# Sub/Contractor Information

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| Principal Investigator Name: | Philip Lobo |
| Organization: | SmithBucklin.com |
| Address: | 16305 Swingley Ridge Road  Chesterfield, MO 63017 |
| Phone: | 636-681-2259 |
| Email: | plobo@smithbucklin.com |

# Project Information

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| Project Number: | 1640-512-5261 Final Report |
| Project Title: | Soy In Aquaculture Research |
| Primary Contractor: | SmithBucklin |
| Project Manager’s Name: | Philip Lobo |
| Start Date: | 03/01/2016 |
| Completion Date | 09/30/2016 |
| Final Project Report Date: | 10/31/2016 |
| Action Team: | Meal |
| Long Range Strategic Plan Objective: | ● Increase the value of U.S. soybean meal to the entire value chain. |
| Long Range Strategic Measurement: | ● Meal Revenue Growth - Increase U.S. soybean meal revenue from $10.96 to $13.2 billion by 2020.  ● Oil Revenue Growth - Increase U.S. soybean and oil revenue from $6.88 to $8.4 billion by 2020.  ● U.S. Regulation/Legislation - Increase the overall constraint rating measuring the degree to which U.S. regulation/legislation constrains the soybean industry's ability to operate from 3.62 to 4.86 by 2020.  ● International Regulation/Legislation - Increase the overall constraint rating measuring the degree to which international regulation/legislation constrains the soybean industry's ability to operate from 3.33 to 4.83 by 2020.    ● Biotechnology - Increase the overall constraint rating measuring the degree to which biotechnology regulation/legislation constrains the soybean industry's ability to operate from 3.11 to 4.81 by 2020.  ● Non-Regulatory Influencers - Increase the overall constraint rating measuring the degree to which non- regulatory influencers constrain the soybean industry's ability to operate from 3.39 to 4.84 by 2020.  ● Environmental/Sustainability - Increase the overall constraint rating measuring the degree to which environmental/sustainability issues constrain the soybean industry's ability to operate from 3.48 to 4.85 by 2020.  ● Transportation/Infrastructure - Increase the overall constraint rating measuring the degree to which transportation/infrastructure constrain the soybean industry's ability to operate from 3.38 to 4.84 by 2020.  ● Quality - Increase the overall level of satisfaction with U.S. soy or soy product quality from 4.05 to 4.90 by 2020.  ● Customer Service - Increase the overall level of satisfaction with U.S. soy or soy product customer service from 3.93 to 4.90 by 2020.  ● Market Barriers - Increase the overall rating of U.S. soy or soy product market barriers and opportunities from 3.91 to 4.88 by 2020. |
| Target Area: | Domestic Opportunities |
| Target Area Goal: | Feed |
| Program: | Soy in Aquaculture |
| Constraint or Opportunity Statement/Objective: | Soybean farmers have an opportunity to increase the value of U.S. soybeans by establishing soybean meal as a preferred protein source in aquaculture diets based on research and utilization of best management practices to maximize the inclusion of U.S. soybean meal and soy protein concentrate in aquaculture feed in high-demand global markets, while encouraging consumption and support of farm-raised seafood by educating influencers on the health, environmental and economic benefits of soy-fed fish. |

