

# Montana's Joe Skeen Institute for Rangeland Restoration

## The Montana Sustainable Rangeland Livestock Task Force

### Background:

**The Joe Skeen Institute for Rangeland Restoration** is a consortium of three institutions: Montana State University, New Mexico State University, and Texas A&M University. Funding partners for this consortium include the USDA Cooperative State Research, Education, and Extension Service, and the USDA-USFS Rocky Mountain Research Station. (please see the section below on funding)

Within the Institute, Montana State University's program, called the Montana Sustainable Rangeland Livestock Task Force, was advised by a committee comprised of the following individuals: Chase Hibbard (Chair, appointed by Montana Woolgrowers), Pachy Burns (Montana Farm Bureau), Tom Hougen (Montana Stockgrowers), Mike Frisina (Montana Department of Fish, Wildlife and Parks), Teresa Handley (Bureau of Land Management), and Jim Olivarez (U.S. Forest Service). This Task Force last met in 2007, when it was apparent that ongoing Institute funding was not probable. Therefore, through their prioritization and additional discussion/decisions, new projects were not funded and existing projects were directed to be finished.

The mission of the Montana Sustainable Rangeland Livestock Task Force was to develop and communicate sustainable livestock management technologies and other tools to restore, maintain, and enhance rangeland ecosystems. The Montana Sustainable Rangeland Livestock Task Force was a comprehensive, multi-disciplined program that seamlessly integrates research and extension activities. The Task Force approved all of the projects listed below. Extension education efforts have been targeted to various stakeholder groups using various media: field tours, annual conventions, public educational forums, professional meetings and popular press.

To fulfill its mission, the Task Force focused its efforts in three important and complementary areas. The Task Force's objectives were to develop and communicate livestock management technologies and other tools to: 1) control and manage invasive species, 2) enhance and preserve wildlife habitat, and 3) preserve and enhance riparian areas.

A major emphasis of the Task Force was to develop new strategies for harnessing livestock, especially sheep and goats, as tools to sustain the social, economic, and environmental values of Montana's rangelands. Opportunities abound for using prescribed livestock grazing to achieve ecological objectives, including creating fuel breaks through manipulation of vegetation to control wildfire, enhancing wildlife habitat, controlling noxious weed invasions, increasing the quantity of clean water from rangeland watersheds, controlling conifer encroachment onto rangelands, and helping to establish desirable plants to reclaim and restore degraded sites. Selected specific projects are identified under each objective as listed below.

### **Control and manage invasive species**

Effects of timing of defoliation on spotted knapweed viability and germination

Sequential cattle and sheep grazing to control spotted knapweed.

Summer sheep diets grazing spotted knapweed-infested rangeland

Develop, implement, and evaluate controlled sheep grazing strategies for managing large infestation of leafy spurge, spotted knapweed, and dalmation toadflax

Forage value of seven rangeland weeds

### **Enhance and preserve wildlife habitat**

Will a low-cost nutritional supplement increase goat browsing of ponderosa pine in winter?  
Economic evaluation of tree-shearing to control Douglas fir encroachment  
Will sheep grazing leafy spurge improve wildlife habitat and populations?  
Predicting feeding site selection of mule deer in foothill and mountain rangeland habitats  
Effects of long-term winter spring grazing by elk  
Summer-fall cattle grazing effects on elk feeding site selection in winter-spring  
Habitat comparisons of historically stable and less stable bighorn sheep populations

### **Preserve and enhance riparian areas**

Selective culling of cattle to reduce grazing pressure on riparian areas  
Impacts of cattle trampling on stream bank integrity

### **Funding**

The Institute is a three university consortium of New Mexico State University, Texas A&M and Montana State University. New Mexico State University is the lead university and the other two are subcontractors (the broader alliance includes the two federal funding agencies both with USDA – Cooperative State Research, Education and Extension Service (CSREES) and USFS Rocky Mountain Research Station). Initial funding for the Institute came from congressionally directed funding requests from some members of the three participating states' congressional delegations. The State of New Mexico was the lead with Texas and Montana having subordinate roles, and each state received about one-third of the funds. Depending on the year Montana's one-third share was between \$437,476 and \$541,073. Congressionally directed funding (referred to as earmarks) were awarded to New Mexico State University each year from 2003-2006. The award amount as well as grant initiation/termination dates varied depending on the amount appropriated and the federal award cycle.

