

Ecosystem Management

General Goals

“Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term.” (The greatest good, for the greatest number, for the longest time?)

Subgoals

- Viable populations of native species
- Represent ecosystem types
- Manage over long enough period of time to maintain evolutionary potential
- Allow for human use and occupancy

Dominant Themes

- Hierarchical context: Cannot work on just one level (e.g., species, population, landscape)
- Ecological boundaries: Management must span administrative units
- Ecological integrity: Native species and ecological processes for biodiversity (including natural disturbance regimes)
- Data collection: Habitat and species inventories; baseline characterizations
- Monitoring: Using data to track changes in key indicators over time.
- Adaptive Management: Decisions must allow learning from mistakes
- Interagency cooperation: Ecological boundaries requires integrating goals and procedures
- Organizational change: Land management agencies need to change procedures and norms
- Humans embedded in nature: Humans have a fundamental influence on ecological processes
- Values: Human values and resolving value conflict is a central task

Policy Barriers to Ecosystem Management

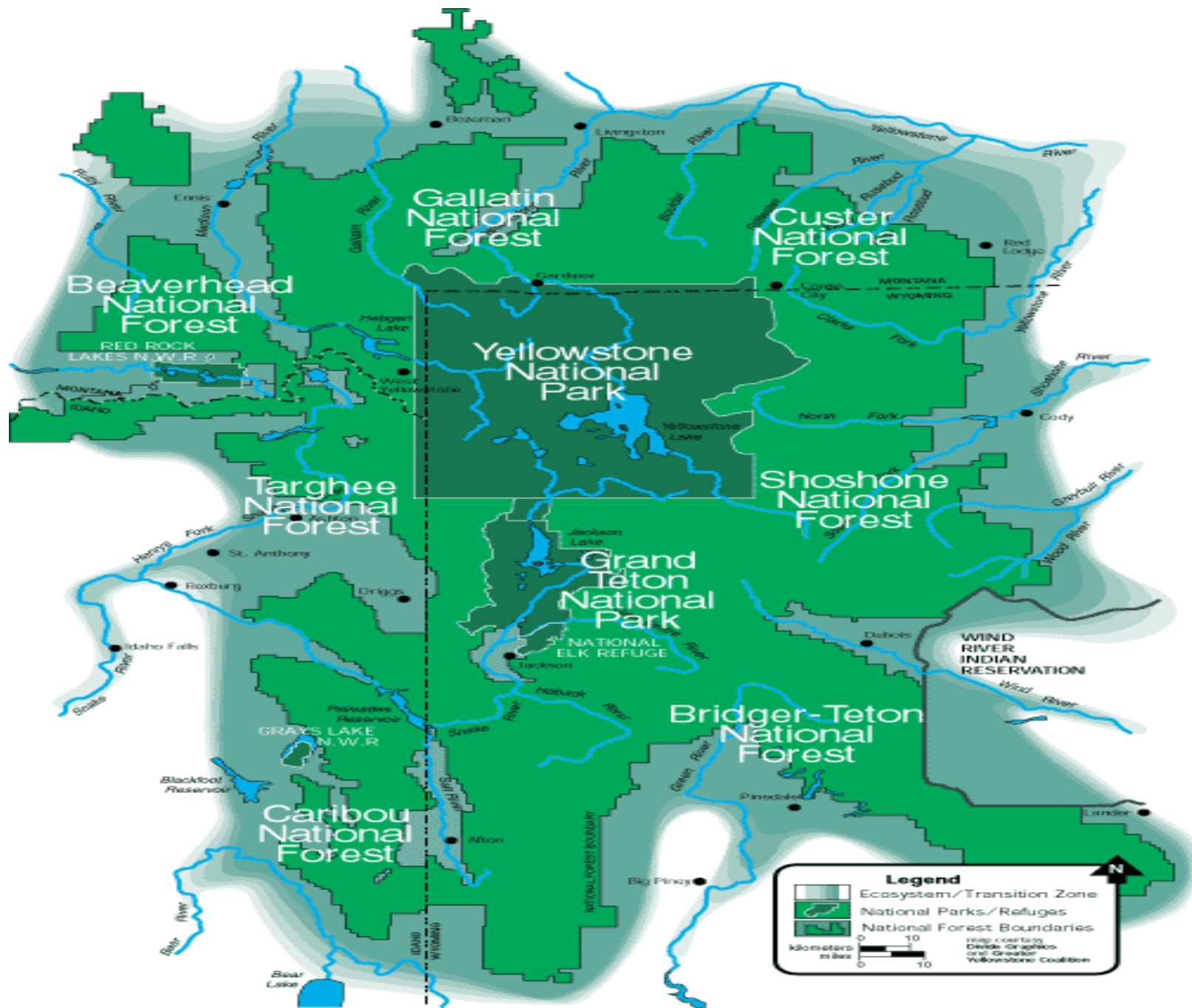
Barriers

- 28 Federal, state, and local authorities manage parts of Yellowstone
- Many private landowners; interest groups like Greater Yellowstone Coalition
- Lack of consensus about extent of problems
- Lack of consensus about appropriate policy goals/value ends
- Missing information on ecosystem processes (including not linking together data from different agencies)
- Lack of interagency coordination (e.g.; agencies excluded from coordinating committees)

Cooperation and Ecosystem Management

Factors that Could Support Cooperation

- Perception of common problems
- Trust between stakeholders
- Quality scientific research
- Perceptions of fairness
- Ability to resolve conflict locally
- Public entrepreneurs
- Support from Federal/State governments
- Belief in value of broad participation and ecological thinking



Legend

- Ecosystem/Transition Zone
- National Parks/Refuges
- National Forest Boundaries

0 10
 Kilometers miles

map courtesy
 Divide Graphics
 and the Greater
 Yellowstone Coalition

Greater Yellowstone Coordinating Committee I

Basics

- Federal advisory committee consisting of three regional foresters, regional director of NPS, six forest supervisors, Grand Teton and Yellowstone superintendents
- Formulates management recommendations, but does not formally control agency decision-making
- Implementation of management recommendations is voluntary and left to the discretion of individual land managers

History (in Brief)

- 1964: Formed as a Memorandum of Understanding between National Park Service and Forest Service.
- 1985: Congressional Research Service presents report critical of interagency coordination
- 1987: Greater Yellowstone Area Aggregation of National Parks and National Forest Management Plans was released.
- 1990: Vision for the Future
- 1999: Winter Visitor Use Management: A Multi-agency Assessment, completed.
- Many other assessments and collections of data also done through 2006

Greater Yellowstone Coordinating Committee II

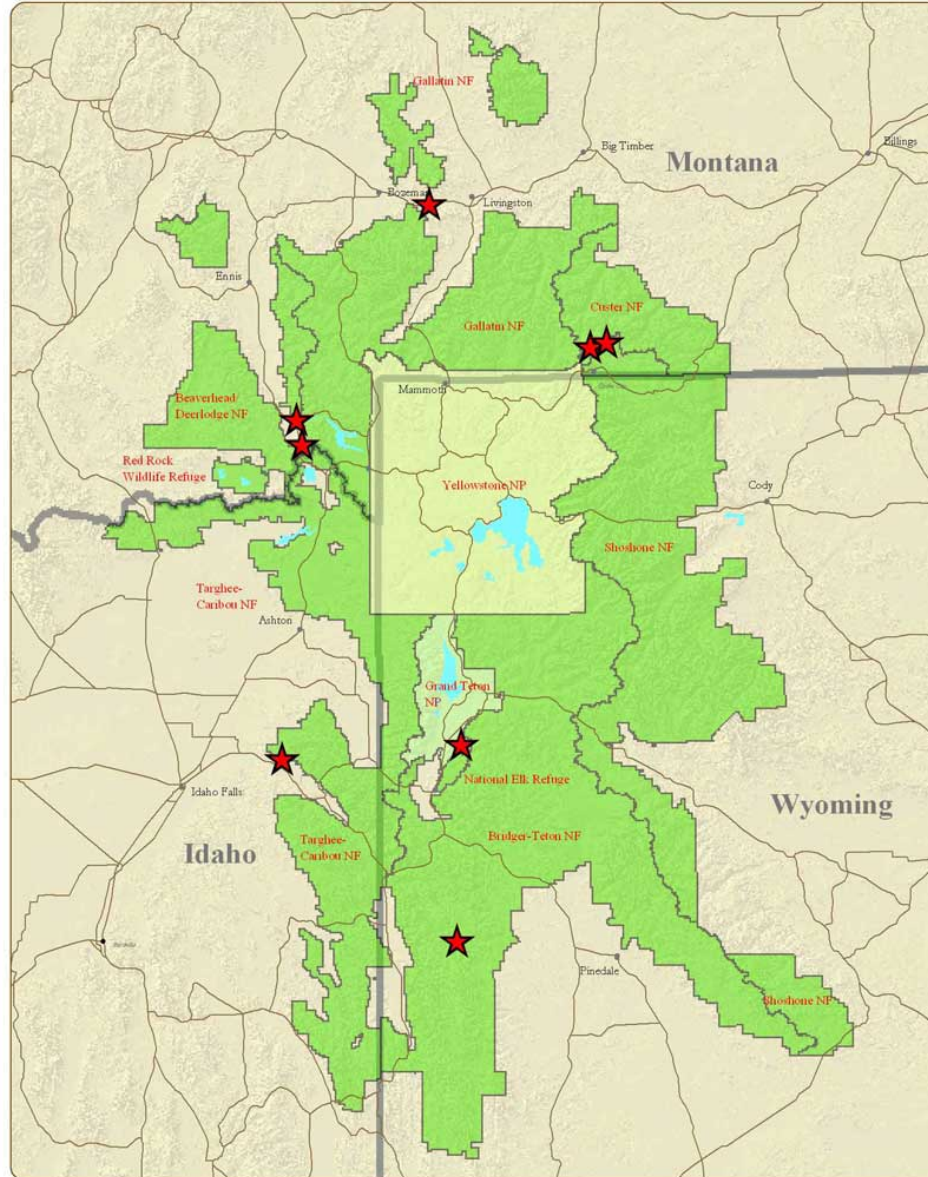
Goals of Vision for Future:

