Center for Invasive Plant Management Competitive Research Grants Program

2005 Research Grants Program Report

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2005 Research Grants Program Report

Executive Summary

The Center for Invasive Plant Management (CIPM) was established in 2000 to promote ecologically sound management of invasive plants in western North America by facilitating collaboration and partnerships among scientists, educators, and land managers.

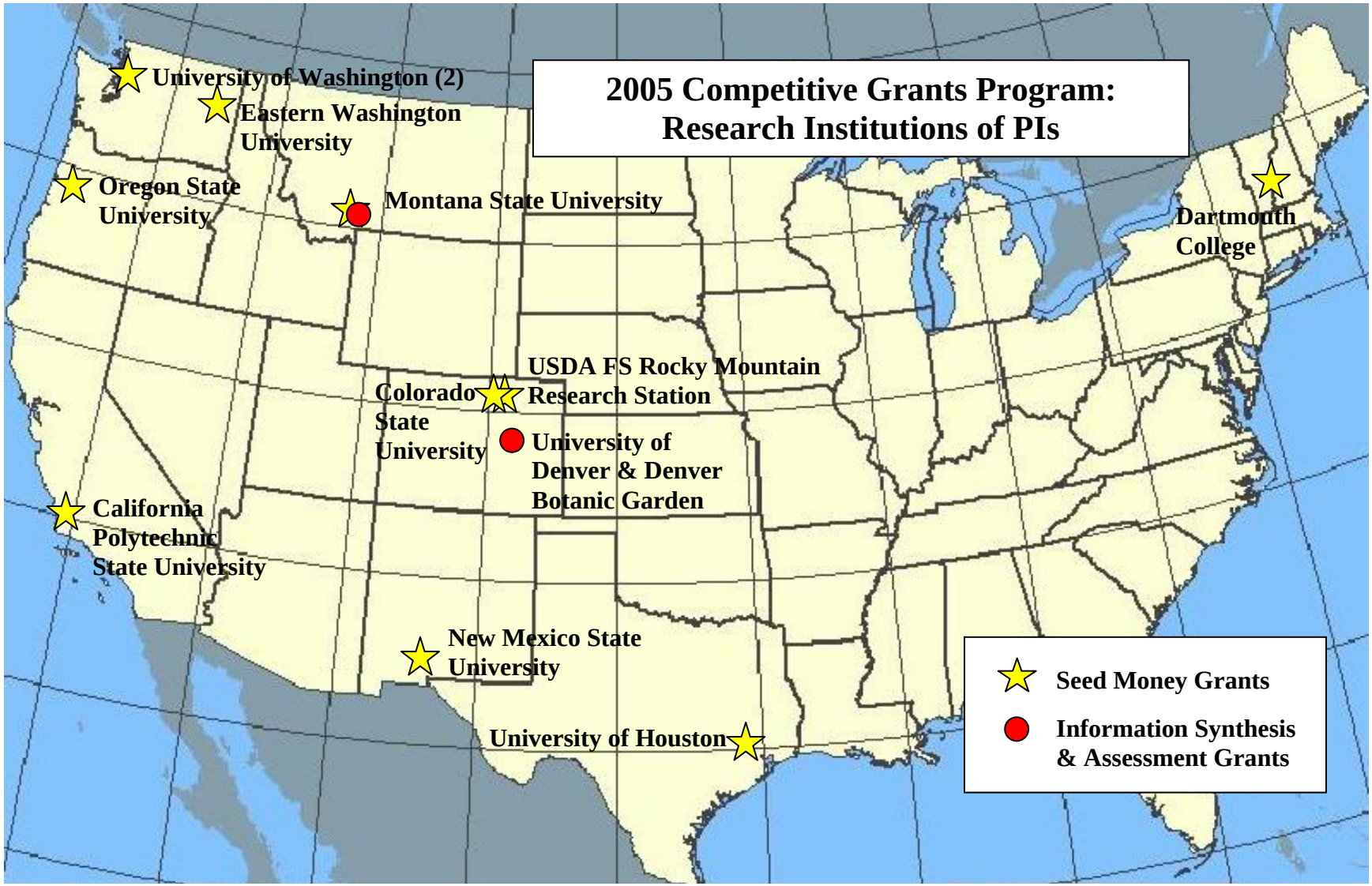
One of the ways CIPM supports invasive plant scientists is through annual research grants for innovative, ecologically-based projects throughout the West. The objective of CIPM's research grants program is to support projects that provide the foundation for new approaches to invasive plant management, as well as to synthesize and communicate research results to improve on-the-ground land management.

In 2005, CIPM issued a request for proposals in its fifth annual round of research grants. Proposals were accepted in three categories: *Seed Money*, *Improving Invasive Plant Management Decision-Making*, and *Information Synthesis and Assessment*. Thirty-eight proposals from fourteen states were received, requesting $303,947. Twelve projects in nine states were awarded a total of $86,434 in research funding. Awards ranged from $3,362 to $20,000.

