

# **FINAL REPORT**

## **INTERIM ASSESSMENT FOR THE DECISION MAKING AND VALUATION FOR ENVIRONMENTAL POLICY GRANTS PROGRAM**

Prepared for:

National Science Foundation  
U.S. Environmental Protection Agency

Prepared by:

Aspen Systems Corporation

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The Decision Making and Valuation for Environmental Policy grants program (DMVEP) was established to support research that will contribute to the development of practical, credible approaches for estimating the benefits and costs of environmental programs and improving decision making about environmental issues. It is an annual \$2.5 million extramural awards competition that is managed jointly by the National Science Foundation (NSF) and the U.S. Environmental Protection Agency (EPA).

The Government Performance and Results Act (GPRA) of 1993 requires all federal programs to show how they serve the public and meet agency goals. GPRA focuses on the outcomes and results of government activities. The intent is to develop measures of outcomes that can be tied to annual budget allocations. GPRA requires each agency to produce three documents: a strategic plan that sets general goals over 5 years; a performance plan that describes annual targets; and an annual performance report.

The National Academies' Committee on Science, Engineering, and Public Policy (COSEPUP) conducted an analysis of evaluating federal research programs in accordance with GPRA (*Evaluating Federal Research Programs: Research and the Government Performance and Results Act*. Washington, D.C.: National Academy Press, 1999). COSEPUP concluded that federal research program results could be evaluated in accordance with the spirit and intent of GPRA. The methods of evaluation must be appropriate for the type of research and its objectives. The committee also stated that expert review is the most effective mechanism for evaluating the quality, leadership, and relevance of research. The research community recognizes that in some cases the value of research is not apparent until many years after it is initiated, so long time periods are necessary to make accurate assessments of scientific contributions.

NSF and EPA are conducting this interim assessment to elicit advice from a variety of experts and users of the research to determine if the DMVEP program is producing useful results and communicating them effectively. They will assess the results of the program to date and recommend improvements. Since the DMVEP grants program is only five years old, many of the research projects are under way and have not reported final results. This compilation examines the data available on the research grants, summarizes the results reported to date, and includes a bibliometric analysis of the research.

NSF and EPA have approached this interim assessment as an opportunity to examine the contribution of the funded research to the multidisciplinary field of environmental valuation, discuss appropriate measures for evaluating research programs, and identify potential program improvements. The reviewers should use the following questions to guide the assessment:

1. **Selecting research topics.** What are the high priority environmental decision-making and valuation topics in your field of expertise or areas of interest, and are these areas being addressed? How is this research relevant and useful to you and/or your agency or discipline? How could it be more useful?



2. **Measuring results.** What are reasonable indicators or criteria for measuring the value of the research results stemming from this program? Research value should be relevant for EPA, NSF, and the general public, as well as to academic institutions and the disciplines involved.
3. **Assessing results.** Is this program generating high-quality research results? What have been the impacts of the funded research on the sponsoring agencies' missions? What have been the environmental protection, educational and training impacts of the research to date, if any? Has the program influenced curriculum or student/faculty development? How can the sponsoring agencies improve these impacts?
4. **Communicating priorities and results.** Are the priorities in the solicitations and the results of this program being communicated effectively to researchers and practitioners? How can the funding agencies help to more effectively and broadly communicate results?
5. **Improving the program.** The research results can provide continuous feedback to EPA and NSF on the evolving status of research in environmental valuation, including trends in research topics, methods, findings, and publications. How can this information be used to support ongoing improvements to a high quality and relevant research program?

This report has been prepared to support the interim assessment reviewers with a summary of program results to date to aid in their analysis. During the interim assessment meeting on April 17-18 in Washington, DC, reviewers will be asked to share their reactions to the information in this report as well as provide NSF and EPA with suggestions for improving the program.

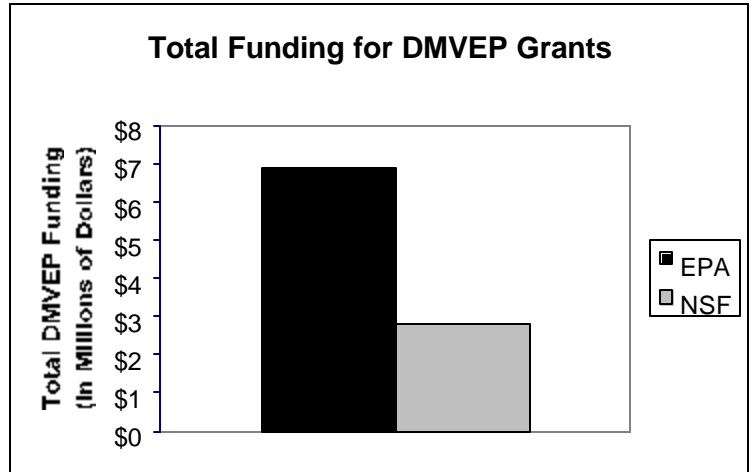
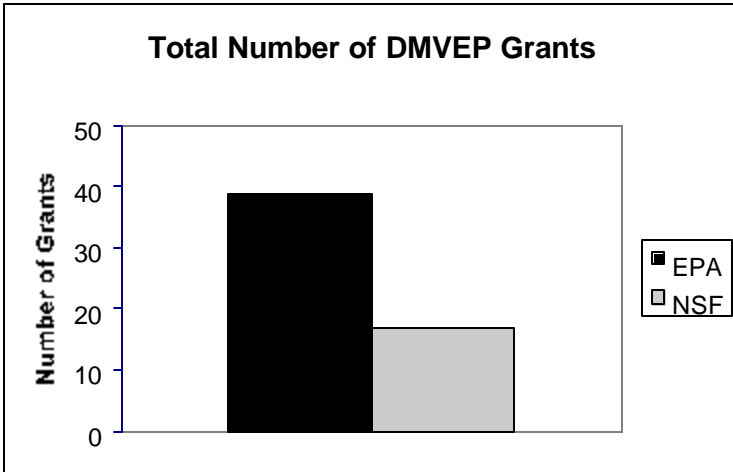
## Methodology

