Impact Statement (2004)**
USDA Forest Service Rocky Mountain Region www.fs.fed.us/r2/projects/lynx/documents/deis/

Abstract: The Southern Rockies Canada Lynx Amendment Draft Environmental Impact Statement (DEIS) documents the results of an analysis of four alternative ways to manage for Canada lynx habitat in the Southern Rockies Geographic Area. This proposed amendment would incorporate management direction for Canada lynx habitat by amending the Land and Resource Management Plans (forest plans) for the Arapaho-Roosevelt, Pike-San Isabel, Grand Mesa-Uncompahgre-Gunnison, San Juan, Rio Grande and Medicine Bow-Routt National Forests. The White River National Forest released their Record of Decision for their Revised Land and Resource Management Plan in the spring of 2002. The White River National Forest Revised forest plan incorporated management direction to provide habitat for Canada lynx and will not be amended as a result of the findings of this analysis.

The No Action alternative (Alternative A) was developed as a baseline for comparing the effects of Alternatives B, C and D. It does not respond to the purpose and need for action, defined for this project to establish direction that conserves and promotes recovery of Canada lynx, while preserving the overall multiple-use direction in existing plans.

Alternatives B, C and D were designed to address the purpose and need for the project. Alternative B reflects the proposed action described in scoping and would adopt the Lynx Conservation Assessment and Strategy (LCAS) recommendations; edited for clarity. Alternatives C and D would add direction similar to LCAS, but **partially responds to concerns about restrictions on new snowmobile trails**, providing for lynx foraging habitat in multistory forests, and precommercial thinning restrictions. Alternative D includes standards and guidelines that may be more flexible to address local situations and new information.

Alternative D is the Forest Service Preferred Alternative and would allow reduction of lynx foraging habitat if needed to reduce fuels. The Forest Service has concluded that this alternative contributes to lynx conservation and recovery.

Reviewers should provide the Forest Service with their comments during the review period of the Draft EIS. This will enable the Forest Service to analyze and respond to the comments at one time and use the information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers of draft environmental impact statements have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts an agency to the reviewer's position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Also, environmental objections that could be raised at the draft environmental impact statement stage but that are not raised until after completion of the final environmental impact statement may be waived or dismissed by the courts. *City of Angoon v. Hodel*, 803 F.2d 1016, 1022 (9th Cir. 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed. (40 CFR 1503.3).

The Final EIS and Lynx Management Plan is scheduled to be released in the fall of 2007 (but wasn't).

6. **Washington state recovery plan for the lynx.** Stinson, D.W. (2001) Washington Department of Fish and Wildlife, Olympia, Washington.
<http://wdfw.wa.gov/wlm/diversty/soc/recovery/lynx/finallynx.pdf>

Executive Summary: The lynx (*Lynx canadensis*) is the rarest of three cat species native to Washington probably numbering fewer than 100 individuals in the state. Lynx have large feet and long legs that give them a competitive advantage in deep snow over other carnivores that might otherwise compete for habitat and prey. Lynx are largely dependent upon a single prey species, the snowshoe hare, but they also eat red squirrels, small mammals, birds, and carrion. Lynx are primarily associated with subalpine and boreal forest types in the mountains of north-central and northeastern Washington, and formerly occurred in the southern Cascades. Topographic relief gives these forests a patchy distribution which in turn affects their potential to support lynx.

Across most of their range in northern boreal forests, lynx undergo cyclic changes in abundance that lag 1 year behind snowshoe hare population cycles. This 10-year cycle in snowshoe hare abundance may occur in Washington with a reduced amplitude, but it has not yet been clearly demonstrated. The lynx's response to the hare cycle produces pulses of dispersing individuals that may travel long distances in search of suitable habitat. At these times, some lynx may immigrate to Washington from larger populations in British Columbia and Alberta. Immigration from northern populations, and dispersal between subpopulations in Washington may be essential to the long-term viability of Washington's lynx population.

Prior to 1947, lynx in Washington were classified a "predatory animal" with a bounty of \$5. Lynx were trapped or hunted until 1991 when a decline was readily apparent. It now seems clear that the lynx population in Washington could not sustain perennial exploitation due to the fragmented nature of subalpine-boreal habitats, low density of snowshoe hares, and variable quality of habitat through time. The lynx was listed as a state threatened species in 1993, and became a Threatened species under the federal Endangered Species Act (ESA) in April 2000.

The major factors affecting habitat and the lynx population include forest management, fire and fire suppression, insect epidemics, and management of lynx harvest and habitats in southern British Columbia. Lynx are relatively tolerant of human activity, but recreational developments and roads with high traffic volumes may affect lynx movements. Anecdotal observations have fueled speculation that snow compaction on forest roads and trails may affect the degree to which lynx must compete with coyotes and other carnivores, but few data exist from which to draw conclusions about the affect on lynx. Most of the lynx habitat in six Lynx Management Zones is on federal lands (92%), and almost 40% is in wilderness, parks and other reserves. Petitions to list the lynx under the ESA, and the subsequent listing increased attention on lynx. The large proportion of habitat in national forests provides the opportunity for

the U. S. Forest Service to manage for lynx at the ecosystem scale. The understanding of lynx harvest management has improved in recent years, providing British Columbia and Alberta the ability to prevent overharvests that could reduce the frequency of immigration to Washington. These factors may improve the prospects for the recovery of lynx populations in Washington.

Meaningful population based recovery objectives are not possible to formulate at this time due to the rudimentary knowledge of lynx population dynamics in southern boreal forests. Interim objectives to down-list the lynx to Sensitive involve consistent occupancy of most of the habitat (>75% of lynx analysis units) capable of supporting reproductive populations. Recovery objectives and maps will be revised as new information becomes available about the habitat and populations of lynx and hare in Washington.

7. **Effects of Winter Recreation on Lynx.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 49-63.

Potential Effects: Because of the secretive nature of lynx and their habit of using deep-forest habitats, few ecological studies of lynx exist, let alone research on the effects of winter recreation. However, the paucity of data should not be construed as evidence that winter recreation has no adverse effects on this species.

Snowmobiling may be particularly adverse to lynx because: 1) this activity occurs when animals are frequently in poor condition due to the stresses of winter; 2) this activity may be dispersed on the landscape (i.e., not confined to roads) on national forest lands outside of wilderness areas; 3) it may occur at night when lynx are usually active; 4) it is frequently accompanied by human disturbance and habitat loss associated with recreational infrastructure; and 5) this activity may alter the density and distribution of snowshoe hares, a favored prey item.

Disturbance, however, does not necessarily lead to a continued reduction in habitat effectiveness for lynx.

Surprisingly, disturbance by people may have a greater negative effect than motorized vehicles on established roadways because mammals habituate more quickly to mechanical noise than to noise from humans. Laughing and yelling can arouse responses of mammals at greater distances than snowmobile noise (Bowles 1995).

Management Guidelines: Snowmobile traffic may reduce the effectiveness of lynx habitats that are peripheral to groomed snowmobile routes. Lynx and hares that use habitats in the vicinity of roads may be adversely stressed by disturbance. Night use of roads may be more detrimental than day use because lynx are nocturnal and crepuscular. However, lynx may show some habituation to snowmobile activity where it is temporally and spatially consistent. Restrictions on quantity and timing of snowmobile travel could reduce adverse effects on lynx. Snowmobiles are frequently used in the backcountry at high elevations, often within or near lynx habitat. Because this activity is highly obtrusive and usually dispersed on the landscape, it has a strong potential to displace lynx from their winter haunts, increase stress levels, and reduce the fitness and viability of lynx populations (Cole and Landres 1995).

Mammals / Mid-Sized Carnivores (Wolverine, Fisher, Marten, Lynx, Bobcat, Red Fox, and Weasel)

1. **Effects of Winter Recreation on Mid-Sized Carnivores (Wolverine, Fisher, Marten, Lynx, Bobcat, Red Fox, and Weasel).** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 65-71.

