



THE HUNTINGTON
Library, Art Collections, and Botanical Gardens

Magnolia portoricensis Collection Report
APGA-USFS Tree Gene Conservation Partnership

November 23, 2016

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Project Summary

The Huntington Library, Art Collections, and Botanical Gardens and Vallarta Botanical Gardens collaborated for a *Magnolia portoricensis* collection trip from September 26 through October 1, 2016 sampling from all four public forests (Bosque Estatal de Carite, Bosque Estatal de Guilarte, Bosque Estatal de Maricao, and Bosque Estatal de Toro Negro) with populations of *M. portoricensis*. *M. portoricensis* is listed as Endangered on the IUCN Red List 2015-4. With the primary threat of logging, the species is severely fragmented. Despite these threats, *M. portoricensis* is not in ex situ cultivation (BGCI, 2016).

List of Participants and Contact Information

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Objectives & Outcomes

1) **Scout extant locations for *Magnolia portoricensis* in the Puerto Rico state forests listed by Little and Wadsworth (1964).**

The first objective had largely been accomplished by Emily Veltjen, a Belgian PhD candidate studying conservation genetics of Caribbean *Magnolia* species, prior to our arrival, although some additional individuals were discovered.

2) **Collect seed (if available)**

The second objective was released as Veltjen and Christian Torres Santana, director of Arboretum Dona Ines in San Juan, were both collecting seed, and further collections would have taxed the remaining populations.

3) **Collect material for micropropagation**

The material for micropropagation will be divided into two sets. One set will remain in Puerto Rico at Pontificia Universidad Católica de Puerto Rico as an on island gene bank that can facilitate research, tissue banking, and potential reintroduction. The other set is being shipped to The Huntington to be grown as live plants and tissue banked and will be distributed to San Francisco Botanical Garden, Longwood Gardens near Philadelphia and Vallarta Botanical Gardens in Mexico.



Folgado prepares buds for micropropagation in field. Photo: Thibault

Daily Field Log

26 September 2016

The field team (Folgado, Gerlowski and Thibault) flew from Los Angeles to San Juan. They rented a field vehicle, traveled to Ponce, and acquired collecting supplies in preparation for an early morning appointment at Bosque Estatal de Maricao.

