Florida TaxWatch

Special Report

Economic Impact Evaluation of a Proposed Honeybee Research and Extension Laboratory in Florida

MARCH 2014

Abstract

Florida has the opportunity to create the premier honeybee research facility in the U.S., which would help recruit and retain top researchers and students. Florida TaxWatch analyzed the economic and fiscal impacts of the potential decision, and quantitatively analyzed the direct effects on the Florida budget.

The economic and fiscal impacts include:

- Short-term construction jobs created during construction phase
- Increase in visiting scholars, students, and out-of-state beekeepers for research and extension
- Expected additional research dollars, creating jobs and increasing tax revenues
- Expected benefits from research for both producers and consumers, and their contribution to state tax revenue

The results of this Special Report indicate that all these components have the effect of increasing state revenues. The most likely additional payoffs of the research would include reduced costs for beekeepers, improved pollination for Florida agriculture producers, and reduced food prices for Florida consumers.

If researchers find solutions to the substantial losses currently being seen in managed bee colonies, recently averaging around 30 percent per year, beekeepers would save substantial amounts of money in bee replacement costs, and improved pollination rates across the state's crops. Many of the fruits and vegetables grown in Florida require pollination, and increased production because of more pollinator availability would contribute to higher production and more farm income. This is especially important for small farmers, many of whom keep bees to improve their other crops and to provide extra income and extra cash flow between harvesting those other crops.

Improved food production benefits consumers. Better availability of healthy Florida citrus, melons, strawberries, sweet potatoes, pumpkins and other consumer favorites not only contributes to the health of Floridians, it lowers their food prices.

This Florida TaxWatch report shows that choosing to build a state-of-the-art bee research and extension laboratory in Florida should have the following effects:

1. Florida producers and consumers should receive approximately $89 million in benefits from decreased costs and increased agricultural production, using Organization for Economic Cooperation and Development estimates of an average of $15.1 of own-state benefit for each agricultural research dollar spent.

2. Using the standard of returns of dollars to the state budget compared to state budget outlays, and accounting for opportunity cost, Florida should expect a net positive return more than $1 million to the state budget if it proceeds with the building of a state-of-the-art bee research and extension laboratory.

Therefore, Florida agriculture producers, Florida consumers, and the state budget should expect to receive a positive return on this investment.

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Introduction

The apiculture industry, more commonly known as beekeeping, plays an important role in the Florida and U.S. economies. Florida is the third largest honey producer in the United States (trailing only North Dakota and South Dakota), with a reported value of $23.1 million in 2012, a 25 percent increase from the previous year.[1]

There were an estimated 3,143 registered beekeepers in Florida in 2013,[2] and 199,000 honey-producing colonies in Florida in 2012,[3] equating to about 7.6 percent of the total honey producing colonies in the United States. Florida may not lead the nation in honey-producing colonies, but does boast the nation's third-highest yield per colony.

Aside from honey production, Florida is the winter nursery for bees from 27 states, and receives around 280,000 colonies (around 10 percent of U.S. total) over the winter, employing around 4,500 workers.

Despite the current successes, there are problems facing the bee industry that researchers have been unable to solve. Loss rates in managed honeybee colonies in the U.S. have averaged around 30 percent over

1 2013 USDA Florida Honey Report. http://www.nass.usda.gov/Statistics_by_State/Florida/Publications/Honey/honey13.pdf

2 "Backyard hives keep area bee biz buzzing amid threat". Orlando Sentinel. http://articles.orlandosentinel.com/2013-08-25/news/os-beekeeping-florida-colony-collapse-20130825_1_adult-bees-commercial-beekeepers-hives

3 2013 USDA Florida Honey Report.

the last 6 years,[4] more than double what the industry considers acceptable. These excess losses cost producers substantial amounts of money in replacement costs and lost production, and can have substantial effects on pollination of farm crops.[5]

The University of Florida has existing bee research and extension programs, but no large programs exist in the Southeast. Today, much of the research on bees is done at programs at the University of California at Davis, Penn State University, and the University of Minnesota.