Potential Effects: Mortality resulting from an accidental collision with a snowmobile is possible, but the probability is low. Intentional killing of carnivores by a snowmobiler is possible, but most likely it would occur in rare, isolated incidents.

Management Guidelines: A literature search produced little information on how winter recreational activities impact carnivores; research on carnivores is extremely expensive and is mostly non-existent on mid-sized carnivores.

Mammals / Moose

1. **Effects of Winter Recreation on Moose.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 73-86.

Potential Effects: Individual animals may be affected if a flight response is initiated by contact with vehicles. Moose may use the groomed surface as a travel route and invite collisions with oversnow vehicles. If human activities are predictable, moose may become habituated..

Management Guidelines: Where human use does occur in moose winter range, regulate activities to make them as predictable as possible. This can be accomplished by restricting them spatially and temporally. For example, restrict skiing or snowmobiling to designated paths and to daylight hours.

2. **Reaction of Moose to Snowmobile Traffic in the Greys River Valley, Wyoming.** Colescott, J.H. & Gillingham, M.P. (1998) *ALCES* Vol. 34(2): 329-338.

Abstract: Understanding how human activities influence wildlife populations is increasingly important as recreational demands on critical habitat increase. We studied the effects of snowmobile traffic on wintering moose (*Alces alces*) in the Greys River drainage, Wyoming from January through February, 1994. Based on 736 moose-hours of direct observations on large willow flats, moose (6 females, 8 males, and 3 juveniles) were active 41.7% and inactive 58.3% of the observation time. Bedding activity lasted on average 118.7 minutes (range: 1 – 144 minutes) and feeding averaged 32.1 minutes (range: 1 – 274 minutes). Standing, walking, and running occurred only for short periods of time, less than 7 minutes on average. Moose bedding within 300 meters and feeding within 150 meters of passing snowmachines altered their response to the disturbance. This response was more pronounced when moose were within 150 meters of the disturbance. The frequency of snowmobile traffic did not seemingly affect the average percent of moose active, or the number of moose present in the study areas. Moose appeared to move away from the active snowmobile trail as the day progressed. Consequently, snowmobile traffic, although it did not appear to alter moose activity significantly, did influence the behavior of moose positioned within 300 meters of a trail and did displace moose to less favorable habitats.

3. **Influence of Nordic skiing on distribution of moose and elk in Elk Island National Park, Alberta.** Ferguson, M.A.D., & Langvatn, R. (1985) *Canadian Field Naturalist*, 96: 69-78.

Abstract: Effects of cross-country skiing on distribution of Moose and Elk during winter were studied on Elk Island National Park, Alberta. Aerial observations and track and pellet-group counts provided indices to distribution that could be related to trail location and/or use. Cross-country skiing influenced the general over winter distribution of Moose but not of Elk. Both species, however, tended to move away from areas near heavily-used trails during the ski season (January-March). Day to day movements away from trails occurred after the onset of skiing, but such displacement did not increase with the passage of additional skiers.

4. **Snowmobilers, Their Experience and Habitat Preferences, and the Implications for Wintering Moose.** Jonker, P.M. Jr. (1984) University of Calgary Master's Thesis.

Abstract: The compatibility of habitat requirements of snowmobilers and of moose was assessed. 306 snowmobile users were interviewed from January to April, 1982, at McLean Creek Snowmobiling Area, Alberta. Physical, psychological, and socio-economic dimensions of the sample were derived and described, as well as local behavioral characteristics, and their preferences for vegetation type, density, slope angle, snow depth, and snow type.

Comparison of the snowmobiler's requirements with those of moose indicates clear conflict of demand over "short deciduous" vegetation stands, and conifer and deciduous stands having densities of 100 – 1000 stems per hectare; such stands offer at the same time good snowmobiling and the bulk of moose browse. Moderate potential conflict exists over "roads and trails," moderate slopes, tree stands having densities of 1001 – 2000 stems per hectare, and powder snow on a firm base. A clear conflict over these is expected to be initiated actually only in the presence of deep snow accumulations, such as do not occur at McLean Creek Area. Minimum demand conflict exists for most parameters measured, including non-vegetated terrain, dense stands of trees, thin powder snow, deep powder snow, landform types, flat topography, and steep slopes.

Mammals / Mountain Goats

1. **Effects of Winter Recreation on Mountain Goats.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 87-96.

Potential Effects: Because of the remote and rugged nature of goat wintering habits, recreational use of such areas is unlikely. Because mountain goats are sensitive to loud noises, snowmobiles and helicopters could affect their behavior depending upon the proximity and duration of the disturbance. In most cases, it appears that wilderness designation and area use limitations have adequately protected mountain goat habitats from motorized-related disturbances in the Greater Yellowstone Area. Because mountain goat winter range is inaccessible and precipitous, goats and recreationists are not often coming into conflict. For recreation, humans tend not to seek the combination of rocky, rugged terrain, and low-snow conditions required for by mountain goats. Rather, snowmobilers and skiers prefer deep snow conditions, which are typically avoided by goats.

Management Guidelines: No immediate management recommendations are offered.

Mammals / Mountain Sheep

1. **Effects of Winter Recreation on Bighorn Sheep.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 5-9.

Potential Effects: Bighorns may abandon high quality winter range that is heavily used by humans, or they may limit their use to a small area near escape terrain.

Management Guidelines: Skiing, snowmobiling, mountaineering, and snowshoeing will most likely only affect bighorn sheep wintering at higher elevations. The encounters between these recreationists and the bighorns may be infrequent enough that there would be little or no impact to the animals. However, if use increases at these higher elevation winter ranges, managers need to monitor the situation in order to prevent the loss of bighorn sheep on isolated winter ranges; human activities should be limited to roads or trails to minimize disturbance to bighorn sheep.

2. **How off-highway vehicles affect mountain sheep.** Laing, M. E. (1992) National Off-Highway Vehicle Conservation Council: 1-2

Abstract: A NOHVCC Fact Sheet summarizing one study in Alberta of sheep response. Humans on foot, humans with dogs, and humans approaching from above (over a ridge) proved to be more disturbing than motor vehicle traffic.

Mammals / Rabbits

1. **Effect of snowmobile noise and deer and rabbits in their natural habitat.** Bollinger, J. (1974)

Abstract: The behavioral patterns of deer and rabbits before, during, and after extensive snowmobile activities were studied. The data gathered was used to assess the noise wildlife levels associated with various behavior patterns, and to assess the noise levels generated by different snowmobile uses on various types of terrain. Additional objectives were to determine the effects snowmobile noise and activity had on the home range of the deer and rabbits and their seasonal movements; to determine the reactions these animals had to men in the area not using snowmobiles but equipped with skis and snowshoes; and to determine if there was a difference in predator behavior in areas where snowmobiles were used versus those where no vehicles were operated. The research team was unable to detect a severe or negative animal reaction to noise generated by vehicles. Conclusions of the study indicate that the deer and rabbits were not forced to move out of their normal home ranges, nor did they seek shelter or remain stationary with fright while snowmobiles were being operated. The only negative effect determined was that the animals did increase their movement during extensive vehicle use periods. Researchers were unable to determine whether it was the noise, physical presence or both that caused the disturbance.

Mammals / Reindeer

1. **Behavior Responses of Wild Reindeer to Direct Provocation by a Snowmobile or Skier.** Reimers, E., Eftesddl, S., & Colman, J.E. (2003) The Journal of Wildlife Management, Vol. 67, No. 4, pp. 747-754.