NSF contracted with Aspen Systems Corporation to provide support in compilation and tabulation of grant results. NSF and EPA provided cover sheets, budget sheets, annual reports, and final reports, as available, for the 56 grants. Aspen developed a categorization scheme for the research areas and methodologies based on the existing data. The grant solicitations did not use the same research topic areas in each of the years examined, so there was no default categorization structure. Aspen prepared two Excel databases, one for general grant award data and one on publications. Excerpts from the databases are included in this report and in the appendices. Appendix A lists the grants by research category, topics, and methods. Appendix B presents the publications. Appendix C includes one-page summaries of the grants abstracts and findings. Aspen conducted bibliographic and citation searches using the Science Citation Index Expanded, which indexes over 5,000 major journals as well as the Social Sciences Citation Index, which indexes over 1,725 major journals. The citation indexes are focused on journals and are therefore unlikely to pick up citations of conference proceedings or chapters in books, so the publications and citations are likely to be underreported in this report.



## Grant Statistics

A total of 56 DMVEP grants awarded in 1995, 1996, 1997, and 1998 were included in this evaluation. Of the 56, EPA awarded 38, NSF awarded 17, and 1 was awarded jointly by EPA and NSF. The joint award is reported under the EPA category for purposes of tallying grants. The grant monies for the joint grant have been split, respectively, between the two agencies.



Year	EPA		NSF		TOTAL	
	#	\$	#	\$	#	\$
1995	13	1,882,558	2	334,939	15	2,217,497
1996	7	1,599,983	6	1,142,121	13	2,742,104
1997	8	1,507,331	4	598,561	12	2,105,892
1998	11	1,900,317	5	751,696	16	2,652,013
<b>Total</b>	<b>39</b>	<b>6,890,189</b>	<b>17</b>	<b>2,827,317</b>	<b>56</b>	<b>9,717,506</b>

Note:

- ?? All NSF grants consist of a seven-digit number, with the first two numbers representing the award year (i.e., 97xxxx).
- ?? All EPA grants consist of a seven-digit code, with the first letter being "R." The award years can be determined by using the following key:
  - ?? If the grant begins with R824 (i.e., R824xxx), then the grant was awarded in 1995
  - ?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are between 300 and 400, then the grant was awarded in 1996
  - ?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are greater than 800, then the grant was awarded in 1997
  - ?? If the grant begins with R826 (i.e., R826xxx), then the grant was awarded in 1998



## Principal Investigator Characteristics

- ?? There were limited data available to support a demographic analysis of the principal investigators (PIs). Different reporting requirements from NSF and EPA account for variation in data and availability. A brief summary of the available information is included below.
- ?? Gender information was provided (or deduced) for 53 of the principal investigators (PIs). The majority of the PIs (85 percent, or 45) are male. The remaining 15 percent (or 8) are female.
- ?? Race information was determined for 33 PIs. Of these, 100 percent are White, not of Hispanic origin.
  - ?? Of the 6 women reporting their race, all 6 (or 100 percent) are White, not of Hispanic origin.
  - ?? Of the 27 men reporting their race, all 27 (or 100 percent) are White, not of Hispanic origin.
- ?? Of the 55 PIs with information found on highest level of schooling completed, 100 percent had achieved the PhD level. Information on education was not found for the other one PI.
  - ?? Of the 8 women reporting their education level, all 8 (or 100 percent) had achieved the PhD level.
  - ?? Of the 44 men reporting their education level, all 44 (or 100 percent) had achieved the PhD level.
- ?? The majority (80 percent or 45) of PIs under the DMVEP grant program are associated with universities, while 20 percent (or 11 PIs) are associated with a non-university research institution or an NGO.
- ?? It is not known at this time if the distribution of demographic characteristics in this small population is representative of the research community in the field of environmental valuation.

