

# Applied Ecological Services, Inc.

AES East

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[www.appliedeco.com](http://www.appliedeco.com)



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*Specialists in Environmental Management and Research*

July 18, 2008

Philip Durgin  
Legislative Budget and Finance Committee  
Room 400 Finance Building  
P.O. Box 8737  
Harrisburg, Pennsylvania 17105-8737

RE: Proposal for Ecological Consulting Services for the Legislative Finance Committee,  
Harrisburg, Pennsylvania (AES # 08-0562)

Dear Mr. Durgin

Thank you for the opportunity to provide you with this proposal for the examination of the Pennsylvania Game Commission's Deer Management Program. Applied Ecological Services, Inc. (AES) is a multi-disciplinary ecological consulting firm that relies on sound scientific research to improve the ecological health of the environment. We are extremely confident that we are exactly what the Legislative Budget and Finance Committee needs to provide a thorough, science-based, objective consultation of Pennsylvania's existing Deer Management Program.

Rooted in the science of ecology, AES brings together experts from multiple disciplines to gather, analyze, and interpret data from all possible sources. Our multi-disciplinary approach—including forest ecologists, wildlife ecologists, biologists, botanists, soils scientists, GIS specialists, water resources engineers, and landscape architects—leads to objective, science-based views regarding particular ecosystems.

Due to the nature of our work, we have consulted frequently with various interest groups of differing needs and concerns. We have executed our approach across many states impacted by deer and have become intimately aware of the issues regarding deer management. It is our dedication to good science that allows us to meet the objectives of our projects.

This proposal directly addresses the objectives of this deer management study. AES will examine historical trends in deer population, identify circumstances and problems, document and conduct a science-based review and analysis, compare practices from outside entities, determine appropriate sizing of WMUs, and develop findings and recommendations for improving Pennsylvania's Deer Management Program. Attached please find our scope of services and fees based on our understanding of your request for our services.

We are confident you will find that AES provides exceptional expertise, service, and value. Because we are a Wisconsin-based firm with an office in Pennsylvania, we believe we can provide an efficient, objective, and truly third-party perspective of deer management practices in Pennsylvania. We look forward to beginning work with you. Please call if you have any questions about the attached proposal and supporting documents.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott Quitel". The signature is fluid and cursive, with the first name "Scott" being more prominent than the last name "Quitel".

Scott Quitel  
AES East Branch Manager

## UNDERSTANDING OF ASSIGNMENT

White-tailed deer hold special significance within Pennsylvania. As Pennsylvania's state animal, they are an integral part of the natural history and ecology of its deciduous forests. Likewise, deer hold immense personal value for hunters and wildlife enthusiasts within the state. Many cultural traditions, such as hunting, have developed around this animal within Pennsylvania. Because of this, white-tailed deer have close ties to the heritage and family traditions of many regions within the state.

In 2003, the Pennsylvania Game Commission (PGC) adopted a deer management plan that changed the way in which deer management plans were defined. These changes reflected a shift from management goals that were defined as the number of density of deer in an area, to the adoption of management goals that were defined based upon establishment of the following targets: deer health, forest habitat health, and deer-human conflicts. Currently, the specific goals of the PGC's current deer management program are:

1. to maintain a healthy deer herd;
2. to maintain healthy forest habitat;
3. to reduce or minimize deer-human conflicts;
4. to provide recreational opportunities for hunters; and
5. to improve the public's knowledge and understanding of deer and the deer management program.

It is our understanding that the changes incurred by the Pennsylvania Game Commission's adoption of the 2003 deer management plan have resulted in considerable contention between various interest groups and segments of the state population. Whereas some groups within Pennsylvania have been receptive to the changes; other groups have opposed and rejected the changes. In response to these conflicts of interests, the Pennsylvania House of Representative passed House Resolution 642 calling on the Legislative Budget and Finance Committee (LBFC) to conduct an independent third-party, science-based evaluation of the state's current deer management plan program and practices.

As a science-based, multidisciplinary ecological consulting firm, Applied Ecological Services, Inc. (AES), is uniquely qualified to carry out an objective, comprehensive examination of the Pennsylvania Game Commission's Deer Management Program and scientifically address the objectives as outlined in HR 642. Headquartered in Brodhead, Wisconsin, with branch offices located in Illinois, Minnesota, and Pennsylvania, AES has worked in several states impacted by deer, to include: New Jersey, New York, Delaware, Maryland, Virginia, Minnesota, Ohio, Georgia, Tennessee, and Missouri, among others.

Our team consists of wildlife ecologists, forest ecologists, biologists, botanists, soils scientists, GIS specialists, water resources engineers, and landscape architects, who are trained to carry out a scientific approach to all land use decisions.

Because it is rooted in the science of ecology, AES understands that there are a variety of factors that can affect the size and health of Pennsylvania's deer herd. Likewise, AES understands that there are also a variety of factors that can potentially impact forest health, other than the size of the deer herd, such as: acid rain, climate, runoff, air pollution, earthworms, invasive plants and animals, invasive insects, other wildlife that may be out of balance, and other external factors. Because of the nature of our work, AES also has extensive experience in working with various interest groups of differing needs and concerns.

It is because of our familiarity with these types of projects, that we feel we could offer a valuable, objective, and science-based examination of the Pennsylvania Game Commission's deer management program, while also considering the rights of hunters.