Abstract: To better understand the effect of winter tourism and public recreation on wild mountain reindeer (*Rang* tarandus tarandus*), we compared reindeer response distances after direct provocations by skiers and snowmobiles during three winters in Setesdal-Ryfylke, southern Norway. Reindeer being provoked by a snowmobile discovered the observer at longer distances than reindeer being provoked by a skier (370 [skier] vs. 534 [snowmobile] m; $P = 0.002$), while total flight (756 vs. 570 m; $P = 0.037$) and total distance moved (970 vs. 660 m; $P = 0.008$) by reindeer were shorter for snowmobile than skier provocation. The fright (328 [skier] vs. 328 [snowmobile] m), flight (281 vs. 264 m), and escape (543 vs. 486 m) distances due to skier or snowmobile provocation were not different ($P > 0.05$). For pooled data, fright distances of reindeer were affected by two other independent variables. Fright distance was longer when the animals were provoked from below rather than from above ($P = 0.046$), while their escape distances were longer when the animals were lying rather than when grazing prior to being provoked ($P < 0.05$). Based on maximum and minimum distance moved for all provocations pooled, daily estimated energy expenditure of reindeer increased between 31 and 590 kJ, representing 0.2 and 2.9% of their estimated total daily energy expenditure. Overall, provocations by skiers or snowmobiles revealed similar behavioral responses. An estimated maximum rate of 3 daily encounters between reindeer and skiers or snowmobiles during winter vacation and Easter would result in moderate energy costs that should be easily compensated for and thus have no demographic consequences. Increasing snowmobile use will, however, significantly expand the area where humans are in contact with reindeer during winter and spring, a period of negative energy balance for reindeer.

Mammals / Subnivean (under-the-snow)

1. **Winter Recreation Effects on the Subnivean Environment of Five Sierra Nevada Meadows.**
Wildlife Resource Consultants, (2004) U.S. Forest Service, Lake Tahoe Basin Management Unit.

Study Introduction: Adaptations to snowpack are an important component of the ecology of small mammals in temperate climates. Some small mammals, such as chipmunks (*Tamias spp*), hibernate and have limited interaction with the snowpack environment. However, shrews (*Sorex spp*) and voles (*Microtus spp*) stay active throughout the winter, and much of their activity occurs in the subnivean space under the snowpack. Other species undergo bouts of torpor between activity (Family: Muridae; deer mouse *Peromyscus maniculatus*). The habitat of species active in the winter includes mesic and dry meadows throughout the Sierra Nevada.

These subnivean mammals are dependent on the subnivean space between the basal layer of snow and the ground for shelter, foraging, and travel. Past research suggests that subnivean space may be formed in one of two ways: mechanically or thermally (Dr. William Pruitt, personal communication). The relative importance of each of these mechanisms in forming biologically useful subnivean space varies by region and type of snow. Subnivean space forms mechanically when the weight of the snowpack is supported by vegetation, woody debris, or complex rocky environments.

Extensive subnivean space may be formed thermally in environments with a temperature gradient between the bottom and top of the snowpack. The snowpack undergoes changes in vertical structure through a process called constructive or temperature gradient metamorphism (Marchand 1991). As water vapor migrates up from warmer to colder regions of the snow, depth hoar forms just above the ground at the base of the snowpack. Open space develops due to loss of water and snowpack during coalescence into larger crystals and transfer of water vapor up through the snowpack. Depth hoar is brittle, loosely arranged crystals that create space in the subnivean environment and facilitate travel by small mammals that readily move through the fragile crystals. In some areas, the basal layer of depth hoar may be 10 to 20 cm thick with individual crystals as large as 10 mm across (Pruitt 1984).

Depth hoar commonly forms and is most well-developed in cold, continental type regions where temperature throughout the snowpack varies significantly. It is documented in three of six snow classes: tundra, taiga, and alpine. These classes were delineated by Sturm et al. (1995) who developed a seasonal snow cover classification based on three climatic variables (temperature, wind speed, and snowfall). Depth hoar is rare to nonexistent in snow classified as maritime, which also tends to be more isothermal.

Study Need – Concern about the effects of winter recreation on wildlife, particularly snowmobiling and grooming of snowmobile and cross country ski trails, has grown as these sports have become more popular. Impacts from snowmobile use have received the most attention and include concern that the compaction of snow destroys the subnivean environment, which reduces temperatures leading to increased metabolic rates, restricts movement, suffocates animals, and increases winter mortality.

Most of typically listed potential impacts are not an issue in the Tahoe National Forest because the large mammal species for which such effects have been documented do not inhabit this area (e.g., elk, bison, white-tailed deer, lynx), and wildlife use naturally decreases because many animals hibernate (e.g., black bears) or migrate (e.g., mule deer) to lower elevations where snowmobile use does not occur. However, snowmobiles could potentially impact subnivean animals through compaction of the subnivean space. Any adverse effects to subnivean animals could indirectly affect the prey base for many Forest Service sensitive species, including the northern goshawk, and pine marten. A reduction in the number of prey could cause a decline in the diversity or numbers of wildlife occurring in an affected area, and could preclude the establishment of a sensitive species later in time as additional acreage of suitable habitat develops in response to Forest Service management direction.

Studies cited as the basis for impacts to the subnivean environment and subnivean animals were generally conducted in locations with continental snowpacks (e.g., alpine) where depth hoar develops. When these studies are cited in environmental documents for agency management decisions (USDA 1999a, 1999b) and in public comments and lawsuits (Biodiversity Legal Foundation. 1995; Bluewater Network. 1999), no caveats are applied regarding the utility of the results to different snowpack classes. No studies are known to have investigated the distribution of subnivean space or the effects of winter recreation on subnivean space in maritime snowpack conditions, such as those found in the Sierra Nevada Mountains. This study was designed to examine the distribution of subnivean space in Sierra meadows, how it is formed, and the impacts of winter recreation on snowpack characteristics and subnivean space.

RESULTS

Sixty-five snow pits were examined for subnivean space, density characteristics, temperature, vegetation type, and the presence of small mammal sign. A summary of the major characteristics of these pits is given in Table 2 in Appendix A of the study.

Subnivean Space – A total of 25,037 cm of snow pit perimeter was examined for subnivean space. Among all 65 pits, a total of 15.6% (3,991 cm) was classified as subnivean space. The percent of subnivean space per snow pit varied from 0 to 70% (Table 2, Appendix A). The subnivean space did not contain depth hoar. The basal layer of snow above the subnivean space was characterized by either wet snow consisting of rounded crystals or a layer of ice. The ground below the ice layer was typically moist, but was never frozen. Some snow pits dug later in the season (i.e., March and April) intersected pooled water. In some cases, the water was extensive enough that the perimeter of the pit could not be sampled and a new pit had to be dug. Where subnivean space was absent, the basal layer of snow rested directly on the ground.

Pooled data for all sites were analyzed by recreational use category. One pit (Number 14; Page Meadows; January 25) intentionally excavated over a large down log (estimate > 18" dbh) was excluded from this analysis because similar woody debris sites were not replicated in all recreational use categories. The pit's total perimeter was 360 cm of which 237 cm (65.8%) were subnivean space. The subnivean space had a smooth, glazed roof with an average vertical height of 6.4 cm.

The "No Use" category had substantially more subnivean space than all other use categories, with an average of 31.4% of the total pit perimeter averaged over 18 pits. This was nearly three times the percent of the pit perimeter occupied by subnivean space for any of the other use categories. Pits classified under one of the two skiing uses or the dispersed over-snow vehicle use were very similar, with an average of about 10.5% of the perimeter occupied by subnivean space. Pits classified as concentrated over-snow vehicle use had the least subnivean space, an average of 6.0% (n=7).

The vertical height of the subnivean space ranged from 1 cm, the minimum height chosen to represent subnivean space in this study, to 6.9 cm. The greatest vertical height was associated with four factors: (1) riparian shrubs, such as willows (e.g., pit 16); (2) large diameter downed wood (e.g., pit 14); (3) vole runways depressed in the ground (often several centimeters) that traversed under the perimeter of the snow wall (e.g., pit 23); and (4) a dense mat of grasses, sedges, and forbs (e.g., pits 19-34). Snow pits dug at Trout Creek Meadow had a relatively large vertical height due to both rodent burrows and the dense mat of herbaceous vegetation.

The presence of subnivean space was highly variable by site. The total percent of subnivean space for all samples from a given study site varied by location. Snow pits dug at Trout Creek had the greatest percentage of subnivean space in the perimeter while those dug at Mount Rose Meadow had the least. Alternatively, snow pits at higher elevations had the least amount of subnivean space, while those at the lowest elevation had the greatest amount.

