Enhancing Pollination Services and Profitability
An Opportunity for U.S. Agriculture
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June 2007

A report outlining the principal findings and recommendations of the Native Pollinator Project- an agricultural led initiative designed to explore pollination services from native pollinators.
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June 2007

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Introduction
Over the past several years awareness and subsequent concern over declines in pollinator populations have been growing, as have calls for initiatives and programs designed to rebuild populations of native pollinators and enhance the pollinator services that they provide. Leadership for most of these efforts has come largely from within the pollination stakeholder community. To date, mainline agricultural organizations have played a limited role in building policy maker support for restoration and protection measures and initiatives.

In an effort to obtain an agricultural perspective on the challenges and opportunities around pollinator population declines, a Pollinator Protection Project was initiated in 2006 as a special project of the FFA Foundation. Through the project, which was guided by a national Steering Committee composed of agricultural and conservation leaders, production agriculture took a fresh look at pollination challenges and opportunities to enhance pollination services with native pollinators.

While this project was not the first examination of challenges associated with declining pollinator populations, what is unique is that its leadership team was composed primarily of individuals either directly involved in production agriculture or who provide support services to the sector. As such, the findings and recommendations that resulted from the project were developed by individuals who produce or support the production of food, feed and fiber. The following summarizes what these leaders had to say about this important subject.

Role of Pollinators
Pollinators, which include bees, insects, birds, and other animals, are vital to production agriculture. Nearly 75 percent of the world’s 240,000 species of flowering plant species are dependent on pollinators for reproduction as are approximately 30 percent of the food and fiber crops grown throughout the world. The fruits and seeds from these crop species provide 15 to 30 percent of the foods and beverages consumed by humans. Roughly translated, approximately one out of every four mouthfuls of food and drink that we consume are produced from pollination services provided by pollinators.

The U.S. grows over 100 crop plants that are pollinated by insects and animals. Primary examples include almonds, apples, pears, citrus fruits, cherries, pumpkins, cucumbers, blackberries, cranberries, raspberries, strawberries, blueberries, melons, tomatoes, soybeans, sunflowers, and other vegetables present in the marketplace today. According to scientists from Cornell University, using data from the National Agriculture Statistics Service, insect-pollinated crops produced in the United States were valued at an estimated $20 billion to the U.S. economy in the Year 2000. In a paper published last year in BioScience Magazine, John Losey and Mace Vaughan estimate that 15 percent of the combined value of U.S fruit, nut, vegetable and field crop production for the period
2001-2003 can be attributed to pollination services provided by native bees. Including meat and dairy products produced from bee-pollinated forage and hay crops, such as alfalfa and clover, as well as the mark-up and sale of insect-pollinated produce, the contribution to the U.S. annual economy could be an order of magnitude more. A list of pollinator dependent crops grown in the United States and their estimated economic value can be found in the report appendix.

Pollination services are provided by managed and native or ‘wild’ pollinators. The European honey bee is the primary managed pollinator in the U.S. today. Commercial honey bee producers providing pollination services manage several hundred to as many as 80,000 hives. The annual almond crop in California alone requires 1.3 million colonies of honey bees to pollinate over 615,000 acres of almond plantations. Almonds are the number one California and U.S. horticultural export crop.

Native pollinators also play a critical role in the production of certain fruits, vegetables and forage crops. Native bees, including the blue orchard bee and numerous bumble bees and other native bees, are significant pollinators and on a bee-per-bee basis can be more effective than honey bees. Native pollinators provide important pollination services for crops like alfalfa, melons, cranberries, blueberries, soybeans, and sunflowers. A recent study of hybrid sunflower production, completed by Steering Committee member Dr. Claire Kremen, revealed that the only fields estimated to achieve 100 percent pollination were those that had abundant native bee pollination services, due to critical interactions between native bees and honey bees that increased the per visit effectiveness of honey bees.