- Conserve sense of naturalness and maintain ecosystem integrity
- Encourage ecological and economic sustainability
- Improve coordination

Critics

- Criticized for lack of membership in terms of other federal agencies (FWS) and environmental groups; over-weighted towards USFS
- Process vs. substance: Criticized for lack of cooperation from multiple-use lands; all agencies oppose legislative mandate
- State governors were heavy critics; George Bush administration significantly rewrote and weakened Vision

Fiscal Year 2006: Greater Yellowstone Land Acquisition Nominations (LWCF)



Scale 1:2,300,000

0 10 20 40 Miles

This map was made from spatial data provided by the Greater Yellowstone Coordinating Committee and the Gallatin National Forest. Map by H. Shovic, Oct 25, 2004. Version 1.0 gygyccacqnsitionsFY2005vsl_85c11.mxd



Case Study: Winter Use Management Plan

- 1994: GYCC establishes planning team to make winter use recommendations in Greater Yellowstone
- Product: “Winter Visitor Use Management: A Multi-agency Assessment”
- Identifies winter use goals, existing conditions/use patterns, and potential management opportunities for each unit in Greater Yellowstone
- Only establishes an *information basis*; actual winter use rules are established in planning process of each unit
- Quote from Executive Summary: “Each unit will independently implement winter use management, although each will be more aware of how their actions may affect another unit.”
- Major question: To what extent does awareness of regional impacts translate into policy? What difference does the information make?
- Clinton admin: bans snowmobiles; Bush admin final rule allows; lots of court cases
- Interim Winter Use Plan allowed 720 snowmobiles per day to enter Yellowstone in 2006, w/commercial guides and best available technology (BAT) requirements for air pollution.
- November 20: Final Winter Use Plan released: 540 snowmobiles, with lawsuits pending

Analysis Results

Description:

This map portrays the analysis results for winter recreation use on federal lands of the Greater Yellowstone Area. The map is comprised of Potential Opportunity Areas, the types of use recommended for in a given area (for more detail about activities permitted in each, see the written Potential Opportunity Area descriptions). These areas represent where an activity is available and not where it will actually take place. This analysis is only one possible allocation of winter recreation management across the Greater Yellowstone Area.

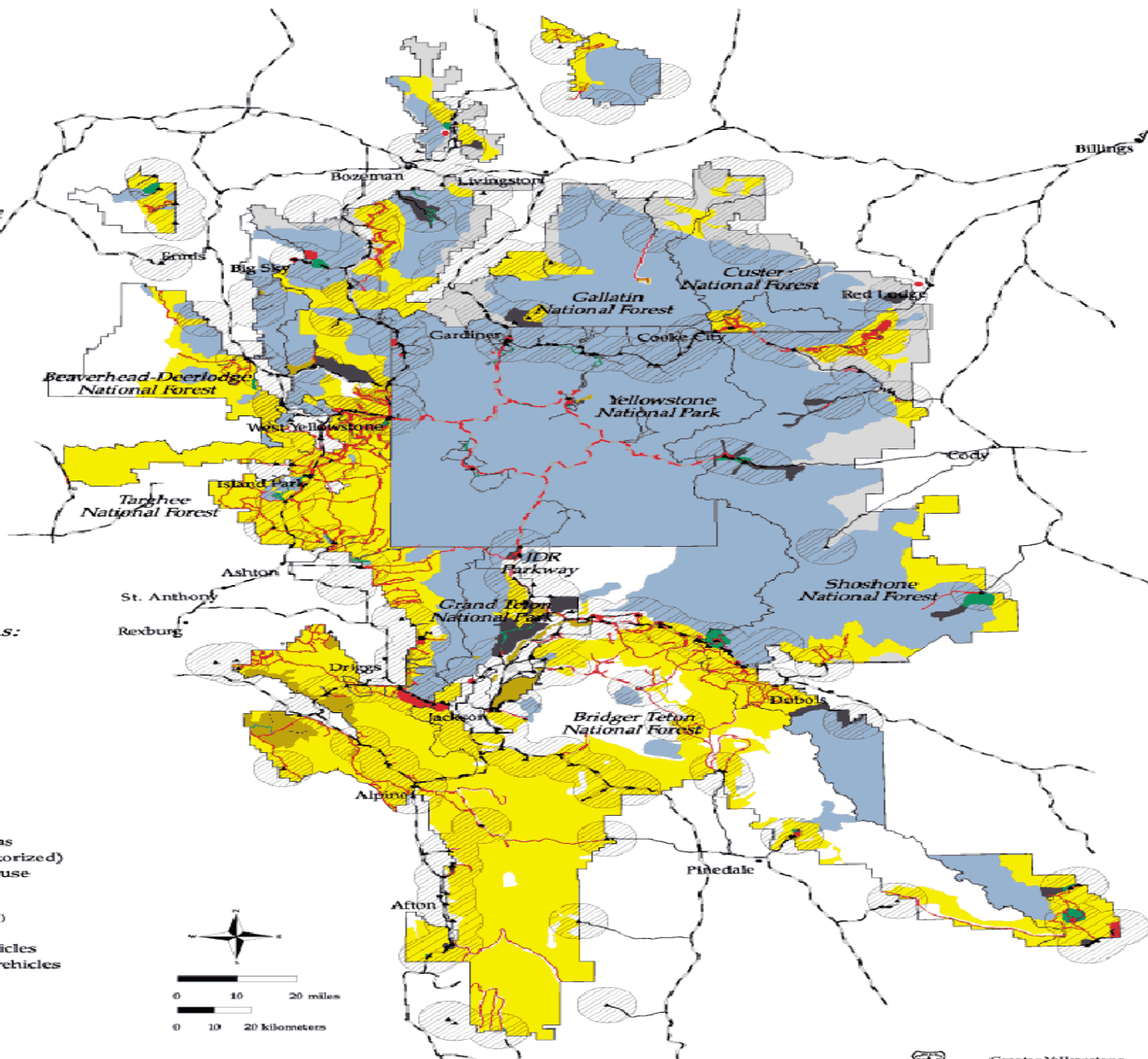
The following criteria (goals) were used to develop these analysis results:

- resolve user group conflicts
- provide as wide a range of opportunities as possible within an hour or so of population centers
- protect wildlife winter range
- resolve conflicts with threatened and endangered species
- resolve air quality, sound, odor degradations
- maintain wilderness integrity
- remain true to agency missions
- provide a full range of experiences within the Greater Yellowstone Area
- avoid/minimize impacts to resources and/or areas of particular concern (thermal areas, tree plantations, etc.)

Legend:

Potential Opportunity Areas:

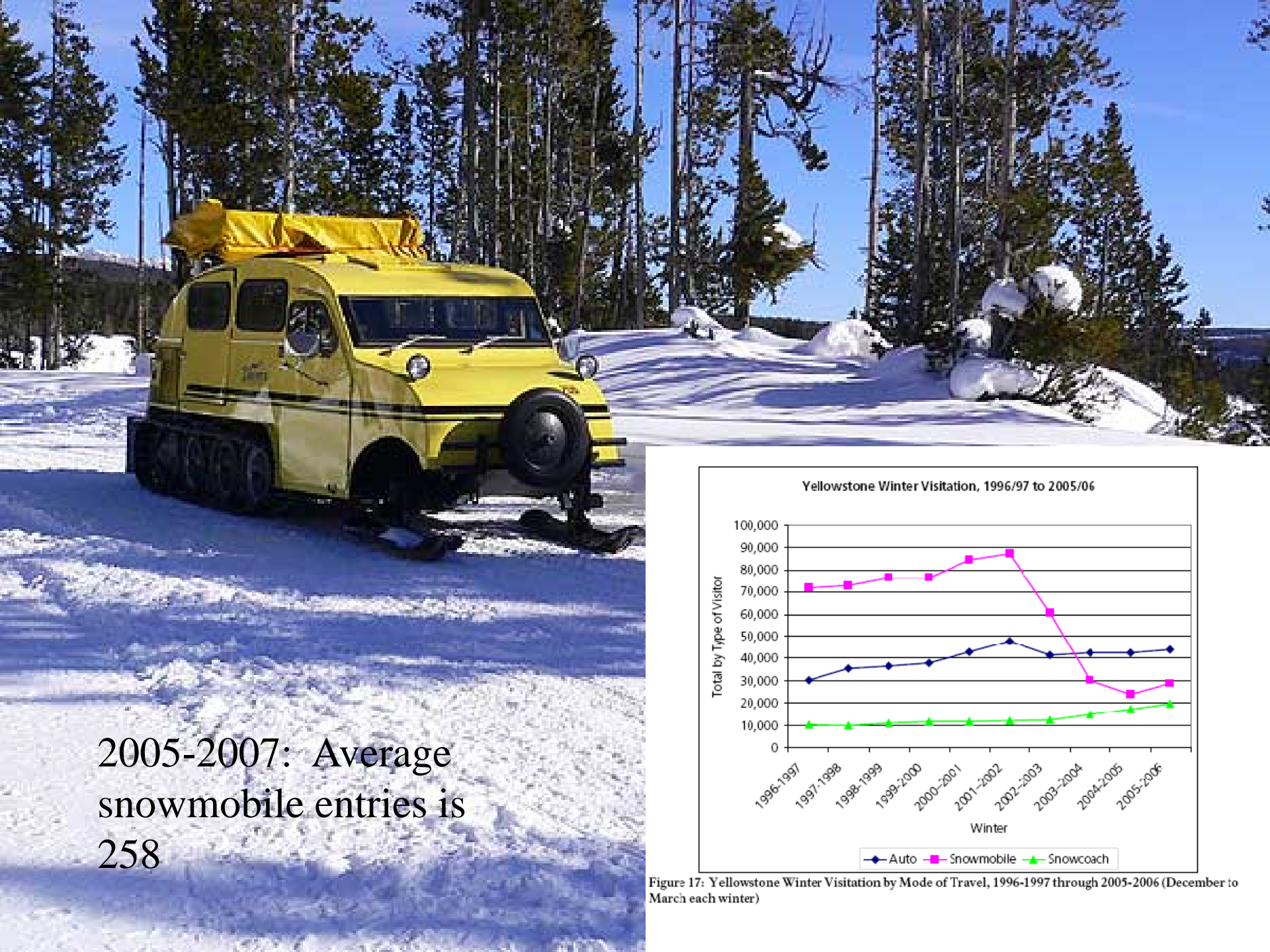
- Population centers
 - Destination areas
 - ▨ Primary transportation routes
 - ▨ Scenic driving routes
 - ▨ Groomed motorized routes
 - ▨ Motorized routes
 - ▨ Groomed nonmotorized routes
 - ▨ Nonmotorized routes
 - Groomed motorized areas
 - Backcountry motorized areas
 - Groomed nonmotorized areas
 - Nonmotorized areas
 - Backcountry nonmotorized areas
 - Downhill sliding areas (nonmotorized)
 - Areas of no winter recreational use
 - Low-snow recreation areas
 - ▨ Areas within 5 mi of trailheads (trailheads accessible by wheeled vehicles)
- Types of Trailheads:**
- ▨ Existing, plowed - wheeled vehicles
 - ▨ Existing, unplowed - wheeled vehicles
 - ▨ Existing oversnow
 - ▨ Potential oversnow
 - ▨ Potential trail head



Universal Transverse Mercator Projection, Zone 12
Thematic information derived from USGS base maps, various scales.



Greater Yellowstone
Coordinating Committee
Federal Land Managers in the
Greater Yellowstone Area



2005-2007: Average
snowmobile entries is
258

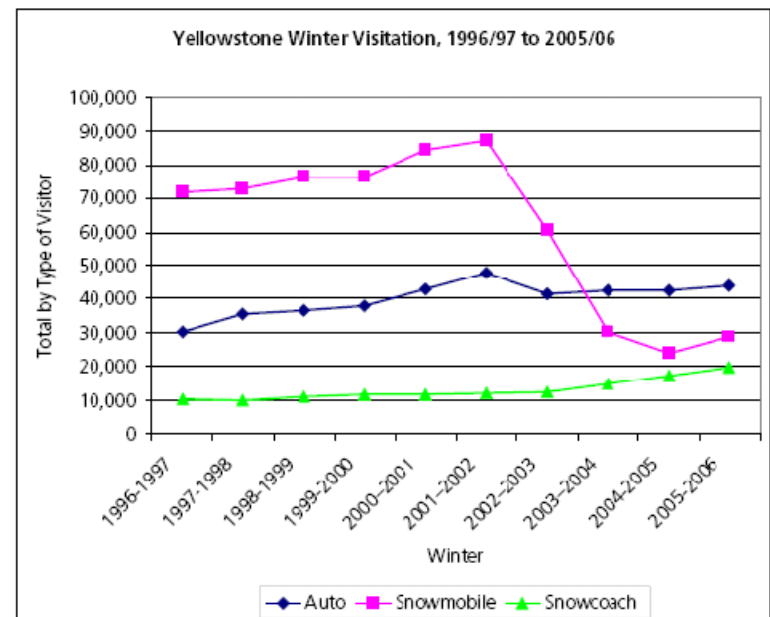


Figure 17: Yellowstone Winter Visitation by Mode of Travel, 1996-1997 through 2005-2006 (December to March each winter)

Snowmobile Users Response to Wildlife in the Madison District (i.e., Madison to West Yellowstone and Madison to Old Faithful)

Elk

Human Behavior	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	161	77.0	92	41.6
Stop	14	6.7	91	41.2
Dismount	12	5.7	12	5.4
Approach	16	7.7	1	0.5
Impede-Hasten	6	2.9	25	11.3

Bison

Human Behavior	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	202	70.9	127	64.8
Stop	24	8.4	49	25.0
Dismount	15	5.3	4	2.0
Approach	18	6.3	1	0.5
Impede-Hasten	26	9.1	15	7.7

Swans

Human Behavior	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	91	75.2	52	48.1
Stop	11	9.1	46	42.6
Dismount	9	7.4	5	4.6
Approach	9	7.4	3	2.8
Impede-Hasten	1	0.8	2	1.9

Wildlife Responses to Snowmobile Users in the Madison District (i.e., Madison to Old Faithful and Madison to West Yellowstone)

Elk

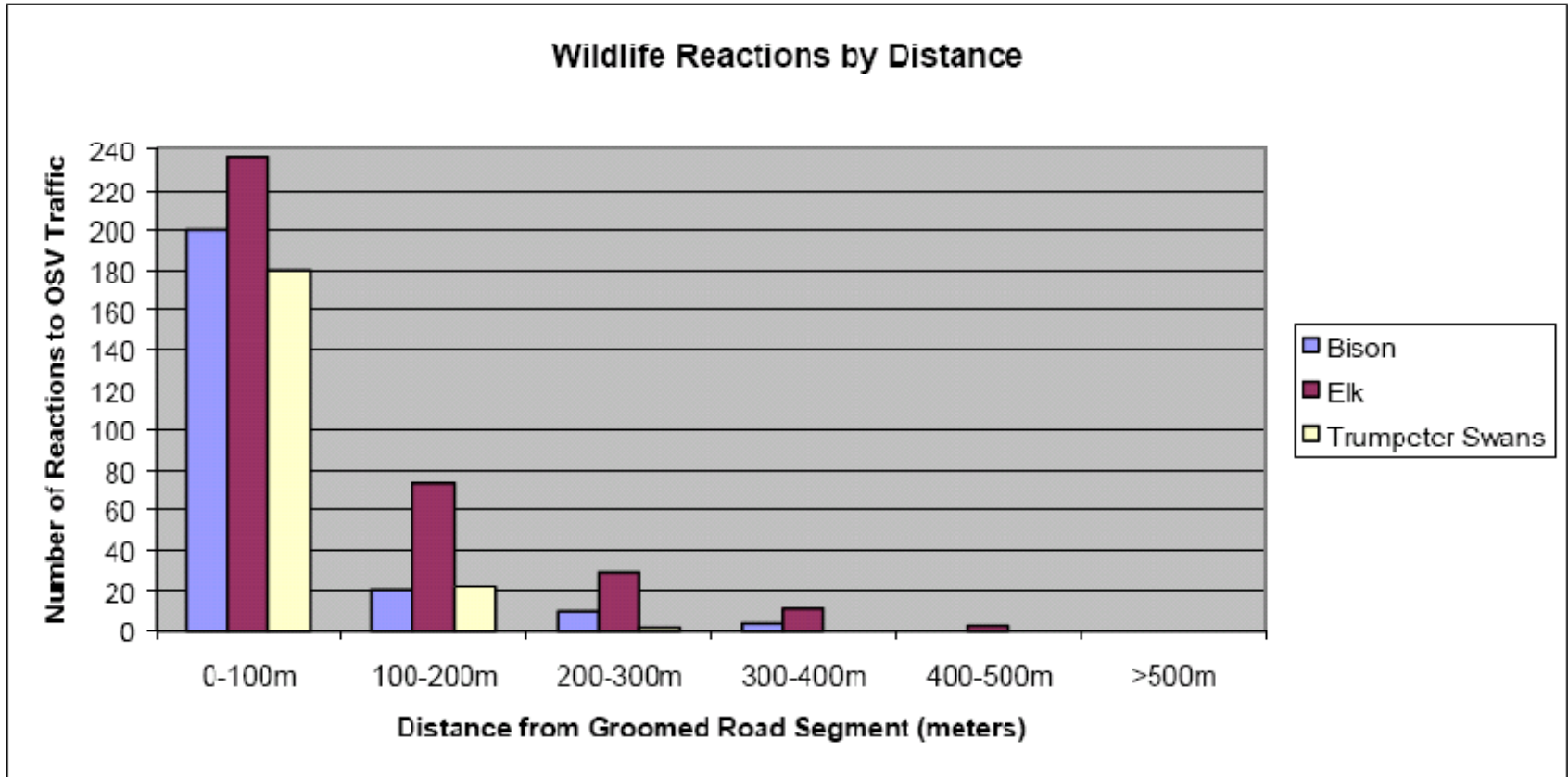
Wildlife Response	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	102	48.8	68	30.8
Look-Resume	53	25.4	49	22.2
Travel	6	2.9	24	10.9
Alarm-Attention	40	19.1	72	32.6
Flight	8	3.8	8	3.6