Table A-3: Pooled Percent of Subnivean Space for All Survey Locations for Each Type of Use

Use	Number of Pits	Total Perimeter (cm)	Total Subnivean Space (cm)	Percent Subnivean Space
Concentrated Cross-country ski	7	2,362	259	10.9%
Dispersed Cross-Country Ski	15	5,885	619	10.5%
Concentrated Snowmobile	7	2,428	140	6.0%
Dispersed Snowmobile	17	6,984	745	10.6%
None	18	7,373	2,439	31.4%
Total	64	25,037	3,991	15.2%

Because pits were generally constructed in areas representing a range of recreational uses at each site, other factors than recreational use influence the presence of subnivean space. For example, the amount of subnivean space in Page Meadows pits was substantially lower across all recreational use categories than at any other site. Compared to other sites, Page Meadows had deep snow and less dense vegetation. Thus, while this analysis suggests that recreational uses had a negative effect on the presence of subnivean space, examination of the entire data set showed that other factors are also influential. The type of vegetation and snow depth appear to play a major role in either the development or maintenance of subnivean space.

Influence of Vegetation

The average percent of subnivean space in the pit perimeter was calculated for all pits pooled by vegetation community type, as well as the average height of subnivean space. Pits dug in riparian shrub communities had the highest percent of the pit perimeter occupied by subnivean space, and the highest average height of subnivean space. Silver sage and wet meadow communities had similar subnivean characteristics, and while both were lower in subnivean space occurrence and height than the riparian shrub community both were also substantially higher than the dry meadow vegetation community.

Vegetation structure appears to be an important factor in creating subnivean space. Subnivean space was high in the vegetation communities with woody shrubs, likely due to the influence of stems that are less compressible than in herbaceous vegetation communities. However, subnivean mammal use was not noted in pits dug in the riparian shrub or silver sage community types. Absence of mammal sign may have been an artifact of pit construction, as the pits with woody shrubs were extremely difficult to construct and sign may have been obliterated during construction. Because no mammal use was noted in the shrub communities, and because the sample size in these communities was small and was not proportionately distributed among recreational use categories, the shrub communities were excluded from the following analysis of recreational effects.

Wet meadows, with their additional herbaceous density and height, may provide more subnivean space compared to dry meadows. For example, the vegetation in the snow pits at Trout Creek consisted of a dense mat of sedges, grasses, and forbs that formed the subnivean space between the basal layer of snow and the ground. The mats were loosely packed between the snow and the ground, which presumably allowed for easy movement by subnivean mammals and multiple signs of activity were common at this site. Trout Creek and Perazzo Meadows contained the greatest proportion of wet meadow and had the first and second largest amounts of subnivean space, respectively.

Dry meadows typically consisted of patches of low herbaceous vegetation (<10 cm height) interspersed among larger areas of bare ground. Bare ground was sometimes characterized by sparse, flattened remains

of decomposed vegetation. Decomposition appeared to have already occurred as a cover of grasses was observed at snow pit locations (e.g., Page Meadows, Mount Rose Meadow) prior to the snow study.

Influence of Snow Depth

The average percent of subnivean space in the pit perimeter was calculated for all pits pooled by snow depth class, as well as the average height of subnivean space. Pits dug in shallower snow had substantially more subnivean space than pits dug in deeper snow, and the height of the space was greater in the shallower pits. This suggests that the depth of snow, which is affected by elevation, strongly influences the development and maintenance of subnivean space. However, there was also a correlation between snow depth and vegetation communities, as most of the pits constructed in low snow depths were also constructed in wet meadows.

Influence of Recreational Use

Except for concentrated cross country skiing, all classes of recreational use, including no use, were fairly well distributed among dry meadow. Pits dug in wet meadow vegetation communities were also well distributed among recreational uses, but there were more pits dug in areas categorized as no use. Also, more pits dug in shallow snow were in the no use recreational category than in other recreational use categories. Given that low snow depth and wet meadow vegetation are correlated with high subnivean space, some of the difference in the amount of subnivean space development between recreational use categories in the following analyses is likely due to these factors.

Excluding pits dug in the shrub vegetation community types, average percent perimeter occupied by subnivean space was calculated for all sites by recreational use, along with the average height of subnivean space. The percent of subnivean space in the pit perimeter was highest in the no use category, followed by concentrated cross country skiing. Both had more subnivean space than the other three uses. Standard deviations of all averages by category overlap due to high variability between pits within categories. None of the differences between use categories would be statistically significant.

Somewhat similar trends were seen in average height of the subnivean space. Concentrated cross country skiing had the highest average height, closely followed by no use. Both over-snow categories were only slightly lower, while cross country skiing was substantially lower.

These data suggest that recreational use has a negative effect on the development and maintenance of subnivean space. It is important to note, however, that high variability between pits and the presence of other factors significant conclusions within this study.

Snow Density – A scatter-plot of all density samples in all pits was constructed. Samples taken in pits constructed in no use areas tend to cluster toward lower density, suggesting that recreational use tends to increase snow compaction. Profiles of snow density by depth were also plotted for each pit. To eliminate the effects of snow depth or season, single plots contain profiles only for one meadow on one day. These plots generally show consistent increases in density with depth among all uses. On plots comparing oversnow vehicle density to no use, over-snow vehicle profiles tend to show higher density (e.g., Perazzo Meadows 17 and 25-Jan-04, Molly Meadow 8-Mar-04). There was no detectable difference between no use profiles and profiles for either cross country skiing category.

Snow Temperature – Most of the pits constructed were relatively isothermal. While temperatures in the pit walls varied between -7 and 5 degrees C over the course of the study, more than 90% of the temperature measurements were between -3 and 2 degrees C regardless of depth. There is no detectable relationship in the scatter-plot between recreational use and temperature.

Profiles of temperature by depth were also plotted for each pit. To eliminate the effects of snow depth or season, single plots contain profiles only for one meadow on one day. These plots generally reinforce the

conclusions that the pits tended to be isothermal, but there is no consistent relationship between recreational use and temperature.

Ram Hardness Profiles

Ram hardness depth profiles were compared to directly measured density at two pit locations. Ram profiles generally agreed with directly measured profiles, and contain more detail. However, there was no evidence that the ram penetrometers can accurately detect the presence of subnivean space.

STUDY SUMMARY DISCUSSION

Implications for Subnivean Animals

This study's results suggest that snowmobiles and cross country skiing may affect the amount of subnivean space, but both snow depth and vegetation are also strong influences. While recreational use did appear to affect snowpack density, it could not cause the same adverse effects reported in other study locations such as destruction of depth hoar, since this snow type did not occur in the study areas. The effects of winter recreation on subnivean space have been best documented in continental climates; it appears that different effects are likely to occur in the maritime climate of the Sierra Nevada where the conditions that lead to the formation of depth hoar do not exist. (This phenomenon was already known to snow scientists (Sturm et al. 1995)). Instead, the distribution of subnivean space correlates with snow depth, vegetation type, and woody debris.

In environments with fluctuating temperatures, the moisture gradient may move down from the snow surface as well as moving up from the bottom (Dr. Pruitt, William, personal communication). In such cases, the snowpack rests directly on the ground as it does in the study area's portion of the Sierra Nevada Mountain Range. Pruitt observed (1984) that only one species of vole was found on the Strait of Belle Isle in Newfoundland. He postulated that the lack of depth hoar in the maritime climate was an important factor governing the depauperate small mammal fauna. However, in the Sierra Nevada study sites, at least four species of subnivean mammals are known to occur in the study's meadows (Manley and Schlesinger 2001; Unpublished data Trout Creek Restoration Monitoring).

The lack of depth hoar in the subnivean space presents an interesting dilemma for understanding the winter ecology of subnivean animals in Sierra Nevada meadows. The question arises, how do the subnivean animals that occupy the meadows in the summer adapt to a maritime snow pack that rests primarily on the ground with very little subnivean space?

