

**Wisconsin Department of Natural Resources
Natural Resources Board Agenda Item**

SUBJECT: The Board will be provided an overview of the proposed Department Handbook on Scientific Integrity. Board input and guidance will be used in the final drafting of the handbook.

FOR: April 2013 Board meeting

TO BE PRESENTED BY: Jack Sullivan, Director Science Services

SUMMARY:

It is the policy and direction of the Natural Resources Board and the department when managing the state's natural resources, to use the principles of scientific management in the development of scientific information used in decision-making. (e.g., NR 1.01, 1.02, 1.95) The handbook, and the policy contained within, establishes the principles and guidelines for professional conduct and management of scientific and scholarly activities, and the use of scientific and scholarly information, by and on the behalf of the Wisconsin Department of Natural Resources. The guidelines contained in this handbook are in addition to and do not supercede Chapter ER-MS 24, Wis. Adm. Code, establishing a Code of Ethics for State employees, as well as the department's "Code of Ethics for Department Personnel" (Manual Code 9121.1), "Work Rules" (Manual Code 9121.06), and state personnel rules and policies. This handbook will apply to all department employees.

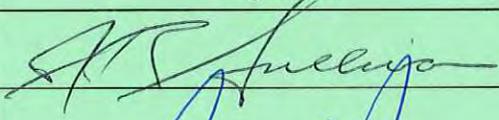
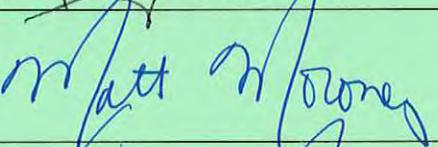
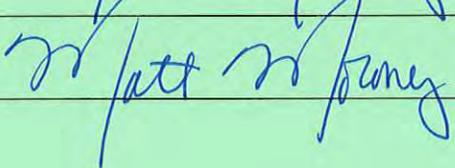
Document Creation Background:

The Bureau of Science Services was requested by administration to draft a Handbook on Scientific Integrity. In development of the handbook, the Science Services Management Team and a small group of staff reviewed 24 Federal agency scientific integrity policies, as well as the published literature on the topic. In addition, existing Department Manual Codes addressing similar subjects (i.e. ethics) were reviewed and are referenced as part of this handbook. Based on this information a comprehensive outline was developed and shared with staff. A revised outline was then reviewed by agency administration and a member of the Natural Resources Board. A drafting team was pulled together to prepare the handbook which was then distributed to agency Divisions for review. A final draft based on the comments received was prepared by the team and is now being shared with the Natural Resources Board. After Board and public input the team will prepare a final draft for agency approval.

RECOMMENDATION: Information and input/guidance.

LIST OF ATTACHED MATERIALS (check all that are applicable):

- Background memo
- Scientific Integrity Handbook Draft April 2013
- Type name of attachment or type N/A if not applicable
- Type name of attachment or type N/A if not applicable

Approved by	Signature	Date
Jack Sullivan, Bureau Director		4/10/2013
Tim Lawhern, Administrator		4/15/13
Cathy Stepp, Secretary		4/15/13

**Wisconsin Department of
Natural Resources**

**Scientific Integrity
Handbook**

(DRAFT: April) 2013

Disclaimer

This Handbook, and the policy contained within, establishes guidelines for the professional conduct and management of scientific and scholarly activities, and the use of scientific and scholarly information, by and on behalf of the Wisconsin Department of Natural Resources (department). The guidelines contained in this Handbook are in addition to and do not supersede Chapter ER-MRS 24, Wis. Adm. Code, establishing a “Code of Ethics for State Employees,” as well as the department’s “Code of Ethics for Department Personnel” (Manual Code 9121.1), “Work Rules” (Manual Code 9121.06), and state personnel rules and policies. These and related statutes, administrative codes, and department Manual Codes and Handbooks are incorporated by cross-reference where appropriate.

The policy in this Handbook is created against a complicated management and regulatory backdrop; the policy is intended to guide department activities in areas that are already subject to numerous rules and policies for various purposes. When there is overlap with other applicable rules and guidance, this policy is not intended to preempt other authorities, but instead to work in conjunction with and supplement them. This policy is intended to improve the internal management and operation of the department. It does not create any obligation, right or benefit for any member of the public, substantive or procedural, enforceable by law or in equity by any party against the State of Wisconsin, its departments, agencies, or entities, its officers, employees or agents, or any other person.

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Department Principles of Scientific Integrity

This section of the Handbook lays out the department's core values related to scientific integrity. These principles underlie and guide the interpretation of the policy, particularly in cases where ambiguity may arise during implementation. These principles affirm the department's high standards for scientific integrity and are consistent with internationally accepted standards for the responsible conduct of research¹ as well as the principles that underlie various federal agency scientific integrity policies.

As we carry out our public trust and regulatory responsibilities, all department staff will be:

Honest in all aspects of scientific effort and:

- Approach all scientific and scholarly activities objectively and thoroughly.
- Clearly identify and differentiate between facts, personal opinions, assumptions, hypotheses, professional judgments, and expert opinions in reporting the results of scientific and scholarly activities, characterizing associated uncertainties when using those results for decision making, and representing those results to other scientists, decision makers, and the public.
- Preserve the integrity of the data record through adherence to quality assurance and quality control (QA/QC) and data management standards.
- Never fabricate nor delete raw data.
- Objectively consider conflicting data and/or studies.
- Accurately report results in a timely manner without allegiance to individuals, organizations, or ideology.
- Disclose any apparent, potential, or actual financial conflicts of interest or non-financial conflicts of interest of their own and others.
- Acknowledge in publications the names and roles of those who made significant contributions to scientific and scholarly activities, including authors, reviewers, funders, sponsors, and others who do not meet authorship criteria.

Accountable in the conduct of scientific and scholarly activities and interpretation of research results and:

- Emphasize the use of peer-reviewed science.
- Use entrusted resources responsibly, including equipment, funds, and staff and volunteer time.
- Disclose all research methods used, available data, final reports, and publications consistent with applicable scientific standards, laws, and policies.
- Provide scientific and scholarly advice as requested to inform department and other decision makers as a component of decisions that often must balance scientific information with public input and desires as well as economic factors.

¹ See, for example, the "Singapore Statement on Research Integrity" developed as part of the 2nd World Conference on Research Integrity held in 2010: www.singaporestatement.org; the European Science Foundation's "The European Code of Conduct for Research Integrity" published in 2010: www.esf.org/publications.html; and the Australian government's *Australian Code for the Responsible Conduct of Research* adopted in 2007: www.nhmrc.gov.au/guidelines/publications/r39.