Investing in a new facility in Florida has the potential to make the state a national leader in this important area of agricultural research.

Importance of Bees to Local Economies

While Florida is a national leader in honey production, the amount of "contract pollination" involving Florida bees may have more economic value, as receipts from pollination services by Florida bees are substantial.

One of the major customers of Florida pollination services is the California almond industry. California almond production uses around 1.4 million colonies for pollination,[6] around half of the managed bee colonies in the U.S. This year, an estimated 90,000 to 100,000 Florida colonies have been sent to California, and with an expected average of $150 per colony, almond pollination alone will send $13.5 to $15 million to Florida beekeepers this year.[7] Many of the Florida bees will return after the almond season where they will be used to pollinate Florida crops, including citrus, blueberries, strawberries, watermelons, squash, and avocados.

Beekeeping serves as a complementary enterprise for many farmers, as well as a means of income diversification. Many of these individuals earn extra income by renting their hives for pollination, giving a boost to cash flow for small producers, since honey sales and contract pollination services have payouts at different times than many other crops in Florida.

4 Winter Loss Survey 2012-2013: Preliminary Results. www.beeingofmed.org/2013/05/winter-loss-survey-2012-2013/

5 One of the most important issues for beekeepers is the disorder where colonies lose their populations suddenly, called Colony Collapse Disorder (CCD). Most estimates consider the damages in the billions of dollars.

6 http://www.ars.usda.gov/news/docs.htm?docid=15572

7 http://fldpi.wordpress.com/2013/02/15/florida-sending-bees-west-as-california-almond-growers-face-pollination-crisis/

Additionally, having a substantial number of small producers scattered through the state can increase local food production, diversify genetics, and reduce the spread of disease.

The Proposed Research Facility

A modern research and extension laboratory has been proposed for construction at the University of Florida (UF). Outfitted with state-of-the-art equipment, research at the proposed new facility will concentrate on honeybee husbandry, biodiversity, ecology, and integrated crop pollination. A substantial portion of the proposed laboratory would be used for research and as a classroom, and would house a hive viewing area so students and visitors can watch live beehives in action.

Florida Already a Leader in Bee-related Policy

In 2008, Florida adopted the first honey identification standard, making the practice of blending and diluting honey illegal in the state. This type of prohibition has subsequently been adopted in California, Wisconsin, and North Carolina.

Florida has also created the nation's first prison reentry training program in beekeeping. Developed in collaboration with the Florida Department of Agriculture and Consumer Services and the Florida Department of Corrections, the program is teaching inmates beekeeping as a vocation, and successfully helping prisoners stay out of the corrections system.

This proposed research and extension facility has the potential to make the University of Florida the top university apiary research facility in the U.S. Aside from the prestige of having the top program and its effect on recruiting and retaining faculty, researchers, and students, this increases the potential for hosting large industry events in Florida.

As of this writing, the American Beekeeping Federation is looking at hosting their national event in Orlando in 2019. Though no economic impact of that possibility is included in the calculations of this paper, the event would likely bring 7,000 to 10,000 beekeepers and industry individuals for events that last more than a week.

Economic Impact Modeling

This paper estimates the returns to the state of Florida on the investment in a world-class bee research facility.[8] The economic impacts of having a top-notch research facility in Florida go far beyond the increased visitation by scholars and graduate students. The local community will see an increase in jobs during construction,[9] and additional impacts include expected increases in research money that could reasonably be expected to come to Florida, due to having world-class staff and facilities. Although there would be other potential benefits to Florida, such as increased enrollment in graduate apiary programs and many other potential benefits, no attempt to quantify those benefits in economic terms are attempted.

The figures that are used are solely the increases over existing amounts in each of the main categories brought about by the impact of the new facility. Additionally, those benefits are compared to an alternative use for the investment amount by the state, allowing the end result to include a reasonable opportunity cost.