AES's examination of the PGC's deer management program will address the following objectives, as outlined in HR 642 and stated in the request for proposal:

1. *To examine historical deer population trends in Pennsylvania over the past 12 years and determine how the size of the state's deer herd has changed over time by Wildlife Management Unit (WMU) or their approximate equivalent. This analysis should include the most current information on the number of deer in Pennsylvania and current and historical information on the age of the herd for both buck and doe (in absolute numbers and percentages).*
2. *To identify the circumstances and problems that led to the initiation of a new approach to deer management in Pennsylvania around 2000 and how the current goals and objectives of the PGC's Deer Management Program (DMP) address these problems.*
3. *To document and conduct a science-based review and analysis of the basic components, principles, and objectives of Pennsylvania's Deer Management Program with an emphasis on examining the modeling, techniques, and management decision-making practices currently employed by the PGC, the extent to which they are based on sound science, and the impact the deer management program has had, to date on (a) the size and health of the Commonwealth's deer herd; (b) healthy forest regeneration, including the potential effects of factors other than the size of the deer herd, such as acid rain; and (c) reducing the level of deer-human conflicts.*
4. *To compare Pennsylvania's deer management practices to such practices in a sample of selected comparable states and to determine if there are more proven and scientifically-based deer management methods available that should be considered for use in Pennsylvania.*
5. *To determine whether PGC's current Wildlife Management Units are appropriately sized for sound management, and in particular whether reducing the size of WMUs would likely result in improved deer management.*
6. *To develop findings and recommendations, as appropriate, for improving PGC's deer management program.*

## **SCOPE OF WORK**

The scope of work will address the following issues, as drafted in the Request For Proposal:

### *Population Estimates*

- 1.) *Identify and explain the model PGC uses to estimate the deer population;*
- 2.) *Determine the current deer population estimates for each Wildlife Management Unit, including estimates of the sex and age of the deer within each Unit;*
- 3.) *Determine deer population trends for the past 12 years, including estimates of the sex and age of the deer.*

### *Healthy Deer*

- 4.) *Evaluate the scientific bases for using embryo data to assess deer herd health;*

- 5.) *Evaluate the scientific bases for using embryo data as an indicator of the balance between deer numbers in a given WMU and the available food to support those deer;*
- 6.) *Evaluate PGC embryo data sample size, and therefore usefulness in making management recommendations;*
- 7.) *Clarify the bases for PGC definitions of deer in poor health, fair health, and good health.*

#### *Habitat Health*

- 8.) *Clarify what the PGC defines as healthy habitat;*
- 9.) *Evaluate the scientific bases for the link between the measures used by the PGC and deer impacts, including the potential effects of factors other than the size of the deer herd on healthy habitat, such as acid rain;*
- 10.) *Evaluate the ability of the PGC system of pooling data across years to follow deer/ habitat interactions.*

#### *Reducing Deer-Human Conflict*

- 11.) *Evaluate whether there is a correlation between Citizen Advisory Council recommendations and actual deer/ human conflicts in WMUs;*
- 12.) *Determine whether the Citizen Advisory Council recommendations are consistent with the goals identified by the PGC deer stakeholders used to develop the Statewide Deer Management Plan and those of independent statewide surveys.*

#### *Smaller Wildlife Management Units*

- 13.) *Evaluate the effectiveness of the current large WMUs in achieving management goals;*
- 14.) *Evaluate the use of smaller WMUs for giving managers, hunters, and land owners greater flexibility in managing deer and compatibility in meeting their expectations, goals, and interests.*

#### *Comparison to Other States*

- 15.) *Compare Pennsylvania's deer management practices to such practices in a sample of selected comparable states, including but not necessarily limited to Maryland, West Virginia, Michigan, and Wisconsin, and determine if there are best practices for deer management in other states that should be considered for use in Pennsylvania.*

### **PROJECT APPROACH**

In general, to carry out these various tasks, we will execute a three-pronged approach to data collection and synthesis:

- 1.) **Research** – Our research will include an evaluation of all relevant deer related data, to include, but not limited to: public information, published reports, all PGC-backed reports, and available GIS data.
- 2.) **Interviews** – Conduct interviews with recognized experts in the field of wildlife management with specific deer management experience and expertise. Interviewees will be drawn from academic institutions, state wildlife agencies, and other qualified sources and have expertise in areas including, but not limited to, wildlife ecology, biology, and wildlife and habitat management, including those with a thorough familiarity of embryo data method of assessment, to be approved by legislative committee.
- 3.) **Field Observation** – Our field observations will entail an evaluation of forest habitat and health and physical deer health based on appearance at Wildlife Management Units and Wildlife Management Unit equivalents for Maryland, West Virginia, Michigan and Wisconsin, and up to 2 more additional states.

Note: We have offices in Wisconsin and Illinois and have worked in several states impacted by deer, to include: New Jersey, New York, Delaware, Maryland, Virginia, Michigan, Ohio, Georgia, Tennessee, and Missouri, among others.

We will address the following objectives and anything else that the LBFC needs that is helpful to the study. The results of our work will meet the objectives of the study as outlines in HR 642:

1. *To examine historical deer population trends in Pennsylvania over the past 12 years and determine how the size of the state's deer herd has changed over time by Wildlife Management Unit (WMU) or their approximate equivalent. This analysis should include the most current information on the number of deer in Pennsylvania and current and historical information on the age of the herd for both buck and doe (in absolute numbers and percentages).*
2. *To identify the circumstances and problems that led to the initiation of a new approach to deer management in Pennsylvania around 2000 and how the current goals and objectives of the PGC's Deer Management Program (DMP) address these problems.*
3. *To document and conduct a science-based review and analysis of the basic components, principles, and objectives of Pennsylvania's Deer Management Program with an emphasis on examining the modeling, techniques, and management decision-making practices currently employed by the PGC, the extent to which they are based on sound science, and the impact the deer management program has had, to date on (a) the size and health of the Commonwealth's deer herd; (b) healthy forest regeneration, including the potential effects of factors other than the size of the deer herd, such as acid rain; and (c) reducing the level of deer-human conflicts.*
4. *To compare Pennsylvania's deer management practices to such practices in a sample of selected comparable states and to determine if there are more proven and scientifically-based deer management methods available that should be considered for use in Pennsylvania.*
5. *To determine whether PGC's current Wildlife Management Units are appropriately sized for sound management, and in particular whether reducing the size of WMUs would likely result in improved deer management.*
6. *To develop findings and recommendations, as appropriate, for improving PGC's deer management program.*

## SCHEDULE

All of this work will be done in the following schedule:

- Milestone 1: Draft outline of report; oral report of preliminary findings – December 8, 2008
- Milestone 2: Confidential draft of written report – April 6, 2009
- Milestone 3: Final written report – June 8, 2009
- Milestone 4: Presentations to LBFC plus two additional presentations to legislative committees – as required.