## Research Area and Methods

The research areas were identified based on an analysis on the types of research being conducted for each of the 56 grants. The categorization scheme we have used is a compromise; the categories are neither mutually exclusive nor collectively exhaustive, and only provide limited insight into what kinds of hypotheses the awardees are testing and how they are testing them. It may be important for some purposes to split the research into the categories "stated" and "revealed" preferences. In other contexts people may be keenly interested in whether the research examines group or individual decision-making. Undoubtedly our categorization schemes have not captured many of these kinds of potentially interesting distinctions.

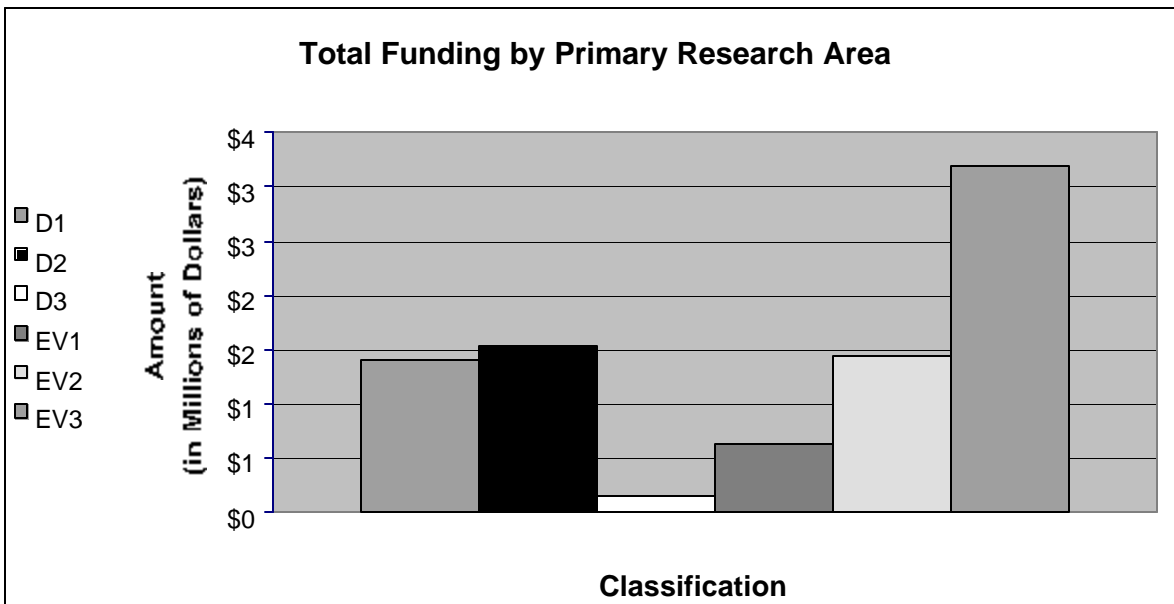
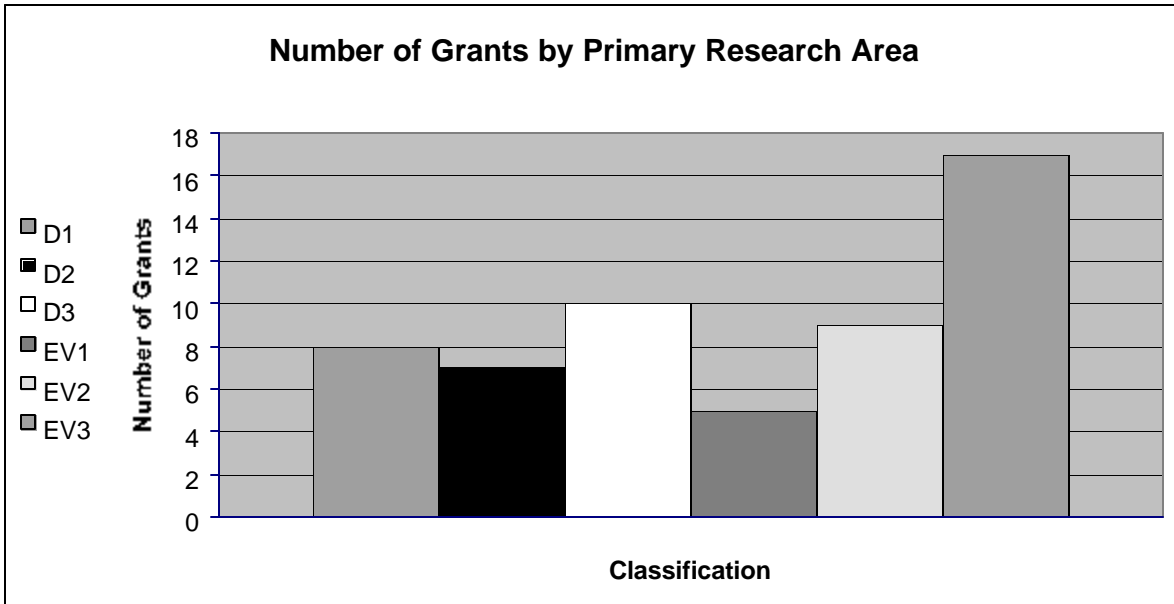


The descriptions of the categories follow:

- ?? Environmental Valuation (research dealing with economic and other valuation methods and practices)
  - ?? EV1 New Method. Development of a new method or theoretical research
  - ?? EV2 Modification of Existing Method. Adaptations of an existing analytical tool to improve accuracy or expand applications
  - ?? EV3 Applications and Testing. Testing of methods under differing conditions or application of methods for specific environmental issues
  
- ?? Decision Making (research dealing with decision making processes such as public participation or policy development)
  - ?? D1 Methods and Processes. Development of new or improvement of existing methods for decision making and analysis
  - ?? D2 Applications. Use of decision making tools in varied settings
  - ?? D3 Other Considerations. Considerations such as social stigma, consumer choice, citizen involvement, local government initiatives, social deliberation, environmental ethics, etc.