**Populations in Decline**

Populations of managed and native pollinators, especially honey bees, several wild bee species, and some butterflies, bats and hummingbirds are in a state of decline across North America. *Varroa* mite infestations and the recently diagnosed Colony Collapse Disorder (CCD) have caused dramatic die offs in European honey bee populations. Honey bee populations have declined approximately 50 percent over the past 50 years. For the California almond crop, valued at $2.2 billion in 2006, the potential impact could be catastrophic because of the dependence on managed pollination services for seed set. In Pennsylvania, where CCD was first discovered in the United States, the apple crop valued at $45 million is 90 percent dependent on insect pollination.

These disturbing trends were documented in the October 2006 National Research Council report entitled “Status of Pollinators in North America.” The panel of experts that prepared the report found that:

- Long-term population trends for the honey bee and several wild bee species (notably bumble bees), and some butterflies, bats and hummingbirds are demonstrably downward.
- Introduced parasites and pathogens have harmed honey bees and have caused instability (ups and downs) in the supply, particularly in the early spring when pollinators are needed for orchard pollination.
Honey bee decline and rising pest control costs have increased pollinator rental fees.
Managed pollinator decline could adversely affect the availability, price, and quality of the many fruits, vegetables and other products that depend on insect pollination.
Causes of decline among native pollinators include introduced pathogens, parasites and habitat degradation and loss.
Management protocols are needed to increase the use of wild pollinator species as alternatives to honey bees, either through domestication of alternative pollinator species and/or habitat management to encourage the presence of wild pollinators.
The consequences of pollinator population declines could result in an increased vulnerability of some plant species to extinction.
Many simple and relatively inexpensive practices for pollinator conservation are available. Widespread adoption of these practices is unlikely unless there is a general appreciation of the ecological and economic benefits of pollinators.
Public outreach is key to pollinator protection, conservation, and restoration.

Major Findings
In exploring this subject, advance sensing interviews were conducted with agricultural leaders and producer organizations to obtain their perspective on current pollination challenges along with their thoughts and recommendations as to what could be done to address the issue of managed and native pollinator population declines. The organizations that the Steering Committee reached out to for input are listed in the report appendix.

Through these interviews and the subsequent discussions that followed, the Steering Committee found that:
- Declines in managed and native pollinator populations represent a real threat to production agriculture and can result in billions of dollars economic losses to the sector and the national economy.
- Major fact gaps exist regarding the cause and effects of changes in populations of native pollinators play an important role in enhancing pollination.
- Native bees can’t replace managed bees but represent a significant part of the overall pollination process for the nation’s agricultural and horticultural crops, particularly in providing an “insurance policy”- providing services when honey bee populations are low.
- The dramatic decline in pollinator populations is a critical issue for production agriculture but it is not yet on the top priority list for many agricultural organizations.
- Many growers are not aware of how significant a contribution native pollinators can make to pollination services and how sound conservation and best management practices can enhance pollinator populations.
- Opportunities exist to “piggy back” pollinator protection efforts with integrated pest management and conservation initiatives designed to protect soil, water and air quality and enhance wildlife habitat.
- Urban/rural collaboration on pollinator protection efforts will be key to rebuilding populations.
**Recommendations**
After carefully examining and discussing their findings over a period of several months, the Steering Committee concluded that the decline in pollinator populations is real and that these declines represent a critical challenge for U.S. agriculture.

In order to maintain economically viable farming operations, minimum agricultural production thresholds must be met. Reductions in pollination services result in reductions in productivity, which in turn often lead to reduced net farm income. This reduction compromises the ability of growers to make important conservation investments that otherwise could provide habitat to sustain viable populations of native pollinators that provide “free” pollination services. This further compounds the challenge of maintaining economically viable farming operations as producers may be required to incur additional costs for pollination services provided by managed pollinators to offset losses previously provided by native pollinators.

The Steering Committee believes the time has come for the agricultural community to come together and provide proactive leadership in restoring and expanding populations of managed and native pollinators. Towards this end the following recommendations are offered to help unite stakeholders and expedite collaborative efforts to address pollination challenges:

**Recommendation 1-** An Agricultural Pollination Alliance should be formed through which the agriculture sector can work collaboratively and proactively to establish and protect native pollinator habitat and increase populations of native and managed pollinators.