In the Ural Mountains of Russia, subnivean mammals were found to migrate before winter from meadows to talus slopes (Bolshakov 1984). The Ural Mountains have a dense maritime snowpack, which probably produces little thermally created subnivean space in meadow areas. Talus slopes, however, provide subnivean space due to support of the snowpack by larger rocks and boulders.

Perhaps subnivean animals that occupy dry meadows in the Sierra Nevada move to and concentrate in mechanically formed subnivean space located in dense herbaceous vegetation, woody shrubs, or around large down logs. If so, then winter recreationists would be unlikely to affect the early season formation of subnivean space over woody shrubs or large woody debris. Until there is a deep snow cover, recreationists tend to avoid woody shrubs as they are difficult to move through and logs can be difficult to cross because of breaking into the subniveal space. Later in the season as snow depth increases, recreational use of these sites probably has a minimal effect due to the snow depth (as seen in pits 14-18).

Not all subnivean animals are restricted to the subnivean environment. In the tundra of Alaska, temporarily enlarged winter claws enable *Dicrostonyx* lemmings to dig tunnels up through harder layers of snow (Pruitt 1984). However, no burrows constructed by voles or shrews were observed in the basal or upper layers of snow within the pits. Burrows dug by voles descended into the soil.

Niveal (in the snow) burrows constructed by gophers (*Thomomys spp*) were observed at Perazzo Meadows, Page Meadows, and Mount Rose Meadows. The tunnels were observed at a variety of heights above the ground (5-12 cm) in the wall of the study pits. Gophers have long claws, which facilitate their digging in hard snow. When excavated, many of the tunnels were extensive.

The material inside the tunnels consisted of a loose or solid mix of dirt, dead vegetation, and occasionally gopher scat. A careful search of the material from multiple tunnels did not reveal any vole scat. Shrew scat would most likely be too indistinct to detect in such material. Subniveal space was observed beneath the dirt core of some niveal burrows, especially as they descended down toward the soil surface. It is unknown whether voles or shrews used this space or used the gophers' fossorial burrows that connected to the niveal tunnels.

Recreation use did not appear to affect niveal burrows as they were noted in areas with concentrated snowmobile use in Mount Rose. Subsequent to this study, on April 27, 2004, a niveal gopher burrow was observed at Perazzo Meadow traversing under a groomed snowmobile trail located on a hard surface road.

The actions of the subniveal animals themselves appear to create subnivean space. Vole runways depressed into the ground sometimes contributed several centimeters to the measured height of the subnivean space. It was unclear whether repeated use contributed to the runways' depression or whether they were excavated into the ground.

The configuration of the measured subnivean space was disjunct and highly variable. Whether subnivean animals use the available spaces and how they move from one area of open space to another is unknown. Grass vole nests observed on the surface of Mount Rose meadow following snowmelt suggests that voles do occupy the space between the basal snow layer and ground. Although a network of depressed runways could facilitate travel under the snow, it seems unlikely that voles could forage effectively where the snowpack rests directly on the soil surface. These findings suggest the importance of food hoarding for winter survival of active subnivean mammals such as shrews and voles (Vander Wall 1990).

Recommendations for Future Studies

This study was specifically designed to examine the effects of established winter recreation use as it actually occurs over time. However, relying on "natural" use patterns created several problems, including the lack of control pits at Mount Rose meadow. Because it was unknown exactly where the recreational use would occur for each site, pit locations could not be delineated prior to snowfall. Therefore, vegetation community type could not be predicted and could only be determined once a pit was dug. Even in study areas well known to the primary investigator, problems were still encountered. For example, several late season (March) pits dug at Page Meadows were placed over pools of water even though efforts were made to avoid them

Digging pits was labor and time intensive. The number of pits that could be dug each day depended on snow depth and on weather. Fewer pits were dug in deep snow and in harsh weather conditions. Ideally, the ram penetrometer could be used to characterize the snowpack density, thus precluding the need to dig snow pits. However, the ram was ineffective at detecting subnivean space in the maritime snow conditions. The ram could not be used to detect mechanically formed space at the base of the snowpack in riparian shrub habitat as its downward progress was blocked by a network of unseen limbs.

If additional work is conducted, consideration should be given to excavating linear trenches, which might allow sampling in the same pit for both use and non-use. Conducting the snow pit survey from January through April might have confounded the investigation by increasing the number of variables. Future research should consider increasing the number of pits dug to produce statistical significance and limiting seasonal variability by concentrating pit digging in one month.

It was not possible to perform a multifactorial analysis in this study because the importance of snow depth and vegetation type on the formation of subnivean space was not understood. Therefore, any future study must identify vegetation type prior to snowfall. The best method to locate pits in known vegetation types would require a detailed vegetation map with significant areas of each vegetation type so that pits could be accurately sited. However, staking sites before snow cover is impractical because of the labor required to maintain the stakes as snow depth increases and because people could move the stakes.

Percent of the pit perimeter occupied by subnivean space appears to be a useful metric in evaluating the effects of recreational use. However, data from this study show that the variable is highly skewed and non-parametric tests may be required. It should be possible to design a multifactorial study that would evaluate the statistical significance of snow depth, vegetation type, and recreational use. A controlled study with recreational use simulated in known environments is likely to provide the best results. Natural recreation use patterns do not allow for sufficient comparison of recreation type, vegetation type, and snow depths. However, the time and expense required would be greater than this study, and excluding regular recreationists from a site to maintain a control location could be problematical.

Potential future research should investigate the winter use of dry meadow habitat by subnivean animals. If subnivean animals migrate out of these sites, then winter recreation use is likely to have a reduced or no effect on these animals.

Recommendations for Management

Vegetation community types should be considered in managing winter recreation use in the Sierra Nevada. This study strongly suggests that wet meadows at low elevations with low snow depth probably have the most subnivean space. This study's findings were not as conclusive regarding the effects of recreational use on subnivean space. But there is some suggestion that winter recreation may impact subnivean space at low elevations. Winter recreation probably has the greatest effect at low snow depths. Further research is needed to produce data that can be tested for statistical significance, with controlled variables, and even distribution of snow pits among the recreational use categories, snow depth, and vegetation types.

2. **Effects of Winter Recreation on Subnivean Fauna.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 97-99.

Potential Effects: Most research relating to the impacts of winter recreation on subnivean fauna has concerned the effects of snow compaction due to snowmobiles on the animals. One of the potential impacts of snow compaction is alteration of the snow microclimate, especially the physical and thermal aspects (Corbet 1970). Some possible changes in snow conditions resulting from snow compaction include a decrease in subnivean air space, a change in temperature, and accumulation of toxix air under the snow (Jarvinen and Schmid 1971, Schmid 1971a and b).

According to Halfpenny and Ozanne (1989), skiers may do more damage to the snowpack than snowmobilers because narrow skis cut deeper into the snowpack and because skis have a greater footload (amount of weight per surface area) in comparison to a snowmobile track. For both ski tracks and snowmobile tracks, multiple passes over the same track will have more impact than a single pass.

Management Guidelines: The lack of information about impacts to subnivean mammals from winter use makes it difficult to draw conclusions...the only management guideline is to encourage more research on the subject.

3. **Ecological impacts of off-road recreation vehicles: Outdoor recreation research applying the results:** Brander, R. B. (1974)

Abstract: This paper focuses on the environmental impacts of snowmobiles. It is not a scientific study; instead the author infers some effects from existing literature on the structure and mechanics of snow and the significance of snow to small mammals and their predators. The insulation that snow provides is very important to small mammals which spend most of the winter at the ground and snow interface. Mechanical compaction reduces snow depth and increases thermal conductivity and snow densities by destroying air spaces. This can result in loss of habitat and in some cases mortality in some small mammal populations. The decrease in small populations of small mammals can in turn negatively affect their predators, and on up the food chain. **More scientific information is needed.** Because snowmobiles accelerate the rate of environmental degradation compared to hikers, existing information should be used in making management decisions. One suggestion is to restrict traffic to a few trails and roads rather than allowing free access to fields, etc.