Category EV3, Applications and Testing, was the predominant research category, with 17 of the 56 grants (30 percent). The smallest number of grants (four) fell into the EV1, New Method category. The remaining grants are fairly evenly distributed among the remaining categories. This distribution of research areas may be indicative of the evolution of environmental valuation and decision making theory. The available methods are being applied in varied circumstances (e.g., wetlands, air pollution, public participation, and others) to evaluate their reliability, sensitivity to influencing factors, and accuracy in predicting behavior.





When comparing the primary research areas with the primary research methods, we found that there are a variety of combinations applied (as shown in the following table). When a particular method was used multiple times, it tended to be found with a variety of research areas—often three or four different research areas.

The topic areas for the research included a wide range of environmental issues. The research methods themselves were the primary topic of research. There were 20 grants awarded to study development,





application, testing, or modification of environmental valuation methods. The research topics and the number of grants that address each are listed below.

<b>Topic</b>	<b># Grants</b>	<b>Topic</b>	<b># Grants</b>
Valuation methods	20	Deforestation	1
Watershed management	5	Environmental taxes	1
Air quality	5	Mortality risk	1
Decision making	4	Infertility risk	1
Wetlands	3	Household hazardous waste	1
Biodiversity	2	Hazardous waste sites	1
Groundwater remediation	2	Offshore oil	1
Forest management	2	Carbon sequestration	1
Recreation and parks	2	Farmland preservation	1
National economic accounts	2	Environmental labeling	1





**Distribution of Grants Across Research Areas and Methods**

<b>Tools</b>	<b>EV1: New method or theory</b>	<b>EV2: Modification of existing method</b>	<b>EV3: Applications and testing</b>	<b>D1: Methods and processes</b>	<b>D2: Applications</b>	<b>D3: Other considerations</b>
<b>Survey</b>  CV-related	Gregory (9525582)	Brookshire (R824679) Swallow (R825307) Van Houtven (R825308)	Carson (R824698) Dietz (R824693) Halstead (R825824) Hammitt (R825312) Krupnick (R824711) Krupnick (R826608) Mansfield (R824687) Schultze (R824688)		Sabatier (9815471)	
Conjoint analysis/MAU		Kanninen (9613045) Opaluch (R824709)	Russell (R824699)		Keller (R826611)	
Non-CV survey	Norton (9729229)		Russell (9727376)			Pfeffer (9613493) Teisl (R826618) Trumbo (9727797) Scholz (9815473) Webler (9613626)
<b>Experiments</b>	Baron (9520288) Satterfield (9602155)		Cummings (R824710) Poe (9727375)	Solow (R825311)	Gregory (9815382)	Werner (R825827)
<b>Modeling/Theory Development</b> Contingent Valuation		Herriges (R825310)				
National Acct	Flores (R824671)	Davis (R824705)				
General		Rausser (R824707) Sohngen (R826616)	Herriges (R826615); Salzman (R826612)	Bockstael (R826617) Fischhoff (R824706) Montgomery (R826619) ReVelle (R825996)	Harvey (R825825) Mayer (R826614)	
Other, economic		Burtraw (9613458; R825313)	Krupnick (R825821)	Toman (9613035)		
<b>Secondary Data Analysis</b>  Hedonic estimation			Thayer (R825826) Geoghegan (R825309) Rausser (R825995) Smith (R826609)			
Other, economic				Opaluch (R826610)	Hulse (R825822)	
Other, decision making						Dietz (9815876) Shabman (9815472)

<b>Philosophical</b>	Sagoff (9613495)					
Notes: ?? No projects were noted as using participant observation or content analytical research methods. ?? None were categorized as primarily using group interview or survey methods. ?? All NSF grants consist of a seven-digit number, with the first two numbers representing the award year (i.e., 97xxxxx). ?? All EPA grants consist of a seven-digit code, with the first letter being "R." The award years can be determined by using the following key: ?? If the grant begins with R824 (i.e., R824xxx), then the grant was awarded in 1995 ?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are between 300 and 400, then the grant was awarded in 1996 ?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are greater than 800, then the grant was awarded in 1997 ?? If the grant begins with R826 (i.e., R825xxx), then the grant was awarded in 1998						