Professional, courteous, and fair in working with others and:

- Neither unfairly hinder the scientific and scholarly activities of others nor engage in dishonesty, fraud, deceit, misrepresentation, coercive manipulation, or other scientific (research) misconduct.
- Provide constructive, objective, and frank evaluation to others on their scientific and scholarly activities as appropriate for standards of respectful peer review, and accept constructive critique from others.
- Contribute to open and respectful scientific and scholarly discourse that adheres to scientific and scholarly standards for reporting results and conclusions.
- Respect the intellectual property rights of others, including acknowledging and crediting prior work.

Good stewards on behalf of others and:

- Diligently create, use, preserve, document, and maintain scientific and scholarly collections and data.
- Adhere to established quality assurance and quality control programs.
- Follow department record retention policies, and comply with laws and agreements related to use, security, and release of confidential and proprietary data.
- Adhere to the laws and policies related to protection of human research subjects, natural and cultural resources, and research animals while conducting scientific and scholarly activities.
- Respect, to the fullest extent permitted by law, confidential and proprietary information provided by businesses, communities, and individuals whose interests are studied or affected by scientific and scholarly activities or the resulting information.
- Immediately report any observed, suspected, or apparent scientific (research) misconduct.

The policy in this Handbook is created against a complicated management and regulatory backdrop with numerous rules and policies, each with its own purposes and implementation procedures. The principles expressed here, and the policy included in the Handbook, are intended to improve the internal management and operation of the department while recognizing that decisions regarding natural resources management and environmental protection are informed by a variety of factors including scientific, social, cultural, legal, economic, budgetary, institutional, and environmental considerations.

Department Policy on Integrity of Scientific and Scholarly Activities

1. Purpose

This Handbook establishes the Department of Natural Resources' (department's) principles of scientific integrity, a general policy on the integrity of scientific and scholarly activities that the department undertakes to inform management and public policy decisions, and guidelines regarding responsibilities related to carrying out such activities.

- 1.1. It is the policy of the Natural Resources Board and the department to seek the best available and most current scientific information on which to base its policy, management, and regulatory decisions (*e.g.*, ss. NR 1.01, 1.02, 1.11(1), 1.15(3), 1.95, and 1.98(1), Wis. Adm. Code). Other factors that may inform department decision making include social, cultural, legal, economic, budgetary, institutional, and environmental considerations.
- 1.2. The principles, guidelines, and procedures presented in this Handbook seek to promote and ensure a culture of scientific integrity within the department. A culture of scientific integrity is one that ensures that scientific decisions are the product of honest investigation, open discussion, refined understanding, and a firm commitment to evidence, and at the same time are shielded from inappropriate personal biases, outside influences, and conflicts of interest.
- 1.3. The principles, guidelines, and procedures presented in this Handbook seek to strengthen the credibility of state government scientific and scholarly activities. Scientific and scholarly information considered in department decision making should be robust, of the highest quality, and result from as rigorous scientific and scholarly processes as can be achieved. Most importantly, scientific and scholarly information should be objective and trustworthy as this information is an important factor that informs decision making on public policies.
- 1.4. The scientific and scholarly ethical standards, including codes of professional conduct, presented in this Handbook further define and clarify responsibilities related to the integrity of scientific and scholarly activities and information, among agency science professionals, department managers, and agency decision makers. Successful application of science in department policy decisions relies on the integrity of the scientific process both to ensure the validity of scientific information and to engender public trust in the department. Thus, it is essential that department decision makers involve science experts on scientific issues, and that the scientific and scholarly information relied upon in policy making manifest scientific integrity, quality, rigor, and objectivity.
- 1.5. This Handbook also establishes a process for the reporting and handling of cases of alleged scientific (research) misconduct.

- 1.6. Finally, the policies outlined in this Handbook are intended to facilitate the free flow of scientific and scholarly information consistent with applicable laws, regulations, and policies.

2. Scope

As of the effective date, this Handbook and policy applies to:

- 2.1. All department employees (including science professionals, department managers, and decision makers) when they engage in, supervise, manage, or influence scientific and scholarly activities, communicate information about the department's scientific and scholarly activities, or use scientific and scholarly information in making agency policy, management, or regulatory decisions.
- 2.2. All contractors, cooperators, partners, permittees, leasees, and grantees (collectively referred to as partners in this Handbook) who assist with developing or applying the results of scientific and scholarly activities.
- 2.3. All volunteers who assist with developing or applying the results of scientific and scholarly activities.

Effective Date of Policy: XX-XX-2013

3. Definitions

This section of the Handbook provides definitions for terms used throughout this Handbook and policy that in the absence of definition might have multiple meanings, be subject to interpretation, or otherwise be misunderstood.

- 3.1. Allegation – Any written or oral statement of possible scientific (research) misconduct made to a department employee or to an employee of a department partner.
- 3.2. Bias (Research Bias) – Research bias, also called experimenter bias, is a process where the scientist(s) performing the research influence results that produce a certain outcome. Research bias can result from intentional or unintentional actions. Careful experimental design reduces the likelihood of bias.
- 3.3. Complainant – An individual or entity who makes an allegation of scientific (research) misconduct under the procedures set forth in Section 7 of this policy.
- 3.4. Conflict of Interest – Any financial or non-financial interest which conflicts with the actions or judgments of an individual when conducting scientific and scholarly activities because it: 1) could impair the individual's objectivity, 2) could create an unfair

competitive advantage for any person or organization, or 3) could create the appearance of either item listed above.

- 3.5. Decision Makers – Department of Natural Resources employees, including those in appointed positions, who may: 1) develop policies or make determinations about policy or agency management, 2) make determinations about expenditures of department funds, 3) implement or manage activities that involve, or rely on, scientific and scholarly activities, or 4) supervise employees who engage in scientific and scholarly activities.
- 3.6. Department Managers – Department of Natural Resources personnel with supervisory responsibilities, including the Secretary and members of the Secretary’s staff, Division Administrators, Bureau Directors, Section Chiefs, and other first-line supervisors.
- 3.7. Expert Opinion – A belief about matters commonly considered to be subjective that results from interpretation of facts and is supported by an argument informed by virtue of credentials, training, education, profession, skill, publication, or experience beyond that of the average person. In the context of this policy, expert opinion relates to opinions about the facts associated with scientific and scholarly activities, not policy or legal interpretations. Different experts may draw opposing opinions from the same set of facts and expert opinions rarely change without new arguments being presented and substantiated.
- 3.8. Fabrication – Making up data or scientific results and recording or reporting them for the purposes of deception.
- 3.9. Falsification – Manipulating research materials, equipment, processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- 3.10. Human Subject Research – The collection and analysis of data that involves the use of human subjects in any capacity in order to answer a specific question. Examples include but are not limited to surveys, questionnaires, interviews, and focus groups. Human subject research can also involve analysis of biological specimens, as well as epidemiological, behavioral, and medical studies.
- 3.11. Hypothesis – A proposed explanation for an observed phenomenon, generally based on previous observations that cannot be explained satisfactorily with available scientific theories. The scientific method requires that hypotheses be testable.
- 3.12. Inventory – Structured activities employed to survey and assess the status and changing conditions of the natural resource features (e.g., fish and wildlife populations, air and water quality conditions, etc.).
- 3.13. Media – Formal communication channels through which news, entertainment, information, education, data, or promotional messages are disseminated. Media includes