27 September 2016

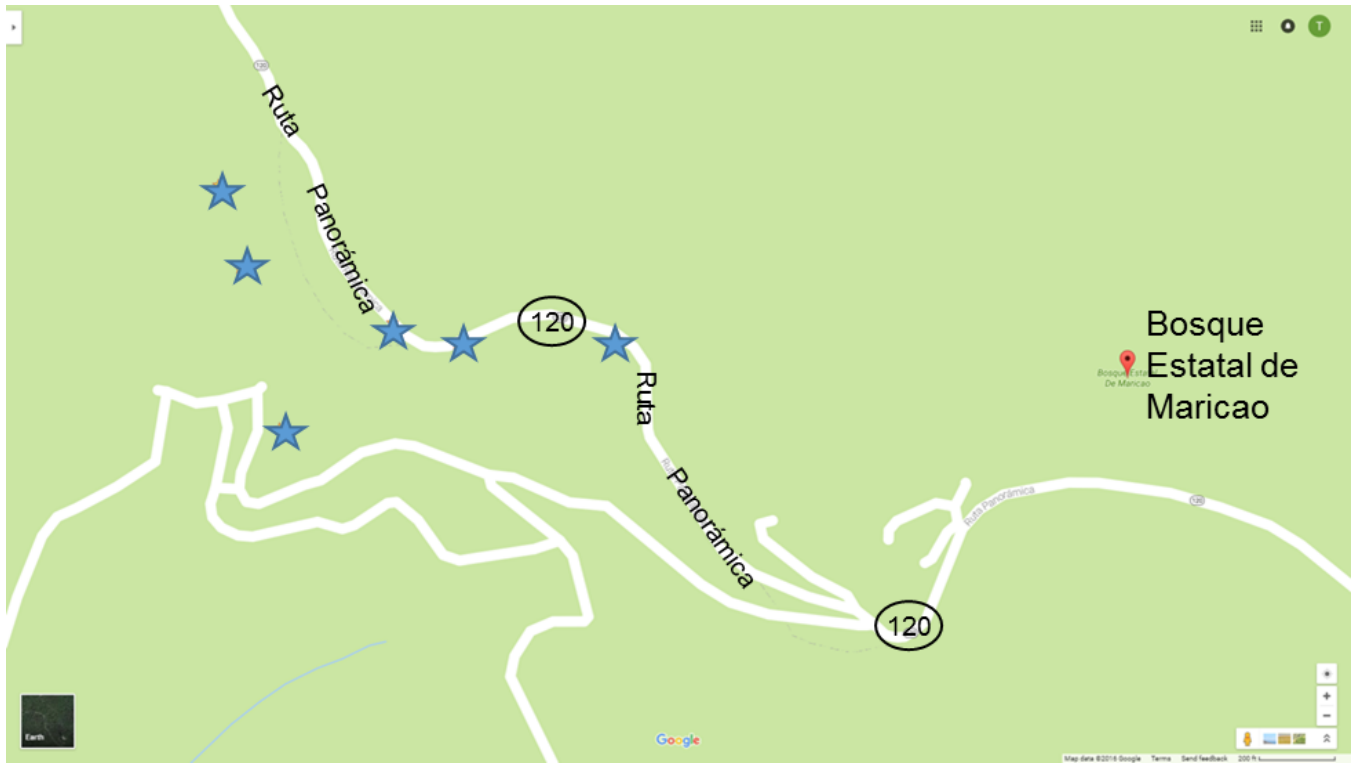
The field team (Folgado, Gerlowski and Thibault) traveled to Bosque Estatale de Maricao. Forest service staff assisted the team in finding magnolias. The team collected from two plants.

Later in the morning, the field team met with Veltjen, a Belgian PhD candidate, and Carlos Rodriguez of ArborNaut, her climber. The team continued scouting and collected from an additional plant. The team then collected along the highway, leapfrogging and sharing material with Veltjen and Rodriguez. Together, three more clones were acquired before the day was cut short due to thunderstorms.



Gerlowski (left) and Thibault (right) discuss climbing logistics.
Photo: Folgado

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Map of collecting sites for 27 September 2016

28 September 2016

The field team (Gerlowski and Thibault) traveled to Bosque Estatal de Toro Negro and met with Gerardo Hernández, forest manager. They were joined by Veltjen, Rodriguez, Torres Santana, and a videographer and were shown cultivated plants near the office, but chose not to sample in order to conserve time and resources for naturally occurring plants.

The group went to the champion tree of species. While Rodriguez climbed the champion tree with material for micropropagation, Gerlowski and Thibault collected from a younger plant that Veltjen had located on the way. Upon return, the field vehicle's gas had been siphoned necessitating a detour to refuel. That afternoon Gerlowski and Thibault visited the population east of Lake Matrullas and found three trees flagged by Hernández and Veltjen. One was correctly identified and collected.



Thibault presses a *Magnolia portoricensis* specimen. Photo: Folgado

Folgado joined the micropropagation team at Pontificia Universidad Católica de Puerto Rico where the collected explants were processed for tissue culture initiation. Folgado prepared the medium for the cultures. Ismary Rivera helped with the preparation of medium and tools. The explants collected in Maricao were washed with tap water. A bleach solution containing a total concentration of 1.5 % Sodium hypochlorite and 5 drops/L of Tween 20 was prepared and the explants were sterilized and rinsed three times in sterile distilled water for five minutes each. Folgado proceeded to the tissue culture initiation. The stem was cut to eliminate the dead tissue and buds were opened to facilitate initiation.