**PAYMENT**

Estimated Fees: Fees noted "estimated" are estimates only. AES will bill on a time plus expenses basis according to the attached Fee Schedule. Total billings may be higher or lower than that estimated.

**ADDITIONAL SERVICES**

AES will provide additional services, above and beyond the scope presented above, with explicit approval from the Client. Fees will be based on the Fee Schedule attached to this contract.

**ATTACHMENTS**

AES Consulting Contract Short Form  
AES Fee Schedule for Consultants and Support Services  
General Terms and Conditions

**VALID PERIOD**

This contract is valid for a period of one year from the date appearing at the top of page one.

**APPROVAL**

In signing the attached Consulting Contract Short Form each party agrees to abide by all terms and conditions presented in this document and the defined attachments. Please sign and return two original copies to Applied Ecological Services. One original with signatures from both parties will be sent back to you.



# APPLIED ECOLOGICAL SERVICES, INC.

SPECIALISTS IN ENVIRONMENTAL MANAGEMENT AND RESEARCH

## AES Consulting Contract Short Form

This form summarizes the information contained in the proposal and is necessary for acceptance of the contract. This summary and signature page must be kept with the proposal and terms and conditions.

Project Name: Examination of PGC Deer Management Program  
Project Number: 08-0562 (Please use this number on all correspondence and invoices)  
Description of Work: Examination of Pennsylvania Game Commission's Deer Management Program  
Branch: Philadelphia

Re: Agreement and/or Authorization for Services by and between AES, Inc. and the legal entity of:  
Legislative Budget and Finance Committee

AES Project Director: Scott Quitel,

### Contents:

<input checked="" type="checkbox"/> Cover Letter	<input checked="" type="checkbox"/> Project Fees	<input checked="" type="checkbox"/> Resumes	<input type="checkbox"/>
<input checked="" type="checkbox"/> Qualifications	<input checked="" type="checkbox"/> Project Schedule	<input type="checkbox"/> Other	<input type="checkbox"/>
<input checked="" type="checkbox"/> Scope of Work	<input checked="" type="checkbox"/> AES Fee Schedule	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Deliverables	<input checked="" type="checkbox"/> Terms and Conditions	<input type="checkbox"/>	<input type="checkbox"/>

Total Amount of Contract: \$72,000

### Payment:

- Progressive (% complete by task, no hourly detail, previous monthly billing total)
- Lump Sum (%complete, by project total)
- Lump Sum by Task (% complete by task)
- Time and Materials (per fee schedule)
- Time and Materials, Not to Exceed (per fee schedule, with not to exceed amount)

### Special Billing Instructions:

### Reimbursable Expenses

- Reimbursable expenses are included in the fee.
- Reimbursable expenses are not included in the fee and will be billed per the fee schedule.

### Acceptance

In signing below, each party agrees to abide by all terms and conditions presented in this document and the defined attachments.

- Work is proceeding by verbal authorization on request from:
- Work will begin upon receipt of this authorization.

Signature	Signature
Date: 7/18/08	Date:
Title: AES East Branch Manager	Title:
Applied Ecological Services, Inc	Company:
1100 E Hector Street, Ste 398	Address:
Conshohocken, Pa. 19428	
610.238.9088 (phone)	Phone #
610-238-9931	Fax#
Email: scott.quitel@appliedeco.com	Email:

Please sign both copies and return one copy to Applied Ecological Services, Inc. A copy of the executed contract will be mailed to you.



## GENERAL TERMS AND CONDITIONS

### 1. TERM OF AGREEMENT

1.1 These Terms and Conditions apply to the attached agreement and any subsequent agreements or changes to existing agreements for services between Applied Ecological Services, Inc. (hereafter AES) and the Client as defined in the agreement. Together these documents and any attachments constitute the Agreement.

1.2 The Agreement is valid for the period stated in the Agreement. Upon expiration of that period, AES has the right to amend the basis of payment and to adjust the time of performance to reflect the delay and to conform to current workloads.

### 2. RESPONSIBILITIES

2.1 Standard of Care: AES will perform the Services in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions.

2.2 Safety: AES is responsible for the safety of its own employees. This provision does not relieve Client or any of its officers, directors, employees, agents, vendors, or contractors from their responsibility for maintaining a safe work site. Neither the professional services of the Client, nor the presence of the Client's employees or subcontractors will imply that AES has any responsibility for any activities on site performed by personnel other than AES's employees or subcontractors.

2.3 Responsibility for Uncompleted Services: If any of the Services are eliminated, or if AES is not retained to perform subsequent phases, AES's responsibility will extend only to the Services it completes.

2.4 Reliance on Information: In performing these services, AES may review and interpret documents and other information provided to it by others, including the Client, the Client's contractors, government authorities, laboratories and other entities. Unless specifically addressed in Project Services authorized by Client, AES may rely upon this information without an independent evaluation of its accuracy or completeness, and shall not be responsible for any errors or omissions contained in such information.

### 3. TIME FOR PERFORMANCE

3.1 General: AES's Services will be performed according to the Schedule specified in the Agreement.

3.2 Effect of Delay: If the Services to be performed by AES are interrupted, disrupted, suspended, or delayed for any reason beyond the reasonable control of AES, the Schedule of work and the date for completion will be adjusted accordingly. AES will be compensated for all reasonable increased costs resulting from such interruption, disruption, suspension, or delay.

### 4. COMPENSATION

4.1 Method of Compensation: Compensation for services shall be as set forth in the Proposal.

4.2 Taxes: All charges are net of any applicable taxes (except income and payroll taxes). Any additional costs due to applicable taxes will be reimbursed by Client.

