

Cover Sheet

Project Title: Evaluating the Extent of Non-Native Invasive Vine Infestations in Monroe County

Project Leader: Kathryn Amatangelo, PhD
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Amount Requested: \$4,123

Project Dates: September 18, 2014 – February 16, 2015

Applicant Organization: Research Foundation for SUNY on behalf of The College at Brockport

Fiscal Contact: Laura Merkl
Research Foundation for SUNY at The College at Brockport
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Institutional Approval:



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B. Proposal Description

B.1. Project summary

Exotic invasive vine species pose a threat to natural and semi-natural plant communities throughout the Finger Lakes PRISM region. Monroe County, the seat of Rochester and the largest metropolitan area in the Finger Lakes PRISM, has been particularly susceptible to plant invaders due to frequent traffic, large population sizes, and prevalence of disturbed ecosystems that facilitate invasion (Davis et al. 2000). Evaluating the current extent of non-native plant populations is key to understanding how populations are spreading and the locations of vulnerable uninvaded communities. This project will fund the mapping of current populations of invasive vine species (*Cynanchum* sp., *Wisteria* sp., and *Celastrus orbiculatus*) in Monroe County by a professor and two undergraduate students at The College at Brockport, SUNY. One significant part of the Finger Lakes PRISM's mission is detection of invasive species, and *Celastrus orbiculatus* and *Cynanchum* sp. are among the top three aggressive terrestrial invaders as identified by the Terrestrial Working Group of PRISM.

B.2. Scope of work

Exotic invasive plant species are often considered one of the greatest threats to communities and ecosystems, and millions of dollars every year are spent on their control. Most exotic invasive species in Western NY are herb and shrub species (e.g. *Alliaria petiolata*, *Phragmites australis*, *Rhamnus* sp, *Lonicera* sp.), many of which have been shown to alter plant communities by out-competing other herb-and shrub-layer species, particularly at the germination and regeneration stage. Vine species may be even more detrimental to native plant populations because they may hasten changes in community structure by outcompeting, or even killing, mature shrubs and trees. A prominent example of this in the Southeastern US is the invasion of the Kudzu vine, which has been shown to smother acres of mature forest (Forseth & Innis, 2004).

One group of such exotic invasive vine species currently increasing in abundance in Western New York are black and pale swallowwort (*Cynanchum louiseae*, *Cynanchum rossicum*). Swallowworts produce plentiful seeds that contain a coma with long hairs that allow for copious wind dispersal (DiTommaso et al. 2005). In addition, both species can spread vegetatively (Averill et al. 2011). The species are most commonly associated with disturbed sites such as old open fields and unused pasture lands, but once established can rapidly spread into less disturbed, more botanically diverse areas such as forested woods and stream banks (DiTommaso et al. 2005). Pale swallowwort in particular has a wider range of light tolerance and has been shown to persist in the understory of mature forests until a break in the canopy allows reproduction and spread (Averill et al. 2011). Evidence for negative impacts on other plant species has been seen in the displacement of the rare, federally-protected Hart's tongue fern (*Pyllitis scolopendrium*, DiTommaso et al. 2005). Pale swallowwort has also been shown to smother small trees in restoration sites (Christensen 1998), and it is likely that black swallowwort has this potential as well.

Another invasive exotic vine species spreading into natural areas in New York State is oriental bittersweet (*Celastrus orbiculatus*). Oriental bittersweet has been shown to completely arrest the natural successional trajectory of old fields from grasslands to shrublands to forest (Fike and Niering, 1999). This is worrisome because much of the natural areas in Monroe County contain extensive old fields undergoing succession. *Celastrus orbiculatus* also has

significant allelopathic potential (Pisula and Meiners 2010), so removal of this species may not be sufficient for rehabilitation of invaded areas. Preventing invasion in the first place, rather than managing an existing infestation, will be key to reducing impacts of this invader. Oriental bittersweet is a shade-tolerant vine and has been shown to exhibit a 'sit-and-wait strategy,' where small individuals persist in the understory until a canopy disturbance allows fast growth and reproduction (Greenberg et al. 2001). Therefore, small populations and ground-layer individuals are the ideal target for management, before resources have allowed twining growth forms to damage trees.