all broadcasting and narrowcasting medium such as newspapers, magazines, television, radio, billboards, and direct mail, telephone, fax, and internet marketing.

- 3.14. **Monitoring** – Structured activities employed to systematically observe and check the progress or quality of natural resource features (e.g., fish and wildlife populations, air and water quality conditions, etc.) over a period of time. Monitoring is often used as a component of program evaluation.
- 3.15. **Peer Review** – The objective evaluation of work by one or more people of similar competence to the producer(s) of the work; a form of self-regulation by qualified members of a profession within the relevant field employed to maintain standards of quality, improve performance, and provide credibility.
- 3.16. **Personal Opinion** – A belief about matters commonly considered to be subjective that may result from an individual’s perspective, understanding, particular feelings, beliefs, and desires, or from unsubstantiated information. Personal opinions may relate to scientific and scholarly activities, but more typically relate to policy decisions or legal interpretations.
- 3.17. **Plagiarism** – The appropriation of another person’s ideas, processes, results, or words without giving appropriate credit; copying the work of others without attribution.
- 3.18. **Professional Judgment** – The exercise of unsupervised decision making informed by widely accepted best practices within a profession. The decision making may rely on the rules, standards, and arrangements within an organization.
- 3.19. **Professional Society** – A group of people having acquired similar specialized knowledge after intensive academic preparation in a particular field.
- 3.20. **Quality Assurance** – Procedure or set of procedures intended to ensure that a product or service under development (before work is complete) meets specified requirements. Among the processes that are considered in quality assurance are planning, design, development, production, and service.
- 3.21. **Quality Control** – Procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer.
- 3.22. **Research** – As defined in Manual Code 8104.1 (“Centralized Research Program”), research includes activities that apply the scientific method and principles of experimental design to produce information, develop technologies, and support the application of science. The aims of research include: 1) the discovery and sound interpretation of new facts and relationships, 2) the synthesis of existing information, analysis of emerging concepts, and revision of accepted conclusions, and 3) the practical application of these new or revised conclusions to guide department programs. Research

activities include both experimental and non-experimental and quantitative and qualitative approaches. Research includes:

- Basic research – systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind.
- Applied research – systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

3.23. Respondent(s) – An individual (or individuals) against whom an allegation of scientific (research) misconduct is made under the procedures set forth in Section 7 of this policy.

3.24. Science – Science at the department is the systematic study of the structure and behavior of Wisconsin's natural resources, and their related ecosystems, including people; and the integration of research, analysis, observations, monitoring, and modeling, or subsets of those and related fields of study. Department science, which is informed by the broader scientific enterprise, includes discoveries and new understandings of natural resources and their intimate relationship to humans, and the application of this understanding to management issues. Science provides the fundamental basis of the service and stewardship elements of the department's mission.

3.25. Scientific and Scholarly Activities – Activities involving inventorying, monitoring, experimentation, study, research, modeling, and scientific and scholarly assessments. Scientific and scholarly activities are conducted in a manner specified by documented protocols and procedures and include any of the physical, biological, cultural, or social and economic sciences as well as landscape architecture, engineering, mathematics, and statistics that employ the scientific method.

3.26. Scientific Integrity – The condition resulting from adherence to professional values and practices when conducting and applying the results of science that ensures objectivity, clarity, and reproducibility, and that provides insulation from bias, fabrication, falsification, plagiarism, interference, censorship, and inadequate procedural and information security.

3.27. Scientific Method – The principles and empirical processes of discovery and demonstration considered characteristic of or necessary for objective scientific investigation. The scientific method generally involves the observation of phenomena, identification of a question or problem, collection of observational, experimental, or other relevant data, formulation of a hypothesis, and the empirical testing of the hypothesis in a manner that allows reproducibility of procedures/replication of results.

3.28. Scientific (Research) Misconduct – The violation of the standard codes of scholarly conduct and ethical behavior in professional scientific and scholarly activities. Scientific misconduct is a broad concept that includes, but is not limited to, actions like plagiarism, distortion of the research process by fabrication or misrepresentation of data, gross negligence in the care of animals used in research, failure to obtain informed consent in human subject research, editorial modification or censorship of research results,

withholding information that might not support conclusions, interpretations, or applications, or distortion of the research process in other ways. Misconduct does not include honest error or differences of opinion.

- 3.29. Science Professionals –Employees and volunteers of the department or partner organizations who engage in scientific and scholarly activities as a part of their duties. The term, as used here, is not intended to refer to the Wisconsin Science Professionals collective bargaining unit.
- 3.30. Traceability – The ability to discover by going backward over the evidence step by step. With respect to research, this includes the ability to reproduce results by reviewing all documented data from the beginning of the process to the end. Full traceability requires that documentation of all steps taken and processes used be maintained.
- 3.31. Transparent (Transparency) – Characterized by visibility or accessibility of information. As used in science, engineering, and business, transparency more generally implies openness, communication, and accountability. Operating transparently allows others to see what actions are performed and what decisions are made.

4. Integrity of Scientific and Scholarly Activities

This section of the Handbook lays out specific guidelines related to the conduct of scientific and scholarly activities. Many scientific integrity-related policies and procedures are already addressed in Wisconsin Statutes, administrative codes, and department Manual Codes and Handbooks. Such existing policies are incorporated by cross-reference where appropriate.