### 5. PAYMENT

5.1 Time of Payment: Client agrees that time is of the essence as to payment of AES's invoices.

5.2 Invoicing: Unless otherwise specified in the Proposal, AES will submit monthly invoices or at the completion of the project to Client for the Services performed and the charges incurred in the preceding period. Invoices are due and payable thirty (30) calendar days after the invoice date.

5.3 Disputed Invoices: If Client objects to all or any portion of the invoice, Client shall notify AES in writing within ten (10) calendar days of the invoice date, identify the cause of the disagreement, and pay when due that portion of the invoice that is not in dispute. In the event that AES and Client cannot resolve the dispute regarding the invoiced amount within thirty (30) days after receipt by AES of the notice of disagreement by Client, the dispute will be subject to the Dispute Resolution provision of this Agreement.

5.4 Interest: Client will pay an additional charge of one and one-half (1.5) percent per month, or the maximum percentage allowed by law, whichever is lower, of the overdue amount for any payment received by AES more than thirty (30) calendar days from the date of the invoice, except any portion of the invoiced amount in dispute and resolved in favor of Client.

5.5 Suspension/Termination of Services for Non-Payment: If any invoice amount is not paid within thirty (30) calendar days after the date of the invoice, AES will have the right, after giving seven (7) days written notice, to suspend all Services on the Project until all accounts (including charges and accrued interest) have been paid. If any overdue amount is not paid within forty-five (45) calendar days after the date of the invoice, AES will have the right to terminate this Agreement. Any attorney fees, court costs, collection fees or other costs incurred in collecting any delinquent amounts will be paid by Client.

### 6. CONFIDENTIALITY

6.1 Nondisclosure: For the purpose of this provision, confidential information will be proprietary business information or trade secrets designated in writing to be confidential.

6.1.2 AES and Client will maintain as confidential any confidential information provided by the other Party, as defined in 6.1.

This provision shall not apply to information that (1) is already known to the recipient as shown by written records in its possession at the time such information is received; (2) is already part of the public domain at the time of disclosure, or subsequently becomes part of the public domain through no fault of the recipient; (3) becomes available to the recipient from a third party who is not under obligation to the recipient with respect thereto; or, (4) is independently developed by an employee or consultant of the recipient who had no knowledge of or access to the information.

6.1.3 Each party may disclose confidential information if the confidential information (1) is required to be disclosed by law, subpoena, order of a court or governmental regulatory agency, or other legal process provided that the disclosing Party gives the other Party reasonable notice and opportunity to challenge the requirement to disclose; (2) is disclosed to a Party's contractor, subcontractor, consultant, agent, or employee who has signed a nondisclosure agreement; (3) is disclosed to a third party who has signed a nondisclosure agreement, but only if both AES and Client agree to such disclosure; (4) is disclosed to avoid a risk of imminent harm to persons, property, or the environment; or (5) is disclosed to protect either Party from criminal or civil liability under applicable law.

6.2 Use of Project Information: Client agrees that AES may use Client's name and a general description of the Project as a reference for other prospective clients, provided that no confidential information is disclosed.

## 7. OWNERSHIP OF DOCUMENTS

7.1 Documents: All plans prepared by AES are instruments of service with respect to this Project, and AES shall retain an ownership and property interest in them (including the right of reuse at AES's discretion), whether or not this Project is completed. Client may make and retain copies of plans, whether in paper or electronic media form, for information and reference in connection with use, by Client or others, on the Project.

7.2 Copyright: AES shall retain all copyrights. Upon completion and satisfactory payment, the Client shall receive without further documentation, a perpetual and irrevocable license to use the drawings, concepts and other materials produced for the Client with proper citations showing AES as the author.

7.3 Use: Any documents generated by AES are for the exclusive use of Client, and any use by third parties or use beyond the intended purpose of the document, will be at the sole risk of Client, unless otherwise agreed upon by AES in writing.

## 8. ALLOCATION OF RISK

8.1 Insurance: AES agrees to purchase and maintain at its own expense general liability insurance, professional liability insurance, and automobile liability insurance. Certificates of insurance will be provided to Client upon request in writing. AES agrees to purchase additional insurance as requested by the Client (presuming such insurance is available to AES) provided the premiums for such additional insurance are reimbursed by the Client.

8.2 Indemnification: Client and AES agree that each Party will be responsible for claims, suits, damages, and losses to the extent caused by their own negligence or willful misconduct. Client agrees to defend and hold harmless AES from claims, damages, suits, and losses by third parties, except to the extent caused by AES. Client releases AES from any claim for damages resulting from or arising out of any pre-existing environmental conditions at the site where the work is being performed.

8.3 Limitation of Liability: The Client agrees to limit AES, by its agents or employees, total liability to the CLIENT and to all Construction Contractors and Subcontractors on the Project, due to AES's professional negligent acts, errors, omissions, strict liability, breach of contract, or breach of warranty and for any and all injuries, claims, losses, expenses, damages, or claim expenses arising out of this Agreement from any cause or causes, such that the total aggregate liability of AES to those named shall not exceed the available limits of coverage as set forth in the terms and conditions of AES's liability insurance policies.

## 9. TERMINATION

9.1 Termination: Either Party upon ten (10) days written notice may terminate this Agreement without cause. In the event of termination, all previous unpaid invoices submitted by AES will be due and payable. AES will also be paid, under the terms of the contract, for any and all work performed, and/or completed, and expenses incurred between the time period covered by the most recent invoice and the date of termination. Additionally, AES will be reimbursed on a time and expenses basis at AES's standard rates for all reasonable termination expenses including: the cost of completing analyses, records, and reports necessary to document job status at the time of termination; the cost to bring any site work to a safe and stable condition and reasonable costs associated with untimely demobilization and reassignment of personnel and equipment.

## 10. THIRD PARTIES

10.1 Successors and Assignees: This Agreement will be binding on AES and Client, and their successors, trustees, legal representatives, and assigns. Neither Party may assign or transfer any rights, responsibilities, or interest in this Agreement without the written consent of the other Party and any attempt to do so without such consent will be void.