Estimated Additional Dollars for Florida

This section examines the potential revenue for Florida taxpayers from additional research money, new scholars and students, and new beekeepers that would visit to study in Florida if the proposed facility is successfully built. These estimates only account for those additional persons coming from out-of-state. Visitors that use the existing program are already included in the current economic impact.

Construction and Outfitting

The project would take an expected three months for architecture and engineering, around six months for the design phase, and between ten months and two years for the construction.[10] If the facility is built at the University of Florida, the building would be built to LEED[11] standards under their sustainability efforts (costs for

8 What this paper does not include is any estimated economic impact of research at UF solving one of the major problems seen in bee mortality: colony collapse disorder. The value of a proprietary solution would produce economic returns to agriculture, to Florida, and to this specific program in dollar figures so high that returns would be many, many multiples of the cost of this world-class bee research facility.

9 In this estimate, the economic modeling software IMPLAN 3.0 was used, with multipliers for Alachua County.

10 Personal communication with Kevin Heinicka, Director of IFAS (Institute of Food and Agricultural Sciences) Facilities Planning & Operations at the University of Florida.

11 For more on LEED standards, visit: http://www.usgbc.org/leed

meeting LEED standards are included), which could expand the economic impact in Florida due to LEED's preferences for local and regionally-produced materials.

BENEFITS FROM CONSTRUCTION OF BUILDING

Impact Type	Jobs	Labor Income	Total Value Added	Output
Direct	17.8	$883,019.6	$1,234,266.4	$2,890,202.5
Indirect	6.8	$304,560.1	$474,027.8	$826,609.1
Induced	6.3	$239,343.4	$456,953.6	$708,166.6
Total	30.9	$1,426,923.1	$2,165,247.9	$4,424,978.2

As expected, a substantial number of the jobs are in Construction or related services.

JOBS CREATED DURING CONSTRUCTION

Top Job Categories	
Construction	17
Architectural, engineering, and related services	2.2

Returns to the state during the construction phase are calculated from the statewide ratio of average percentage of personal income going to the state budget.

This is calculated by applying the average personal income for all Floridians ($804.2 billion, seasonally adjusted)[12] to the state budget during FY 2012-13.

Estimated Return to Florida Taxpayers: $131,705

12 Using the FLOTOT series from the Federal Reserve Database – FRED. FLOTOT shows quarterly personal income, seasonally adjusted. Data for Q3 2012 through Q2 2013 was averaged. This period coincides with the Florida budget year 2012-13.

Research Grants Increase Jobs

Typically, once the laboratory is fitted with equipment, a high percentage of research dollars go to the salaries of personnel. In calculating the job impact of estimated additional research dollars, it was divided by the salary of the average agricultural post-doc position, estimated to be $50,000 per year. This figure is less than the amount of U.S. Department of Agriculture Post Doctoral Fellows, and higher than the average in the U.S. This would be an over-estimate for graduate students, and less than full-time faculty. Without knowing the educational requirements of these future researchers, the $50,000 average is a reasonable assumption.

The extra jobs produced by increased research dollars, when calculated as above, shows up to seven additional jobs with $750,000 per year in research income.

Over the 30-year period of this study, an estimated $9,239,333 of additional funds would be used for bee research if a new facility is built. It is likely that this will be made up of both federal research grants and state grants.

The net present value of this estimated investment in research is around $5.9 million.

Estimated Returns to Florida Taxpayers from:

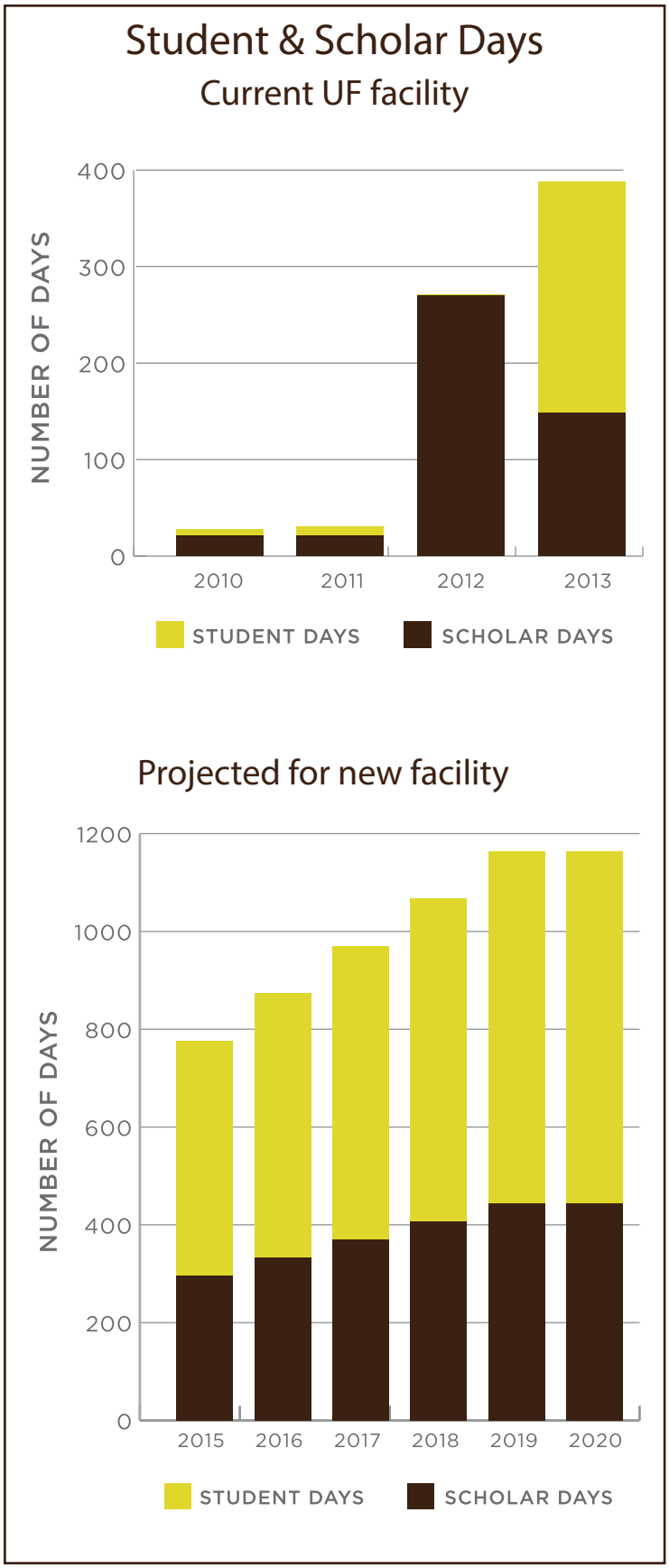
Additional Research Income - $435,130.10

Indirect Portion of Research Dollars - $87,397.67

Additional Florida Visitors

The current program has grown, and visiting scholars from many states and other countries have expressed interest in studying in Florida, but cannot be accommodated with the current laboratory. The chart on the top of the next page shows the substantial growth of visitor days for both scholars and students for current bee research at UF.

In 2010, records reflect 21 scholar-days and only seven student days. There were substantial increases in both 2012 and 2013, with the most-recent records showing 148 scholar days and 240 student days. (see top chart, right)



The extension bee program, also known as Bee College, is expected to grow from two to eight classes per year. Estimates from the University of Florida's Dr. Jamie Ellis show that an additional 100 visitors from outside Florida would attend Bee College, as it expands its class offering. These visitors typically stay in Florida for five to seven days, on average, and therefore the additional beekeeper days used in the model range from 500 to 700 each year, starting in 2015.[13] (bottom, left)

The numbers used for the "2015 and beyond" impact in the model are the expected increases over the averages of 2012-13: 209 scholar days and 120 student days. The average expenditures per person per day for domestic visitors, including transportation, was $148.40.[14] This paper uses a conservative $118 per day spending for the scholar

13 The expanded Florida beekeeper numbers, although important, are not considered here as this activity may substitute for other spending in the economy by this group.