Chinese and Japanese wisteria (*Wisteria sinensis* and *Wisteria floribunda*, respectively) and their hybrids are spreading in the Southeastern United States and have been identified as invasive in 15 eastern states (Trusty et al. 2007). *Wisteria* sp. twines up trunks of mature trees and girdles them much as *Celastrus orbiculatus* does. In the USDA Plants database, both non-native wisteria species are listed as being restricted to the southeastern counties of New York State (USDA Plants Database, 2014). Additionally, the New York non-native plant invasiveness ranking from 2013 indicates that they are absent from the FL-PRISM (New York State Invasive Species Council, 2013). However, I have seen at least two naturalized populations in Monroe County. Of particular concern is a large infestation at Mendon Ponds County Park, which has girdled and killed multiple (20+) mature trees and is spreading throughout a large forest patch. Wisteria, like other vines most problematic in the south, is likely to become more invasive in the FL-PRISM area as climate warms, so it is important to identify and control existing patches as soon as possible and get ahead of the invasion curve.

Currently, parks and natural areas are under-surveyed on iMap for all invasive species, including these invasive vine species. Natural areas such as Mendon Ponds County Park, Northampton County Park, Black Creek Park, and Cobb's Hill (Washington Grove), which all likely have populations of invasive vine species, have few, if any, mapped points. As the presence of propagules is necessary for further invasion (Davis et al 2000), surveying the current extent of invasive species populations will allow researchers and managers to predict where new invasions are likely to occur. Surveys will also be useful for targeting manageable populations for control. This project will entail the mapping of populations of invasive vine species at City, County, and State natural areas in Monroe County by two undergraduate students under the supervision of PI Kathryn Amatangelo. Students will travel alone or together to each park and map, using GPS, populations of each target species. In heavily infested areas, the perimeter of large populations will be recorded; for smaller populations, individual plants or small populations will be entered as points. In addition to GPS measurements, students will indicate the size of populations, whether populations are in open (i.e. fields, trail-sides) or closed (i.e. forest interior) locations, community type, and whether or not invasive populations are reproducing (if possible, based on phenology). For wisteria and bittersweet we will also record whether or not visible tree mortality has occurred due to strangulation. Deliverables on this project will include GIS maps of surveyed parks, with population locations, population size estimates, and reproduction layers (if possible), and observations will be entered into iMap.

References:

- Averill, K.M., DiTommaso, A., Mohler, C.L., and L.R. Milbrath. 2011. Survival, growth, and fecundity of the invasive swallowworts (*Vincetoxicum rossicum* and *V. nigrum*) in New York State. *Invasive Plant Science and Management* **4**:198-206.
- Casagrande, R.A. and Dacy, J. 2001. Monarch butterfly (*Danaus plexippus*) oviposition on black swallowwort (*Vincetoxicum nigrum*). *Rhode Island Nat. Hist. Surv.* **8**:2-3.