Bison

Wildlife Response	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	219	76.8	156	79.6
Look-Resume	20	7.0	4	2.0
Travel	24	8.4	19	9.7
Alarm-Attention	14	4.9	11	5.6
Flight	7	2.5	6	3.1
Defense	1	0.4	0	0.0

Swans

Wildlife Response	Commercially Guided Groups		Administrative Groups	
	No. Events	Proportion	No. Events	Proportion
None	55	45.5	44	40.7
Look-Resume	27	22.3	17	15.7
Travel	12	9.9	33	30.6
Alarm-Attention	25	20.7	13	12.0
Flight	2	1.7	1	0.9



Other basic findings: “Active” responses more frequent as number of vehicles increases; more likely for administrative groups; elk in general more sensitive to all variables

INTERNAL REVIEW DRAFT: WINTER USE PLANS

Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway

Table 39: Wildlife Responses to Human Recreationists

No response means the animal did not respond in any way to the human or OSV.

Vigilance response means the animal directed its attention at the OSV, but did not otherwise move.

Active response means the animal walked or ran away or charged the human or OSV.

Study	% No Response	% Vigilance Response ²	% Active Responses ⁴
Jaffe et al. (2002)	88%	66% of responses were considered vigilance ²	29% of responses were considered 'moderate'; 5% were considered agitation ⁵
Davis et al. (2004)	Bison: 78% Elk: 32% Swans: 42% Combined: 61%	Bison: 13% Elk: 42% Swans: 36 Combined: 23%	Bison: 9% Elk: 26% Swans: 22% Combined: 16%
White et al. (2004) ⁶	62%	15%	24%
Borkowski et al. (2006)	Bison: 80% Elk: 49% Swans: 57% Bald eagle: 17% Coyotes: 39%	Bison: 12.5% Elk: 44.3% Swans: 32.5% Bald eagle: 72.8% Coyotes: 36.7%	Bison: 7.1% Elk: 8% Swans: 10% Bald eagle: 10.5% Coyotes: 23.8%

¹ Data combined for off-road bison, elk, swans, bald eagles and coyotes
² Species provided if specified, otherwise number is averaged across species
³ Movement, running, defense
⁴ 8% of total interactions
⁵ ~4% and <1% of total interactions
⁶ Data for bison, elk and swans combined

“The NPS does recognize a strong perception or concern, expressed in the public comments, continues to exist that snowmobiles are hurting wildlife, despite scientific evidence to the contrary.” (2007 Record of Decision)

Yellowstone is a Class I area under CAA: Non-degradation

**Table 5-1
Maximum Predicted 1-hour CO Concentrations
(parts per million)**

Scenario	Description	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Old Faithful Staging Area	Site 4: Flagg Ranch Staging Area
		1-hour (ppm)	1-hour (ppm)	1-hour (ppm)	1-hour (ppm)
Alternative 1a	Current Plan	6.4	1.4	0.7	4.7
Alternative 1b	Current Plan, East Entrance Closed	6.7	1.1	0.7	5.3
Alternative 1d	East Ent Closed & Elim. 40 Snowmobiles	6.4	1.1	0.7	4.8
Alternative 1e	Experimental Closure Gibbon Canyon	6.4	1.1	0.8	4.7
Alternative 2	Snowcoaches Only	0.3	0.3	0.2	0.2
Alternative 3*	Eliminate Most Road Grooming	0.2	0.2	0.4	4.4
Alternative 4	Enhanced Recreational Use	7.7	1.5	0.9	6.4
Alternative 5	Provide for Unguided Access	4.3	0.6	0.5	2.9
Alternative 6	Mixed Use (West-side Roads Plowing)	2.0	0.4	0.5	4.4
Current Conditions	Current Conditions / Actual Use Scenario	3.7	0.7	0.4	1.8
1999 Historical	Historical Unregulated Scenario	23.7	21.0	1.7	8.7

Note:

* Background levels only for Sites 1 and 2, since no West Entrance and Madison oversnow access for Alternative 3.

NAAQS for CO are 35 and 9 parts per million (ppm), for the 1 hour and 8 hour averaging periods, respectively.

2006 Draft EIS

Table 14: Summary and Comparison of Alternatives

	Alternative 1: Current Plan (Preferred Alternative)	Alternative 2: Snowcoaches Only	Alternative 3: 3A: Eliminate Most Road Grooming 3B: No Oversnow Vehicles (no action)	Alternative 4: Enhanced Recreational Use	Alternative 5: Provide for Unguided Access	Alternative 6: Mixed Use
General Description	Allows for nearly historic levels of snowmobile use but requires commercial guides. This Alternative mimics the temporary winter use plan currently in place, with three primary changes: 1) snowcoaches must meet BAT standards; 2) daily limit on snowcoaches; and 3) Sylvan Pass would be closed to through travel.	Emphasizes snowcoach access; prohibits recreational snowmobiling. Road grooming would continue. Sylvan Pass would be closed to through travel.	3A: Prohibits road grooming or packing on most road segments in Yellowstone National Park. The road from the South Entrance to Old Faithful would be the only oversnow motorized access route in Yellowstone. 3B: Recreational oversnow vehicle access would cease in all three parks.	Allows for increased snowmobile use, relative to historic numbers. Commercial guides would be required for most snowmobilers; some could also visit the park after completing a non-commercial or unguided guide training course.	Balances snowmobile and snowcoach access and accommodates some visitors who wish to have an unguided snowmobile experience. Features a seasonal limit as well as a flexible daily limit.	Emphasizes plowing Yellowstone's mid-elevation, west-side roads to allow wheeled commercial vehicle access. Continue to allow oversnow vehicle access through the South Entrance and on the east side of the park. Sylvan Pass would be closed to through travel.
Daily Snowmobile Limits in YNP	720 snowmobiles per day West: 424 South: 256 North: 20 East: 0 Old Faithful: 20 Cave Falls Road: 50 snowmobiles (no BAT or guiding)	Snowmobiles prohibited Cave Falls Road closed to snowmobiles	3A: South: 250 snowmobiles per day Cave Falls Road closed to snowmobiles 3B: No recreational motorized oversnow access.	1,025 snowmobiles per day West: 600 South: 250 North: 25 East: 100 Old Faithful: 50 Cave Falls Road: 75 snowmobiles (no BAT or guiding)	540 snowmobiles per day West: 290 South: 145 East: 40 North: 40 Old Faithful: 25 Cave Falls Road: 50 snowmobiles (no BAT or guiding) Seasonal entry limit would be put in place.	350 snowmobiles per day South: 250 Old Faithful/Norris: 100 100 commercial wheeled vehicles Cave Falls Road: 50 snowmobiles (no BAT or guiding)

3B is the “environmentally preferred alternative”

2007 Final EIS

Table S-3: Summary and Comparison of Alternatives

	Alternative 1: Continued Temporary Plan	Alternative 2: Snowcoaches Only	Alternative 3: 3A: Most Road Grooming Eliminated 3B: Oversnow Roads Closed (No Action)	Alternative 4: Expanded Recreational Use	Alternative 5: New Management Tools and Improved BAT	Alternative 6: Mixed Use	Alternative 7: Revised Preferred Alternative
General Description	Allows for nearly historic levels of snowmobile use but requires commercial guides. This alternative mimics the temporary winter use plan with three primary changes: 1) snowcoaches must meet Best Available Technology (BAT) standards; 2) daily limit on snowcoaches; and 3) Sylvan Pass would be closed to through travel.	Emphasizes snowcoach access; prohibits recreational snowmobiling. Road grooming would continue. Sylvan Pass would be closed to through travel.	3A: Prohibits road grooming or packing on most road segments in Yellowstone National Park. The road from the South Entrance to Old Faithful would be the only oversnow motorized access route in Yellowstone. 3B: Recreational oversnow vehicle access would cease in all three parks.	Allows for increased snowmobile use, relative to historic numbers. Commercial guides would be required for most snowmobilers; some could also visit the park after completing a non-commercial or unguided guide training course. Sylvan Pass would be open to through travel.	Balances snowmobile and snowcoach access and accommodates some visitors who wish to have an unguided snowmobile experience. Features a seasonal limit as well as a flexible daily limit. Sylvan Pass would be open to through travel.	Emphasizes plowing Yellowstone's mid-elevation, west-side roads to allow wheeled commercial vehicle access. Continues to allow oversnow vehicle access through the South Entrance and on the east side of the park. Sylvan Pass would be closed to through travel.	Combines elements of Alternatives 1, 5, and others to balance snowmobile and snowcoach access. Protects park soundscapes better by reducing snowmobile numbers; protects wildlife better and enhances visitor experience by retaining 100% commercial guiding; and improves employee and visitor health and safety by closing Sylvan Pass to motorized travel.
Daily Snowmobile Limits in Yellowstone National Park (YNP)	720 snowmobiles per day West - 424 South - 256 North - 20 East - 0 Old Faithful - 20 Cave Falls Road - 50 (no BAT or guiding)	Snowmobiles prohibited Cave Falls Road closed to snowmobiles	3A: South - 250 snowmobiles per day Cave Falls Road closed to snowmobiles 3B: No recreational motorized oversnow access	1,025 snowmobiles per day West - 600 South - 250 North - 25 East - 100 Old Faithful - 50 Cave Falls Road - 75 (no BAT or guiding)	540 snowmobiles per day West - 290 South - 145 East - 40 North - 40 Old Faithful - 25 Cave Falls Road - 50 (no BAT or guiding) Seasonal entry limit implemented.	350 snowmobiles per day South - 250 Old Faithful/Norris - 100 100 commercial wheeled vehicles Cave Falls Road - 50 (no BAT or guiding)	540 snowmobiles per day West - 300 South - 185 North - 35 East - 0 Old Faithful - 20 Cave Falls Road - 50 (no BAT or guiding)