- 4.1. **Conflicts of Interest** – Section ER-MRS 24.04(2)(a), Wis. Adm. Code, establishes the requirement that “no [state] employee may use or attempt to use his or her public position... or use the prestige or influence of a state position to influence or gain financial or other benefits, advantages, or privileges for the private benefit of the employee, the employee’s immediate family, or an organization with which the employee is associated...”
 - 4.1.1. All department employees should review the department’s guidelines on outside employment and political activities (Manual Codes 9103.2 and 9103.31, respectively). Additionally, department employees involved in outside forestry employment should review the guidelines for outside forestry employment (Manual Code 9103.21) and credentialed department employees should review the guidelines for outside employment of credentialed employees (Manual Code 9103.22).
 - 4.1.2. Furthermore, Manual Code 9121.1 provides guiding principles to reduce conflict “between the private interests and official duties of Department employees.” Self-disclosure of potential conflicts of interest is critical to maintaining accountability and integrity in scientific and scholarly activities. All department employees

should be familiar with this Manual Code and consult with their supervisor(s) if they believe that a substantial conflict of interest could develop in carrying out their official duties.

4.1.3. The department's "Work Rules" (Manual Code 9121.06) require all department employees to refrain from "requesting, retaining or failure to report [an] offer of a bribe or gratuity" and the department's guidelines on "Employee Political Activities" (Manual Code 9103.31) prohibit department employees from "offering to pay or accept benefits in return for desired political action or inaction."

4.1.4. No department employee will be allowed to work under the immediate supervision of, or directly supervise, a relative also employed by the department. Relatives of current department employees may be offered employment only when the offer of employment is made in accordance with Manual Codes 9171.5, 9170.7, and 9172.1, and applicable civil service rules.

4.2. **The Scientific Method, Experimental Design, and Data Management** – Scientific and scholarly activities should be conducted using documented protocols and procedures that build upon the scientific method. Written protocols for conducting research, inventory, and monitoring, and maintaining records supporting these activities and their results should allow for the traceability of the processes employed.

4.2.1. Science professionals should strive to minimize the likelihood of research bias in the scientific and scholarly activities that they undertake. This includes following thoughtful experimental designs, adhering to established quality assurance and quality control standards, applying rigorous statistical analyses, and providing transparency for methods, data, analyses, and interpretations used.

4.2.1.1. To ensure robust experimental designs, hypotheses should be stated clearly.

4.2.1.2. To ensure traceability, meticulous records should be kept of all steps taken, processes used, and results obtained.

4.2.1.3. Peer review of experimental/study designs prior to initiating scientific and scholarly activities can help science professionals avoid missing opportunities or duplicating prior work. It can also help identify and eliminate research biases.

4.2.2. Science professionals are responsible for creating, using, preserving, documenting, and maintaining records, methodologies, and information in accordance with established policy and procedures, including applicable quality assurance and quality control standards and the department's Records Management Handbook (9520.5). Data and records associated with scientific and scholarly activities constitute public records, when deemed final by the department.

4.2.3. Science professionals are responsible for data used or created during the course of their scientific and scholarly activities and the integrity of the conclusions, interpretations, and applications derived from the data. To this end, data should be managed in accordance with established policies, procedures, and applicable data standards. Data collected as part of scientific and scholarly activities constitute public records, when deemed final by the department.

4.2.4. Analytical Support – The State Laboratory of Hygiene, under s. 36.25(11), Wis. Stats., provides analytical and other services to department programs. In order to achieve maximum efficiency and effectiveness in providing laboratory services for department programs, procedures for ensuring “Coordination of Analytical Support for Department Programs” are outlined in Manual Code 4810.1.

4.2.5. Aerial Remote Sensing – The department’s guidelines for “Aerial Remote Sensing” (Manual Code 8622.3) specifies procedures to ensure employment of the most effective techniques, provide for multiple-use of aerial photographs, and avoid unnecessary duplication of effort.

4.2.6. Science professionals are responsible for not withholding information that might not support predetermined or desired conclusions, interpretations, or outcomes.

4.2.7. Science professionals are responsible for identifying, justifying, and carefully documenting procedures for identifying and excluding faulty data. In doing so, science professionals should not let personal reactions or outside influences interfere with their professional judgments.

4.3. **Protection of Cultural and Natural Resources in Scientific and Scholarly Activities** – The department is committed to remaining a good steward of the natural and cultural resources entrusted to it. Accordingly, department managers and science professionals should comply with all relevant statutes, administrative rules, case law, and department policies applicable to cultural and natural resources when carrying out scientific and scholarly activities, and should carry out their scientific and scholarly activities in an ethical and responsible manner.

4.3.1. Field Archaeology Activities – Section 44.47, Wis. Stats, requires a permit from the State Archaeologist to conduct field archaeology on land owned by the state, a county, or a municipality. The department’s guidelines for “Field Archaeology on Department Lands” (Manual Code 1446) outline procedures associated with permits involving department-owned lands.

4.3.2. Research in State Natural Areas – Anyone who wishes to collect specimens or do research on Wisconsin State Natural Areas, including department employees and volunteers, is required to apply for permission. The department’s “Procedure for Obtaining a Permit for Collecting or Doing Research on Wisconsin State Natural Areas” (Manual Code 1752.1) outlines the procedure for obtaining a permit for collecting or doing research on Wisconsin State Natural Areas as permitted in ss.

23.28(3), 23.29(10), and 23.29(22), Wis. Stats., and as authorized in s. NR 45.13(1), Wis. Admin. Code.

- 4.3.3. Natural Heritage Inventory Reporting – The Department’s Endangered Resources Handbook (1724.5) establishes procedures for obtaining objective observations on endangered and threatened species and on other species for which more information is needed. Science professionals and partners who observe endangered and threatened species during the course of their scientific and scholarly activities should report the occurrences following the department’s standard protocols using the Miscellaneous Observation Forms (Forms 1700-14 and 1700-15 available on the department’s Web site).
- 4.3.4. Invasive Species – Ch. NR 40, Wis. Admin. Code, classifies invasive species into “prohibited” and “restricted” categories. With certain exceptions, the rule bans the transport, possession, transfer, and introduction of prohibited species and the transport, transfer, and introduction (but not possession) of restricted species. The department may issue permits for research on prohibited and restricted species. Department science professionals and partners working with invasive species should obtain the appropriate permits prior to beginning their research and should comply with permit provisions throughout the course of their scientific and scholarly activities.
- 4.3.5. Invasive Species Reporting – Early reports of newly established species or populations facilitates rapid response and control activities that can help prevent the spread of invasive species into new areas. Science professionals and partners observing invasive species during the course of their scientific and scholarly activities should report the occurrences following the department’s standard protocols (available on the department’s Web site).
- 4.3.6. Historic Preservation – Section 44.40, Wis. Stats, requires each state agency to develop an historic preservation program with the Wisconsin Historical Society. The department accomplished this through a Memorandum of Agreement. Guidelines on “Historic Preservation” (Manual Code 1810.1) provide the procedures to implement the agreement. Manual Code 1810.1 also provides procedures to comply with related federal laws.
- 4.4. **Animal Care and Use in Scientific and Scholarly Activities** – The department is committed to ensuring the continued health and vitality of Wisconsin’s wildlife resources. Accordingly, department managers, science professionals, and partners should comply with all relevant statutes, administrative rules, case law, and polices applicable to the care of animals when carrying out scientific and scholarly activities, and should carry out their scientific and scholarly activities in an ethical and responsible manner.
- 4.4.1. The transportation, care, and use of animals, especially warm-blooded vertebrates, in scientific and scholarly activities should be in accordance with the federal Animal Welfare Act (7 U.S.C. 2131 *et. seq.*), its implementing regulations (*CFR*,

Title 9, Chapter 1, Subchapter A, Parts 1-3), and other applicable federal and state laws, administrative rules, case law, guidelines, and policies.