10.2 Subcontractors: Nothing in this section will prevent AES from employing subcontractors or consultants to assist in the performance of Services under this Agreement.

## 11. DISPUTE RESOLUTION

11.1 Unless otherwise agreed in writing, AES shall continue the project and maintain the approved schedules during all dispute resolution proceedings. If AES continues to perform, the Owner shall continue to make payments in accordance with this Agreement. In the event that the Owner fails to make payments for undisputed work, provision 5.5 of this agreement will apply.

11.2 If a dispute arises out of or relates to this Agreement or its breach, the parties shall endeavor to settle the dispute first through direct discussion. If the dispute cannot be settled through direct discussions, the parties shall endeavor to resolve the dispute through the involvement of a neutral mediator. The Commercial Mediation Rules of the American Arbitration Association shall govern this process. The costs of any mediation proceeding shall be shared equally by the parties.

11.3 Both parties agree that upon receipt of a written description of the other party's grievance(s), the offending party will reply in writing with the intent to resolve the dispute. If either party fails to respond in a timely manner, the aggrieved party has the right to demand mediation.

12. INTERPRETATION

12.1 Severability: If any provision of this Agreement is determined to be void or unenforceable by a Court, all remaining provisions will continue to be valid and enforceable. The court will reform or replace any void or unenforceable provision with a valid and enforceable provision that comes as close as possible to expressing the intention of the void or unenforceable provision.

12.2 Governing Law: This Agreement will be governed by the laws of the State of Wisconsin.



## Introduction to Applied Ecological Services, Inc.

*Bringing the science of ecology to all land-use decisions*

At Applied Ecological Services, Inc. (AES) we solve real-world problems with practical approaches. By identifying where humans and nature are potentially in conflict, and where we can potentially cooperate, we can provide leadership in resolving conflicts in favor of sustainable natural systems.

Good science is the foundation of our business. Projects that impact natural systems require sound, scientific underpinnings of precise data, accurate analysis, clear understanding of dynamic environmental processes and thorough familiarity with pertinent regulations. Beyond this, creative problem solving is needed to achieve client, stakeholder and regulatory goals. Finally, plans must be carefully implemented and progress monitored to ensure desired outcomes are achieved.

We integrate natural functions with client needs. AES has undertaken complex environmental projects with exemplary results for more than 25 years. We've shown that the science of ecology can inform all land-use and property asset management decisions. Multiple benefits accrue from this approach, including benefits to commerce. Brown-field redevelopment, landfill reclamation, and industrial development or redevelopment all demonstrate positive impacts from this ecological approach, often at lower costs compared to traditional engineering solutions. Even global-scale issues such as air and water quality, soils restoration, wildlife conservation and global warming are positively impacted.

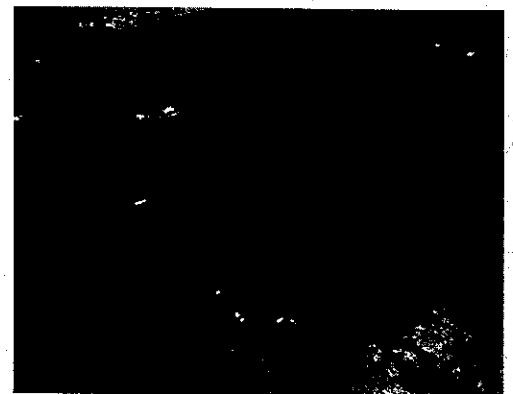
We balance ecology, economics and society. Working with natural systems requires good science. Good science requires a serious commitment. At AES, we embrace that commitment for future generations.

We create ecologically driven land use solutions that are practical, economical, and based on the best science and technology. We strive to inspire and enable the careful stewardship of land, life, water, soil and air.



Flambeau Mine before restoration

As industry leaders in science and restoration, Applied Ecological Services, Inc. (AES) is a broad-based ecological consulting, contracting and restoration firm that was founded in 1978. Our staff of experienced scientists and project managers is adept at tackling difficult and unique environmental problems on a variety of scales. AES has been the principal



Flambeau Mine after restoration

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AES owns and operates three native plant nurseries in Wisconsin, Minnesota, and Kansas.

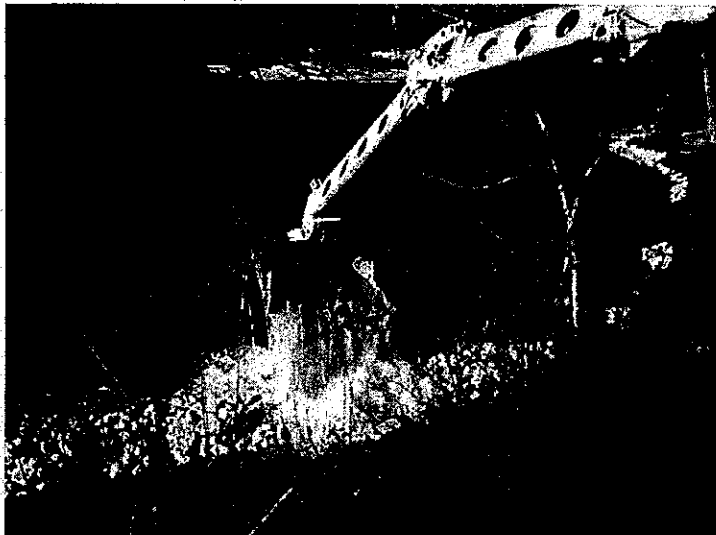
At AES, our consulting ecologists, engineers, landscape architects, planners and professional contracting staff approach all projects with a solid foundation in science. Informed decisions result in completed projects, satisfied clients and sustainable ecological systems.