The Alliance should be composed of and led by agricultural leaders, service providers and technical experts with vested interests in enhancing productivity and profitability of farming operations. It should be ephemeral in form and operate by consensus. The Alliance should also collaborate closely with related initiatives providing valuable leadership in this area. Examples include the North American Pollinator Protection Campaign, the Xerces Society for Invertebrate Conservation “Farming for Pollinators” project and government pollinator protection programs.

An action plan for organizing and mobilizing such an alliance is outlined in the report Appendix.

**Recommendation 2-** The Alliance should focus first on gathering information, identifying priorities and engaging partners and policy makers on the need to address pollination challenges.

Key areas of focus for the Alliance should include:
- assessing grower awareness of pollination challenges and opportunities to make greater use of native pollinators for providing pollination services
- working with government agencies and universities to:
  - better document economic benefits and losses,
- strengthen population assessments
- identify and quantify the consequences of pollinator population declines and
- publicize “at risk” pollinators, baseline data, and benchmarks for improvement
- prioritizing challenges and opportunities and developing recommendations for addressing same
- identifying research and technology transfer needs
- informing policy makers about the scope and magnitude of pollination problems and advocating for programs and funding to address these challenges

**Recommendation 3-** Education outreach programs focused on pollinator protection and enhancement efforts should be initiated with and through the FFA, the Land Grant System, Cooperative Extension, Natural Resources Conservation Service (NRCS), state departments of agriculture and other conservation agencies and organizations and pollination experts.

Key areas of focus should include:
- promoting conservation and management practices which help enhance biodiversity and support healthy populations of pollinators and
- assisting NRCS with updating technical guides to benefit and protect pollinators.

**Desired Outcomes/Benefits**
The Steering Committee sees near term opportunities to increase agricultural productivity and profitability by enhancing pollination services provided by both managed and native pollinators.

By working together, leaders within the agriculture sector and other pollinator champions can improve long-term profitability and sustainability of agriculture and assure abundant, safe and affordable food supplies. An agricultural-led pollinator alliance can provide valuable leadership in improving awareness and understanding of the importance of pollinators. It can also help rebuild viable and vibrant pollinator communities across all lands and improve resiliency and functional redundancy in pollinator populations while increasing food and biosecurity and biodiversity. Last but not least, an effective alliance can form productive and lasting partnerships among participating individuals and organizations.

The project Steering Committee stands ready to help guide the development of an Agriculture Pollinator Alliance and support its work in aiding both production agriculture and pollinators.
Appendix A.

Native Pollinator Initiative
Project Steering Committee Member
BioSketches

Chair:

Rudy Rice – Rudy is a lifelong dairy and grain farmer from DuQuoin, IL and has been involved in the conservation movement since 1974. Rudy served as the President of the Illinois Conservation Districts and was President of the National Association of Conservation Districts from 1998-2001

Project Director:

Ernest Shea – Ernie is the President and CEO of Natural Resource Solutions, LLC, a conservation planning and consulting firm in Lutherville, MD. Ernie served as the CEO of the National Association of Conservation Districts from 1986-2004 and worked for the State of Maryland for 10 years where he held a number of senior leadership positions including Assistant Secretary of Agriculture for Agricultural Development and Resource Conservation.

Steering Committee Members

Ashley Boren – Ashley is the Executive Director for Sustainable Conservation, and a member of the California State Board of Food and Agriculture. Sustainable Conservation is a nonprofit environmental organization that proactively engages businesses and private landowners in developing and implementing solutions to environmental problems. Ashley is also a member of the California State Board of Food and Agriculture.

Robert Bugg - Robert is a Professor and cover crops analyst with the Sustainable Agriculture Research and Education Program at the University of California- Davis and conducts research on biological control of insect pests, cover crops, and restoration ecology. He was co-originator of Biologically Integrated Orchard Systems for almonds and for walnuts and provides technical support for the two Biologically Integrated Farming Systems (BIFS) projects.