- 4.4.2. The *U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training*, promulgated by the Interagency Research Animal Committee and adopted by U.S. Government agencies that either develop requirements for or sponsor procedures involving the use of vertebrate animals (including wildlife species), provide a framework for ensuring humane and ethical use and care.
- 4.4.3. Department science professionals and partners should plan and conduct experiments involving animals in accordance with the highest scientific, humane, and ethical principles. Proper use of animals, including the avoidance or minimization of discomfort, distress, and pain when consistent with sound scientific practices, is imperative.
- 4.4.4. Science professionals and support personnel should be appropriately qualified and experienced for conducting procedures involving living animals and department managers should ensure adequate arrangements for staff in-service training.
- 4.4.5. Application of science-based standards, such as the guidelines produced by tax-specific professional societies (see, for example the “References and Additional Reading” section), will be valuable to federal agencies that regulate wildlife research and to the department’s institutional animal care and use committee in determining whether a practice is appropriate.
- 4.4.6. Federal Scientific Collectors Permit— The federal Migratory Bird Treaty Act allows the U.S. Fish and Wildlife Service to issue permits for scientific collecting, special purposes (rehabilitation, educational, migratory game bird propagation, and salvage), take of depredating birds, and various other purposes. The regulations governing these permits are contained in *50 CFR 13* and *50 CFR 21*. Department science professionals and partners working with migratory birds should obtain the appropriate permits prior to beginning their research and should comply with permit provisions throughout the course of their scientific and scholarly activities.
- 4.4.7. The department’s institutional animal care and use committee reviews research protocols involving live, warm-blooded, vertebrate animals. Science professionals undertaking such studies should obtain approval from the committee prior to beginning their scientific studies.
- 4.4.8. Partners conducting research involving live, warm-blooded, vertebrate animals shall obtain approval from their respective institutional animal care and use committee or other applicable oversight body prior to beginning their scientific studies.

4.5. **Human Subjects in Scientific and Scholarly Activities** – The department is committed to ensuring the continued health and well-being of Wisconsin’s citizens. Accordingly, department managers and science professionals should comply with all relevant statutes, administrative rules, case law, and polices applicable to human subjects research when carrying out scientific and scholarly activities, and should carry out scientific and scholarly activities in an ethical and responsible manner.

- 4.5.1. Research is considered to involve human subjects when an investigator conducting research obtains either: 1) data through intervention or interaction with a living individual, or 2) identifiable private information about a living individual. (*45 CFR 46*)
- 4.5.2. The U.S. Environmental Protection Agency’s EPA Order 1000.17 Change A1 (“Policy and Procedures on Protection of Human Research Subjects in EPA Conducted or Supported Research”) requires that all covered human research conducted or supported by the EPA be compliant with *40 CFR 26*, and sets forth procedures designed to help assure such compliance.
- 4.5.3. Department employees seeking to survey members of the public should follow the department’s “Surveys Clearinghouse Procedures” (Manual Code 1511.1).
- 4.5.4. Partners conducting research involving human subjects shall obtain approval from their respective institution’s Institutional Review Board or other applicable oversight body prior to beginning their scientific studies.

4.6. **Scientific and Technical Peer Review** – Independent peer review of department scientific and scholarly activities is a crucial aspect of scientific integrity. Accordingly, the department welcomes constructive criticism of scientific and scholarly activities and products, including economic and social science activities and products, and promotes responsiveness to peer review. In addition, the department recognizes the importance of department scientists participating in the peer-review of the scientific and scholarly work of others working outside of the department.

- 4.6.1. Department managers and science professionals should ensure that data and research efforts used to support policy decisions undergo independent peer review by qualified experts, where feasible and appropriate, and consistent with law.
- 4.6.2. Department managers and science professionals should welcome constructive criticism of scientific and scholarly activities. Peer review should be accepted in a professional manner with the sole intent to maintain standards of quality, accuracy, and credibility of the department.
- 4.6.3. Peer reviews prepared by department managers and science professionals should provide constructive, objective, and valid peer review for the purpose of maintaining the integrity of the scientific and scholarly activities and products, department employees, and the department. Peer reviews should remain free of

unfounded personal opinions, personal or professional jealousy, competition, non-scientific disagreement, or conflicts of interest.

4.6.4. Peer review of experimental/study designs prior to initiating scientific and scholarly activities can help science professionals avoid missing opportunities or duplicating prior work. It can also help identify and eliminate research biases.

4.7. **Communicating Results of Scientific and Scholarly Activities and Release of Scientific Information** – The department is committed to facilitating open communication among science professionals, between department employees and the scientific and technical community, and between department employees and the public. The department requires the results of department-funded research, both internal and external, to be made available to the scientific community and to the public, consistent with privacy, security, ethics, and proprietary considerations. Further, as outlined in the department's Media Relations Handbook (8505.1), it is the department's goal to provide clear, accurate, and timely information to media representatives, stakeholders, and the general public on issues affecting public and environmental health, natural resources, and environmental management policies. To this end, the department may appoint designated spokespersons to manage public information and media relations.

4.7.1. **Presumption** – Under this policy, scientific and scholarly information of the department and expert opinion of department employees should be communicated openly unless specific provisions in law or department policy dictate otherwise. Department employees should be careful to distinguish between expert opinions and personal opinions, particularly if their personal opinions differ from department policies or decisions. Department managers can assist department employees in clarifying the differences between expert opinion and personal opinion. In addition, the following specific limitations should be considered.

4.7.1.1. **Confidential and Proprietary Information** - The department's "Work Rules" (Manual Code 9121.06) require all department employees to refrain from "unauthorized disclosure of confidential information and records." Particular care should be taken to protect the confidentiality of interview and survey participants and data included in the Natural Heritage Inventory.