4. **Snowmobile activity, subnivean microclimate and winter mortality of small animals.** Schmid, W. D. (1972) Bulletin of Ecological Society of America, 53(2), 37.

Abstract: Mechanical compaction of snowfields by snowmobiles alters the mild subnivean microclimate and promotes densification of snow. The stress of winter temperatures may increase for organisms that live within or beneath these compacted snowfields and the densified snow may be a greater barrier to animal movement in the subnivean space. **Experimental manipulation of a snowfield has shown that the winter mortalities of small mammals are markedly increased under snowmobile compaction.** We recovered none of the twenty-one marked animals from the experimental plot, whereas eight of eighteen marked specimens were captured at least once on an adjacent control plot.

5. **Snowmobile use and winter mortality of small mammals.** Jarvian, J. A., & Schmidt, W.D. (1971) Paper presented at the M. Chubb, ed. Proceedings of the 1971 Snowmobile and Off the Road Vehicle Research Symposium, East Lansing, MI. Michigan State University.

Abstract: Trapping results in Minnesota showed increased winter mortality of small mammals beneath snowmobile compacted snowfields. It is suggested that compaction inhibits mammal movements beneath snow and subjects subnivean organisms to greater temperature stress. **Report states that more information is necessary.**

Mammals / Wolverine

1. **Distribution and Ecology of Wolverines in the North Cascades: Pilot Project – Year 2 Year-End Status Report.** Aubry, K., Raley, C., & Roher, J., (2007) U.S. Forest Service, Methow Valley Ranger District, Okanogan-Wenatchee National Forests.
www.wolverinefoundation.org/research/research.htm

Abstract: During the winter of 2006/07, we operated 4 log cabin-style livetraps for wolverines in the northwestern portion of the Methow Valley Ranger District in the Cascade Range of north-central Washington. We opened traps for varying time periods from January 9 to March 30, for a total of 180 trap-nights. We captured 3 different wolverines on 5 occasions, 2 of them twice and 1 once. We trapped one a third time, but he escaped. We fitted all 3 wolverines with radio-collars containing both satellite (Argos) and VHF transmitters. A young female (Xena) used an area about 760 mi², based on 120 high-quality satellite locations (Argos location classes 1–3). A young male (Chewbacca) used an area of about 730 mi², based on 80 high-quality locations. Xena and Chewbacca's activity areas overlapped by about 90%. We recaptured Melanie this year, a young female we originally captured in February 2006. As of last year, she had not bred, but she was pregnant this year. Based on 130 high-quality locations, she used an area of approximately 560 mi². Due to logistical constraints and problems encountered during aerial

telemetry, we were unable to locate her natal den, or even verify that she had successfully reproduced. A preliminary analysis of elevational use by our 3 study animals indicated that elevations <4,400 ft were used less than expected, elevations 5,901–7,000 ft more than expected, and other elevation zones (4,401–5,900 ft and >7,400) at levels comparable to availability, suggesting a preference for relatively high-elevation habitats near treeline. In April 2007, we obtained a remote-camera photograph of Thor, a young male we originally captured in April 2006, near the Hart's Pass trap. We suspect these 4 animals represent 2 mated pairs, because there was almost complete overlap of Chewbacca and Xena's activity areas and, although location data on Thor were limited, Melanie's activity area this winter completely encompassed Thor's activity area from last winter. Future research will involve the continuation of trapping and telemetry efforts, including the construction of 2 additional live-traps along the southern boundary of the Pasayten Wilderness, and field trials using GPS radio-collars in an effort to improve our ability to locate the natal and maternal dens of reproductive females.

Introduction

The wolverine (*Gulo gulo*) is one of the rarest mammals in North America, and the least known of large carnivores (Banci 1994). It is considered a sensitive species in the Pacific Northwest Region by the U.S. Forest Service, and a candidate species for listing as threatened or endangered by the state of Washington. The northern Cascade Range in Washington represents the southernmost extent of the current range of wolverines along the Pacific coast of North America (Aubry et al. 2007). Wolverines have never been studied in the field in this region, due partly to their low densities and extremely limited access during all periods of the year into the unroaded wilderness areas where they occur. Recent research on wolverines in the Rocky Mountains of British Columbia (Krebs et al. 2007) and the United States (Copeland 1996, Copeland et al. 2007, Squires et al. 2007) indicates that wolverines are wide-ranging, inhabit remote areas near timberline, and are sensitive to human disturbance at natal and maternal den sites. Winter recreation activities are widespread in the North Cascades and often occur in suitable wolverine denning habitat. Such activities may adversely affect wolverine populations or their preferred habitats.

Results: We captured 2 new wolverines, recaptured the juvenile female from last year, and documented the first known reproductive event for wolverines in Washington state. We captured wolverines 6 times in 180 trapnights for a capture rate of 1 wolverine per 30 trapnights, which is higher than the capture rate reported by Copeland (1996) in Idaho (1 wolverine per 47 trapnights). We were unable to re-capture the sub-adult male from last year, but that was probably due to our inability to maintain the Hart's Pass trap throughout the winter. All 3 of our new-design radio-collars remained on our wolverines throughout the winter, and generated 80-130 high-quality locations for each study animal during a 5-6 month period.

With these data, we were able to delineate activity areas for 3 wolverines, which indicate that Chewbacca and Xena, and probably Thor and Melanie, represent reproductive pairs (Figure 5). Although we do not know the fate of Melanie's offspring, we have documented that reproduction is occurring among Washington wolverines. Furthermore, during the past 2 winters, the activity areas for all 4 of our study animals were located primarily in Washington, demonstrating there is a resident population of wolverines in the state. Clearly, recent verifiable wolverine occurrence records in Washington did not simply represent Canadian wolverines that occasionally wander into Washington; rather, our results provide support for the current range of wolverines described by Aubry et al. (2007). However, the extent and location of the activity areas we delineated suggest that a relatively small number of wolverines may be capable of establishing home ranges within the state. The conservation of wolverines in Washington will depend on reliable knowledge of their distribution, population status, and habitat relations. This knowledge can only be gained by long-term field research; thus, it is essential to continue this research and find ways to expand the scope of our activities beyond the boundaries of our current study area.

2. **Greater Yellowstone Wolverine Program Update: December 2006—March 2007.** Inman, B., & McCue, T. (2007) Wildlife Conservation Society.
www.wolverinefoundation.org/research/research.htm

Summary:

This winter we focused on the Montana region of our study area. Our goal was to replace aging transmitters and instrument all females with GPS collars. The winter trapping effort began December 28 and ended March 15. One field crew operated 11 traps in the Madison, Gravelly, Henrys Lake, and Centennial Ranges for a total of 371 trap-nights. We recaptured 5 female wolverines a total of 9 times. Implants were replaced and each was fitted with a GPS collar. We did not capture any new individuals.

Report includes a photo that shows an important aspect of the wolverine/winter recreation interaction that we would like to learn more about. F121's natal densite is marked with the arrow on the right. **The snowmobiling shown in the picture occurred while the den was active (relatively close to the densite). She has remained at this densite to date.**

We have started our spring effort to collect reproduction data. Only one of our seven radioed adult females has given an indication of denning this spring. We will continue to monitor all of the females throughout the spring and early summer to verify their reproductive status. On 2/28/07 we verified the location of F121's den in the Gravelly Range. We will attempt to capture the kits in May.

We are also searching the north end of the Teton Range for a densite from the female we believe is occupying this area. Other areas scheduled to be searched for possible densites are the Snowcrest, Gallatin, and Snake River Ranges.

We documented one mortality during this update period. F405, a known age female captured as a kit in the Teton Range, was killed in an avalanche in Grand Teton National Park in mid-December.