## Interim Outputs, Outcomes, and Impacts

### Publications

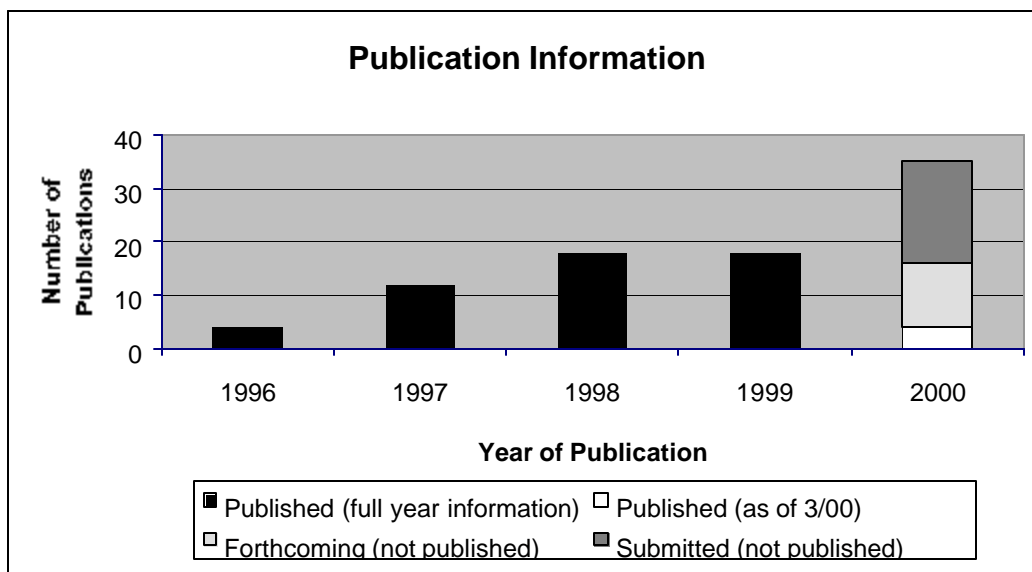
To determine publication trends throughout the DMVEP program, all publications listed in the annual and final reports, as well as the Primary Investigator names of the DMVEP grants were searched using both the Science Citation Index Expanded and the Social Sciences Citation Index by means of the Institute for Scientific Information's Web of Science.

The Science Citation Index Expanded, a multidisciplinary database, indexes over 5,000 major journals across more than 160 disciplines. It includes abstracts from 1987-present (though for the purposes of this task, only abstracts for the years between 1995 and the present were searched)

The Social Sciences Citation Index, another multidisciplinary database, indexes more than 1,725 journals spanning 50 disciplines, covering the journal literature of the social sciences. Over 2.8 million articles are located within the SSCI, with more than 2,800 additional articles added each week.

Research funded by the DMVEP has resulted in a total of 87 publications thus far in journals, books, conference proceedings, etc. The number of publications will increase as the program matures.

For the 56 publications where the year of publication was determined, the following chart illustrates the number of publications generated each year. The 31 publications that have either been submitted to journals or other published sources or are forthcoming in journals or other published sources are shown as potential publications for the year 2000.

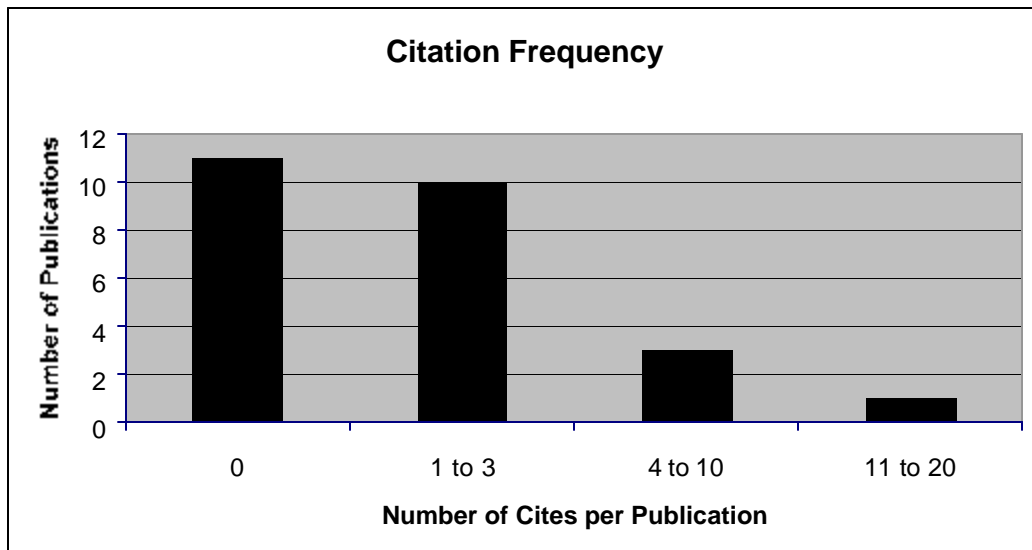


Of the 87 publications where information on peer-review was found:

- ?? 62 publications (71 percent) have been refereed
- ?? 25 publications (29 percent) have not been peer-reviewed
- ?? Of these 25, 15 (60 percent) were published in books

The bibliometric data were collected through citation searches through the majority of the science and social science journals. There are inherent weaknesses in the citation indices; for example, we know that books and conference proceedings are underreported. Again, the data reported below should serve as an indication of the prevalence of this research in the literature. It is not a comprehensive or exhaustive analysis, and some publications may have been missed by the searches. As shown in the following chart, of the 25 publications (where citation information was determined) written by the PIs on research performed under the DMVEP grants:

- ?? 44 percent of the publications have not been cited at all
- ?? 40 percent of the publications have been cited between 1 and 3 times
- ?? 16 percent of the publications have been cited more than 4 times



The most cited publications are listed below.