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Map of collecting sites for 28 September 2016

29 September 2016

Gerlowski and Thibault traveled to Bosque Estatal de Guilarte to meet Axel Alvarado, forest manager. The team collected from a native tree uphill from the office. Alvarado accompanied the team to collect from El Gigante, the largest tree of the species in the forest and highlighted as Punta 007 in the visitor map for Cerro Guilarte. At the end the day, Alvarado led the field team to the largest grouping of species. Although there are questions about the origin of these trees, the team collected from seven individuals until it was too dark to continue. Folgado processed the collected explants from the previous day.



Map of collecting sites for 29 September 2016

30 September 2016

Gerlowski and Thibault traveled to Bosque Estatal de Carite to meet Torres Santana at the office of Hecsor Serano, forest manager. They collected from two cultivated trees at office and from large tree along Highway 184. The team scouted for a smaller tree that Veltjen had found with help from Serano and two forest service staff.

That afternoon the field team traveled to Bosque Estatal de Toro Negro to pick up samples of a champion tree left by Veltjen and Rodriguez. Hernández was able to find items Veltjen and Rodriguez left, but not the buds from the champion tree. The field team then traveled to Pontificia Universidad Católica de Puerto Rico to drop off samples for processing with Rosa Berrios Villarini with ample time for processing prior to departure from Puerto Rico. Collected explants were treated and there was a minimal variation regarding the type of bleach used in sterilization and initiation.



Folgado (left) and Banch (right) process *Magnolia portoricensis* in lab. Photo: Berrios Villiani



Map of collecting sites for 30 September 2016

1 October 2016

The field team (Folgado, Gerlowski and Thibault) traveled to El Yunque National Forest to scout for *Magnolia splendens* around the Britton Observation Tower, finding one individual. Closed roads were noted to support efforts to reach other trees should work be expanded to include this species in the future.

The team toured Arboretum Dona Ines with Torres Santana and learned that herbarium specimens could not be taken without phytosanitary inspection and that this service was unavailable on Saturdays. Santana graciously offered to guide the specimens through the required process and the team departed San Juan for Los Angeles.

Conclusions and Future Opportunities

Prior to departure, it had been suggested that there could be as few as 18 remaining individuals of *Magnolia portoricensis*. This project collected from 20 total individuals, 18 wild and two cultivated. The material collected on the first two days processed well in the lab, proving the utility of these methods.

The species is more prevalent than expected. Veltjen had found approximately 200 in her two month stay on the island. The two western state forests of Maricao and Guilarte have relatively dense populations with good seed set, although the origin of the trees in Guilarte needs further investigation. Should Longwood Gardens pursue a seed collecting grant under this program for 2017, they would do best to concentrate on these forests.



Gerlowski finds a fruit on *Magnolia splendens*.
Photo: Folgado

The combined skills and resources of The Huntington and Pontificia Universidad Católica de Puerto Rico may be best applied to additional collections from the scattered populations of *Magnolia portoricensis* in Toro Negro, Tres Picachos and Carite. Unless Veltjen and Torres Santana found significant populations of *Magnolia splendens* in El Yunque, these populations could be an expansion of the work. Pontificia Universidad Católica de Puerto Rico is excited to expand their conservation efforts of the native flora.

Collaborators and Contributions

- Axel Alvarado, Bosque Estatal de Guilarte. Field guide on Thursday, 29 September.
- Piel Banch, Pontificia Universidad Católica de Puerto Rico. Provided technical support in lab. Acquired material for experimentation prior to arrival.
- Rosa Berrios Villarini, Pontificia Universidad Católica de Puerto Rico. Primary host and collaborator in lab. Established decontamination protocols prior to arrival.
- Gerardo Hernández, Bosque Estatal de Toro Negro. Advised team on tree locations on Wednesday, 28 September.
- Ismary Rivera, Pontificia Universidad Católica de Puerto Rico. Provided technical support in lab.
- Carlos Rodriguez, ArborNaut. Climber for Emily Veltjen. Worked together in field on Tuesday, 27 September, and Wednesday 28 September.
- Alma Santiago Cortes, Pontificia Universidad Católica de Puerto Rico. Signed MOU between university and The Huntington. Allocated university resources in support of project.
- Hecsor Serano, Bosque Estatal de Carite. Joined in field on Friday, 30 September.
- Christian Torres Santana, Arboretum Dona Ines. Joined in field on Wednesday, 28 September, and Friday, 30 September. Processed herbarium specimens for phytosanitary certificate.
- Emily Veltjen, University of Ghent. Arranged visits with forest managers of all four sites. Advised on collecting sites throughout trip. Joined in field, Tuesday, 27 September, and Wednesday, 28 September.