The kit we captured last spring, F133, is currently dispersing. F133 spent the majority of last summer in the north end of the Gallatin Range. Beginning in the fall, she started spending more time in the southern portion of the Gallatin. In late February she began showing signs that she might disperse with a move to the southern tip of the Gallatin Range. Her first move outside the Gallatin was to the Madison Range across US Highway 191 in Yellowstone National Park (YNP). We were able to document the location where she crossed back into the Gallatin Range a few days later. After a short stay in the southern Gallatin, her next location was in the Thorofare Creek area southeast of YNP. We will attempt to monitor her throughout her dispersal.

3. **Absaroka-Beartooth Wolverine Project: Spring 2006 Newsletter.** Copeland, J., Murphy, K., & Wilmot, J. (2006) The Wolverine Foundation.
www.wolverinefoundation.org/research/research.htm

Project Overview: The Absaroka-Beartooth Wolverine Project began this past January in the eastern portion of Yellowstone National Park and on the Shoshone and Gallatin National Forests. The project, which is a cooperative effort developed by Yellowstone National Park and the Forest Service's Rocky Mountain Research Station, is designed to increase our understanding of one of the rarest carnivores in North America. Prompted by elevated public concerns regarding the presence, abundance, and status of wolverine across the northern Rocky Mountains, researchers hope to aid management by clarifying the wolverine's dependence on habitats in Yellowstone National Park and surrounding National Forest lands. **The project will study wolverine distribution and movements, habitat and food associations, and population indices such as survival rates, birth rates, and dispersal movements. Also, we seek to clarify the wolverine's relationship with other carnivores in the Yellowstone ecosystem.**

Wolverine will continue to be live-trapped using log box traps and instrumented with implant transmitters, and in some cases, GPS collars capable of collecting high precision, fine-scale information on wolverine movement and habitat use. The project is designed to operate in and around Yellowstone National Park through a 4-year study period with primary funding support provided by the Yellowstone Park Foundation and the Forest Service.

Twenty-seven log box-traps border the rugged Absaroka-Beartooth and Gallatin Mountain ranges in northern Wyoming and southern Montana. The traps are designed to lure the rare and elusive wolverine to the promise of a fresh meal of beaver and venison. The wolverine inhabits the most rugged, inaccessible country in the western United States. Its lifestyle demands that it remain in almost constant movement in search of a food source that is rarely predictable and often little more than hide and bones—a situation researchers hope to exploit with their well-stocked bait sites. Wolverine occur at naturally low densities (generally about 1 wolverine/150 km²) and exhibit a tenacious adherence to daily foraging routines. This makes wolverine trapping a tenuous undertaking. “Wolverine captures will be rare and unpredictable with success requiring diligence and constant attention to detail,” says Jeff Copeland, Rocky Mountain Research Station biologist and co-principal investigator on the project.

In early 2006, four trap lines operated for a total of 1,827 trap nights that produced 71 red fox, 41 American marten, and 2 wolverine captures. Both wolverines were adult males; M1 was captured on the Gallatin Forest just north of the park, and M2 was captured near Sylvan Pass on the eastern interior of the park. Both individuals were implanted with a VHF transmitter and fitted with a GPS collar. Unfortunately, both individuals have since shed their collars due to apparent collar malfunctions. However, data collected and stored on the collars has been retrieved, providing insight into the daily movements of both individuals. VHF implant transmitters will provide continued contact with the animals through aerial and ground-based telemetry, which will continue throughout the year.

Male M1 was instrumented with a GPS collar on March 22. His collar began collecting data early on the morning of March 23. Over the next 26 days his collar collected 194 locations as he traveled 453 kilometers across the Gallatin National Forest. The collar was programmed to attempt a GPS fix every 2 hours, which would have tallied 308 locations for this period. The 194 locations collected represent a fix success rate of 63%. While he was on the move, M1 traveled at a rate of 1.4 km/hour. During one articular 2-hour foray on March 31, he moved 9.1 kilometers.

4. **Wolverine Population Assessment in Glacier National Park: Spring 2006 Progress Report.** Copeland, J.P. & Yates, R.E. (2006) USDA Forest Service, Rocky Mountain Research Station, Missoula, MT. www.wolverinefoundation.org/research/research.htm

Executive Summary: The Glacier National Park Wolverine Project has just completed its third full year of study. During that time, 19 wolverines have been captured and instrumented providing over 3,000 telemetry-location points. Reproductive den sites, documented for two adult females, occurred on upper slopes in sparse timber beneath downed, woody debris. Females used 2-3 dens prior to weaning of kits. **These dens represent nearly 50% of all wolverine dens ever found in the continental U.S.** Four kits were captured and instrumented at den sites and monitored through their first summer to document 17 rendezvous sites; these occurred primarily in boulder talus and cliff areas. Kits separated from their mother at 6-7 months-of-age in late September. Kit survival to adulthood has been low as evidenced by 3 of 4 kits dying during their first year. GPS collars were tested at 4-hr, 2-hr, 30-min, and 5-min fix acquisition intervals providing insight into capabilities of documenting patterns and rates of movement, habitat use, and social interactions. GPS data from 2 males indicated movement rates averaging 2 km/hr in a pattern of long-distance movements (commonly exceeding 10 km) interspersed with localization periods of up to 20 hrs. Wolverines traverse the landscape apparently indifferent to topographic features. Glacier National Park wolverine home ranges averaged 496 km² for males and 141 km² for females. DNA analysis for 20 individuals suggests less genetic structure than expected with relatedness contained by 2 distinct genotypic groups within our study population.

The 3-year study period provided by the Natural Resources Protection Program grant ended in 2004. Glacier National Park and Rocky Mountain Research Station staff met in 2005 and agreed to continuation of the project for 3 additional years pending funding. Additional funding provided by agencies, private grants, and private donations will allow continuation into FY 2007.

Mortalities — Both 2004 kits died during their first year. One was legally taken by a trapper outside the park boundary, and the second of unknown cause at approximately 9 or 10 months of age. One of the 2005 kits was killed by an unknown predator at 8 months of age. A 3-year-old female (F5) died in an avalanche in 2005. We are currently conducting a formal survivorship analysis of our study population.

In our 2004 progress report, we described the disappearance of subadult male M8. Believed to be a yearling at capture in February 2004, M8 left GNP about a week after capture. He moved into the Whitefish Range near Hungry Horse at which time we began closely monitoring his movements. He disappeared from the Whitefish Range in early April, in spite of efforts to maintain daily contact. In late July, researchers conducting a grizzly bear flight in the northern portion of the Kootenai National Forest detected M8's telemetry signal. The bear researchers continued to monitor M8 near American Creek and the Northwest Peaks Natural Area until he was legally taken by a trapper in December 2004. He had traveled over 200 kilometers as measured by straight-line distance.

5. **Historical Biogeography of the Wolverine in the United States.** McKelvey, K., Aubry, K., & Rivera, P.T. (2002) Proceedings from Defenders of Wildlife Conference on Carnivore Biology and Conservation. p. 64. www.wolverinefoundation.org/research/research.htm

Abstract: We compiled current and historical records of wolverine (*Gulo gulo*) occurrence in the contiguous United States from published literature, museums, state wildlife agencies, federal resource management agencies and natural heritage databases. Records obtained were of varying degrees of reliability; they included many museum specimens, photos and first-hand accounts of wolverines being trapped (verified records), but were dominated numerically by visual observations of wolverines or their tracks (unverified records). Resulting biogeographic analyses, including assessments of the current and historical distribution of wolverines in the United States, and correlations between elevation and land-cover types varied substantially in accordance with the reliability of occurrence records included in the analyses. Specifically, the geographic distribution of wolverines based only on verified records is much more disjunct and isolated within high-elevation, boreal habitats than is depicted in published range maps. The distribution of verified records also suggests that wolverines have been absent for many years from California, Colorado and the Great Lakes states. We compare inferences resulting from various data sets and discuss the challenges and conservation implications of determining the current and historical ranges of rare and secretive species that have not been surveyed with reliable methods.