Case Study: Large Carnivore Conservation

Challenges

- Costly and extensive habitat requirements
- Habitat suitability requirements are poorly understood (e.g., Lynx reintroduction in CO; no snowshoe hares)
- Competition with humans (eating livestock, and sometimes people)
- Limited agency budgets focused on tangible benefits
- Conflicts between state and Federal government (ex. Montana state legislature passing resolutions to stock Wash DC with wolves; adequacy of Wyoming wolf management plan with respect to delisting)
- Policy coordination
- Organization of participants into “advocacy coalitions”
- Carnivore conservation is surrogate for broader policy conflicts

Ursus arctos horribilis



Okay, this isn't a griz. But the guy in the ranger hat is the 1932 Yellowstone Park Superintendent

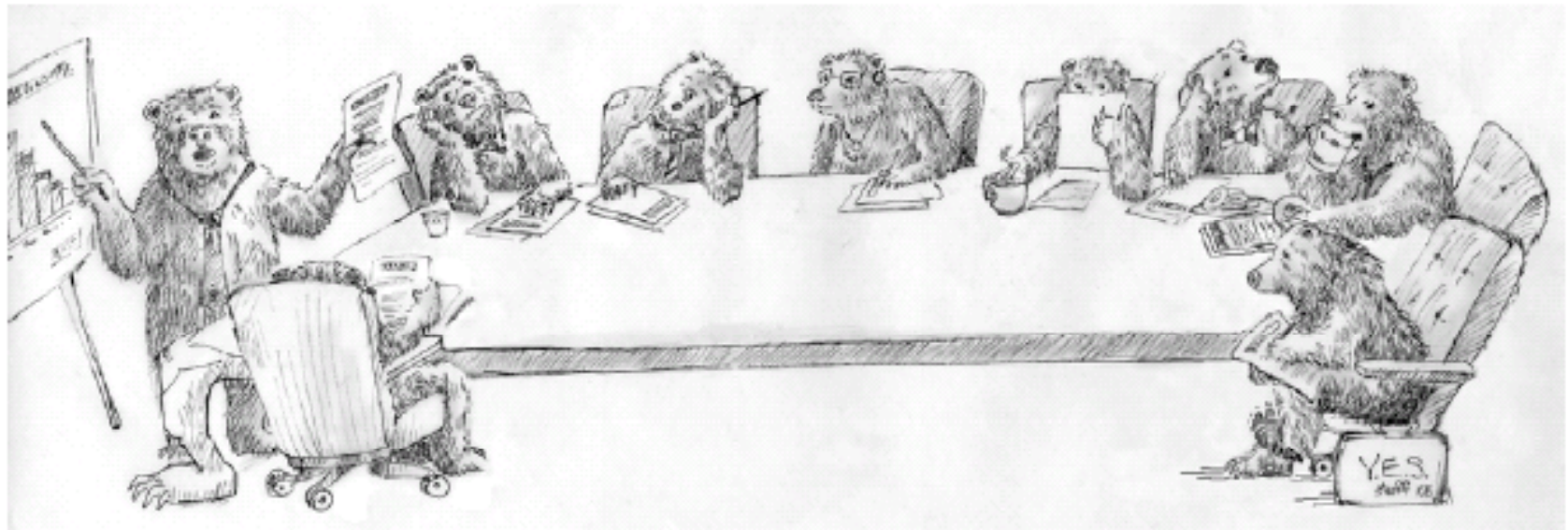
Grizzly Bear Policy: Overview

The Endangered Grizzly

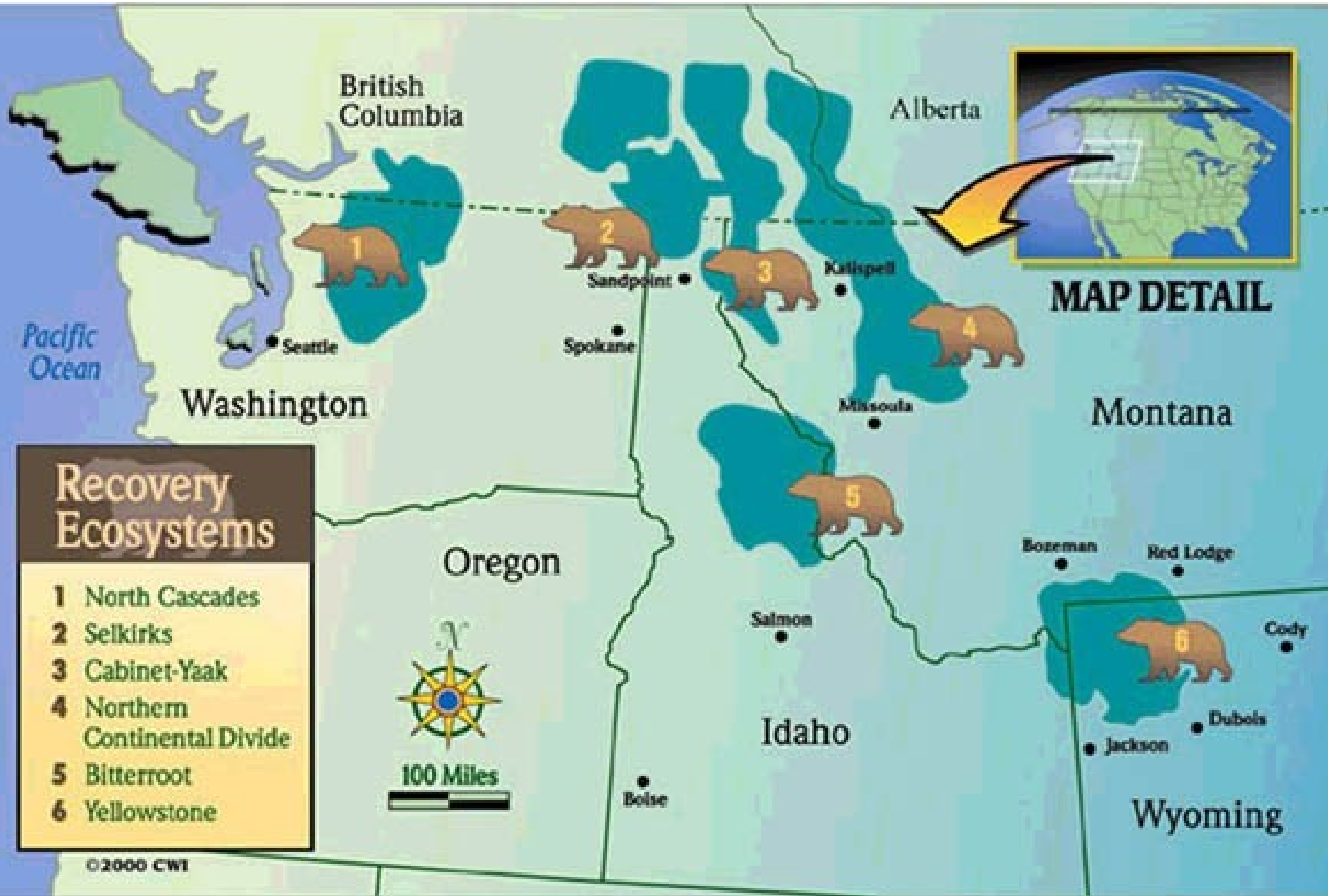
- 1975: Grizzly bear listed as threatened species in lower 48
- Only 6-7 isolated subpopulations; 98% of original range gone
- Pre-European settlement estimates of 50,000 bears in lower 48; now there are around 1,400
- About 600-700 bears currently in Greater Yellowstone; some scientists recommend viable genetic population should be 3000
- FWS never listed critical habitat for grizzlies (common problem)
- 1982 Grizzly Bear Recovery Plan; latest revision 1993
- Federal listing under ESA, but DOI currently is taking public comments on rule for delisting the bear; MARCH 2007: Yellowstone population delisted
- Management plans of state programs in Montana, Idaho, and Wyoming and Federal lands now apply

Interagency Grizzly Bear Committee

- Rooted in policy network created by 1973 Interagency Grizzly Bear Study Team (scientists)
- Created in 1983 to support implementation of Grizzly Bear Recovery Plan
- Consists of regional directors of USFS, NPS, FWS plus three state reps (WY, ID, MT); subcommittees