- Christensen, T. 1998. Swallowworts: the ecology and control of *Vincetoxicum* spp. *Wildflower: North America's Magazine of Wild Flora* **14**: 21-15.
- Davis, M.A., Grime, J.P., and K. Thomas. 2000. Fluctuating resources in plant communities: a general theory of invisibility. *Journal of Ecology* **88**: 528-534.
- DiTommaso, A., Lawlor F.M. and Darbyshire, S.S. 2005. The Biology of Invasive Alien Plants in Canada. *Canadian Journal of Plant Science* **85**:243-263.
- Fike, J. and W.A. Niering. 1999. Four decades of old field vegetation development and the role of *Celastrus orbiculatus* in the Northeastern United States. *Journal of Vegetation Science* **10**(4):483-492.
- Foreseth, I. and A.F. Innis. 2004. Kudzu (*Pueraria montana*): History, physiology, and ecology combine to make a major ecosystem threat. *Critical Reviews in Plant Sciences* **23**(5):401-413.
- Greenberg, C.H, Smith, L.M, and D.J. Levey. 2001. Fruit fate, seed germination and growth of an invasive vine – an experimental test of 'sit and wait' strategy. *Biological Invasions* **3**:363-372.
- New York State Invasive Species Council. 2013. New York non-native plant invasiveness ranking form for *Wisteria sinensis*/*W. floribunda*.
http://www.nyis.info/user_uploads/e8d88_Wisteria.sinensis.NYS.pdf
- Pisula, N.L. and S.J. Meiners. 2010. Relative allelopathic potential of invasive plant species in a young disturbed woodland. *Journal of the Torrey Botanical Society* **137**(1):81-87.
- Trusty, J.L., Lockaby, B.G., Zipperer, W.C., and L.R. Goertzen. 2007. Identity of naturalized exotic *Wisteria* (Fabaceae) in the south-eastern United States. *Weed Research* **47**:479-487.
- USDA Plants Database. 2014. Locations of *Wisteria* Nutt.
<http://plants.usda.gov/core/profile?symbol=WISTE>. Accessed 9/12/2014.

B.3. Timeframe/Timeline

September 22, 2014 – November 26, 2014: Survey and GPSing of invasive vine populations

December 1 – December 22 2014: Data entry and mapping

January 5, 2015 – January 23, 2015: Project summary

I anticipate having a final report completed by the end of January, 2015.

B.4. Personnel and collaboration

The Project Investigator for this project is Dr. Kathryn Amatangelo, Assistant Professor at The College at Brockport. Two students with experience in plant identification will be hired for this project. Both are seniors at the College at Brockport in the Environmental Science and Biology Department. Scott Ward is currently in Plant Diversity and Identification and has extensive experience identifying and surveying plants. He is currently finishing up a project on Swallow-wort impacts in Monroe County parks, which puts him in an ideal position to map the locations of Swallow-wort and other vine species. Emily McCall, also a student at Brockport, excelled in

Plant Diversity and Identification under its previous teacher and since has had two botany-intensive field jobs. She has volunteered as a tutor for students in Plant Diversity.

B.5. Project location

Initial surveys will take place on public lands (City and County Parks) in Monroe County. We have the approval of the Monroe County Parks Department (from Ryan Loysen) to survey and take samples of invasive species on Monroe County lands. If we have completed surveys in Monroe County in the time allotted we may additionally survey parks in other Finger Lakes PRISM Counties.

C. Personnel

Dr. Kathryn L. Amatangelo

Assistant Professor, Environmental Science & Biology, The College at Brockport – State University of New York, Brockport, NY 14420

PROJECT-RELATED EXPERTISE

Invasive species mapping, plant identification, GPS/GIS map creation, invasive species research

PROFESSIONAL PREPARATION

2001 B.S. (*Resource Ecology and Management*) University of Michigan

2008 Ph.D. (*Biological Sciences: Ecology and Evolution*), Stanford University

APPOINTMENTS

2013-present Assistant Professor, Environmental Science & Biology, The College at Brockport – State University of New York

2010-2013 Postdoctoral Research Associate, Ecology and Evolutionary Biology, Brown University

2008-2012 Postdoctoral Research Associate, Department of Botany, University of Wisconsin-Madison

2000-2002 Research Assistant, Great Lakes Fishery Commission, Ann Arbor, Michigan

RELEVANT PRODUCTS

Klionsky, S., **K.L. Amatangelo**, and D.M. Waller. 2010. Above- and below-ground impacts of European buckthorn (*Rhamnus cathartica* L.) on four native forbs. *Restoration Ecology*. 19(6) 728-737.