The *Seed Money* grants continued to be the most popular granting category, underscoring the unique opportunity for funding CIPM provides with these grants. These grants support the collection and analysis of ecological data to better understand the prevention, introduction, spread, management, and ecology of invasive plants. These data are then used as a springboard for more intensive investigations. The ten funded projects established new directions in diverse areas of invasive species research from dispersal agents to hybridization. The goal of the *Improving Invasive Plant Management Decision-Making* grant was to fund a project that focused on the application of the threshold concept to improve decision-making. Only one application was received for this grant, so CIPM's Science Advisory Council chose to fund an extra *Information Synthesis and Assessment* grant instead. The *Information Synthesis and Assessment* grant was directed at documenting t*he role of invasive plant species in altering riparian ecology and watershed hydrology*. Two grants were funded in this category.

This report was compiled in 2008 to summarize the final reports submitted in 2006-2007 of CIPM-funded research projects awarded in 2005. Furthermore, this report highlights the evolution of CIPM-funded research grants and the broad impact of CIPM funds on the innovation of invasive species science throughout the West.

This report describes a successful fifth-year granting program that directly benefited ten research institutions. Since the program's inception, the number of proposal submissions has increased dramatically and the quality of the projects continues to be very high. The seed money grants have been instrumental in securing long-term funding for several projects. Overall, the grants have resulted in numerous presentations and papers, as well as new and promising directions in finding solutions to invasive plant issues.


2005 Competitive Grants Program:
Research Institutions of PIs
University of Washington (2)
Eastern Washington University
Oregon State University
Montana State University
Dartmouth College
USDA FS Rocky Mountain Research Station
Colorado State University
University of Denver & Denver Botanic Garden
California Polytechnic State University
New Mexico State University
University of Houston
Seed Money Grants
Information Synthesis & Assessment Grants

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2005 Competitive Research Grants Program Description

The Center for Invasive Plant Management (CIPM) was established in 2000 to promote ecologically sound management of invasive plants in western North America by facilitating collaboration and partnerships among scientists, educators, and land managers.

One of the ways CIPM supports invasive plant scientists is through annual research grants for innovative, ecologically-based projects throughout the West. The objective of CIPM's research grants program is to support projects that provide the foundation for new approaches to invasive plant management, as well as to synthesize and communicate research results to improve on-the-ground land management.

CIPM has offered competitive research grants for five years. Every year five to ten *Seed Money* grants are awarded for up to $5,000. In addition, each year larger grants in areas of particular significance are awarded. The grants have become increasingly competitive and continue to attract high quality projects.

In 2005, proposals were accepted in three categories: *Seed Money, Improving Invasive Plant Management Decision-Making,* and *Information Synthesis and Assessment*. New in 2005 was the *Improving Invasive Plant Management Decision-Making* category, which emphasized application of the threshold concept to improve decision-making. The *Information Synthesis and Assessment* category, which was first offered in 2003, concentrates on documenting the impact of an invasive plant species or complexes of invasive plant species on ecosystem function. In 2005 the particular emphasis was on *invasive plant species' role in altering riparian ecology and watershed hydrology*. Overall, 38 proposals from fourteen states were received, requesting $303,947. The *Seed Money* grants continued to be the most popular category, underscoring the unique opportunity for funding CIPM provides with this grant. Twelve projects in nine states were awarded a total of $86,434 in research funding. Awards ranged from $3,362 to $20,000.

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The following members of the **2005 Science Advisory Council** evaluated the submitted proposals: **Dr. Steve Radosevich, Chair,** Department of Forest Science, Oregon State University, Corvallis; **Dr. Cynthia Brown**, Department of Bioagricultural Sciences and Pest Management, Colorado State University; **Dr. Joel Brown,** USDA NRCS Jornada Experimental Range, New Mexico State University, Las Cruces; **Dr. Tim Prather**, Department of Plant, Soil, and Entomological Sciences, University of Idaho; and **Dr. Tony Svejcar,** USDA ARS, Burns, Oregon.

Online grant application forms, abstracts of funded projects, and select final reports are available on the CIPM web site, www.weedcenter.org.

Seed Money Grants

Seed Money grants continue to be the most popular granting program that CIPM provides. Feedback on this program consistently cites it as a unique and exceptional opportunity to initiate research in innovative directions and assist beginning researchers with developing their programs. These grants are awarded to support the collection and analysis of ecological data to better understand the prevention, introduction, spread, management, and ecology of invasive plants. The results of these 12- to 18- month projects are expected to provide a springboard for subsequent longer-term investigations. Seed Money grants are one-time awards to applicants from universities, government agencies, or non-profit organizations. Projects funded by this grant might include (but are not limited to):

- Ecological data acquisition,
- Data acquisition or analysis of long-term impacts,
- Systems modeling,
- Initial investigations into integration of scientific disciplines or approaches for management of invasive plants,
- Innovative approaches or techniques for prevention or monitoring of invasive plant species, or restoration/rehabilitation of invasive-plant-dominated lands.