Jack Eberspacher – Jack is the President and CEO of the Agricultural Retailers Association. Prior to joining ARA in 2001, Jack was the CEO of the National Association of Wheat Growers. Jack is also a general manager of Quercus Farms, Inc., a 3,200 acre farm comprising purebred cattle and a timber operation near Atlanta, GA.

Yvonne Erickson – Yvonne is the President of the American Agri-Women Association. American Agri-Women is a non-profit, non-partisan, all volunteer national coalition of
51 farm, ranch, and agri-business organizations and works with consumer awareness, industry promotion and on legislation and regulation issues. Yvonne also serves on the national advisory board of “America’s Heartland” public television series. Yvonne has taught vocational high school, worked for the Minnesota Extension Service, and served as chairman of her local school board. She has also served on the Board of Directors for Minnesota Farm Bureau as the chair of their promotion and education committee. The family farm operation is now retired from dairy and is renting out the cropland.

**Frankie Hall** - Frankie Hall is associate director for Florida Farm Bureau’s Agricultural Policy Division and is responsible for coordinating the activities of Farm Bureau’s commodity advisory committees as well as the organization’s policy development and implementation programs.

**A.G. Kawamura** – A.G. is the Secretary of the California Department of Food and Agriculture and a produce grower and shipper from Orange County, where his family grows strawberries, green beans and other specialty crops. A.G. has also served as president of the Orange County Farm Bureau, chairman of Western Growers Association, and president of the Orange County Agricultural Association. He has also served as a director on the boards of the California Strawberry Commission and the California Celery Research Advisory Board.

**Claire Kremen** – Claire is an Assistant Professor in the Department of Environmental Science, Policy and Management at the University of California, Berkeley. Claire’s specialty is Conservation Biology working on mechanisms for slowing or preventing the loss of biodiversity.

**Jeff Lafleur** – Jeff is Executive Director of the Cape Cod Cranberry Growers Association. CCCGA is the trade association representing the cranberry industry in Massachusetts. CCCGA has over 330 grower members. CCCGA conducts government affairs, environmental matters, horticultural research and provide a weather advisory service for its members. Jeff also runs a small diversified farm producing pumpkins, plums, cut flowers, and miniature horses. Jeff is also serves as President of the New England Farmers Union.

**Karen Scanlon** – Karen Scanlon has been the executive director for the Conservation Technology Information Center (CTIC), West Lafayette, Ind., since 2005. In that role, Karen is responsible for overall operation of this national not-for-profit organization dedicated to environmentally sound, economically viable decision making in agriculture. Before joining CTIC, Karen worked in the Oklahoma County Conservation District office and directed the Oklahoma City Blue Thumb program, a water quality education and volunteer monitoring program in Oklahoma City, Okla.

**Kent Schescke** – Kent is the Senior Director of Development for the National FFA Organization. The National FFA Organization is dedicated to making a positive difference in the lives of students by developing their potential for premiere leadership, personal growth, and career success through agricultural education.
Luther Smith - Luther Smith, CAE, is the Executive Director of the Certified Crop Adviser Program and Certified Professional Soil Scientist/Classifier Programs. Certified Crop Advisers (CCAs) work with growers to implement best agronomic practices that are site specific and provide recommendations for inputs that are economically and environmentally friendly.

Lloyd Snyder – Lloyd is a third generation beekeeper and the owner of Snyder’s Apiaries in White Hall, MD. Snyder’s Apiaries provides pollination services, produces and markets honey and beeswax products and is a provider of bees and beekeeping equipment. Lloyd is also a lecturer and award winning mead maker.

Alto Straughn – Alto is President and CEO of Straughn Farms in Windsor, FL where he a successful grower of blueberries and other agricultural crops. Mr. Straughn’s blueberry crop accounts for one-third of the annual blueberry crop in Florida.