Amatangelo, K.L. and D. Sax, Meta-analysis of ecosystem function response to variation in Native-exotic dominance. Ecological Society of America Annual Meeting, 2012, Portland, OR.

Amatangelo, K.L., Sax, D.F., Stevens, L., Wilcox, D., and S.T. Jackson. Origin is a poor predictor of invader impacts in a wetland ecosystem. In prep.

D.M. Waller, Mudrak, E.L., **Amatangelo, K.L.**, Klionsky, S.M, and D.A. Rogers. Using fine-scale association analyses to evaluate the impact of non-native species in temperate forests. In prep.

SYNERGISTIC ACTIVITIES

2014-present Terrestrial Working Group, FL-PRISM

2012-present Steering committee, NSF RCN: Synthesizing deep time and recent community ecology, PIs S.K. Lyons, A.K. Behrensmeyer, N.J. Gotelli.

2011-2012 Organized secondary school curriculum activity development in Great Lakes states in accordance with state science standards

2008-present Mentor or co-mentor for four REU projects, three senior theses, two Brockport Foundation students, two Masters projects, and two high school projects

F. Budget and Justification Template

Proposal Budget Template	
Project Title: Evaluating the Extent of Non-Native Invasive Vine Infestations in Monroe County	
Sponsor: FL-PRISM	
PI: Kathryn Amatangelo, PhD	
Overseeing Department: Environmental Science & Biology	
Period of Performance for project: 9/15-14 – 1/15/15	
Submission Deadline: 9/15/14	
BUDGET	
Salaries (academic year) = \$2,400	Two undergraduate research assistants at \$10/hour x 10 hours week for 12 weeks at \$1,200 each x 2 assistants = \$2,400
Salaries (summer)	
Fringe on salaries = \$120	Institutional rate for undergraduate students at 5% of salary x \$2,400 = \$120 -
Student wages (academic year)	
Student wages (summer)	
Fringe on summer student	
Total Salaries, Wages + Fringe = \$2,520	
Travel - Domestic/Regional = \$672	Travel by car by research assistants to and from park sites at average of 60 miles a day x 2 days a week x 10 weeks = 1,200 miles x \$.56 mile (federally allowed rate) = \$672
Equipment*	-
Participant Costs**	
Materials & Supplies = \$300	Second GPS device for use by research assistants = \$200 and \$100 for consumable supplies
Consultants	
Outside Computer Services	-
Other Direct Costs (explain in justification)	
Subcontract (recipient name)	-
Total Direct Cost = \$3,492	-
Indirect Costs = \$631	At institution's federally negotiated rate for off-campus project of 26.3% of salaries and wages (see attached) -
Total Request to Sponsor = \$4,123	
Total Project Costs = \$4,123	-

ORIGINAL

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1146013200F8

DATE: 07/22/2010

ORGANIZATION:

FILING REF.: The preceding agreement was dated 05/22/2006

RFSUNY and SUNY College at Brockport
35 State Street
Albany, NY 12207-2826

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

SECTION I: INDIRECT COST RATES

RATE TYPES: FIXED FINAL PROV. (PROVISIONAL) PRED. (PREDETERMINED)

EFFECTIVE PERIOD

<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE(%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
PRED.	07/01/2010	06/30/2014	75.00	On-Campus	All Programs
PRED.	07/01/2010	06/30/2014	26.30	Off-Campus	All Programs
PROV.	07/01/2014	Until Amended	75.00	On-Campus	All Programs
PROV.	07/01/2014	Until Amended	26.30	Off-Campus	All Programs

*BASE

Direct salaries and wages including vacation, holiday, sick pay and other paid absences but excluding all other fringe benefits.