2005 Seed Money Grants Highlights:

- In 2005, 31 proposals were submitted requesting $150,941. Of these, 10 (32%) were funded for a total of $46,634 (Table I). All were completed.
- Researchers from ten different institutions were principal investigators on the projects.
- Invasive plant research topics were diverse, covering invasive species and animal-mediated seed dispersal, soil disturbance, soil ecology, hydrologic alteration, detrital food webs, fire effects, and hybridization.
- Specific species studied included cheatgrass (*Bromus tectorum*), English ivy (*Hedera* spp.), yellow toadflax (*Linaria vulgaris*), Japanese knotweed (*Polygonum cuspidatum*), Russian knapweed (*Acroptilon repens),* perennial pepperweed (*Lepidium latifolium*), butterfly bush (*Buddleja davidii*), and spotted and diffuse knapweed (*Centaurea maculosa* and *C. diffusa*).
- Dr. Brown reported that the seed money grant provided an exceptional learning opportunity for three students, who were able to travel from the Pacific Northwest to the Eastern United States to collect data and learn about Japanese knotweed (*Polygonum cuspidatum*) and that the results will provide an excellent basis for future funding.
- Dr. Bolger's seed money grant provided start-up funds for what is now a multi-year grass litter manipulation study to understand how non-native grasses impact native shrubs, their soil communities, and ecosystem properties.
- Based upon information from their seed money study, Drs. Goergen and Chambers have planned three additional experiments to study the role of nitrogen and plant invasion in the sagebrush steppe system.
- Dr. Endress explored animal-mediated seed dispersal and germination of native and invasive plants that served as the foundation for a USDA-NRI grant proposal funded in 2006 that focuses on native seed limitation as a key factor in invasive plant dominance.
- The grant received by Dr. Gold was instrumental in supporting chemical analyses that assisted researchers in redirecting further chemical analyses to more fruitful areas of

research that reflected soil biotic activity important for higher plant nutrition, and it also provided critical funding for the research of a Master's student.

- Dr. Hufbauer's team conducted a combination of phenotypic surveys of hybrid populations and biological control agents in 47 populations (19 spotted [*Centaurea maculosa*] and 28 diffuse knapweed [*C. diffusa*]) in six western states (CO, ID, MT, OR, WY, WA) to examine the role of hybridization in these species.
- Dr. Reichard's study resulted in a better understanding of the distribution of butterfly bush (*Buddleja davidii*), a newly listed noxious weed, within the active riparian zone and suggested numerous lines of future research for this species.
- The funds provided to Dr. Renz in New Mexico for studying the impacts of exotic phreatophyte management on the invasiveness of Russian knapweed (*Acroptilon repens)* and perennial pepperweed (*Lepidium latifolium*) provided interesting results and created a new collaboration between two invasive plant ecologists.
- Dr. Rew's team was able to study the effect of the scale of soil disturbance on the colonization potential of yellow toadflax (*Linaria vulgaris*) for one season, refine methods for future research, and leverage for funding in future proposals.
- Seed money funds provided initial support for Dr. Wiernasz's doctoral students to study the preference of the harvester ant (*Pogonomyrmex occidentalis)* for seeds of cheatgrass (*Bromus tectorum)*, generating preliminary data for successful multi-year proposals.

Table I. Summary of Seed Money grant recipients

2005 SEED MONEY GRANTS		
Title	**Investigators**	**Award**
The role of fire and nitrogen on plant invasions into the Northeastern Sierra Nevada	Dr. Jeanne Chambers and Erin Goergen, USDA FS-Rocky Mountain Research Station	$4,987
Changes to native forest soils due to English ivy infestation	Dr. Warren G. Gold and Anna Marie Heckman, University of Washington	$3,641
Granivore activity on the invasive grass, *Bromus tectorum*: a factor in establishment of exclusion?	Dr. Diane C. Wiernasz, University of Houston	$3,362
Impacts of exotic phreatophyte management on the invasiveness of perennial pepperweed and Russian knapweed	Dr. Mark J. Renz, New Mexico State University and Dr. Scott Steinmaus, California Polytechnic State University	$4,950
The impact of invasive plants on detrital food webs	Dr. Douglas Bolger, Dartmouth College	$4,939
Animal-mediated seed dispersal and germination of native and invasive plants in western North America	Dr. Bryan A. Endress, Oregon State University	$5,000
The role of hybridization in biological invasions: A study with *Centaurea maculosa* and *C. diffusa*.	Dr. Ruth Hufbauer and Amy C. Blair, Colorado State University	$4,884
Assessing the effect of the scale of soil disturbance on the colonization potential of yellow toadflax (*Linaria vulgaris*) & native vegetation	Dr. Lisa J. Rew and Erik Lehnhoff, Montana State University	$5,000
Effects of hydrologic alteration on *Polygonum cuspidatum* invasion in riparian ecosystems.	Dr. Rebecca L. Brown, Eastern Washington University	$5,000
Invasion by *Buddleja davidii*: the impact of riparian forests in King County, Washington	Dr. Sarah Reichard and Jennifer Leach, University of Washington	$4,871