Label Data for *Magnolia portoricensis* Specimens Collected

Puerto Rico: San German: Bosque Estatal de Maricao, entry road to forest manager's office. Upper Cordillera Forest. 792 m. 18.15125°N, 66.99368°W. Moderate to steep W slope, clay with organic layer, in association with *Podocarpus*, *Cecropia*, *Cyathea*, *Clusia*, *Croton*, *Gleichenia*, Melastomaceae, bamboos. Tree to 9 m., foliage dark green; fruits light green; seeds pink to coral. Tim Thibault, Raquel Folgado and Neil Gerlowski 1299. 27 Sep 2016.

Puerto Rico: San German: Bosque Estatal de Maricao, entry road to forest manager's office. Upper Cordillera Forest. 810 m. 18.15185°N, 66.99385°W. Moderate to steep W slope, clay with organic layer, in association with *Podocarpus*, *Cecropia*, *Cyathea*, *Clusia*, *Croton*, *Gleichenia*, Melastomaceae, bamboos. Tree to 4.5 m., foliage dark green. Tim Thibault, Raquel Folgado and Neil Gerlowski 1300. 27 Sep 2016.

Puerto Rico: San German: Bosque Estatal de Maricao, trail below abandoned stone house. Upper Cordillera Forest. 808 m. 18.15008°N, 66.99338°W. Moderate W slope, clay with organic layer, in association with *Podocarpus*, *Turpinia*, *Brunellia*, *Eucalyptus*, *Cyrilla*, *Cecropia*, *Cyathea*, *Clusia*, *Gleichenia*, Melastomaceae, bamboos. Tree to 6 m., foliage glossy dark green. Tim Thibault, Raquel Folgado and Neil Gerlowski 1301. 27 Sep 2016.

Puerto Rico: San German: Bosque Estatal de Maricao, along Highway 120 near forest manager's office. Upper Cordillera Forest. 828 m. 18.1507°N, 66.99202°W. Moderate S slope, clay with organic layer, in association with *Podocarpus*, *Cecropia*, *Cyathea*, *Clusia*, *Cyrilla*, *Erythrina*, *Petitia*, *Lantana*, *Gleichenia*, Melastomaceae, bamboos. Tree to 10 m., foliage dark green, fruits light green. Tim Thibault, Raquel Folgado, Neil Gerlowski, Emily Veltjen and Carlos Rodríguez 1302. 27 Sep 2016.

Puerto Rico: Maricao: Bosque Estatal de Maricao, along Highway 120 near forest manager's office. Upper Cordillera Forest. 817 m. 18.15085°N, 66.99252°W. Moderate S slope, clay with organic layer, in association with *Podocarpus*, *Cecropia*, *Cyathea*, *Clusia*, *Cyrilla*, *Erythrina*, *Petitia*, *Lantana*, *Gleichenia*, Melastomaceae, bamboos. Tree to 6 m., foliage dark green, fruits light green. Tim Thibault, Raquel Folgado and Neil Gerlowski 1303. 27 Sep 2016.

Puerto Rico: San German: Bosque Estatal de Maricao, along Highway 120 near forest manager's office. Upper Cordillera Forest. 834 m. 18.15073°N, 66.9908°W. Moderate S slope, clay with organic layer, in association with *Podocarpus*, *Cecropia*, *Cyathea*, *Clusia*, *Cyrilla*, *Erythrina*, *Petitia*, *Lantana*, *Gleichenia*, Melastomaceae, bamboos. Tree to 8 m., foliage dark green, fruits light green, seeds pink to coral. Tim Thibault, Raquel Folgado and Neil Gerlowski 1304. 27 Sep 2016.