# Project description

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| Project Summary: *In a few bullet points formulate (a) the project objectives, (b) the activities that will be undertaken to meet the objective, and (c) the targets.* | | |
| Global aquaculture production is growing at a rapid rate and the rate of increase has been sustained for over 10 years. Aquaculture species require high-quality, high-protein formulated diets for maximum weight gain. Fish meal has been the primary ingredient of choice, but global supplies of fish meal are not sustainable long term to meet the growing demand. Further, there is limited information available to support inclusion of soybean meal into high quality diets for many of the cultivated species. Thus, there is an opportunity for market expansion of soybean meal and soy protein concentrate into diets fed to aquatic animals. | | |
| Other Cooperators/Funding Sources | | |
| Expected Outputs/Deliverables: | | |
| Grouper  ● Recommended dietary protein: energy rations for tiger and humpback grouper for different weight ranges  ● Feed trial results that shows diet based on current knowledge of dietary requirements for humpback grouper provides faster, more efficient growth than common commercial diets  Netting for White Seabass  ● Determine if extra cost of predator netting is justified given stress and growth performance of White Seabass  ● Determine if nylon nets can be used to lower cost for growing White Seabass in offshore systems with and without surrounding predator net  Seriola rivoliana (Kampachi)  ● Prove that 48.5 percent SPC diets can deliver similar results to 40 percent SPC diets in Seriola rivolana  (kampachi)  ● Determine a path forward for approval of stearic acid-rich soybean oil in marine fish diets  ● Develop genetics for algal-based feedstock that provides taurine and eicosapentaenoic acid (EPA) an omega- 3 fatty acid for fish feeds  White Seabass and CA Yellowtail  ● Determine the proper dietary taurine level in high level soy-based diets for both White Seabass and California Yellowtail  ● Determine the secondary amino acid (especially threonine and tryptophan) requirements of White Seabass  Pompano-Auburn  ● Evaluate the use of a fermented soy protein (PepSoyGen) in Florida Pompano diets  ● Identify the lowest inclusion level of fishmeal in Pompano diets using PepSoyGen  ● Save the pompano industry money by determing an appropriate amount of squid hydrolysate than can replace squid meal to enhance soy based diets  Pacific White Shrimp-Auburn  ● Reduce production costs and improve feed conversion ratios in Pacific White Shrimp using automated feeders  Improvement current management systems by identifying ways to reduce labor, biomass and phosphorous output | | |
| Key Performance Indicators (KPIs): | | |
| *Develop KPIs specific to this project. The KPIs must focus on outcomes (impact),* ***not*** *outputs (actions, activities). They must be measurable and record meaningful progress. A good KPI also measures a change in behavior.*  *Hint:* ***Outputs*** *indicate what has been done (e.g. organized a workshop, conducted experiments, published a newsletter).* ***Outcomes*** *indicate the quantified impact of the action that progresses US soy farmer interests (e.g. Percentage/number of participants that changed their attitude/behavior as a result of what they learned at the workshop; impact of experiment results on research hypothesis; use of research results in commercial applications, percentage/number of newsletter readership that changed attitudes/ behavior as a result of the information shared in the publication).* | | |
| 1. | Grouper  ● Feed conversion will be increased from over 7:1 to 1.5:1 by 2019  ● Grouper diets will include 15-40 percent soy-based products in feed formulation resulting in 10,000-28,000 tons of soy-based products used per year by 2019 | |
| 2. | Netting for White Seabass  ● Predator netting return will be 1.2:1 for ocean cage raised White Seabass  ● Nylon nets will lower netting expense by 90 percent for growing White Seabass in offshore systems | |
| 3. | Seriola rivoliana (Kampachi)  ● 48.5 percent SPC diets can deliver similar results to 40 percent SPC diets in Seriola rivolana (kampachi)  ● One new cost-effective algal-based feedstock is developed providing taurine and eicosapentaenoic acid (EPA) an omega-3 fatty acid for fish feeds | |
| 4. | White Seabass and CA Yellowtail  ● White Seabass and California Yellowtail can be fed high-soy diets supplemented with taurine that compete with current commercial diets at a lower cost  ● White Seabass can be fed high-soy diets supplemented with threonine, tryptophan, taurine and a feed attractant that lowers fishmeal inclusion and the cost of feed | |
| 5. | Pompano-Auburn  ● 40 percent inclusion of fermented soybean meal can be added to improve feed conversion in Florida Pompano diets  ● Soy based diets with squid hydrolysate will increase performance over soy based diets with squid meal by 4 percent or more | |
| 6. | Pacific White Shrimp-Auburn  ● Pacific White Shrimp can improve feed conversion ratios from 1.8:1 to 1.3:1 using a combination of automated feeders and best management practices | |
| etc. |  | |
| Approved Budget: | | $760,071.00 |
| Billed to Date: | | $599,983.48 |
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# Project Progress Assessment

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| LRSP Accomplishments: How does this project address the relevant long range plan strategic objective? This project contributes to the increased value and volume of soybean meal in aquaculture feeds both domestically and internationally. |
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| Program constraint/opportunity accomplishments: How does this project address the specific program constraint or opportunity? This project is conducting research that will increase soybean meal consumption by the domestic andinternational aquaculture industries. |
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| Target Area accomplishments: How does this project impact the relevant target areas and target area goals? It contributes to the Domestic and International target areas meeting their soybean meal consumption goals. |