6. **Aerial Surveys for Wolverine Presence and Potential Winter Recreation Impacts to Predicted Wolverine Denning Habitats in the Southwestern Yellowstone Ecosystem.** Heinemeyer, K. & Copeland, J. (2001) Department of Environmental Studies – University of California Santa Cruz, Idaho Department of Fish and Game, and Targhee National Forest. www.wolverinefoundation.org/research/research.htm

Introduction: Wolverines (*Gulo gulo*) are rare, medium-sized carnivores that historically inhabited forested regions across the northern tier of North America. Their distribution included much of Canada, southward into United States from Maine to Washington State. Southward, wolverine extended down the Cascade Mountains of Oregon and into the southern Sierras in California, and down the Rocky Mountains into Arizona and New Mexico (Grinnell et al. 1937, Banci 1994, Hash 1987). The wolverine has experienced dramatic reductions in their southern distributional extent. In the United States, their present distribution is restricted to the Rocky Mountains, and only Idaho, Montana and Wyoming are known to support populations. The wolverine is considered extirpated or at extremely low numbers in the Pacific States and the southern Rocky Mountains. Even in northern US Rockies, we know very little about the extent and status of wolverine populations.

We have little understanding of the historical and current impacts to wolverine populations. Some historical threats may continue to threaten wolverine populations, including habitat alteration and population isolation. Additionally, new threats place novel stresses on the remaining populations. One

relatively new potential impact is winter recreational use of natal denning habitats. Female wolverines appear to prefer high elevation, north-facing talus slopes for natal denning. Often located within cirque basins, the females occupy extensive snow tunnels that form a complex of dens (Magoun and Copeland 1998). These dens are occupied during the early spring (February – April) birthing and whelping periods. There is a growing body of evidence that females are prone to disturbance at den sites, particularly at the natal dens where birthing occurs. Idaho wolverine selected specific natal and kit rearing habitat and responded negatively to human disturbance near these sites (Copeland 1996). Female wolverine abandoned dens in Finland (Pulliainen 1968) and Norway (Myrberget 1968) when disturbed by human activity.

Both snowmobile use and backcountry ski use has seen rapid increases in popularity over the last several years. Advancements in the power and technology of snowmobiles have resulted in machines and riders that can readily access what was previously viewed as inaccessible areas due to the rugged terrain. Extreme snowmobilers, who use the steep slopes of the cirque basins as playgrounds, favor these remote areas. Unfortunately, it is during the wolverine denning season (February – April) that we may see the highest or most intense recreational use of denning habitats (i.e., cirque basins), by both snowmobilers and skiers. Spring snow pack provides the most favorable conditions to access the remote regions, and it is exactly during this time when these recreationists will most negatively affect reproductive activities of resident wolverines. As snowmobiling and backcountry skiing continues to grow in popularity, there is an increasing concern that reproductive habitats may become limiting to populations due to human disturbance. Protection of reproductive denning habitat may be critical for the persistence of wolverine. An association between wolverine presence and refugia (e.g., Wilderness Areas) may be linked to a lack of available reproductive denning habitat outside protected areas.

Discussion and Recommendations: While the actual percentage of denning habitats with snowmobile activity appears low, particularly in comparison with last year's results, this is due primarily to having a much larger amount of predicted habitats in the study area. The spatial extent of the recreational activity on the TNF appears similar between 1999 and 2000. The areas most impacted by recreational activities are the Targhee Creek, East Centennials and Palisades SUs, with the Teton Range receiving some heavy localized use. These areas warrant careful management consideration if maintenance of potentially critical wolverine reproductive habitat is desired. Below, we discuss each of these areas.

The Targhee Creek SU has the most intensive snowmobile use across the study area. Last year we located a potential wolverine den in the single small basin that was free of snowmobile activity. This year, we saw high levels of wolverine activity in this same general area, which was again without snowmobile activity. We also located wolverine tracks throughout the Targhee Creek SU, but never within areas of high snowmobile activity. Additionally, we did not find any foraging behaviors (e.g., digs, meandering paths) in areas with snowmobile activity. This may indicate that not only are wolverine sensitive to recreational use near denning sites, but also need secure areas for foraging activities. It is interesting to note that wolverine in this area were found digging for whitebark pine seeds, and we wonder if the limited amount of secure foraging habitat forced animals to seek inferior, alternative food sources in areas free of snowmobile use. We also followed a set of wolverine tracks from this area along the Miles Creek drainage down to open country at its mouth, where there are known elk wintering grounds. We lost the tracks in the low elevation, crusted snow, and do not know if it was seeking or feeding on carrion in this atypical wolverine habitat. Again, it appears that snowmobile activity may be forcing this individual to resort to possibly atypical or risky behaviors to meet winter food requirements.

The East Centennial SU also supports extensive snowmobile activity, but little of this recreational activity occurs in the predicted wolverine denning habitats. Most of the predicted denning habitat occurs along the north face of the range, and is primarily a series of steep avalanche chutes. We found no wolverine tracks along this north face, and the characteristics of these predicted habitats do not appear to form high quality wolverine denning habitat. We did find several wolverine tracks along the broad top of the Centennial Range, and along the south-facing portions of the mountains. This same region of the mountain range was

heavily impacted by snowmobiles. Yet, again, most tracks were found in areas with little snowmobile activity, although some tracks did move through areas with high intensity snowmobile activity. Similar to Targhee Creek, tracks in areas with snowmobile activity showed little deviation from a straight path, indicating that the animal was willing only to travel through these used areas. Most of the predicted denning areas not located on the north face were impacted by snowmobile use. If the avalanche chutes on the north-face are not truly denning habitat, then the small amount of denning habitat available in the East Centennial SU is impacted by high intensity snowmobile use.

We found a single set of wolverine tracks on Saddle Mountain in the East Centennial SU. This lone mountain may provide a linkage corridor between Targhee Creek and the East Centennials. Snow conditions did not allow us to follow the tracks to confirm that this animal was moving between the two mountain ranges. In an earlier survey, we did find a single set of tracks traveling through Hell Roaring Canyon, at the base of Sawtell Peak and in an area heavily impacted by snowmobiles. There is the possibility that this drainage forms part of a movement corridor connecting Targhee Creek and the Centennial Mountains via Saddle Mountain.

As was noted in 1999, the heli-ski operation in the Palisades SU impacts a substantial portion of the predicted denning habitats in the area. When combined with the extensive snowmobile use in this area, denning habitats are widely impacted across the Palisades region (approximately 27%), more heavily impacted than even the Targhee Creek SU. We have not found evidence of wolverine presence in the Palisades after 2 years of surveys. We would recommend that at least another year of survey, and preferably multiple surveys be conducted in this area. The region appears to contain high quality wolverine habitat, but these habitats appear to be incurring potentially large impacts due to the widespread winter recreational activities.

Winter recreational use, particularly snowmobile and heli-skiing, may be having potentially severe localized habitat impacts on wolverines. While the impact on populations due to removal of critical denning habitats is more obvious, these recreational uses may be placing additional impacts on wolverine populations by removing foraging habitats as well. Management of snowmobile and heli-skiing is warranted in areas with significant amounts of potential denning habitat, and should include access restrictions during the denning period (February – April).

We recommend future research efforts focus on the winter ecology of wolverines and the impacts of winter recreational activities on individuals and populations. The study area we have examined may provide excellent research opportunities, with the extensive and variable nature of the snowmobile and ski activity across the region. This area has additional advantages in providing naturally and anthropogenically fragmented landscapes and wolverine populations. This provides the unique and critical opportunity to collect data on large-scale animal movements and landscape connectivity. We have documented what we believe is an animal moving between Targhee Creek and the East Centennial via Slide Mountain. Additionally, we documented a single track moving through the north end of the Italian Peaks in 1999, and a single track in the Gravelly Mountains this year. We do not know if the tracks belong to resident animals or to animals using these habitats to move to larger blocks of habitats. Obtaining information on landscape connectivity will be critical for population maintenance of wide-ranging species such as wolverines. The knowledge gained by such research will have application across a diversity of landscapes, including those artificially fragmented by human development and land management practices.