Most cited publications	# of times cited	# of times cited by self
Goulder, L.H., Parry, I.W.H., and Burtraw, D. 1997. Revenue-raising versus other approaches to environmental protection: The critical significance of preexisting tax distortions. <u>Rand Journal of Economics</u> 28: (4) 708-731.	11	7
Ando, A., Camm, J., Polasky, S., et al. 1998. Species distributions, land values, and efficient conservation. <u>Science</u> 279: (5359) 2126-2128.	6	0
Sagoff, M. 1998. Aggregation and deliberation in valuing environmental public goods: A look beyond contingent pricing. <u>Ecological Economics</u> 24: (2-3) 213-230.	5	0
Geoghegan, J., Wainger, L.A., and Bockstael, N.E. 1997. Spatial landscape indices in a hedonic framework: an ecological economics analysis using GIS. <u>Ecological Economics</u> 23: (3) 251-264.	4	0

The following are some general observations regarding the publications:

- ?? All of the publications being cited frequently were published at least two years ago, though the majority of the publications written by the DMVEP PIs have been published in the past three years.
- ?? Many of the PIs indicated that they had submitted publications to journals that had not yet been published or are forthcoming in those journals. The number of publications by DMVEP PIs will continue to grow as more peer-reviewed publications are issued.



The following table lists the most frequently cited PIs.

<b>Most cited PIs (by grant)</b>	<b># of publications</b>	<b># of times cited</b>
Burtraw, D. (9613458)	12	16
Gregory, R. (9525582)	10	11
Solow, A. (R825311)	1	6
Sagoff, M. (9613495)	9	5
Geoghegan, J. (R825309)	4	4
<p><b>Note:</b></p> <p>?? All NSF grants consist of a seven-digit number, with the first two numbers representing the award year (i.e., 97xxxx).</p> <p>?? All EPA grants consist of a seven-digit code, with the first letter being "R." The award years can be determined by using the following key:</p> <p>?? If the grant begins with R824 (i.e., R824xxx), then the grant was awarded in 1995</p> <p>?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are between 300 and 400, then the grant was awarded in 1996</p> <p>?? If the grant begins with R825 (i.e., R825xxx), and the last three numbers are greater than 800, then the grant was awarded in 1997</p> <p>?? If the grant begins with R826 (i.e., R825xxx), then the grant was awarded in 1998</p>		





The following is a listing of all the published works featuring publications written by the PIs.

<b>Published Works</b>	<b># DMVEP publications</b>
<b>Books and Chapters in Books</b>	15
<b>Refereed Journals</b>	
Agricultural and Resource Economics Review	3
American Behavioral Scientist	1
American Journal of Agricultural Economics	1
Annals of the American Academy of Political and Social Science	1
Arizona Law Review	1
BioScience	1
Ecological Economics	6
Environmental Science and Technology	1
Forestry Chronicle	1
Human Communication Research	1
Human Ecology Review	4
Journal of Agricultural Economics	2
Journal of Environmental Economics and Management	6
Journal of Environmental Management	2
Journal of Policy Analysis and Management	3
Journal of Public Economics	3
Journal of Risk and Uncertainty	3
Journal of Risk Research	1
Journal of Water Resource Planning and Management	1
Land Economics	2
Pacific Economic Review	1
Policy Studies Journal	2
Rand Journal of Economics	1
Resource and Energy Economics	2
Risk Analysis	2
RISK: Health, Safety, and Environment	1
Scandinavian Forest Economics	1
Science	1
Society & Natural Resources	3
Space Policy	1
Water Resources Research	3
<b>Non Refereed Journals/Unable to Determine</b>	
Camp Resources	1
Climate Issues Brief – Resources for the Future	1
Coastlines	1
Interact: The Journal of Public Participation	1
Proceedings of the Society for Risk Analysis -Europe Annual Meeting	1
Proceedings volume: Building Partnerships for Commercializing University Research	1
Proceedings: 1998 DMVEP Workshop	1
Report from the Institute for Philosophy and Public Policy	1
Resources	1
Water Resources Update	1



<b>Published Works</b>	<b># DMVEP publications</b>
<b>TOTAL</b>	<b>87</b>



## Presentations

Of the 45 PIs indicating whether or not that they had made presentations to professional societies, government, or non-government policy fora and public meetings:

?? 20 (or 44 percent) indicated that they had made at least one presentation

?? 25 (or 56 percent) indicated that they had not made any presentations

## Other Forms of Outreach

Two EPA-funded grants have reported being presented on public radio:

?? Mario Tiesl's 1998 grant (R826618) was reported during June, 1999, on American News Service news release, and during September, 1999, National Public Radio's "Morning Edition" presented a news story featuring the research.