Grizzly Recovery Ecosystems



Grizzly Bear Recovery in Yellowstone Ecosystem

Overview

- 2000 Conservation Strategy for Grizzly Bear in Yellowstone Area: Defines conservation strategies after possible delisting
- Identify Primary Conservation Area, divide PCA into bear management units
- Monitor grizzly populations both within PCA, and in 10-mile band outside PCA (recommendations more favorable to griz within PCA)
- Current estimates suggest spatial distribution of grizzlies has increased 48% since 1970, with current pop. of about 600 bears
- Uncertainty about possibility of habitat linkages between ecosystems

Grizzly Recovery Criteria from 1993 Recovery Plan

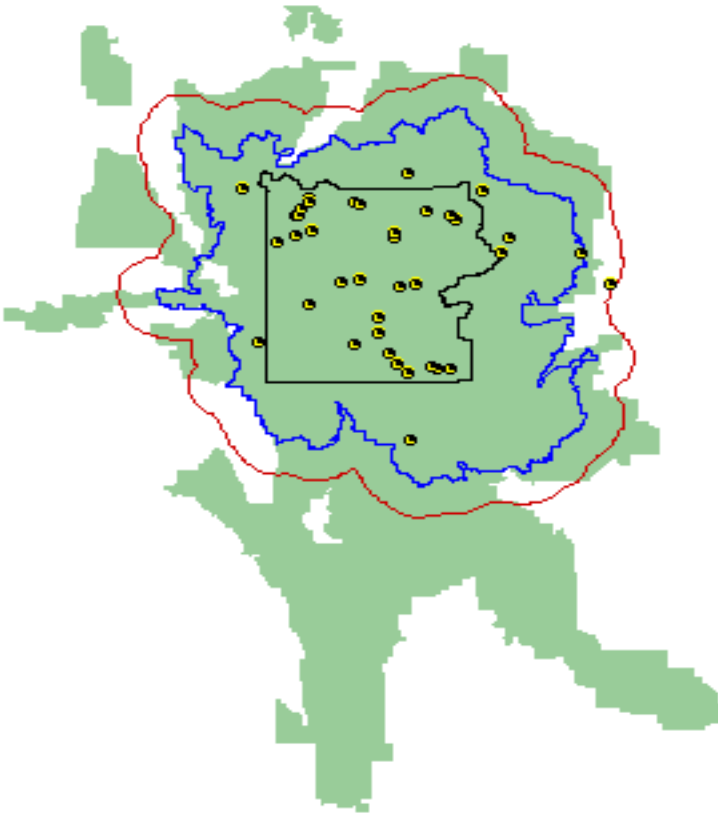
- 4% limit on human-caused mortality No more than 30% of 4% can be females
- Confirm 15 females with cubs in total area; 6-year running average
- 16/18 bear management units must be occupied at least one year in six
- Reduce the number of human-bear conflicts (#1 cause of bear mortality)
- Maintain road density at 1998 levels (Roads bad for griz)

Figure 2. The Primary Conservation Area showing bear management unit and subunit boundaries.



Increased Range in Greater Yellowstone

Initial sightings of females with cubs of the year, 1979-1981.

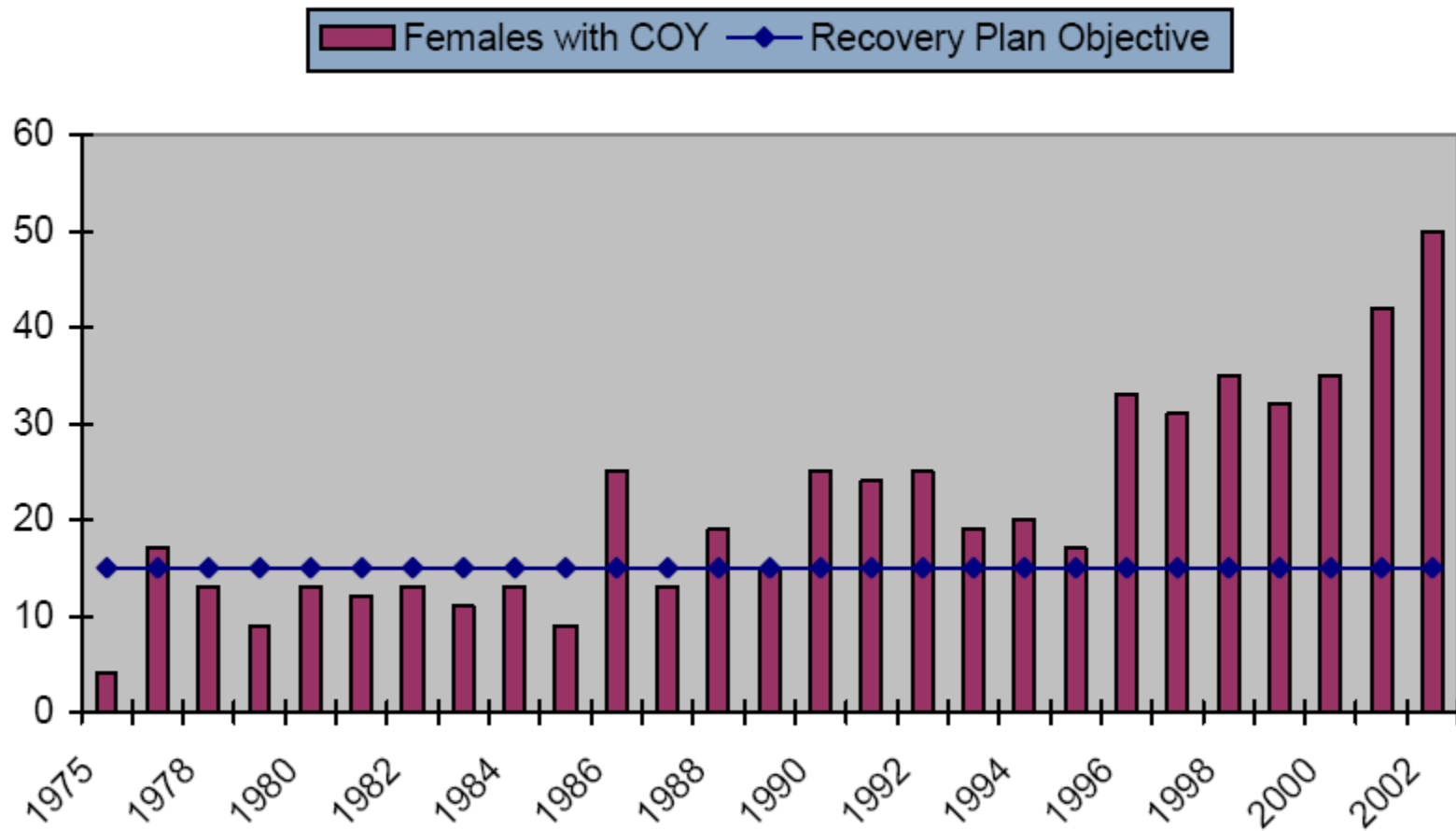


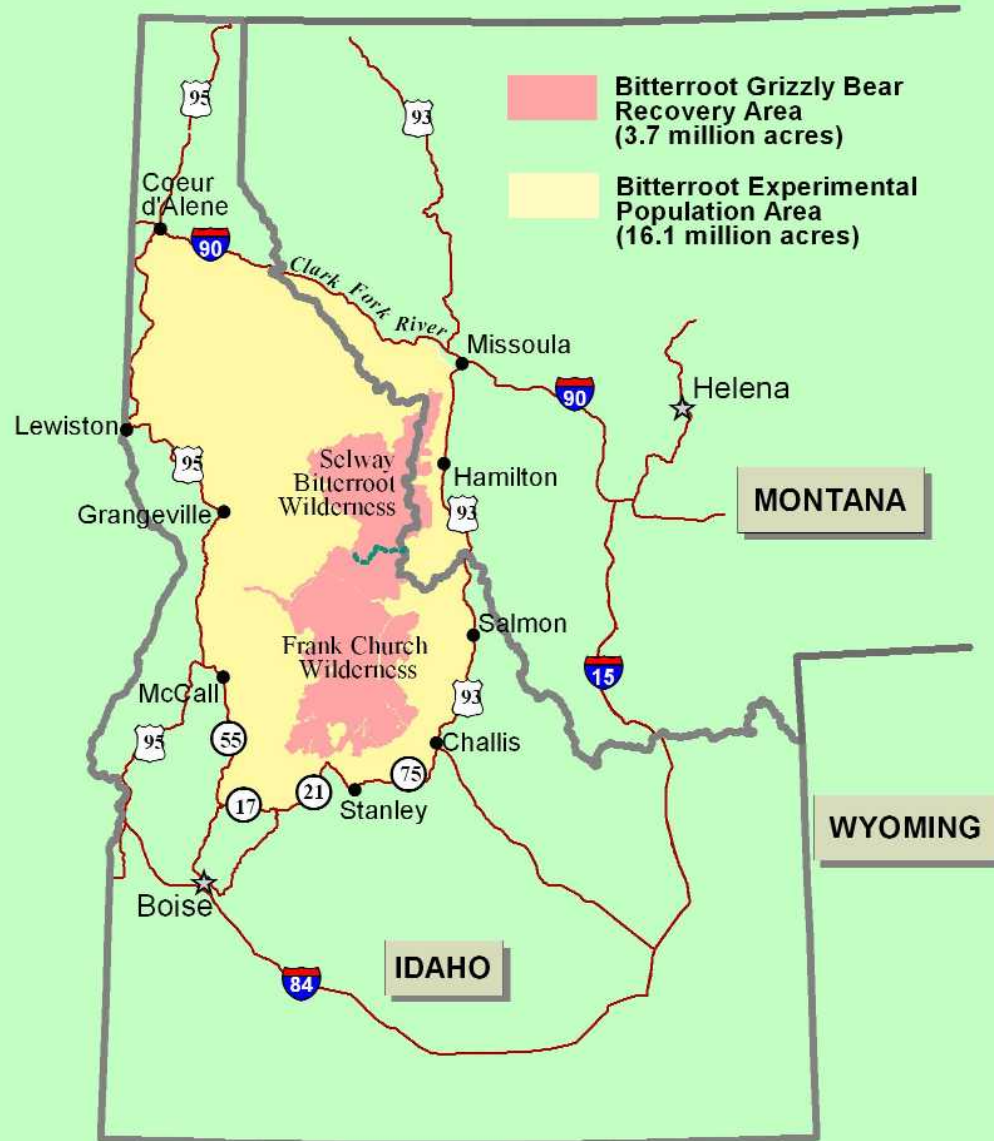
Initial sightings of females with cubs of the year, 1999-2001.