Mace Vaughan – Mace is Conservation Director, Xerces Society for Invertebrate Conservation. Mace has led the Xerces Society’s Agricultural Pollinator Conservation program for the last four years. In this capacity, he supervises research and outreach on habitat restoration for crop pollinating native bees, develops and presents educational materials to policy makers, land managers, and growers, and collaborates extensively with scientists researching the role and habitat needs of crop-pollinating native bees. He has written numerous articles on the conservation of bees, butterflies, aquatic invertebrates, and insects, and is co-author of the Pollinator Conservation Handbook and lead author of Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms. He has spoken on numerous occasions about pollinator conservation and invertebrate conservation and he was a lecturer on honey bee biology and beekeeping at Cornell University. His background includes a Masters Degrees in Entomology and Teaching from Cornell University, research into the behavior and community ecology of insects, and stints as an insect wrangler for PBS Nature.

Jay Vroom – Jay is chief staff executive of CropLife America. He serves as its principal representative before U.S. congressional and regulatory bodies and is the primary media spokesperson for the association. Established in 1933, CropLife America (formerly the American Crop Protection Association) represents the developers, manufacturers, formulators and distributors of plant science solutions for agriculture and pest management in the United States. Jay previously served as chief executive of the Merchants Exchange of St. Louis and later of the National Fertilizer Solutions Association (now the Agricultural Retailers Association).
Appendix B. Organizations Interviewed

Agricultural Retailers Association
Almond Board
American Agri-Women Association
American Association of Nursery and Landscape Association
American Farm Bureau Federation
California Department of Food and Agriculture
California Farm Bureau
Cape Cod Cranberry Growers
Conservation Technology Information Center
CropLife America
Florida Fruit and Vegetable Association
Florida Farm Bureau
Missouri Dept. of Agriculture
National Cotton Council of America
National Farmers Union
National FFA Organization
North America Pollinator Protection Campaign
University of California (Berkeley and Davis)
United Fresh Fruit and Vegetable Growers
USDA- Agroforestry Center, CSREES and NRCS
Western Growers Association
Xerces Society
## Appendix C. Value of Crop Production Resulting From Managed and Native Pollinators*