?? Two researchers associated with John Halstead's 1997 grant (R825824) were interviewed as part of a feature story by New Hampshire Public Radio.

## Findings

Findings were extracted from annual and final reports submitted for the research grants. There were 20 grants with no reported findings available and some of the reported findings are preliminary. As noted in the Introduction, this grants program has a limited history, with the first awards taking place in 1995. This section highlights a selection of the grants to illustrate the types of research and findings that are being reported to the grant administrators. As the program matures, grants reach completion, and follow-on work is completed, the literature resulting from the research will grow. Please note that in the following section, only the principal investigator's name is reported for each grant.

?? For the 1995 NSF-funded grant 9525582, Robin Gregory of Decision Science Institute, Inc., used small groups, surveys, and experiments to examine the rationale for using a constructed preferences approach to elicit environmental values. The study employed a decision-pathway method that enabled investigators to structure the values of participants and construct policy options. The findings provide evidence that public values for complex environmental assets are not known in advance but rather are constructed in the course of an elicitation process. This perspective argues for the adoption of environmental survey and small-group approaches that help participants understand the attributes and implications of their own values, as well as technical facts, to a greater extent than is typically done at present.

?? Under the joint 1996 NSF-funded grant 9613458 and 1996 EPA-funded grant R825313, Dallas Burtraw of Resources for the Future investigated the economic cost of policy instruments for environmental protection in the presence of preexisting taxes. He used theoretical and numerical



models to advance the understanding of the interactions between environmental policy and the tax system. The project findings included the following:

- ?? Preexisting distortions away from economic efficiency raise the cost of environmental regulations to the economy in almost all contexts. Preexisting taxes are an important example of a distortion that raises the cost of environmental regulations.
  - ?? The extra cost that is identified in the context of preexisting taxes is an increasing function of the magnitude of preexisting tax rates.
  - ?? The extra cost that is identified in the context of preexisting taxes varies significantly according to the type of policy instrument used to impose environmental regulations. The key characteristic is the ability of the instrument to raise revenues that can be used to reduce other preexisting taxes.
  - ?? Regulatory design and the decision whether to raise revenue with environmental regulations can be equally as important in terms of economic efficiency as the decision to convert fixed emissions quotas into tradable emissions permits. Tax interactions put the permit system that fails to raise revenue at a significant efficiency disadvantage relative to a revenue-raising environmental tax.
- ?? For the 1995 EPA-funded grant R824688, William Schulze of Cornell University conducted an analysis to determine if contingent valuation can provide effective measurements of values. Among the findings were the following:
- ?? A one-shot provision point mechanism with money-back guarantee and proportional rebate of excess contributions was tested. The results show that this relatively simple mechanism is empirically demand-revealing in the aggregate when used with large groups who have heterogeneous valuations for the public good.
  - ?? Field and laboratory experiments were used to test the use of a provision point mechanism to finance renewable energy programs. In contrast to most green pricing programs, relatively high participation is found in the field, while laboratory results suggest that demand revelation is achieved by the mechanism in a single shot environment with a large group of potential participants.
  - ?? Provision point mechanisms should be used in contingent valuation validity testing. The researchers employ such a mechanism in a validity study of green electricity pricing. Some upward hypothetical bias is found even when this improved mechanism is used.
  - ?? The researchers compared phone and mail responses using a contingent valuation questionnaire. Social desirability effects were more prevalent in phone responses to subjective questions, but do not appear to affect hypothetical participation decisions. Neither mode (phone or mail) appears to dominate from the perspective of providing more valid estimates of actual participation decisions.



- ?? For the 1995 EPA-funded grant R824705, Graham Davis of Colorado School of Mines conducted a study of valuing the stock and depletion of mineral assets in national income accounting. The research findings included the following:
- ?? Many of the valuation rules currently used are by necessity simple, with rules that are modified to suit national income accounting needs. Resultant valuations are subject to substantial error. The researchers reformulated rules to make them more consistent with the economic and financial principles of valuation.
  - ?? The Hotelling Valuation Principle, used worldwide for mineral reserve valuation in national income accounting, performs poorly when tested against actual reserve values. The investigators uncover biases in the net price rule, allow for non-constant returns to scale and heterogeneous reserves, and consider the effects of capital constraints on production.
  - ?? The researchers present a model of reserve valuation under price uncertainty, with the important finding that the Hotelling Valuation Principle is an upper bound on reserve value under uncertainty, rather than a lower bound.
- ?? Under the 1995 EPA-funded grant R824707, Gordon Rausser of the University of California Berkeley investigated the economic value of biodiversity as an information resource. The project derived formulas for computing biodiversity option values within a dynamic model of biotechnological innovation. The research findings included the following:
- ?? The researchers found that when scientific models are sufficiently rich to provide useful guides to the search process, promising materials can command significant information rents. Information creates value not so much by increasing the likelihood of a lucrative discovery, but by decreasing search costs in expectation.
  - ?? An increase in the payoff to research success has virtually no effect on genetic resource rents. Furthermore, improvements in search technology actually lower the value of promising leads.
  - ?? Results of a numerical simulation suggest that bioprospecting information rents could, under reasonable assumptions, be large enough to finance meaningful biodiversity conservation.
- ?? Under the 1997 EPA-funded grant R825826, Mark Thayer of San Diego State University investigated improving air quality benefit estimates from hedonic models. The researchers examined the relative importance of data aggregation, attribute tradeoffs, and variation caused by space and time within a hedonic benefit study. Results indicate that air pollution, as measured by ozone, total suspended particulates, and visibility, is a significant determinant of home sale price. Preliminary analysis indicates that previous studies, based both on the hedonic price method and the contingent valuation method, have seriously underestimated the economic value of visibility improvements.