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| KPI Accomplishments: On reflection, did the project KPIs | Check Box | |
| *(Respond to this question for both midterm and final project reports)* | YES | NO |
| 1. Address the relevant program constraint(s)? | X |  |
| 1. Address the project objective(s)? | X |  |
| 1. Prove measurable? | X |  |
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| How were the KPIs measured? *(Summarize in a few sentences)* | | | | | | |
| *(If this is a midterm report, describe how the KPI will be measured)* | | | | | | |
| Did this project meet the intended KPIs measured? | | | | | | |
| For final project reports  [For each KPI check one] | | KPI not met - little or no progress | KPI not met - significant progress | KPI met | KPI exceeded | |
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|  | Grouper |  |  |  |  | |
| 1. | Feed conversion will be increased from over 7:1 to 1.5:1 by 2019 |  | X |  |  | |
| 2. | Grouper diets will include 15-40 percent soy-based products in feed formulation resulting in 10,000-28,000 tons of soy-based products used per year by 2019 |  | X |  |  | |
|  | Netting for White Seabass |  |  |  |  | |
| 3. | Predator netting return will be 1.2:1 for ocean cage raised White Seabass |  |  | X |  | |
| 4. | Nylon nets will lower netting expense by 90 percent for growing White Seabass in offshore systems |  |  | X |  | |
|  | Seriola rivoliana (Kampachi) |  |  |  |  | |
| 5. | 48.5 percent SPC diets can deliver similar results to 40 percent SPC diets in Seriola rivolana (kampachi) |  |  |  |  | |
| 6. | One new cost-effective algal-based feedstock is developed providing taurine and eicosapentaenoic acid (EPA) an omega-3 fatty acid for fish feeds |  |  |  |  | |
|  | White Seabass and California Yellowtail |  |  |  |  | |
| 7. | White Seabass and California Yellowtail can be fed high-soy diets supplemented with taurine that compete with current commercial diets at a lower cost |  |  | X |  | |
| 8. | White Seabass can be fed high-soy diets supplemented with threonine, tryptophan, taurine and a feed attractant that lowers fishmeal inclusion and the cost of feed |  | X |  |  | |
|  | Pompano-Auburn |  |  |  |  | |
| 9. | 40 percent inclusion of fermented soybean meal can be added to improve feed conversion in Florida Pompano diets |  | X |  |  | |
| 10. | Soy based diets with squid hydrolysate will increase performance over soy based diets with squid meal by 4 percent or more |  | X |  |  | |
|  | Pacific White Shrimp-Auburn |  |  |  |  | |
| 11. | Pacific White Shrimp can improve feed conversion ratios from 1.8:1 to 1.3:1 using a combination of automated feeders and best management practices |  | X |  |  | |
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| Elaborate on the circumstances that played a role in (a) achieving, or (b) not achieving the KPI(s): *(For midterm project reports elaborate on any circumstances that might prevent or promote achievement of the KPIs*) | | | | | |
| *Hint: Elaborate on the factors that have contributed to the success or those that hindered success. For example:*   * *Achieving the objectives*   + *Key crushers sent senior buyers (decision makers) to the workshop and they initiated trading;*   + *Company X saw the results and funded scale-up;* * *Not achieving the objectives*   + *Company X saw that results and initiated a scale-up, but was taken over by another company which had other priorities;*   + *Key buyers expressed interest, but import regulations have frustrated sales;*   + *The soy protein produced had poor tensile strength;*   + *The leading researcher (or decision maker) no longer works for this organization.* | | | | | |
| All subcontractors on this project are experienced, but when dealing with living animals multiple variables can come into play that can inhibit the ability to get optimal results. Regardless, great strides forward were made.  For KPI 11, it should be noted that though feed conversion rate did not improve, shrimp yield improved by nearly 49%. This is a significant economic gain to the shrimp producer. | | | | | |

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| Were all project deliverables supplied? | [Check one] | | No deliverables due yet | YES | NO |
|  |  | |  | X |  |
| **If NO, then why:** | | | | | |
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| Are all project deliverables on schedule? | | [Check Yes or No] | | YES | NO |
| *(For midterm reports, provide an assessment whether the project and its deliverables are on track)* | | | | X |  |
| **If No, then why** | | | | | |
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For the following question, select ONE response that applies best to the impact of specific type of project you are reporting.