<table>
<thead>
<tr>
<th>Crop</th>
<th>Average Value from Insect Pollination ($millions)</th>
<th>Average Value from Managed Pollinators ($millions)</th>
<th>Average Value from Native Bees ($millions)</th>
</tr>
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<tbody>
<tr>
<td>Fruits and Nuts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Almond</td>
<td>1120.00</td>
<td>1120.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Apple</td>
<td>1585.10</td>
<td>1422.59</td>
<td>162.51</td>
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<td>Apricot</td>
<td>30.00</td>
<td>16.80</td>
<td>4.20</td>
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<tr>
<td>Avocado</td>
<td>382.40</td>
<td>344.16</td>
<td>38.24</td>
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<td>Blueberry</td>
<td>216.00</td>
<td>194.40</td>
<td>21.60</td>
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<tr>
<td>Boysenberry</td>
<td>3.90</td>
<td>2.81</td>
<td>0.31</td>
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<td>Cherry</td>
<td>346.90</td>
<td>280.98</td>
<td>31.23</td>
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<tr>
<td>Citrus</td>
<td>2409.00</td>
<td>724.89</td>
<td>131.88</td>
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<td>Cranberry</td>
<td>159.70</td>
<td>143.73</td>
<td>15.97</td>
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<tr>
<td>Grape</td>
<td>2774.80</td>
<td>27.75</td>
<td>249.73</td>
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<td>Kiwifruit</td>
<td>16.70</td>
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<td>Loganberries</td>
<td>158.00</td>
<td>63.20</td>
<td>15.80</td>
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<td>Macadamia</td>
<td>31.10</td>
<td>25.19</td>
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<td>Nectarine</td>
<td>121.20</td>
<td>58.18</td>
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<td>Olive</td>
<td>66.50</td>
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<td>Peach</td>
<td>487.90</td>
<td>234.19</td>
<td>58.55</td>
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<tr>
<td>Pear</td>
<td>263.90</td>
<td>166.26</td>
<td>18.47</td>
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<tr>
<td>Plum/Prune</td>
<td>197.80</td>
<td>124.61</td>
<td>13.85</td>
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<td>Raspberries</td>
<td>95.80</td>
<td>68.97</td>
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<tr>
<td>Strawberry</td>
<td>1187.60</td>
<td>23.75</td>
<td>213.77</td>
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<tr>
<td>Total</td>
<td>11654.30</td>
<td>5056.66</td>
<td>1008.60</td>
</tr>
<tr>
<td>Vegetables</td>
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<td>Asparagus</td>
<td>164.30</td>
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<tr>
<td>Broccoli</td>
<td>543.40</td>
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<td>Carrot</td>
<td>575.50</td>
<td>517.95</td>
<td>57.55</td>
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<tr>
<td>Cauliflower</td>
<td>219.80</td>
<td>197.82</td>
<td>21.98</td>
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<tr>
<td>Celery</td>
<td>256.50</td>
<td>205.20</td>
<td>51.30</td>
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<tr>
<td>Cucumber</td>
<td>379.50</td>
<td>307.39</td>
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<tr>
<td>Cantalope</td>
<td>401.00</td>
<td>288.72</td>
<td>32.08</td>
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<tr>
<td>Honeydew</td>
<td>94.10</td>
<td>67.75</td>
<td>7.53</td>
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<tr>
<td>Onion</td>
<td>808.00</td>
<td>727.20</td>
<td>80.80</td>
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<tr>
<td>Pumpkin</td>
<td>75.50</td>
<td>6.80</td>
<td>61.15</td>
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<td>Squash</td>
<td>192.30</td>
<td>17.31</td>
<td>155.76</td>
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<tr>
<td>Vegetable Seed</td>
<td>61.00</td>
<td>54.90</td>
<td>6.10</td>
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<tr>
<td>Watermelon</td>
<td>315.90</td>
<td>199.02</td>
<td>22.11</td>
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<tr>
<td>Total</td>
<td>4086.80</td>
<td>3226.99</td>
<td>601.29</td>
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<tr>
<td>Field Crops</td>
<td>7212.8</td>
<td>7212.80</td>
<td>6852.16</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Alfalfa Hay</td>
<td>109.0</td>
<td>109.00</td>
<td>103.55</td>
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<tr>
<td>Alfalfa Seed</td>
<td>3449.5</td>
<td>68.99</td>
<td>55.19</td>
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<tr>
<td>Cotton Lint</td>
<td>689.3</td>
<td>137.86</td>
<td>110.29</td>
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<tr>
<td>Cotton Seed</td>
<td>34.1</td>
<td>34.10</td>
<td>30.69</td>
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<tr>
<td>Legume Seed</td>
<td>793.1</td>
<td>79.31</td>
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<td>Peanut</td>
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<td>0.27</td>
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<td>Rapeseed</td>
<td>15095.2</td>
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<td>Sugarbeet</td>
<td>1057.3</td>
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<td>Sunflower</td>
<td>312.7</td>
<td>312.70</td>
<td>281.43</td>
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<td><strong>Total</strong></td>
<td><strong>28753.3</strong></td>
<td><strong>9570.31</strong></td>
<td><strong>8225.35</strong></td>
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<td><strong>Grand Total</strong></td>
<td><strong>44494.4</strong></td>
<td><strong>19463.85</strong></td>
<td><strong>16509.00</strong></td>
</tr>
</tbody>
</table>

*Crop values based on computations derived from Table 2 in:
Appendix D. Alliance Formation Plan

In support of the desired outcomes identified by the project Steering Committee, the following organizing model is suggested to help to facilitate the creation of an agriculture centered pollinator protection alliance. The key to success will be identifying and recruiting the right individuals and organizations to come together and provide leadership for forming the Alliance. The Alliance must be formed from the inside out and be built on a foundation of trust among its participants.