The last congressionally directed funding specifically for the Skeen Institute was in 2006 and the last of the funding from this source will be expended in 2009 (extensions have been granted through the no-cost extension approval process). In federal fiscal year 2007, there were no federal earmarks. Federal earmark requests were submitted by some congressional members from all three consortium states for federal fiscal years 2008 and 2009. In federal fiscal year 2008 only CSREES monies from USDA were appropriated. The final outcome of the FY09 appropriations process is yet to be determined.

Drs. Jeff Mosley, Rodney Kott and Tracy Brewer are the most recent principal investigators on the Institute funds which will expire in the fall of 2009. These principal investigators will use the remaining funds to support Dr. Frost, Brent Roeder, Dr. Lisa Surber, Jim Moore and several technicians who will complete these projects, and present results and applications in scientific and extension meetings. As reported by these faculty, scientific publications will be prepared on: Defoliation timing effects on viable seed production of spotted knapweed, Sequential cattle and sheep grazing for spotted knapweed control, Feeding site selection by Rocky Mountain mule deer, Habitat effects on Bighorn sheep populations, Effects of winter-spring elk grazing on foothill rangeland, Mechanical rehabilitation of dense clubmoss-infested rangeland, Tree-shearing for controlling conifer encroachment, Goat browsing to control conifer encroachment, Cattle trampling effects on streambank integrity, and Feeding site selection by Rocky Mountain elk. In addition, grazing prescriptions and case studies will be developed as a component of a Prescribed Grazing Handbook.

**Annual Budget Summary**

**Joe Skeen Institute Funds received by MSU – 2003-2006 – Account Details on following page**

<b>Grant Period</b>	<b>Total Grant Amount</b>
9/15/03 – 9/14/05	\$467,978
7/01/04 – 6/30/07	\$437,476
9/15/05 – 9/15/08	\$514,953
9/15/06 – 9/14/09	\$541,073
<b>Total Skeen Funds to MSU</b>	<b>\$1,961,480</b>

**SKEEN PROJECT ACCOUNT DETAILS:**

Grant Period: 9/15/03 – 9/14/05									
PI	Grant	Fund	Title	Auth Amt	FY 09	Start	End	Total Exp	Balance
Kott, Rodney W	Z3633	425394	Joe Skeen Rangeland Restoration	84,984	0	9/15/2003	9/14/2005	84,984	0
Brewer, Tracy K	Z3685	425446	Joe Skeen Rangeland Restoration	191,694	0	9/15/2003	9/14/2006	191,694	0
Knight, James E	Z3686	425447	Joe Skeen Rangeland Restoration	70,500	0	9/15/2003	9/14/2005	70,500	0
Mosley, Jeffrey C	Z3687	425448	Joe Skeen Rangeland Restoration	120,800	0	9/15/2003	9/14/2006	120,794	6
Total for Grant period 9/15/03-9/14/05				\$467,978	\$0			\$467,972	\$6

Grant Period: 7/01/04 – 6/30/07									
PI	Grant	Fund	Title	Auth Amt	FY 09	Start	End	Total Exp	Balance
Brewer, Tracy K	W0143	4W0143	Montana SKEEN Institute - Brewer 04	194,297	0	7/1/2004	6/30/2007	194,297	0
Kott, Rodney W	W0165	4W0165	Montana SKEEN Institute - Kott 04	76,679	0	7/1/2004	6/30/2007	76,666	13
Knight, James E	W0166	4W0166	Montana SKEEN Institute - Knight 04	64,000	0	7/1/2004	3/8/2006	64,013	-13
Mosley, Jeffrey C	W0167	4W0167	Montana SKEEN Institute - Mosley 04	102,500	0	7/1/2004	6/30/2007	102,500	0
Total for Grant period 7/01/04-6/30/07				\$437,476	\$0			\$437,476	\$0

Grant Period: 9/15/05 – 9/15/08									
PI	Grant	Fund	Title	Auth Amt	FY 09	Start	End	Total Exp	Balance
Knight, James E	W0857	4W0857	Montana Skeen Institute - Knight 05-07	65,031	1,119	9/15/2005	9/14/2008	65,031	0
Brewer, Tracy K	W0895	4W0895	Montana Skeen Institute - Brewer 05-07	226,883	25	9/15/2005	9/14/2008	226,883	0
Kott, Rodney W	W0896	4W0896	Montana Skeen Institute - Kott 05-07	85,525	0	9/15/2005	9/14/2008	85,525	0
Mosley, Jeffrey C	W0897	4W0897	Montana Skeen Institute - Mosley 05-07	112,513	152	9/15/2005	9/14/2008	112,513	0
Gipp, Wayne F	W0898	4W0898	Montana Skeen Institute - Gipp 05-07	25,000	1,391	9/15/2005	9/14/2008	25,000	0
Total for Grant period 9/15/05-9/15/08				\$514,953	\$2,687			\$514,953	\$0