Part of the AES success story springs from our turnkey Ecological Systems Approach™, used in all projects to identify and alleviate major obstacles before they create complex problems. This approach integrates ecological science with all other aspects of a project, including our numerous professional relationships with other specialist firms, to significantly enhance project implementation and outcomes. You can rely on AES for:

- Expert scientific information
- Effective cost control
- Professional management
- Efficient coordination
- Reliable implementation
- Project success
- Clear lines of responsibility
- Regulatory expertise
- Creative solutions
- Rapid response
- Positive publicity

ecological consultant in many diverse, large-scale restoration and site remediation projects, including creative developments and beneficial reuse projects that have drawn national acclaim.

As industry leaders in ecological science and restoration, AES scientists have developed state-of-the-art mitigation and restoration techniques that are now employed by ecological contracting services throughout the country. In addition to expertise in restoration ecology, we have extensive experience with mine and quarry reclamation, brownfield mitigation and ecotoxicological assessment of environmentally sensitive habitats.



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# Summary of Services

AES is a full-service environmental consulting and contracting firm with internationally recognized expertise encompassing the following service areas:

## Ecological Consulting

### Design – Research – Regulatory

- Comprehensive Ecological Assessment, Planning and Management
- Wetland Delineation, Mitigation and Banking
- Conservation Banking
- Restoration Design, Planning and Management
- Regulatory Permitting
- Legal Discovery, Expert Witness and Environmental Mediation
- GIS Modeling and Cartography
- Environmental Engineering
- Ecological Research
- Environmental Impact Studies
- Ecotoxicology and Brownfield Reclamation
- Mine and Landfill Reclamation
- Biological Inventories and Quantitative Analysis
- Wildlife Studies and Management
- Environmental Monitoring
- Soil Bioengineering and Shoreline Stabilization
- Threatened and Endangered Species Studies
- Habitat Conservation Planning
- Natural Area Project Management and Administration
- Alternative Stormwater Management Design
- Conservation Development Planning
- Native Landscape Design

## Environmental Contracting

- Comprehensive Design-Build Services
- Construction Management
- Native Seed and Plant Production
- Restoration and Phytoremediation Planting
- Shoreline, Streambank and Slope Stabilization
- Native Nursery Construction
- Native Landscape Installation
- Prescribed Burning
- Prescribed Herbicide Application
- Woody Brush Removal



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# The Wildlife Team

Applied Ecological Services (AES) and its cooperators bring to a wildlife-oriented project decades of experience in the creation of wildlife habitat, provision of special conditions for wildlife life cycle needs, and the reintroduction and management of wildlife populations. The team's wildlife work rests on a strong scientific foundation backed up by practical experience in project design and implementation.

The team is comprised of individuals who are employees of AES or participants from other agencies in projects where AES has a lead role. For the Delano Project, we have assembled a team consisting of experts in wildlife habitat creation, restoration and management; bird, mammal, butterfly, and aquatic species life cycle needs; wildlife reintroduction; wildlife ecotoxicology and disease; and nuisance wildlife management. The team members together have expertise and project experience in two or more of these areas, establishing the complete range of skills and knowledge to address any wildlife issue that might arise.

The team's depth of understand and range of experience with wildlife issues is described in detail under each team member's brief biography at the end of this document.

The Wildlife Team works closely with clients to devise and carry out a feasible program for projects where creation of wildlife habitat is the focus, and where efforts will be taken to create opportunities for people using a site to share, watch, and live with a variety of wildlife. The approach used depends on the client's specific needs and the characteristics of the site and its surroundings. While this varies, a general approach is taken by the Wildlife Team.

## The AES Approach to Creating Wildlife-Oriented Places

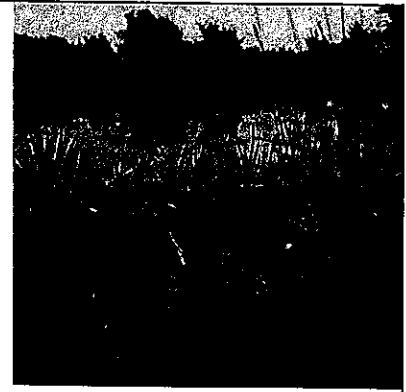
The approach taken by AES to create wildlife-oriented places combines a scientific basis for decision-making with a deliberate process for evaluating the wildlife potential of a site, developing concepts for meeting the needs of targeted wildlife at that site, and delivering planning and implementation documents that prescribe the creation of wildlife habitat, provision of special wildlife needs, long term management and monitoring of wildlife populations, and education targeted at people using the site.

### Science-based Approach

Our approach to creating wildlife habitat and attracting and keeping wildlife species is based on demonstrated scientific principles of wildlife management. Data from field studies and successful wildlife habitat creation and restoration projects are the foundation of construction, habitat restoration, completing the life cycle needs of species, and long term management specifications.

Fundamental to this effort is creating habitats that have a stable ecology and contain a large variety of plant species. In a stable ecological setting the needs of wildlife are provided for by ensuring:

- Cycles of gradual water level changes,
- vigorous growth of plant life
- variety of plant heights and densities
- abundant flowering and fruiting of plant life
- regular disturbances that benefit the plant life
- low invasion by plants that have low wildlife value



# The Wildlife Team

## Long Term Management and Monitoring of Wildlife Populations

After habitat restoration and as multiple life history needs are provided for, a new stage in the project begins. The wildlife team will have developed a long term management plan for wildlife habitat and wildlife populations, a long term monitoring program for wildlife populations, and a public education program. The long term management plan is similar to existing vegetation management plans created and implemented by AES. This plan contains information on the existing natural features, the baseline conditions that must be maintained, and the management techniques and schedule required to maintain those conditions. Standard specifications exist for accomplishing many of these management tasks. The long term monitoring plan is necessary for documenting the size of target wildlife populations in order to ensure that they are not diminishing to a point where they are at risk of disappearing from the site. The plan would identify a trigger threshold population at which remedial management action must be taken in order to retain the target wildlife population. Additionally, some species may become problems because they prey on nests of birds or turtles, or are homestead pests. The monitoring program would again identify threshold population levels that would trigger a management action designed to reduce populations of these species. These species will likely not be target species.