- Initial Sightings
- ▭ YNP
- ▭ Recovery Zone
- ▭ 10-mile perimeter
- ▭ Federal Lands

Figure 4. The number of unduplicated females with cubs-of-the-year within the Primary Conservation Area and the 10-mile perimeter area, as per the Recovery Plan, 1975-2002.







WARNING



**MANY VISITORS HAVE BEEN
GORED BY BUFFALO**

**BUFFALO CAN WEIGH 2000 LBS
AND CAN SPRINT
THREE TIMES FASTER**

**THESE ANIMALS MOVE
WILD, UNPREDICTABLE**

DO NOT APPROACH

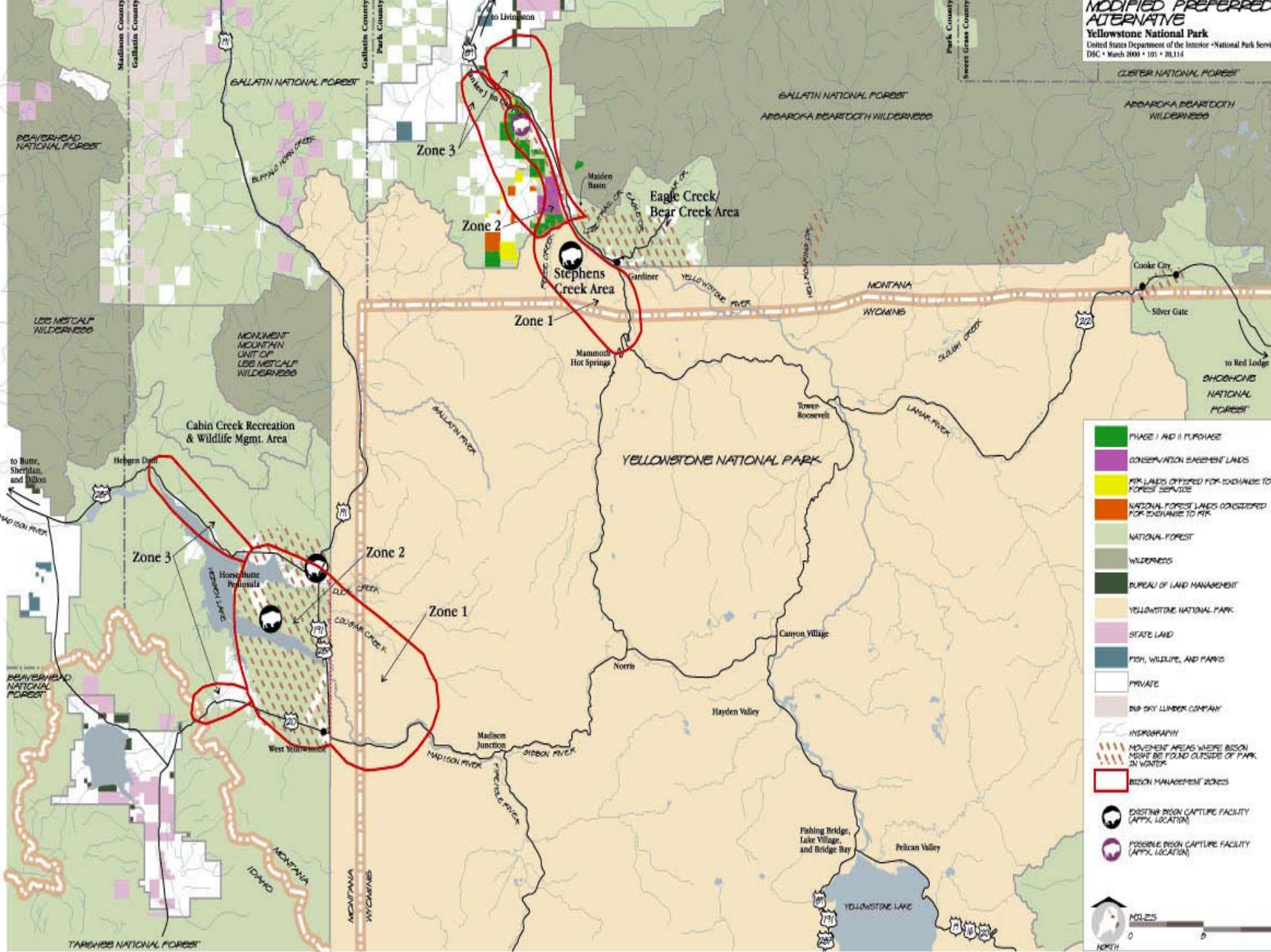


Honey, are you getting this on the video camera? Look at my Gore-Tex boots!



Case Study: Bison Management

- Major issue is brucellosis, which is transmitted from cattle to bison through ingestion of “birth materials”
- Long-term bison management plan began as cooperative effort between state of Montana, NPS, USFS, and disease control branch of USDA
- Several interim plans focused on shooting or capture/slaughter of bison leaving the park
- Adaptive management plan focuses on spatial and temporal separation of bison from cattle
- Seropositive bison outside park are captured and slaughtered
- Seronegative (non-infected) bison attempting to leave the park and not amenable to hazing when either the population exceeds 3,000 or exceed tolerance levels outside the park (100 bison) are removed to quarantine. If the quarantine facility is full or otherwise unavailable, they would be sent to slaughter or shot
- Zones define where bison are allowed, and where hazing, quarantine and lethal removal may occur (Zone 1 allows most bison; Zone 2 has bison up to specified tolerance levels; Zone 3 is the killing zone)



PHASE I AND II PURCHASE

CONSERVATION EASEMENT LANDS

RIP LANDS OFFERED FOR EXCHANGE TO FOREST SERVICE

NATIONAL FOREST LANDS CONSIDERED FOR EXCHANGE TO RIP

NATIONAL FOREST

WILDERNESS

BUREAU OF LAND MANAGEMENT

YELLOWSTONE NATIONAL PARK

STATE LAND

FISH, WILDLIFE, AND PARKS

PRIVATE

BSP SKY LUMBER COMPANY

HYDROGRAPHY

MOVEMENT AREAS WHERE BISONS MIGHT BE FOUND OUTSIDE OF PARK IN WINTER

BISON MANAGEMENT ZONES

EXISTING BISON CAPTURE FACILITY (APPRX. LOCATION)

POSSIBLE BISON CAPTURE FACILITY (APPRX. LOCATION)