14 2012 Florida Visitor Study. Visit Florida. Figures for spending by those visiting scholars and students is estimated by discounting average spending for Florida tourism, reducing those amounts typically less related to visiting scholars such as retail purchases and discounting spending on hotels and rental cars.

category, and $80 per day for the graduate student category, reflecting the likely differences in income and spending of these categories compared to those in the state for tourist-oriented activities.

Estimated Returns to Florida Taxpayers: $173,986.04

Research Investment Returns

One large economic impact of the research dollars includes the rate of return to research and how much of the benefits of that would be captured in Florida. Benefits from agricultural research of this type can produce returns that are mostly public goods because all beekeepers, agriculture producers, and the consuming public can benefit from any discoveries and solutions that come out of this type of research, but what is important for this analysis is the expected return on the state's proposed investment in this program.

In the case of potential proprietary solutions, where a substance is found or created that solves substantial problems in the beekeeping industry, there could be considerable returns to the state university system and the state of Florida. The University of Florida is, by far, the leading university in the state in terms of licensing technology invented by faculty and staff.[15]

Returns to research investment are highly variable, and difficult to predict. They can range from negative returns to substantially more than a 100 percent return on investment, depending upon the success of researchers. These returns have been estimated in multiple academic papers, and analyzed in a significant meta-study published by the Organization for Economic Cooperation and Development (OECD) in 2010.[16, 17]

According to the OECD-published meta-study referenced above, the internal "own-state" rate of return in the Southeastern states for agricultural research & development averaged 17.6 percent per year, and the cost-benefit ratio (figured at

15 Florida's Universities and Technology Transfer. Florida TaxWatch. September 2011.

16 Alston, J.M. (2010), "The Benefits from Agricultural Research and Development, Innovation, and Productivity Growth", OECD Food, Agriculture and Fisheries Papers, No. 31, OECD Publishing.

17 The Organization for Economic Cooperation and Development was established in 1961, and has 34 member countries. The OECD Secretariat collects and analyzes data, and the OECD publishes outlooks, overviews, and peer-reviewed papers on many subjects including agriculture.

a 3 percent real discount rate), is 15.1.[18] The Southeastern states show lower own-state returns than most states, where the own-state minimum found was 2.4, the maximum was 57.8, and the average was 21.0.

This is a conservative estimate because Florida, as a substantial producer of honey, an important wintering place for hives, and a substantial supplier of hives for pollination, would receive more than average benefits due to its size in the market from breakthroughs that are applicable everywhere, and a substantial portion of benefits from any proprietary method found to deal with significant problems in the bee industry.

Although estimates of cost-benefit ratios were indicated to be sensitive to model specifications, the benefits to agricultural productivity exceeded costs by "a factor of 10 or more," no matter which methods of measurement used. Because of the highly positive rates of return, seen in a vast amount of academic literature, the OECD study concludes "the world has systematically underinvested in agricultural R&D, and is probably continuing to do so."

It is difficult to predict the effects of results from future research, but for this paper, the gains have been allocated to reducing production costs for beekeepers and reducing consumer expenditures on food due to improved pollination of Florida crops. These are the most likely scenarios because research may well help decrease the die-off experienced, with rates recently around 30 percent per year. This example assumes that 40 percent of the reduced costs to producers and consumers will be spent in taxable activity. This a conservative estimate, because it is likely that producers would spend on increased production items including equipment, containers, as well as diverting some of the money to consumer goods. Consumers are likely to do the same with money not spent on non-taxable food.

Estimated Returns to Florida Taxpayers: $2,135,578.94

18 This report uses the Southeastern estimates for Florida.

Aggregate Results

Using the aforementioned "own-state" multiplier, the value of returns to the state from the additional research is estimated to be approximately $89 million. This could very well be a low estimate, given our state's unique place in the bee industry and the potential impacts of any improvements brought about by new research.