## Education About Wildlife for People Using the Site

Lastly a public education program would provide early information to landowners at the site so that their decisions about the use of their own property can be guided by knowledge of target wildlife needs at the site. Additional educational methods would be designed and delivered over the course of the project, as the timing requires. These would include:

- coordinate development activities with and work to influence the designs of adjacent landowners;
- An education program that describes observable wildlife so that residents know what they are looking for and know something about it;
- A native landscaping option for residential lots so that residents have the option of bringing green space into their yards;
- Design templates for bird and butterfly gardens, water gardens, and other landscaping techniques that residents can use to improve wildlife habitat on their property;
- An educational program on feeding wild birds, as most of the consistent wildlife observations will occur at bird feeders.

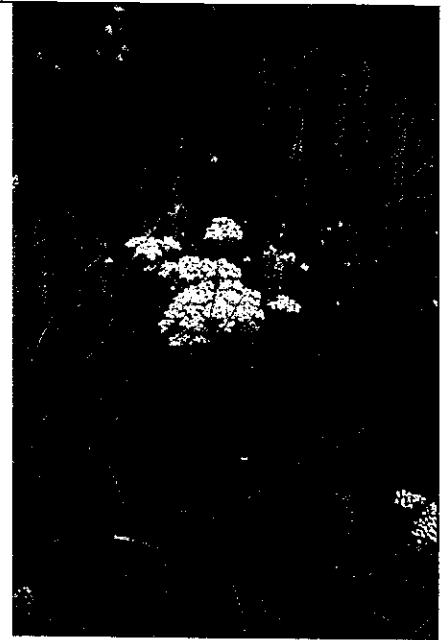




# The Wildlife Team

## Evaluation of Wildlife Potential

Each site is unique and capable of providing for the needs of a different wildlife species depending on the amount of forest, grassland, wetland, woodland, savanna, and cropland. Many wetland wildlife species fulfill their life history in neighboring upland areas of grass and forest cover. The upland buffer and the wetland habitat together are core habitat that meet the needs of many species of turtles, frogs, butterflies, and marsh birds and mammals. Aquatic insects, frogs, crustaceans living in wetlands provide the base of the food chain for numerous species of birds and mammals. At the bottom of this food pyramid is plant life and water and soil quality. Clean water and soil together with diverse and vigorous vegetation supports the smaller animal life that eventually is preyed on by top predators, such as egrets, cranes, rails, herons, mink, and otter.



Perpetuation of high quality wildlife habitat depends on long term management, including a regular regime of natural disturbance that is suited to the plant life of each habitat. These natural disturbance range from the ups and downs of water levels in marshes and wet meadows, fire, and mechanical removal of vegetation to simulate grazing or fire.

After the proper habitat has been designed and the correct set of natural disturbances prescribed, specific requirements of individual species can be planned. It is difficult to generalize these requirements. Instead, the wildlife team develops a target list of species appropriate for the general conditions of the site. These conditions are the ultimate conditions anticipated following conservation, restoration, and development work. The life history needs of these species are determined and specific prescriptions written to provide for as much of the full life cycle of the species on the site. These prescriptions recommend a variety of special constructed conditions, depending on the species, such as nesting boxes and structures, resting and basking areas, nesting and spawning sites, feeding areas, specific food requirements, predator avoidance measures, young-of-the-year needs, and other special needs.

Once a prescription is development for each target species, the wildlife team visits the site and identifies specific locations where the special needs of target species might be fulfilled. These locations are mapped and the site is evaluated as to its capacity to support each target species. From this the wildlife team identifies the most feasible species for the site and develops a special life history design that overlays the general habitat restoration design. Implementation plans are then drawn up. These plans are integrated with public education and wildlife viewing program designed for the site. Viewing blinds and platforms, trails, distant overlooks, kiosk and educational delivery structures, educational materials and programs are all part of this program. At this planning stage, an appropriate balance will be struck between the need for people to see the wildlife and the need for many of the target wildlife species to avoid being seen. Achieving this balance would require that strategies be designed for locating houses and yards adjacent to common open space, and for placing trails, observation blinds, overlooks and interpretive signs; these strategies will minimize intrusion on wildlife we wish to breed on site, or wish to attract regularly to the site for feeding and resting.

## Experience and Qualifications

Following are brief biographical sketches of the Wildlife Team emphasizing their project-based experiences with wildlife.

### **Steve Apfelbaum, M.S.**

B.A. Botany, Zoology and Ecology, University of Illinois,  
Urbana-Champaign, Illinois

M.S. Ecological and Biological Sciences, University of Illinois, Urbana-Champaign, Illinois



### ***Habitat Creation, Restoration, and Management***

Designed 185 acres of restored prairie at Prairie Crossing, a conservation development in Grayslake Illinois. This habitat was designed to attract grassland bird species, waterfowl, herons, bluebirds, sparrow hawks, and rare birds such as Upland Sandpipers.

Created 1,200 acres of wildlife habitat including wetland, prairie and forest for the Jackson County Iron Mine Project, which is now the Lake Wazee County Park; the Park has attracted timber wolves, there are now brook trout in the restored streams, and there is use of the area by waterfowl and other species.

Evaluated heron colony to design and install nesting platforms to replace dying trees and restore and stabilize the nesting island at Baker's Lake, Barrington, Illinois; the entire colony now nests on artificial platforms.

Created refuge for the state threatened Butler's garter snake in Wisconsin for the Milwaukee School District.

Developed a habitat evaluation plan and designed habitats to attract specific species of birds and other wildlife for the Flambeau Mining Project including a variety of wildlife goals.

As part of team representing the Grand Canyon Trust, completed a restoration plan for the Virgin River in Zion National Park, Utah. Steve finished reintroduction plans for three federal endangered fish species and completed the habitat restoration plan and evaluation of needs of species and impediments to use by the fish.