The following steps are recommended for forming an Ag Pollinator Alliance:

- Project Steering Committee provides leadership in forming the Alliance
  - secure leadership commitments for Phase Two work
  - recruit candidates to fill current gaps

- Identify and invite national leaders with connections to the following Stage One organizations/communities to participate:
  - American Beekeepers Federation
  - American Farm Bureau Federation
  - American Seed Trade Association
  - Certified Crop Advisors
  - Florida Fruit Growers
  - Grape and Tree Fruit League
  - Grazing lands Conservation Initiative
  - National Association of Conservation Districts
  - National Association of State Conservation Agencies
  - National Association of State Departments of Agriculture
  - Organizations representing specialty crops:
    - Alfalfa
    - Almonds
    - Apples
    - Blueberries
    - Cranberries
    - Cucurbits
    - Sunflowers
  - United Fresh Produce
  - Western Growers Association

- Engage around the theme of “What’s in it for agriculture”.

- Assist the Alliance in identifying challenges and opportunities; setting priorities; developing and implementing action plans; and evaluating progress towards meeting agreed to goals and objectives.

- Identify leaders to represent the Alliance in interfacing with parallel initiatives and campaigns.
• After the core nucleus of the Alliance is formed, reach out and invite Stage Two organizations and interest groups to join the Alliance

  o American Farmland Trust
  o American Forest and Paper Association
  o American Nursery and Landscape Association
  o American Society of Agronomy
  o American Viticulture Federation
  o Audubon Society
  o Crop Science Society of America
  o Department of Interior – BLM, NPS, FWS, BOR
  o Ducks Unlimited
  o Environmental Defense Fund
  o Farm Managers and Rural Appraisers
  o Minor Crop Farm Alliance
  o National Association of State Land Grant Universities and Colleges
  o National Cattlemen’s Beef Association
  o National Farmers Union
  o National Grange
  o National Wildlife Federation
  o National Wild Turkey Federation
  o Nature Conservancy
  o Natural Resources Defense Council
  o Pheasants Forever
  o PLANET – Land care
  o Quail Unlimited
  o Sierra Club
  o Soil and Water Conservation Society
  o USDA – ARS, CSREES, FS, RMA, NRCS,
Appendix E. References

Native Pollinator Protection Reference Materials


21. Native Bees are Valuable Crop Pollinators, Princeton U. and The Xerces Society for Conservation Studies Fact Sheet, Portland, OR.


23. Natural Areas and Native Pollinators. The Xerces Society For Conservation Studies Fact Sheet, Portland, OR. 2006


Appendix F. “What’s In It For Agriculture?”

Free Pollination Services from Native Pollinators

What’s In It For Agriculture?¹

Insect pollination is critical for the production of many important crops in the United States including alfalfa, almonds, apples, blackberries, blueberries, cherries, canola, cranberries, pears, plums, squash, sunflowers, tomatoes, and watermelons. Native pollinators, most importantly wild bees, provide “free” pollination services and enhance growers productivity and profitability through increased yields and improvements in crop quality. Native pollinators supplement services provided by managed pollinators and are an increasingly important resource in 21st Century production agriculture.

Why Are Native Pollinators Important To Farming Operations Today?

1. Native Pollinators Can Increase Crop Yields.
If natural habitat is nearby, native bees can provide much of the pollination necessary for many crops, and in some cases all of it if enough habitat is present. For example:

- Fifty-one species of native bees have been observed visiting watermelon, sunflower and tomato crops in California.
- Over forty-five species of bees have been recorded pollinating berry crops in Maine and Massachusetts.
- Sixty-seven species of bees have been observed pollinating berry crops in Nova Scotia.
- Native pollinators have been shown to nearly triple the production of cherry tomatoes in California.
- Studies show that wild native bees improve the pollination efficiency of honey bees in hybrid sunflower seed crops by causing them to move between male and female rows more often. Only the fields with abundant native bees and honey bees had near 100 percent seed set.
- Research suggests that, in the absence of imported honey bees, canola growers in Alberta, Canada make more money from their fields if 30 percent of the land is left in natural habitat, rather than planting it all. This natural habitat supports populations of native bees close to fields and increases bee visits and seed set in adjacent crops. Similar benefits have been shown with watermelon and coffee.