Improving Invasive Plant Management Decision-Making

In 2005, CIPM offered one competitive *Improving Invasive Plant Management Decision-Making* grant to a project that focused on the *application of the threshold concept to improve decision-making.* The aim of this program is to support the development and testing of new tools to improve decision-making in weed management by applying established concepts in the area of cropland weed management—such as yield, economic and treatment thresholds—to wildland weed management decision-making. Although these concepts are well-developed in the literature and in application to decision support for intensive agricultural systems, they are poorly developed and lacking in application for less-intensive and more spatially extensive natural and semi-natural systems. CIPM sought proposals for the delivery of a framework for a watershed-(500, 000 to 1.5 million ha)-based model that would account for thresholds in the populations of invasive plants, including applications to restoration ecology.

One award of up to $30,000 was offered for this area. One proposal requesting $29,965 was received. This proposal was not funded. The Science Advisory Council chose to award two *Information Synthesis and Assessment* grants instead.

Information Synthesis and Assessment

CIPM continued its *Information Synthesis and Assessment* awards program in 2005. This program *emphasizes gathering and synthesizing existing information about a particular topic pertaining to invasive plants, and then assessing the state of that knowledge by scientists and natural resource managers.* The results of this grant should enhance the usefulness of existing knowledge and clarify what is currently known about the topic. The grants should also lay the foundation for further CIPM-funded research by identifying crucial gaps in information needed for the successful management of invasive plant species.

In 2005, this program concentrated on *the role of invasive plant species role in altering riparian ecology and watershed hydrology*. Water availability and accessibility are critical issues in the western United States. Not only is water demand and use exceeding supply, but the redistribution of water regionally and locally is causing major changes to the way ecosystems function and to the products and services that western ecosystems provide. Although there is general agreement on the negative impact of invasive plant species in riparian ecology and watershed hydrology, there is a general lack of quantitative information upon which to systematically base estimates of the value of excluding or containing invasive species from a watershed. Scientifically-based decisions require at least a systematic qualitative approach to estimating impacts. CIPM was interested in funding a review and synthesis that *(1)* organized the relevant information with a goal of providing information that allows researchers to define reasonable assumptions about the impacts of weed invasion and the value of weed management at the watershed level, and *(2)* gives land managers a logical framework for making decisions about the allocation of resources for weed management among and within watersheds.

2005 Information Synthesis and Assessment Highlights:

- One award for a maximum of $20,000 was offered, but two awards were made in this category in lieu of awarding one in the Decision-Making category (Table II). Six proposals were submitted requesting a total of $123,041. Two awards (33%) were funded totaling $39,800.
- Ms. Schmitz and Dr. Jacobs synthesized information and conducted an experts' workshop on the impacts of invasive plant species on watershed and river reach level ecosystem processes. They created numerous products to disseminate the information including a customized bibliographic database with 200+ records, an annotated bibliography. and a comprehensive literature review and synthesis report. The Synthesis Report and Annotated Bibliography can be found at http://www.weedcenter.org/grants/abstracts.html
- Dr. Sher examined the responses of ecosystems to riparian restoration involving woody invader removal by sampling of restoration sites in six western states (AZ, CO, MT, NM, NV, and WY). Results show that environmental factors, especially moisture availability and soil texture, can be used to predict restoration success for areas controlled for saltcedar (*Tamarix spp.)* and Russian olive (*Elaeagnus angustifolia)* invasions. The final report for this grant can be found at http://www.weedcenter.org/grants/abstracts.html and numerous publications are forthcoming.
- Several manuscripts are in preparation for publication from these grants and the projects have been disseminated at numerous regional and national conferences as well as on the CIPM website.

Table II. Summary of Information Synthesis and Assessment recipients

2005 INFORMATION SYNTHESIS AND ASSESSMENT GRANTS		
Title	**Investigators**	**Award**
Multi-scale impacts of invasive plants on watershed hydrology and riparian ecology—a synthesis	Denine Schmitz and James Jacobs, Montana State University	$20,000
Predictive models for restoration success in *Tamarix* and *Elaeagnus* infested watersheds.	Anna Sher, University of Denver and Denver Botanical Gardens	$19,800