Serving as the lead and technical expert on technical team designing habitat restoration and recovery plans for the San Francisco garter snake and California red-legged frogs, both federally threatened species for the Cloverdale Ranch, Halfmoon Bay, California.

Serving as the lead and sole technical provider for designing habitat restoration and recovery plans for the California tiger salamander in Santa Barbara, California; working with the US Fish and Wildlife Service.

Worked with The Nature Conservancy on the 7,300 acre Kankakee Sands Grassland Restoration Project in Indiana with the goal of providing a complete range of wildlife opportunities including habitat for the greater prairie chicken (absent from Indiana for approximately 100 years), amphibians, and reptiles. This area was used as a whooping crane migration stepping stone in 2003 by the Wisconsin-Florida migratory flock.

Designed a vegetation planting plan to attract birds that were not susceptible to avian botulism for the US Army Corps of Engineers Waterway Experimental Station, at which major wildlife mortality occurred due to the disease.

## Experience and Qualifications

### *Wildlife Reintroduction*

Introduced endangered fish species into the lake at Prairie Crossing, a conservation development in Grayslake, Illinois.

Reintroduced ducks and waterfowl species at the River Trail Nature Center in Chicago, which desired to establish a resident flock of wood ducks and mallards. 50-100 of each species were raised, pen-reared, and released; a breeding population of wood ducks and mallards have become established as a result.

Reintroduced rehabilitated screech owls and great horned owls at the River Trail Nature Center and at nearby homes and farms.

Planned the reintroduction of Peregrine falcons to Michigan for the Michigan Department of Natural Resources; recommended sites became the release sites.

Reintroduced beaver in the Cal Sag Canal, Chicago, to control box elder invasion in prairies at that location.

Moved a heron rookery for the Balefill Landfill Project in Elgin. To do so, Steve developed a method for moving the rookery to several other properties adjacent to the landfill; this method included building platforms and simulated branch nests on telephone poles. As a result, the rookery moved to the created sites.

### *Nuisance Wildlife Management*

Trapped, marked, and released gulls for a study at the Door County Wisconsin airport and landfill to determine whether nuisance gulls at the airport were coming from the landfill. The study showed that the gulls from the landfill typically went to Green Bay rather than the airport showing that the airport gull problem was not due to the landfill.

Developed the *Living with Nature* brochure for homeowners which includes information to assist in the management of common nuisance wildlife including deer and geese.

Designed a wetland filtration system for the Hawkeye Athletic Complex at the University of Iowa, Iowa City, that included goose prevention structures.



# Experience and Qualifications

## Kim Chapman, PhD.

B.A. Biology, Kalamazoo College, Michigan

M.A. Biology/Ecology, Western Michigan University

Research focused on grassland ecology in Michigan

PhD. Conservation Biology, University of Minnesota, Twin Cities

Research documented the differences in bird and woody plant communities in response to different levels of development found in nature reserves, farm country, and suburbs.



### *Habitat Creation, Restoration, and Management*

Developed plans for the restoration of prairie and savanna habitats at Toledo's Oak Openings MetroPark and Kitty Todd Reserve (Ohio). The management over several years resulted in increases in butterfly populations and bird populations associated with prairies and savannas.

Developed restoration and management plans for prairies and savannas owned by The Nature Conservancy in southern and western Minnesota. These were old field settings, or overgrown savannas. Management over time resulted in changes in wildlife populations favoring prairie and savanna birds and insect populations.

Developed restoration and management plans for planting trees in old fields within forest remnants in the vicinity of Big Woods State Park, Northfield, Minnesota. The goal was to reduce forest fragmentation and create continuous forest cover to favor forest interior.

### *Wildlife Life Cycle Studies*

Researched specific habitat needs of over 60 different species of songbirds in the northern Twin Cities metropolitan region. This research involved taking bird data over two years at over 300 locations, then documenting the environmental parameters that correlated with the abundance of different types of species of birds found at those locations. The conclusions provide specific advice on the proportion of different habitats needed to sustain different species of songbirds, and the amount of shrub and tree.

Completed GIS-based research on habitat requirements and landscape land use patterns for attracting and retaining prairie chickens on booming grounds in Western Minnesota.

## Experience and Qualifications

### **Carrol Henderson, M.S.**

B.S. Zoology, Iowa State University  
M.S. Ecology, University of Georgia  
Emphasis on Forest Resources

#### ***Habitat Creation, Restoration, and Management***

Planned lakescaping demonstration areas throughout Minnesota as part of a large wildlife corridor project and selected sites with respect to their physical characteristics and potential ecological benefits for these demonstration projects. As a result, 30 different sites have been planned and executed on private lakeshore plots along the wildlife corridor. Carrol oversaw the project, raised funds, hired staff to do actual planning and designing, in some cases participated with installations, or visited sites once or twice, and evaluated the outcomes.

Established volunteer network, sponsored workshops to promote bluebird conservation, created bluebird Recover Team through Audubon Society. Now they are self-sustaining with annual conference. Woodworking for wildlife—worked with Dick Peterson to design, field test, and promote his nesting box design statewide.

Supported bluebird box construction and placement program to increase bluebird populations in Minnesota.

Provided overall program oversight for a loon census and habitat evaluation program.

Improved and protected nesting sites for endangered and rare wildlife species.

Developed and oversaw program to provide lesson plans about wildlife management to Minnesota schools through Project WILD.

Has written six books that provide the public with information on how to help wildlife, including how to build nest boxes and bird houses, landscape yards and lakeshores to attract and keep wildlife, and become a successful bird feeder and bird-watcher.

#### ***Wildlife Reintroduction***

Worked with The Nature Conservancy and the University of Minnesota Raptor Center to plan, acquire funding for, and carry out releases of peregrine falcon throughout Minnesota.

Major planner, instigator, and fund-raiser for collecting Trumpeter swan eggs in Alaska; oversaw hatching, rearing and release of the swans in Minnesota.

Coordinated live-trapping then release of otters at Lac Qui Parle and on the Minnesota River—they had been gone for over 100 years from the area.