4.7.1.2. **Authorization** – The department's "Work Rules" (Manual Code 9121.06) require all department employees to refrain from unauthorized distribution of written material.

4.7.1.3. **Clarity** – The department's "Code of Ethics for Department Personnel" (Manual Code 9121.1) requires all department employees to "strive to protect the department's programs and personnel from misrepresentation and misunderstanding." Department employees should be aware that public expressions of personal opinion that do not reflect department decisions or policies can contribute to misunderstandings.

- 4.7.1.4. **Statements of Policy** – The department’s “Code of Ethics for Department Personnel” (Manual Code 9121.1) requires all department employees to “issue public statements on matters relating to department policies and procedures only after verifying the accuracy of their information.” Department employees should exercise care when publically expressing personal opinions regarding matters related to department policies and decisions so that their stated personal opinions do not undermine department policies and decisions.
- 4.7.1.5. **Accuracy** – The department’s “Code of Ethics for Department Personnel” (Manual Code 9121.1) requires all department employees to “express opinions in public on technical natural resources subjects only after becoming fully informed as to the facts.” To the greatest extent possible, expert opinions should reflect the current state of the science, be evidence-based, and be informed by the professional standards of the science professional’s scientific or scholarly field.
- 4.7.1.6. **Personal Opinion** – The department’s “Media Relations Handbook” (8505.1) requires that, if department employees express personal opinions to the news media using letters or other means, they must do so outside of work hours. Department employees should ensure that media reporters understand that the employee is not speaking for the department. Department employees who are interviewed or otherwise convey personal opinions to the media should not do so while on department premises nor use department equipment.
- 4.7.1.7. **Personal Opinion** – Department employees should exercise care when publically expressing personal opinions regarding matters related to department policies and decisions so that their personal opinions do not undermine department policies and decisions or foster misunderstandings of department policies or decisions. Statements of personal opinions or unsubstantiated remarks that may call into question the integrity of or reflect negatively on the department should be avoided.
- 4.7.1.8. **Judicial Proceedings** – The Bureau of Legal Services is responsible for preparing cases substantively and procedurally for hearings held by either the department or by the Department of Administration’s Division of Hearings and Appeals. Procedures for “Department Personnel Appearing or Testifying at Department or Division Hearings” are outlined in Manual Code 8307.5. To ensure testimony is orderly and concise, Legal Services staff consult with department witnesses prior to the beginning of hearings. In addition, inappropriate or premature disclosure of information related to a legal proceeding may jeopardize the department's position in the proceeding and could be subject to disciplinary action outside of this policy.
- 4.7.1.9. **Legislative Proceedings** – The extent to which state government employees, including department employees, may engage in political activities is set forth in ss. 11.36 and 230.40, Wis. Stats., and by the Federal Hatch Act (5 U.S.C.

1501-1503) which applies to state employees who work in federally funded programs.

4.7.1.10. Legislative Proceedings – Department employees may contribute information and expert opinion in their areas of expertise in legislative proceedings consistent with the department’s guidelines for “Employee Political Activities” (Manual Code 9103.31). Because such proceedings often concern department policy, department employees should exercise particular care in distinguishing department policy from scientific information and expert opinion. Statements of personal opinion should be made outside of work hours and state facilities, done without the use of state equipment, and be clearly stated to be personal opinions.

4.7.2. Scientific Findings and Expert Opinions – Science professionals may express their expert opinion regarding their areas of scientific and scholarly expertise, methods, data, results, and related matters and may review departmental communications concerning their work. This right includes, without limitation, communication through working papers, peer reviewed articles, professional discussions online, presentations at scientific and scholarly conferences, and participation in professional societies. Manual Code 1472.1 provides guidance for department employee participation in professional meetings and conferences.

4.7.2.1. When expressing expert opinions, science professionals should focus their comments on matters of a scientific and technical nature and avoid matters of policy or legal interpretation. To the greatest extent possible, expert opinions should reflect the current state of the science, be evidence-based, and be informed by the professional standards of the science professional’s scientific or scholarly field. Department managers can assist department employees in clarifying the differences between scientific and technical matters and policy matters.

4.7.2.2. In communicating expert opinion on matters that do not reflect their official department scientific activities or direct responsibilities, science professionals should specify that they are not speaking on behalf of, or as a representative of, the department but rather in their private capacity. So long as this disclaimer is made, the department employee is permitted to mention his or her institutional affiliation and position if this has helped inform his or her expert views on the matter.

4.7.2.3. Science professionals have the right to review, approve, and comment publicly on the final version of any proposed publication that significantly relies on their scientific or scholarly activities, identifies them as an author or contributor, or purports to represent their expert opinion.

4.7.2.4. It is department policy that decision makers, including those in appointed positions, should not suppress or alter scientific or technological findings.

Under no circumstance may department managers or decision makers, including those in appointed positions, ask or direct science professionals to alter their scientific or technical findings.

4.7.2.5. Scientific and technical information from or about department programs and projects should be accurate and uncensored. The department may rely on public information officers or designated spokespersons to communicate with non-technical audiences, but editing to ensure that public information products are well-written and appropriate for the intended audience should not change scientific or technical data or the meaning of scientific content.

4.7.2.6. The department is committed to conveying to the public scientific and technical information derived from its scientific and scholarly activities. When conveying such information, department managers and science professionals should provide a clear explanation of underlying assumptions, accurate contextualization of uncertainties, and the probabilities associated with both optimistic and pessimistic projections, including best-case and worst-case scenarios when appropriate.

4.7.3. Communicating with Media – Department media relations are primarily coordinated by the Office of Communications and are guided by the department's Media Relations Handbook (8505.1). In addition, the department may designate spokespersons to manage public information and media relations related to specific topics. All department employees are expected to answer requests for information from the media and the public freely and in a timely manner.

4.7.3.1. Consistent with the provisions of section 4.7.1 above, department employees should communicate scientific and scholarly information and expert opinion openly, unless law or department policy dictates otherwise. Department employees should be careful to distinguish between expert opinions and personal opinions, particularly if their opinions differ from department policies or decisions. Department managers can assist department employees in clarifying the differences between expert opinions and personal opinions.

4.7.3.2. Science professionals are responsible for: 1) working with Office of Communications staff to make significant research developments accessible and comprehensible to the public, 2) ensuring the accuracy and integrity of their communications, and 3) to the extent possible, consulting with the Office of Communication prior to communications with media representatives.