0 5 10 MILES

NORTH

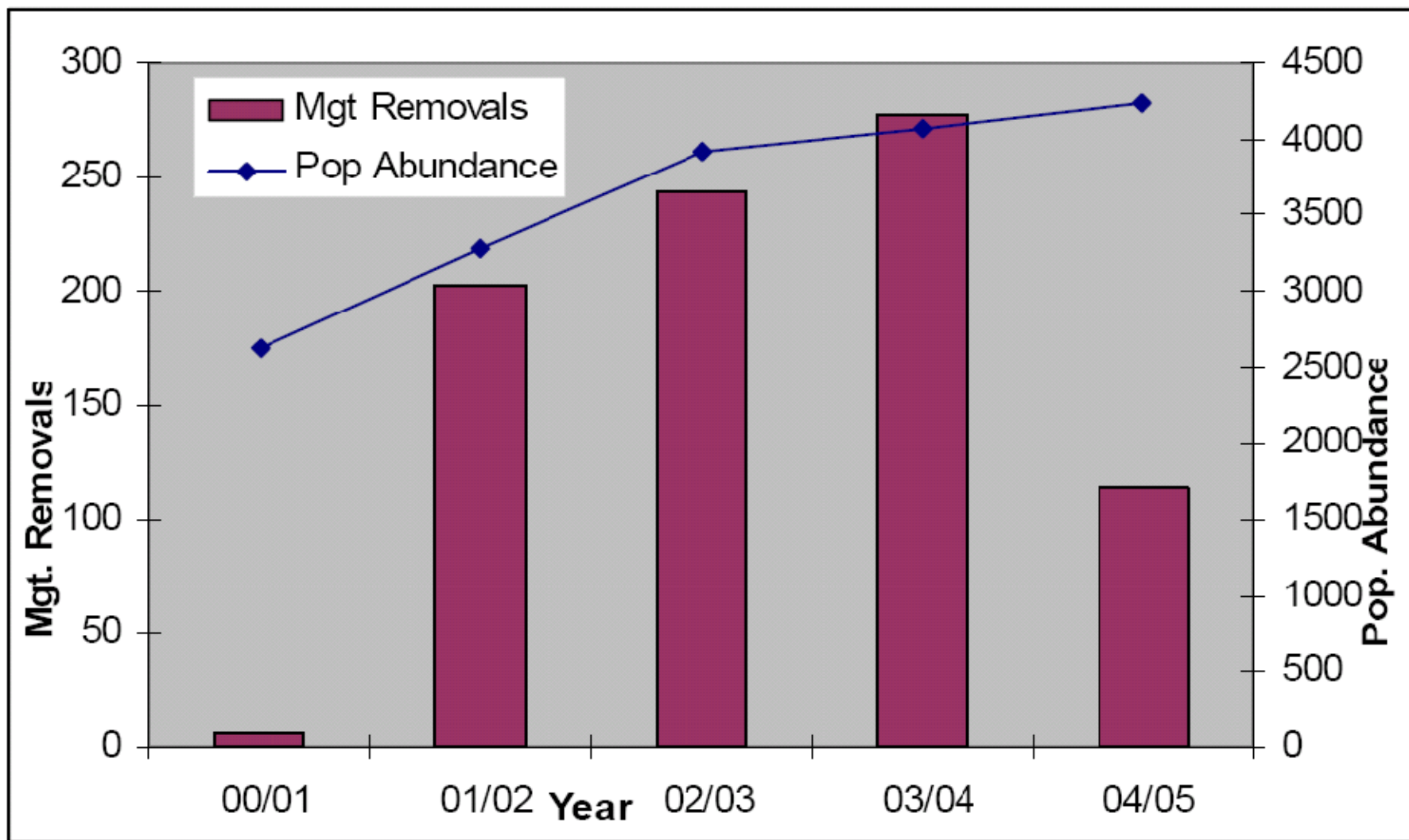


Figure 1. Comparison of bison removed and annual population estimates.

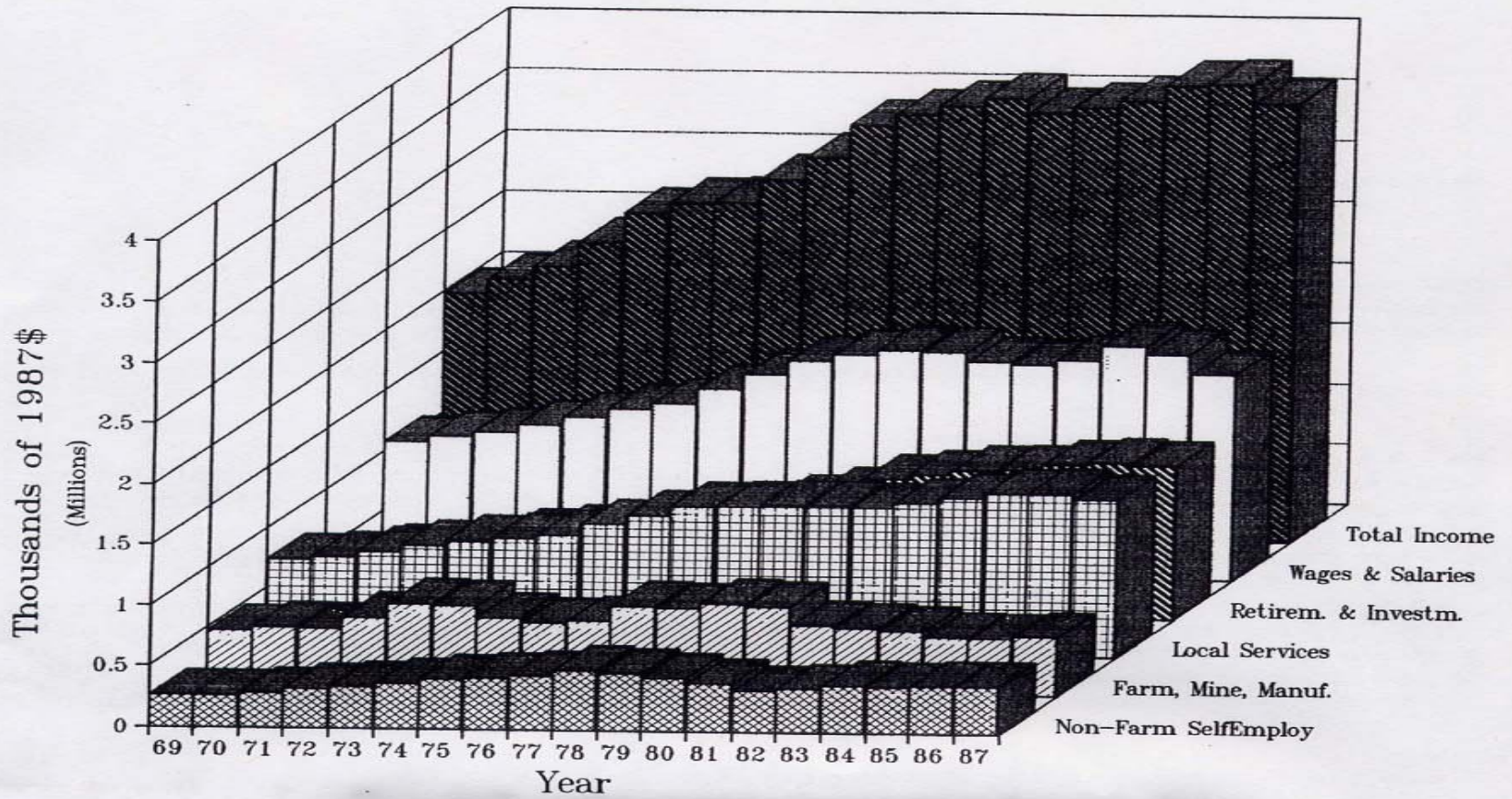
Ecosystem and Economy in Greater Yellowstone

Research Questions (Thomas Michael Power)

- Is there really a conflict between ecosystem protection and economic welfare?
- How important are extractive industries to overall economic welfare? The “rearview” perception of economic activities

Three Major Changes in GYE Economy

1. Since 1960s, proportion of economy in extractive industries declining
 2. Replacement of extractive industry income by service jobs, self-employment, and “non-labor” income (e.g., retirement and investment dividends)
 3. On GY National Forests, over 80% of jobs and economic benefits related to recreation
- No statistical relationship between extractive industry income and wealth in rest of economy
 - Some of this new economic activity occurring because people moving for quality-of-life issues
 - These trends not limited to Greater Yellowstone Ecosystem; defining economic patterns of the “New West”
 - Consequences?



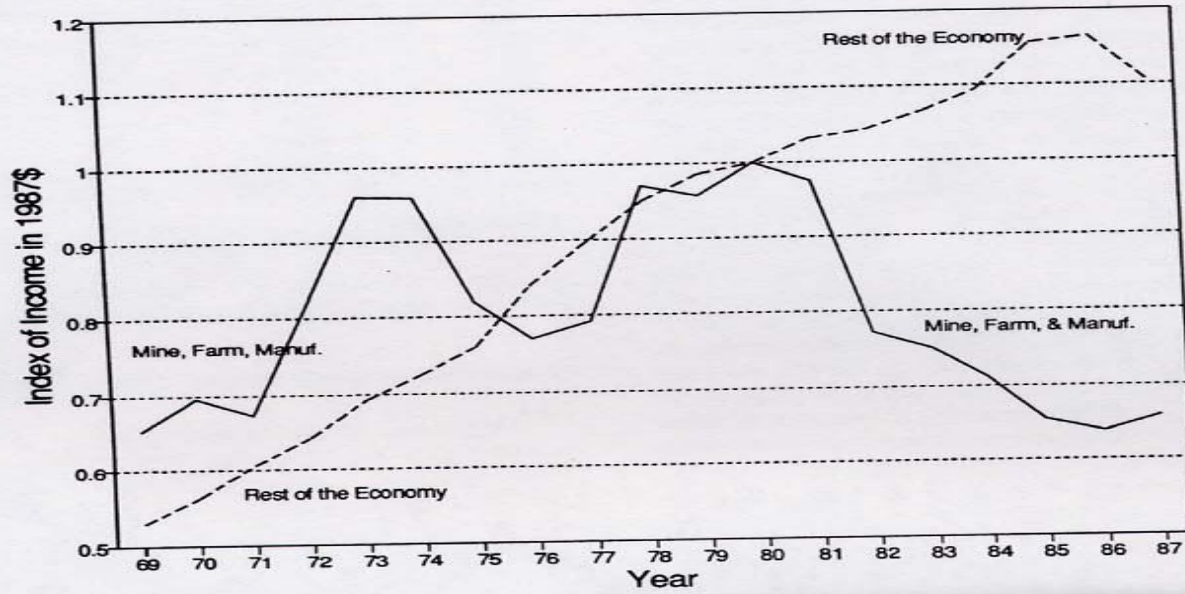


Figure 5. Export income versus the rest of the economy in the GY area, 1969-87 (1987\$)