Puerto Rico: Orocovis: Bosque Estatal de Toro Negro, forest access road off Highway 564 at water tank. Upper Cordillera Forest. 996 m. 18.18595°N, 66.49403°W. Moderate to steep S slope, clay with organic layer, in association with *Cecropia*, *Cyathea*, *Prestoea*, *Pinus*, *Dacryodes*, Melastomaceae, bromeliads, bamboos. Multi-trunked tree to 7 m., foliage dark green. Tim Thibault, Neil Gerlowski and Emily Veltjen 1305. 28 Sep 2016.

Puerto Rico: Orocovis: Bosque Estatal de Toro Negro, south of Highway 590 and east of Lago de Matrullas. Upper Cordillera Forest. 825 m. 18.20946°N, 66.47409°W. Moderate to steep SW slope, highly organic soil, in association with *Cecropia*, *Coccoloba*, *Prestoea*, *Schefflera*, *Rhipsalis*, *Malvascum*, Melastomaceae, bromeliads, bamboos, aroids. Tree to 13 m., foliage waxy dark green, fruits light green. Tim Thibault and Neil Gerlowski 1306. 28 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, natural resource office interpretive path near water tank, aluminum tree tag #177. 1,042 m. 18.14675°N, 66.76579°W. Naturally occurring plant at edge of cultivated landscape. Tree to 7 m., foliage dark green with sooty mold. Tim Thibault, Neil Gerlowski and Axel Alvarado 1307. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, Camino al Cerro, trail to El Gigante, interpretive map number 007. Upper Cordillera Forest. 1,104 m. 18.14321°N, 66.77012°W. Moderate to steep W slope, rocky clay with organic layer, in association with *Prestoea* (dominant), *Cecropia*, *Cyathea*, *Erythrina*, *Coffea*, *Pilea*, Melastomaceae, bromeliads. Tree to 14 m., foliage dark green with sooty mold, fruits light green, seeds red, wood orange-tan with bay laurel fragrance. Tim Thibault, Neil Gerlowski and Axel Alvarado 1308. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 971 m. 18.1331°N, 66.75992°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 18 m., foliage dark green, fruits light green, wood orange-tan with bay laurel fragrance. Tim Thibault and Neil Gerlowski 1309. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 953 m. 18.13342°N, 66.75978°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 12 m., foliage dark green, seeds coral. Tim Thibault and Neil Gerlowski 1310. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 954 m. 18.13343°N, 66.75947°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 16 m., foliage dark glossy green, fruits light green. Tim Thibault and Neil Gerlowski 1311. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 945 m. 18.13355°N, 66.75938°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 13 m., foliage dark green, seeds coral. Tim Thibault and Neil Gerlowski 1312. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 933 m. 18.1336°N, 66.75942°W. Moderate NE slope, clay

with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 14 m., foliage dark green, fruits light green. Tim Thibault and Neil Gerlowski 1313. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 941 m. 18.13371°N, 66.75922°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 18 m., foliage dark green, fruits light green, seeds orange. Tim Thibault and Neil Gerlowski 1314. 29 Sep 2016.

Puerto Rico: Adjuntas: Bosque Estatal de Guilarte, at kitchen sink on forest access road off Carretera Plutarco Albino west of Lago Garzas. Secondary forest. 904 m. 18.13482°N, 66.75783°W. Moderate NE slope, clay with organic layer, in association with *Prestoea*, *Cecropia*, *Cyathea*, *Turpinia*, *Pinus*, *Eucalyptus*, *Viburnum*, *Aristolochia*, Melastomaceae, bromeliads. Tree to 13 m., foliage dark green, fruits light green. Tim Thibault and Neil Gerlowski 1315. 29 Sep 2016.