## Infrastructure Products (Software, Databases, Web Pages, etc.)

- ?? No web pages were developed as part of these DMVEP grants.
- ?? One of the PIs created a statistical program to aid simulations for logistic regression applications.
- ?? Three PIs indicated that a total of four databases were created for work performed under the DMVEP grants.

## Honors

Phaedra Corso (under James Hammitt's 1996 EPA-funded grant R825312) presented findings on respondents' preferences between lotteries on lifespan at the 1999 Society for Medical Decision Making annual conference, where it was awarded the Lee B. Lusted Student Prize.

## Educational Outcomes

By reviewing the grantee's annual and/or final reports as well as budget information from the participating agencies, the following items were determined:

- ?? A total of 45 graduate students, undergraduate students, interns, and post docs participated in the grants.
  - ?? 42 of the 45 (94 percent) were graduate students
  - ?? 2 of the 45 (4 percent) were post-doc students
  - ?? 1 of the 45 (2 percent) was an undergraduate student
  - ?? No interns were reported on any of the grants
- ?? One MA/MS Thesis was produced under V. Kerry Smith's 1998 EPA-funded grant (R826609). Entitled, "Evaluation of how SEE, hedonic and RUM indexes compare in developing local price indexes," it was written by Spencer Banzhaf.
- ?? Only one doctoral thesis was reported as being produced in conjunction with a DMVEP grant—the thesis was produced under James Opaluch's 1995 EPA-funded grant (R824709).
- ?? Ten PIs reported significant educational outcomes; most frequently cited were presentations made at universities or colleges. More than 20 presentations made at universities were attributed to the research gleaned from the PI's participation in the DMVEP grant program.
- ?? Mark Sagoff in his 1996 NSF-funded grant (9613495) presented a four-day seminar on Political and Economic Factors in Environmental Policy at the University of Oklahoma in January, 2000. He also made numerous presentations about the Noneconomic and Economic Value of Biodiversity at Ohio State University in February, 2000.



- ?? Thomas Dietz reported that his 1998 NSF-funded grant (9815876) produced significant impact on three classes taught at George Mason University:
  - ?? A section covering local policy initiatives and notions of social capital was added to this course (Sociology 633)
  - ?? A new introductory course for the Environmental Sciences program focused on the messy intersection of science and politics in environmental policy making
  - ?? A graduate environmental policy seminar (Environmental Sciences 511) will be started that will deal with the theory and practice of democratic policy making
  
- ?? As a result of his NSF-funded grant (9613495), Mark Sagoff changed the curriculum of the environmental ethics and policy courses that he teaches.
  
- ?? Under Bryan Norton's 1997 NSF-funded grant (9729229), a new capstone course was added to the PhD curriculum of the School of Public Policy at Georgia Tech, "Ecosystem Management: Theory and Practice."
  
- ?? On-going research through Max Pfeffer's 1996 NSF-funded grant (9613493) has been presented in seminars at both Cornell University and the University of Massachusetts.

## Career Outcomes

Very little information was reported on career outcomes related to the DMVEP grant. PI Sagoff served as President of the International Society for Environmental Ethics during his grant period, as well as serving as a Fellow of the Woodrow Wilson Center for International Scholars from 1998-99. PI Sagoff also served as a member of the National Academy of Science (National Research Council) Committee to study the Noneconomic and Economic Value of Biodiversity.

## Conclusion

The DMVEP Grants Program exhibits characteristics expected from a maturing and expanding research program. Many publications on environmental valuation are being produced, both from within this grant program and outside of it. The cross-section of the research community represented by the DMVEO principal investigators indicates that the researchers continue to develop and improve methods as they apply them to diverse environmental issues. The DMVEP Grants Program will benefit from the insights, observations, and recommendations of the interim assessment reviewers, whose contributions will be used to improve the program.



## **APPENDIX A**

### **GRANTS BY RESEARCH CATEGORY, TOPIC, AND METHODS**



## **APPENDIX B**

# **PUBLICATIONS DATABASE FOR DMVEP INTERIM ASSESSMENT**

Published or  
Pending Publication  
as of 3/00

## **APPENDIX C**

# **DMVEP RESEARCH GRANT ABSTRACTS AND FINDINGS**