An estimated $2.1 million of that amount is what would be expected to be returned to state coffers, mostly in the form of sales taxes on the spending brought about by reduced costs to producers and consumers. The returns from additional jobs and labor, and from additional scholar and student spending, as well as the returns from building the research facility, are detailed in the table below.[19]

To show the expected net present value of the project, the opportunity cost of using the money for the state is deducted. In this case, although there may be many different options for the amount of this investment, the opportunity cost is calculated using the state's guaranteed rate of return in paying off state debt.

AGGREGATE RETURNS - NET PRESENT VALUE

Activity	Estimated Net Present Value of Return to State Budget
Building Facility	$131,705.00
New Scholar & Student Spending	$173,986.04
Additional Research $	$435,130.10
Indirect Portion of Research $	$87,397.67
Returns to Research	$2,135,578.94
Opportunity Cost	($1,959,078.15)
Expected Net Present Value of Investment	**$1,004,719.60**

19 The results table separates the estimated net present value for the related activities that provide returns to the state. Each is calculated on a net present value basis so the returns and the costs can be compared. These calculations assume no pre-payment penalty for paying off that debt.

Conclusion

This example, using the aforementioned assumptions, indicates that the total returns to Floridians are estimated to be substantial, mainly due to the typically high own-state rates of return to agricultural research. Even when the much tighter standard of returns to the state budget and opportunity cost are applied, this project is estimated to return more than $1 million in state tax revenue.

Therefore, the expected return to the state for investing in a modern bee research and extension laboratory is positive for agricultural producers, Florida consumers, and the Florida budget.

About the author

Dr. Jerry D. Parrish is TaxWatch Chief Economist and the Director of the Center for Competitive Florida at Florida TaxWatch. Dr. Parrish is also an Adjunct Instructor in the Masters in Applied Economics Program at Florida State University.

He earned a Bachelor's in Agricultural Business and Economics from Auburn University, an M.B.A. from Bellarmine University, an M.S. in Economics from the University of North Carolina at Charlotte, and a Ph.D. in Economics from Auburn University. He regularly publishes articles on the Florida economy, Florida's competitiveness, Florida's property and casualty insurance system, and other economic topics of interest to Floridians.

Dr. Parrish previously served as the Associate Director of the Center for Economic Forecasting & Analysis (CEFA) at Florida State University. Prior to joining TaxWatch, he spent several years in management roles with international companies.

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Dominic M. Calabro
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Dear Dominic:

I am interested in the potential economic benefits of a proposed project that will benefit consumers and agricultural producers, especially small farmers, in Florida.

There is a proposal to build a modern research laboratory in Florida. Research at the proposed new facility, likely sited at the University of Florida, will concentrate on honeybee husbandry, biodiversity, ecology, and integrated crop pollination. I believe it would be a world-class facility that would help Florida become a global resource for advancements in the study of Colony Collapse Disorder (CCD), a phenomenon that causes unexplained losses of managed honey bee colonies, that costs beekeepers, agricultural producers, and consumers millions of dollars per year in our state – and billions worldwide.

I would appreciate if you and your staff could conduct a comprehensive third-party analysis of this proposed project to determine the potential return for the state of Florida and its taxpayers.

Sincerely,

W. Keith Perry

ABOUT FLORIDA TAXWATCH

As an independent, nonpartisan, nonprofit taxpayer research institute and government watchdog, it is the mission of Florida TaxWatch to provide the citizens of Florida and public officials with high quality, independent research and analysis of issues related to state and local government taxation, expenditures, policies, and programs. Florida TaxWatch works to improve the productivity and accountability of Florida government. Its research recommends productivity enhancements and explains the statewide impact of fiscal and economic policies and practices on citizens and businesses.

Florida TaxWatch is supported by voluntary, tax-deductible memberships and private grants, and does not accept government funding. Memberships provide a solid, lasting foundation that has enabled Florida TaxWatch to bring about a more effective, responsive government that is accountable to the citizens it serves for the last 34 years.

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