Grant Period: 9/15/06 – 9/14/09									
PI	Grant	Fund	Title	Auth Amt	FY 09	Start	End	Total Exp	Balance
Knight, James E	W1401	4W1401	Montana Skeen Institute - Knight 06	83,475	9,538	9/15/2006	9/14/2009	72,806	10,669
Kott, Rodney W	W1482	4W1482	Montana Skeen Institute - Kott 06	69,157	2,678	9/15/2006	9/14/2009	47,901	21,257
Brewer, Tracy K	W1483	4W1483	Montana Skeen Institute - Brewer 06	159,274	0	9/15/2006	9/14/2009	56,700	102,575
Mosley, Jeffrey C	W1484	4W1484	Montana Skeen Institute - Mosley 06	106,211	41,609	9/15/2006	9/14/2009	84,148	22,063
Brewer, Tracy K	W1485	4W1485	Montana Skeen Institute - Admin 06	2,301	0	9/15/2006	9/14/2009	-66	2,367
Brewer, Tracy K	W2118	4W2118	Montana Skeen Institute Brewer 06	120,654	35,025	9/15/2006	9/14/2009	38,066	82,588
Total for Grant period 9/15/06-9/14/09				\$541,073	\$88,850			\$299,555	\$241,519

**TOTAL SKEEN FUNDS TO MSU      \$1,961,480      \$91,537      \$1,719,956      \$241,524**

**Accomplishments** – details and site locations on projects summarized below are available at:

<http://www.ioeskeeninstitute.montana.edu/msu/projects.htm>

***Objective 1. Develop and communicate livestock management technologies and other tools to control and manage invasive species.***

- We determined that diets of sheep grazing at a landscape scale in spotted knapweed-infested rangeland largely reflected forage availability, indicating that sheep will increase the amount of spotted knapweed in their diets as level of infestation increases.
- When grazed early or mid-summer by sheep, we determined that regrowth of spotted knapweed in late summer will not produce viable seed, so sheep grazing in early, mid, or late summer can effectively control spotted knapweed.
- Using prescribed grazing by sheep helps to manage large infestations of leafy spurge, spotted knapweed, and dalmation toadflax.
- We determined that sequential cattle and sheep grazing effectively controls spotted knapweed without harming desirable native grasses and without utilizing too much cattle and wildlife forage.
- As a grazing monitoring tool, near infrared spectrometry (NIRS) of sheep feces, once calibrated, can accurately predict the amount of spotted knapweed and desirable grasses in sheep diets.
- We determined that low-cost nutritional supplements increase browsing of ponderosa pine (which is encroaching on foothill rangeland throughout western Montana) in winter by domestic goats, which will enhance forage and habitat for livestock and wildlife.
- We determined that domestic goats are better suited to suppressing conifer encroachment than domestic sheep.
- New and existing research results are being summarized and will be developed into targeted grazing bulletins for suppressing cheatgrass, leafy spurge, spotted knapweed, and conifer encroachment, and for enhancing wildlife habitat and forest regeneration.
- We determined that tree-shearing foothill rangeland with moderate densities of conifer encroachment is an economically effective way to control conifer encroachment. Whereas, tree-shearing light or heavy stands of encroachment is not economical.
- We determined that dense clubmoss can be effectively controlled with treatment by an aerator in the spring. Fall treatments with an aerator or spring or fall treatments with a plant-o-vator are not effective.

***Objective 2. Develop and communicate livestock management technologies and other tools to enhance and preserve wildlife habitat.***

- Sheep grazing of leafy spurge had minimal impact, positive or negative, on small mammal populations and their habitat.
- To physically repel deer and elk from high value pastures, we determined that adding 1.8 m woven wire to existing fence was the most cost-effective approach among several commonly used methods.
- We proved that both mule deer and elk in winter-spring prefer to graze where cattle have grazed moderately during the previous summer. Moderate cattle grazing enhanced the habitat of mule deer and elk on foothill rangelands.
- We determined that heavy grazing by elk in the winter-spring period degrades foothill rangeland, even when no other grazing by any ungulate occurs during the remainder of the year.