4.7.3.3. The department's Media Relations Handbook (8505.1) provides guidance for the participation of department staff in press conferences arranged by another organization or agency. All department employees should review the Media Relations Handbook prior to participating in such events.

4.7.4. Public Records – All department employees shall comply with Wisconsin’s open records statutes (ss. 19.31-19.39, Wis. Stats.) and the department’s “Open Records Requests Policy and Procedure” (Manual Code 9521.1) and Records Management Handbook (9520.5). Section NR 2.195, Wis. Adm. Code, provides a complete description of policies for providing or withholding information.

4.8. **Professional Standards for Authoring and Responsibly Publishing** – The department encourages and supports the publication of agency-sponsored research findings in both peer-reviewed, professional, or scholarly journals and popular outlets intended for lay audiences.

4.8.1. Newly hired staff members should be provided opportunities and encouraged to complete and submit for publication any papers or research results pending at the time of appointment.

4.8.2. Plagiarism – The department’s “Code of Ethics for Department Personnel” (Manual Code 9121.1) requires all department employees to “be scrupulous, in writing or in speech, to give full credit to others insofar as personal knowledge goes, for procedures and methods devised or discovered and ideas advanced by them.” Department employees shall not plagiarize.

4.8.3. Copyright – Department employees should always obtain permission to use the works of others for department purposes. The department’s guidelines for “Copyright of Department Materials and Obtaining Permission to Use Works of Others” are included in Manual Code 8321.1.

4.8.3.1. Science professionals should not rely on the doctrine of “fair use”, which can, in some circumstances, allow use for educational purposes. Whether a use is “fair”, and therefore not infringing, should be determined on a case-by-case basis looking at a number of factors. The Bureau of Legal Services can provide guidance on when “fair use” is applicable.

4.8.3.2. Simply identifying the source of material one uses does not avoid a claim of copyright infringement, nor does altering a work, such as by cropping a photo.

4.8.4. Authorship – Department managers and science professionals should ensure that appropriate authorship credit is given for products resulting from scientific and scholarly activities.

4.8.4.1. All persons designated as authors should qualify for authorship, and all those who qualify should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. Authorship should be based only on: 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data, 2) substantial contributions to drafting the article and revising it critically for important intellectual content, and 3) final approval of the version to be published.

Conditions 1, 2 and 3 should all be met for someone to be designated an author.

4.8.4.2. Merely being a holder of an administrative or supervisory position, such as bureau director or section chief, does not justify authorship. Acquisitions of funding, collection of data, or general supervision of a research group, by themselves, do not justify authorship.

4.8.4.3. All contributors to scientific and scholarly activities who do not meet the criteria for authorship can and should be listed in the acknowledgements section of written products and included in acknowledgements in oral presentations.

4.8.5. When presenting scientific information on matters that do not reflect their official department scientific activities and direct responsibilities, science professionals and department managers must clearly identify that the information represents their views and not those of the department and use the following disclaimer language:

The views expressed in this [article/chapter/paper/speech] are those of the author(s) and do not reflect the views or policies of the Wisconsin Department of Natural Resources.

4.8.6. Science professionals and department managers should ensure that all funding sources and relevant potential conflicts of interest by authors are acknowledged and disclosed in written reports and professional presentations of scientific and scholarly activities.

4.9. Participation in Professional Societies or Other Non-governmental Organizations - Scientific leadership is a key component of advancing the department's mission and the department has a strong commitment to ensuring that its staff members maintain high levels of competence in their fields by fostering a culture of continuous learning. Science professionals are, therefore, encouraged to engage with their peers in academia, industry, government, and non-governmental organizations, consistent with their work responsibilities and department budgetary constraints. Consistent with Manual Code 1472.1, department employees (including science professionals) are permitted to pursue research and developmental activities related to the department's mission and goals such as attending or giving presentations at conferences or involvement in technical committees during work time.

4.9.1. Consistent with their work responsibilities and with supervisory approval, science professionals are encouraged to serve on technical committees, task forces, work groups, and other specialized bodies of professional societies.

4.9.2. Participation as Editors or Editorial Board Members – It is department policy to allow science professionals to serve as editors or editorial board members of

professional or scholarly journals. This service is generally considered part of a science professional's official duties and, when approved by the science professional's supervisor, may be carried out as part of the science professional's job responsibilities. The department recognizes that such service is not only important for the professional development of science professionals, but also that such development serves the interests of the state government and the taxpayer by improving the quality and professional standing of department employees.

4.9.3. The department should provide department employees with training and development opportunities, as budgets allow, in accordance with section 230.046(1), Wis. Stats., and the department's "Employee Development and Training Policy and Definitions" (Manual Code 9152) and guidelines for a "Career Development Plan" (Manual Code 9152.4). The objective is to develop skills, knowledge, and competencies to enhance department employee and organizational capability and performance.

4.9.4. Limitations

4.9.4.1. Personal Memberships – Membership in professional organizations whose primary function is to protect its members are considered to be of a personal nature and treated as an employee expense. The department will not reimburse such costs. See the department's guidelines for "Professional Society Membership Approvals, Meetings and Conferences Attendance" (Manual Code 1472.1).

4.9.4.2. Participation as an Officer or Member on the Board of Directors – The department's "Code of Ethics for Department Personnel" (Manual Code 9121.1) requires employees to "refrain from accepting leadership positions in organizations which potentially may be engaged in litigation or criticism of the program and policies of the Natural Resources Board or department."

4.9.5. Honors and Awards – Science professionals may receive honors and awards for their research and discoveries. State ethics laws prohibit state government employees, including department employees, from using their public position for private benefit and from accepting anything of value or items that are likely to influence them in their public duties. Department employees should review the State Code of Ethics for Public Officials and Employees, subchapter III, chapter 19, Wis. Stats., and the department's guidelines for "Acceptance of Honorariums" (Manual Code 1403.2).

5. Code of Ethics for Science Supervision and Management

This section of the Handbook outlines routine responsibilities of department managers for ensuring integrity in department scientific and scholarly activities.