The projects are classified as follows:

* **Research projects** - all fundamental and applied research projects related to soybean yield and composition improvement, production practices, industrial uses, aquaculture, and human nutrition;
* **Market development/marketing/advertising/PR projects** - all projects that aim to change targets’ attitudes and behavior.
  + These can be domestic or international projects with a wide range of targets spanning the whole value chain and key influencers of the value chain.
  + They can include research projects aiming to identify advantageous attributes of US soy and soy products when the results will be used to differentiate and create preference for US soy products vs. competitor origins or alternative products.
  + Communication with US soy farmers about best farming practices should be included here.
* **Farmer** check**-off communication projects** - Check-off dollars are invested to benefit US soybean farmers. A small number of projects aim to keep the broader soy farmer community informed about how check-off dollars are spent, the key priorities and the work being done to maintain/increase farmers’ wellbeing so that they continue to support the check-off legislation.
* **Special projects**:
  + Information **gathering** for planning and for use by USB and the industry - these projects collect relevant market or other information, or represent on-going market and industry sector monitoring. In most cases, the information/data provided is used internally.
  + **Other** - these cover Director travel, various subscriptions, program administration, etc. They frequently support other types of projects.

| How is the impact of this project best characterized? *(Respond to this question for final project reports only; leave blank for midterm reports)* | |
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| **Research projects** | CHECK ONE |
| 1. This project has resulted in an identified product/technology/research outcome that is commercialized and will lead to benefit to soybean farmers. |  |
| 1. This project has resulted in specific prospects for commercialization; the potential benefits are clear but an industrial partner needs to be identified in order to realize benefits | X |
| 1. This project has contributed to building a foundation and knowledge base that may lead to benefits for future generations of soybean farmers |  |
| 1. The results of this project are unlikely to lead to commercially viable benefits or to changes in attitudes and behavior in favor of soy farmer and industry interests |  |
| **Market development/marketing/advertising/PR projects** | CHECK ONE |
| 1. This project has resulted in positive changes in the targets’ behavior |  |
| 1. This project has resulted in changes in the targets’ awareness and attitudes that will potentially lead to positive changes in behavior |  |
| 1. The results of this project are unlikely to lead to commercially viable benefits or to changes in attitudes and behavior in favor of soy farmer and industry interests |  |
| **Farmer communication projects** | CHECK ONE |
| 1. US soy farmers understand how check-off funds are being invested and how this work will benefit them; they continue to support the check-off |  |
| 1. This project is unlikely to contribute to farmers’ understanding and support of the check-off |  |
| **Special projects** | CHECK ONE |
| 1. This project has met its objectives and the outcomes and will contribute to meeting USB’s strategic objectives |  |
| 1. This project has not developed according to plan and expectations |  |

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| Is any further investment required for this project to realize its intended benefits for US soybean farmers? *(Respond to this question for final project reports only; leave blank for midterm reports)* | CHECK ONE |
| 1. No further investment is required benefits, have been realized |  |
| 1. Smaller (75% or less) than the current level of investment is required to realize benefits. | X |
| 1. Maintain approximately the current level of investment. |  |
| 1. Larger (25% or more) than the current level of investment in further work is required. |  |
| 1. There should be no further investment in this project because the results are unlikely to lead to contribute to soybean farmers and industry well-being. |  |

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| Over what period of time will the expected benefits to US farmers be realized? *(Respond to this question for final project reports only; leave blank for midterm reports)* | CHECK ONE |
| 1. Immediate to near future |  |
| 1. 3 - 5 years | X |
| 1. More than 5 years |  |
| 1. N/A, project is not showing potential to realize benefits or this has been a one-off Special Project |  |

# Learning and next steps

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| Have similar projects been funded in the past? | [Check Yes or No] | YES | NO |
| *(Answer for both final and midterm project reports)* |  | X |  |
| **If yes, how do they relate to the current one?** | | | |
| Foundational work on which the current program was built. | | | |
| Is this project funded for the next fiscal year? | [Check Yes or No] | YES | NO |
|  |  | X |  |
|  |  |  |  |
| What, if any, follow-on steps are required to capture benefits for all US soybean farmers? Continued support for future projects is necessary to expand soy products use in aquaculture. Success will require sustained effort over time. | | | |
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