ORGANIZATION: RFSUNY and SUNY College at Brockport
AGREEMENT DATE: 07/22/2010

SECTION 1: FRINGE BENEFIT RATES**

<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE (%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
FIXED	7/1/2010	6/30/2011	39.00	All	Regular Employees
FIXED	7/1/2010	6/30/2011	17.00	All	Summer Employees
FIXED	7/1/2010	6/30/2011	13.00	All	Graduate Students
FIXED	7/1/2010	6/30/2011	5.00	All	Undergraduate Students
PROV.	7/1/2011	Until amended	41.50	All	Regular Employees
PROV.	7/1/2011	Until amended	17.00	All	Summer Employees
PROV.	7/1/2011	Until amended	13.00	All	Graduate Students
PROV.	7/1/2011	Until amended	5.00	All	Undergraduate Students

** DESCRIPTION OF FRINGE BENEFITS RATE BASE:
Salaries and wages.

ORGANIZATION: RFSUNY and SUNY College at Brockport

AGREEMENT DATE: 07/22/2010

SECTION II: SPECIAL REMARKS

TREATMENT OF FRINGE BENEFITS:

The fringe benefits are charged using the rate(s) listed in the Fringe Benefits Section of this Agreement. The fringe benefits included in the rate(s) are listed below.

1. These Facilities and Administrative cost rates apply when grants and contracts are awarded jointly to Research Foundation of SUNY and SUNY College at Brockport.

2. For all activities performed in facilities not owned or leased by the institution or to which rent is directly allocated to the project(s), the off-campus rate will apply. Grants or contracts will not be subject to more than one Facilities and Administrative cost rate. If more than 50% of a project is performed off-campus, the off-campus will apply to the entire project.

3. The fringe benefit costs listed below are reimbursed to the grantee through the direct fringe benefit rates applicable to Research Foundation employees:

- | | |
|-------------------------------|-----------------------------------|
| A. Retiree Health Insurance | G. Group Life Insurance |
| B. Retirement Expense | H. Long Term Disability Insurance |
| C. Social Security | I. Workers' Compensation |
| D. NYS Unemployment Insurance | J. Dental Insurance |
| E. NYS Disability Insurance | K. Vacation and Sick Leave* |
| F. Group Health Insurance | |

*This component consists of payments for accrued unused vacation leave made in accordance with the Research Foundation Leave Policy to employees who have terminated, changed accruing status, or transferred. It also includes payments for absences over 30 calendar-days that are charged to sick leave.

The fringe benefit costs for State University of New York employees are charged utilizing the New York State fringe benefit rate for federal funds. This approved rate is contained in the New York State-Wide Cost Allocation Plan. This rate includes the following costs:

- | | |
|--------------------------|---------------------------|
| A. Social Security | E. Workers' Compensation |
| B. Retirement | F. Survivors' Benefits |
| C. Health Insurance | G. Dental Insurance |
| D. Unemployment Benefits | H. Employee Benefit Funds |

4. Equipment means an article of nonexpendable, tangible personal property having a useful life of more than one year, and an acquisition cost of \$5,000 or more per unit.

5. Treatment of Paid Absences: *Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims for the costs of these paid absences are not made.

ORGANIZATION: RFSUNY and SUNY College at Brockport

AGREEMENT DATE: 07/22/2010

SECTION III: GENERAL

A. LIMITATIONS:

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted; such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. ACCOUNTING CHANGES:

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency, such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

C. FIXED RATES:

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES:

The rates in this Agreement were approved in accordance with the authority in Office of Management and Budget Circular A-21 Circular, and should be applied to grants, contracts and other agreements covered by this Circular, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

E. OTHER:

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:

RFSUNY and SUNY College at Brockport

(INSTITUTION)

(SIGNATURE)

Michelle Aguilar

(NAME)

Director of Financial Campus Services

(TITLE)

July 22, 2010

(DATE)

ON BEHALF OF THE FEDERAL GOVERNMENT:

DEPARTMENT OF HEALTH AND HUMAN SERVICES

(AGENCY)

(SIGNATURE)

Robert I. Aaronson

(NAME)

Director, Northeastern Field Office

(TITLE)

7/22/2010

(DATE) 0154

HHS REPRESENTATIVE: Michael Leonard

Telephone: (212) 264-2069