Puerto Rico: Cayey: Bosque Estatal de Carite, forest manager's office. 532 m. 18.12769°N, 66.07043°W. Cultivated tree of uncertain origin at edge of forest. Tree to 7 m., foliage dark green. Tim Thibault, Neil Gerlowski and Christian Torres Santana 1316. 30 Sep 2016.

Puerto Rico: Cayey: Bosque Estatal de Carite, forest manager's office. 531 m. 18.12773°N, 66.07046°W. Cultivated tree of uncertain origin at edge of forest. Tree to 4.5 m., foliage dark green, fruits light green. Tim Thibault, Neil Gerlowski and Christian Torres Santana 1317. 30 Sep 2016.

Puerto Rico: Cayey: Bosque Estatal de Carite, Highway 184 near km 24.6. Upper Cordillera Forest. 758 m. 18.11813°N, 66.07182°W. Gentle E slope, clay with organic layer, in association with *Cecropia*, *Cyathea*, *Prestoea*, *Eucalyptus*, *Schefflera*, Melastomaceae, bromeliads. Tree to 13 m., DBH 57.5 cm., foliage dark green, fruits light green. Tim Thibault, Neil Gerlowski and Christian Torres Santana 1318. 30 Sep 2016.

DRAFT - *Magnolia portoricensis* Collection Report
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Project Expenses	APGA-USFS		Cost Share		Totals	
	Budget	Actuals	Budget	Actual	Budget	Actual
<u>Salaries & Benefits</u>	\$ -	\$ -	\$ 7,965	\$ 8,565	\$ 7,965	\$ 8,565
Sub-total Salaries & Benefits	\$ -	\$ -	\$ 7,965	\$ 8,565	\$ 7,965	\$ 8,565
<u>Travel</u>						
Airfare						
2 RT LAX-SJU	\$ 1,010	\$ 722	\$ -	\$ -	\$ 1,010	\$ 722
1 RT PVR-SJU	\$ 710	\$ 719	\$ -	\$ -	\$ 710	\$ 719
Transportation						
3 days Jeep rental	\$ 310	\$ 758	\$ -	\$ -	\$ 310	\$ 758
Fuel 120 km/day @ 8 km/l*\$0.67/l	\$ 40	\$ 83	\$ -	\$ -	\$ 40	\$ 83
Hotel						
3 @ 1 night San Juan	\$ 225	\$ -	\$ -	\$ -	\$ 225	\$ -
3 @ 3 night Ponce	\$ 730	\$ 1,329	\$ -	\$ -	\$ 730	\$ 1,329
Per Diem						
Gerlowski 3 days per diem @ \$200	\$ -	\$ -	\$ 600	\$ 1,000	\$ 600	\$ 1,000
MI&E	\$ 801	\$ 443	\$ -	\$ -	\$ 801	\$ 443
Sub-total Travel	\$ 3,826	\$ 4,053	\$ 600	\$ 1,000	\$ 4,426	\$ 5,053
<u>Shipping/Distribution</u>						
3 @ \$90 Ponce-H	\$ 270	TBD	\$ -	\$ -	\$ 270	TBD
2 @ H-SF	\$ 30	TBD	\$ -	\$ -	\$ 30	TBD
1 @ H-PHL	\$ 35	TBD	\$ -	\$ -	\$ 35	TBD
Sub-total Shipping/Distribution	\$ 335	TBD	\$ -	\$ -	\$ 335	TBD
<u>Supplies</u>						
Climbing supplies	\$ 180	\$ 84	\$ -	\$ -	\$ 180	\$ 84
TC supplies	\$ 242	\$ -	\$ -	\$ -	\$ 242	\$ -
Collecting supplies	\$ 20	\$ 10	\$ -	\$ -	\$ 20	\$ 10
Sub-total Supplies	\$ 442	\$ 93	\$ -	\$ -	\$ 442	\$ 93
Total Project Expenses	\$ 4,603	\$ 4,147	\$ 8,565	\$ 9,565	\$ 13,168	\$ 13,712