2. Native Bees Are Effective and Efficient Pollinators For Commercial Operations.
Native bees are more effective than honey bees at pollinating flowers on a bee-per-bee basis. For example, only 250 female orchard mason bees (also called blue orchard bees) are required to effectively pollinate an acre of apples, a task that would need 1.5 to 2 honey bee hives—approximately 15,000 to 20,000 bees. Why can native bees sometimes be more efficient?

¹ This Fact Sheet was developed in part from information contained in the Xerces Society’s “Farming For Bees” publication.
Selected native bees, like mason and bumble bees, are more active in colder and wetter conditions than honey bees. The range of foraging behaviors is more diverse among many species of native bees than in European honey bees. For example, nectar foraging honey bees often never contact the anthers (pollen-producing structure) in many orchard crops, unlike orchard mason bees that forage for both pollen and nectar. Alfalfa flowers are shaped in a way that makes it hard for honey bees to reach the nectar and pollen; the native alkali bee can easily forage on these flowers.

Some native bees specialize in one type of flower. Squash bees visit primarily cucurbits. Female bees begin foraging before dawn and males may even spend the night in the flowers, which results in efficient pollination and larger fruits. Unlike honey bees, bumble bees and many other native bees perform buzz pollination (the bee grabs onto a flower’s stamens and vibrates its flight muscles, releasing a burst of pollen from deep pores in the anther). This behavior is highly beneficial for the cross-pollination of tomatoes, peppers, cranberries and blueberries, among other plants. Although tomatoes don’t require a pollinator to set fruit, buzz-pollination by bees results in larger and more abundant fruit.

3. Native Pollinators Can Save Growers Money.
Farms with strong populations of native pollinators can save money because they have less need for imported hives of honey bees.

4. Native Bees Can Be a Buffer Against Pollinator Losses.
If populations of one bee species decline because of natural cycles of parasites or disease, other native bee species can fill the gap and provide a stable, reliable source of pollination. Furthermore, if the beekeeping industry continues to have trouble because of pests and diseases, or the mysterious Colony Collapse Disorder, native bees can fill in when managed honey bees are in short supply or more expensive to import.

5. Native Pollinators Can Provide Additional Farm Revenue Opportunities.
- Some species of wood nesting bees may be reared in nest tubes and sold at local farmers markets or produce stands for home gardeners looking for efficient, local, and gentle (non-stinging) pollinators.
- Farms that provide habitat for native bees may promote themselves as wildlife-friendly or sustainable. When faced with many choices about where and from whom to purchase produce, many consumers will choose farms that are “pollinator-friendly” or “wildlife-friendly” over others.
- If a small farm is open to tours or u-pick—an increasing trend, especially at vineyards and pumpkin patches — beautiful hedgerows and other improvements for wildlife can be promoted. A farm could even host a tour showcasing its resident, beneficial insects.
- Many federal and state agencies need large amounts of native seed for habitat restoration efforts. Native shrubs and wildflowers could be grown as a source of seed or cuttings and provide forage for native insects and a source of revenue for the farm.
6. Native Pollinator Habitat Improvements Can Provide Other Benefits for Farming Operations.
In addition to pollination, restoring or creating habitat has other benefits. If placed along drainage ditches or field edges, conservation plantings can:

- Reduce soil erosion and the cost of cleaning out ditches or tail-water ponds.
- Reduce the loss of irrigation water and improve water quality.

Native plant habitat created adjacent to fields can reduce weed seeds sources adjacent to crops. The habitat will also support other wildlife, and beneficial insects, such as parasitic wasps and predaceous beetles that help combat pest insects on crops.

Snags (dead standing trees) left along stream banks or field edges for tunnel-nesting bees will also provide perches and nest sites for woodpeckers and other birds. Owls and other raptors may take up residence in restored habitat and can help control rodent populations. Protecting, enhancing, restoring, and creating habitat for pollinators will have benefits for both a farmer’s bottom line and wildlife.
Appendix G. Project Steering Committee Contact Information

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