- 5.1. Consistent with Wisconsin's civil service recruitment and selection policies and procedures, department managers should ensure that the selection of candidates for scientific and technical positions is based primarily on their scientific and technological knowledge, skills, experience, credentials, and integrity.
 - 5.1.1. Department managers should develop position descriptions and recruitment announcements that highlight required scientific and scholarly knowledge, skills, and experience, and academic credentials germane to the scientific and scholarly fields needed to address natural resources and environmental protection priorities.
 - 5.1.2. Department managers should advertise vacancies broadly, including in newsletters, publications, and Web sites of appropriate scientific societies and professional organizations.
- 5.2. Department managers should ensure that the scientific integrity policy in this Handbook and related policies (e.g., Animal Care and Use, data standards, etc.) are shared broadly with and remain readily accessible to staff, contractors, cooperators, partners, permittees, leasees, grantees, and volunteers.
- 5.3. Department managers should support the scientific and scholarly activities of others and refrain from dishonesty, fraud, misrepresentation, coercive manipulation, censorship, or other misconduct that alters content, veracity, or meaning of work products.
- 5.4. Department managers should refrain from activities that may affect the planning, conduct, reporting, or application of scientific and scholarly activities within established priorities, budgets, and legal authorities.
- 5.5. Department managers should offer respectful, constructive, and objective review of employees' scientific and scholarly activities and encourage appropriate peer reviews by qualified experts of work conducted by department science professionals.
- 5.6. Department managers should respect the intellectual property rights of others and substantiate comments made about the work of others using the same care with which one carries out and reports the results of one's own activities.
- 5.7. Department managers should adhere to appropriate standards for reporting, documenting, and applying results of scientific and scholarly activities used in decision making and ensure public access to those results in accordance with departmental policy and applicable laws.

6. Scientific Integrity in Decision Making

This section of the Handbook clarifies the role of science professionals in agency decision making and outlines how scientific and scholarly information is to be used to ensure scientific integrity in decision-making processes. The department's procedures for "Policy Development" are outlined in Manual Code 1020.7 and "Rule Development Procedures" are addressed in Manual Code 1020.5.

- 6.1. Expert Involvement in Policy Development – Where feasible and relevant, department decision makers will involve science professionals in developing and implementing policies as a component of decisions that also balance public input and desires as well as social, cultural, legal, economic, budgetary, institutional, and environmental factors.
- 6.2. It is the policy of the department to seek the best, most current scientific information available on which to base its management and regulatory decisions (s. NR 1.98 (1) (a), Wis. Adm. Code). When scientific or technological information is considered in policy decisions, the information should be representative of the current state of the science, evidence-based, and when feasible, appropriate, and consistent with law, subject to well-established scientific processes such as peer review.
- 6.3. When feasible, appropriate, and consistent with the law, department employees should ensure that the underlying assumptions, uncertainties, and probabilities of scientific or technical data are taken into account and communicated during the decision-making process.
- 6.4. It is department policy that no attempts are to be made to alter or suppress the use of scientific or technological findings in the decision-making process, and department employees should ensure that this standard is achieved. The department's "Code of Ethics for Department Personnel" (Manual Code 9121.1) requires department employees to "strive to protect the department's programs and personnel from misrepresentation and misunderstanding."
- 6.5. Transparency and Public Availability – Except where information is properly restricted from disclosure as required by law, department managers and decision makers shall make available to the public the scientific and technological findings or conclusions considered or relied upon in making policy or related operational decisions. The results of scientific and scholarly activities may not be suppressed or altered.

7. Allegations of Scientific (Research) Misconduct

This section of the Handbook outlines procedures for the department's review of allegations of scientific (research) misconduct.

- 7.1. The department takes allegations of scientific (research) misconduct seriously. The department seeks to uphold high standards of scientific integrity and to maintain the ethical standards set forth in its "Code of Ethics for Department Personnel" (Manual Code 9121.1).
- 7.2. The department shall investigate scientific (research) misconduct allegations made against department employees, partners, or volunteers. The department should review and assess allegations thoroughly, to the extent possible, and as warranted by the nature of the allegations. The Bureau of Human Resources is responsible for managing investigations of alleged scientific (research) misconduct in collaboration with department programs.
- 7.3. In investigating an allegation of scientific (research) misconduct, the department may consult scientists and scholars with expertise in the field, sufficient to evaluate the allegations. The department may consult experts outside of the department if necessary. The department may create a formal review panel if warranted.
- 7.4. The department's review of alleged scientific (research) misconduct should proceed in a timely fashion without delay.
- 7.5. Following review, the department shall prepare a report of its findings. The report should describe the scientific (research) misconduct allegations, review process, experts consulted (if any), findings, and other pertinent information. Based on the investigation findings, a determination will be made whether disciplinary action will be taken and the appropriate level of discipline.

Background and Further Reading

Background on Scientific Integrity Handbook

In early 2012, the Bureau of Science Services management team developed a strategic framework document to help guide the department's science program over the next several years. The team identified the need for a policy on scientific integrity as a key product to help ensure a world-class science program for the agency. Drafting of this plan was slated to commence over the following year.

In the fall of 2012, members of the Natural Resources Board and representatives of the news media inquired as to whether the department had such a policy to protect decision making from undue personal bias and potential outside influence. Aware that the Science Services management team had identified the need for such a policy and had plans to prepare a policy for the Science Services program, agency administration directed the bureau to prepare a policy for the agency as a whole.

Science Services managers and staff reviewed approximately 24 federal agency scientific integrity policies and associated implementing protocols, as well as the published literature on the topic (see, for example, the "References and Additional Reading" in the next section). A comprehensive outline for an agency policy, which integrated existing department administrative codes, agency policies, Manual Codes, and Handbooks, was drafted and shared with staff in late 2012. A revised outline was then discussed with agency administration and the requesting Natural Resources Board member in late 2012.

In early 2013, a drafting team was convened to prepare a Handbook based on the initial outline and the review comments that had been received to date. The team prepared an initial draft that was presented to the Science Services management team for review and consideration. Following discussion with the Science Services management team, the working draft Handbook was circulated to reviewers in each department division, as well as the department's legal counsel, in mid-March. In late March, the drafting team reviewed comments submitted by the divisions and prepared a final draft for consideration by agency administration and the Natural Resources Board.

It is anticipated that the Handbook and policies contained within will be subject to periodic review and revision.

Resources and Additional Reading

This Handbook section lists references and resources that department managers and science professionals may find useful in furthering their understanding of the principles and policies associated with various aspects of scientific integrity. The Bureau of Science Services will maintain a “Scientific Integrity” page on its intranet site. All staff members are encouraged to review the materials housed on the page periodically.

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The Scientific Method, Experimental Design, and Data Management

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Advocacy and Science

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Science is fundamentally a search for the truth about nature and any practice that deviates from that goal is unacceptable. Thus, scientific misconduct is by definition always damaging to the scientific enterprise, and while it can, for a while at least, sometimes benefit the perpetrator, the scientific community always suffers. In our opinion, science is a purist enterprise that functions best when we pursue the truth and can trust in the work of our fellow scientists.

- Montgomerie and Birkhead 2005