***Objective 3. Develop and communicate livestock management technologies and other tools to preserve and enhance riparian areas.***

- We determined that selective culling of cattle that spend inordinate amounts of time in riparian areas will not reduce riparian habitat use by a free-ranging cattle herd.
- We determined that heavy cattle trampling was not sustainable, but moderate cattle trampling was sustainable on a foothill rangeland stream.
- We determined that three techniques used to measure streambank trampling all provide different estimates of impact. Agencies and landowners must use the same technique used to measure streambank trampling as the same method used to set the allowable use guidelines.

**Outcomes**

- All field research was conducted cooperatively with private landowners and with agencies on public lands.
- Developed a strategic prescribed livestock grazing method to control spotted knapweed on Montana's rangelands while maintaining and enhancing native landscapes.
- Provided technical knowledge in 7 counties to over 700 individuals that influence the management of spotted knapweed-infested rangelands in Montana (e.g., ranchers/landowners, agency land managers, extension educators, researchers).
- Proved that prescribed grazing to control spotted knapweed is at least 50% less expensive than herbicides, it is more feasible on Montana's rugged terrain, and, in many situations, may be more socially acceptable than using herbicides.

- Trained and completed seven M.S. level graduate assistants.
- Presented 23 papers, including abstracts, at scientific meetings.
- Published three peer-reviewed invited book chapters.
- Published two peer-reviewed manuscripts, 23 additional manuscripts are “in preparation”.
- Published one extension bulletin, eight additional extension bulletins are “in preparation”.
- Presented hundreds of outreach, extension talks throughout Montana
- Leveraged \$76,286 in grant funds from USDA-CSREES Western Region Integrated Pest Management Center Grants Program to fund additional research of spotted knapweed.
- Leveraged \$356,690 in grant funds from USDA-CSREES Rangeland Research Grant Program to fund research of sulfur cinquefoil.
- Leveraged \$54,250 in grant funds from the Western Sustainable Agricultural Research and Education Grants Program to fund research of sulfur cinquefoil and \$62, 600 in grant funds from the Western Sustainable Agriculture, Research, and Education program in 2006 for continued spotted knapweed research.

JOE SKEEN INSTITUTE FOR RANGELAND RESTORATION COOPERATORS

NAME	TYPE OF COOPERATOR
David Mannix	Mannix Brothers Ranch
Chase Hibbard	Sieben Live Stock
John Lehfiedt	Producer
Pachy Burns	Producer
Larry Pilster	Producer
Lerory Dean	Producer
Riley Wilson	Producer
Dean Dutton	Land Owner
Plum Creek	Land Owner
Paws Up	Land Owner
Ranchland Inc.	Group of Small Landowners
Fish Wildlife and Parks	Land Owner, Agency People
Wall Creek Game Range	Land Owner
BLM	Land Owner, Agency People
Madison Weed District	Agency People
Madison Valley Ranchlands Group Weeds Cmte	Agency People
Powell County Weed District	Agency People
City of Missoula	Agency People
Blackfoot Challenge	Agency People
Jim Stone	Blackfoot Challenge
Jason Powell	Powell County Weed Coordinator
Lee Rinehart	Agriculture Specialist, Nat'l Ctr. For Appropriate Technology
Sven Svenson	Producer
Cliff Cox	Land Owner
John Potter	Land Owner
Doug Potter and numerous small landowners	Land Owners
Lewis and Clark Weed and Broadwater Districts	Agency People
Jim and Nina Baucus	Sieben Ranch
Jim Murphy	Bair Ranch
Glen Hough	Bair Ranch
Harv Van Waggoner	MSU
Jed Evgene	American Fork Ranch
Emmy Stevens	American Fork Ranch
Virginia Knerr	Broadwater Extension Agent
5 Rockin' MS Angus Ranch	
Artie Dorris	Maloney Ranch
Jim Ellingston	Land Owner
Stand and Ellen Hendrickson	Land Owner
U.S. Forest Service	Land Owner
Deerlodge Ranger District	Land Owner
Bill Perkins	Land Owner
Dick Geving	Mooncrest Ranch
Curt Bales	TE Ranch
Bill Galt	Galt Ranch
Kelly Crane	Consultant, Frontier Natural Resources Consulting
Quentin Kujula	Sun River Wildlife Management Area
Tom Lane	Lane Ranch
Roger Lang	Sun Ranch
Marty Malone	Park County Extension Agent