



***Plant Risk Evaluator -- PRE™  
Evaluation Report***

***Pyrus calleryana 'Bradford' -- Texas***

***2017 Farm Bill PRE Project***

**PRE Score:** 19 -- Reject (high risk of invasiveness)

**Confidence:** 78 / 100

**Questions answered:** 19 of 20 -- Valid (80% or more questions answered)

**Privacy:** Public

**Status:** Completed

**Evaluation Date:** March 28, 2017

*This PDF was created on August 13, 2018*



## Plant Evaluated

*Pyrus calleryana* 'Bradford'



Image by David Stephens, Bugwood.org



## Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Pyrus calleryana* 'Bradford') in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

## General Information

**Status:** Completed

**Screener:** Kim Taylor

**Evaluation Date:** March 28, 2017

## Plant Information

**Plant:** *Pyrus calleryana* 'Bradford'

### **If the plant is a cultivar, how does its behavior differs from its parent's?**

The species is self incompatible, so individual cultivars which are genetically identical are not invasive in and of themselves. Crossing between different cultivars however allows for the spread of the species. The 'Bradford' cultivar appears to freely hybridize with all other cultivars with one study suggesting the 'Bradford' variety was in the top 3 varieties for parents of naturalized plants (Hardiman 2010). Since any differences between cultivars are lost by the second generation, and we cannot ignore the contribution this apparent "sterile" cultivar makes to the wild population, we will treat the plant as the whole species, not just the cultivar.

## Regional Information

**Region Name:** Texas



## **Climate Matching Map**

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California-Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click [here](#) to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.



## Evaluation Questions

These questions are based in an original article published at the University of California, Davis, and can be found on the PLOS One website, here: <https://doi.org/10.1371/journal.pone.0121053>

### Invasive History and Climate Matching (Questions 1 - 6)

#### 1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

#### Answer / Justification:

The cultivar 'Bradford' is not capable of reproducing on its own due to self-incompatibility. It is however capable of crossing with other cultivars to produce offspring, and these offspring have naturalized across most of the Southeastern US. The naturalized range in the US is from New Hampshire to Texas with a few records in Utah and California. It has also naturalized in Australia.

#### Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- GBIF (0). *Pyrus calleryana* Decne. - gbif.
- Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.

---

#### 2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.



**Answer / Justification:**

The Southeastern US, where the plant has become naturalized and invasive matches the climate in parts of Texas, particularly East Texas. Portions of Australia where the plant has naturalized are also a climate match.

**Reference(s):**

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
  - United States Department of Agriculture (2014). USDA-NRCS Plants Database.
  - GBIF (0). *Pyrus calleryana* Decne. - gbif.
- 

**3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?**

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

*Pyrus calleryana* is listed as invasive in Alabama, Georgia, North Carolina, Maryland, New Jersey, Illinois, and Pennsylvania. It is on the watch list in Tennessee, New York, South Carolina, and Oklahoma. It is considered a potential environmental weed in Australia. Individual cultivars themselves are not invasive, but the combination of cultivars within an area can create a situation in which invasive plants are produced.

**Reference(s):**

- Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
  - Invasive Plant Atlas of the United States (0). Callery pear (Bradford pear): *Pyrus calleryana* (Rosales: Rosaceae): Invasive Plant Atlas of the United States.
- 

**4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?**

- Answer: **Yes**, which contributes **3** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.



**Answer / Justification:**

The Southeastern US, where the plant has become naturalized and invasive matches the climate in parts of Texas, particularly East Texas.

**Reference(s):**

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
  - United States Department of Agriculture (2014). USDA-NRCS Plants Database.
- 

**5. Are other species of the same genus (or closely related genera) invasive in a similar climate?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeners* has a **High** confidence in this answer based on the available literature.

**Answer / Justification:**

*Pyrus communis* is listed as invasive in Florida, an area that shares a partial climate match with Texas. All cultivars of *P. calleryana* are potentially invasive as they hybridize to create fertile fruits and spread into natural systems.

**Reference(s):**

- Invasive Plant Atlas of the United States (0). Callery pear (Bradford pear): *Pyrus calleryana* (Rosales: Rosaceae): Invasive Plant Atlas of the United States.
  - Swearingen, J., & Barger C. (0). common pear: *Pyrus communis* (Rosales: Rosaceae): Invasive Plant Atlas of the United States.
- 

**6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?**

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screeners* has a **High** confidence in this answer based on the available literature.



**Answer / Justification:**

About 70% of the naturalized range in the US and about half of the native range is a climate match with Texas.

**Reference(s):**

- GBIF (0). *Pyrus calleryana* Decne. - gbif.
- 

## Impact on Native Plants and Animals (Questions 7 - 10)

### 7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

"Because of its rapid growth and preference for high light environments, *P. calleryana* can potentially impede the establishment of late- to middle-stage successional species in disturbed sites." "Once established Callery pear forms dense thickets that push out other plants including native species that can't tolerate the deep shade or compete with pear for water, soil and space. A single tree can spread rapidly by seed and vegetative means forming a sizeable patch within several years. Its success as an invader results from its capacity to produce copious amounts of seed that are dispersed by birds and possibly small mammals, seedlings that germinate and grow rapidly in disturbed areas and a general lack of natural controls like insects and diseases, with the exception of fire blight."

**Reference(s):**

- Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
  - Texas Invasives (0). Texas Invasives - *Pyrus calleryana*.
-





## 8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screeener* has a **Medium** confidence in this answer based on the available literature.

### Answer / Justification:

There is no evidence for promotion of fire or changing of fire regimes.

### Reference(s):

- [Anonymous] .
- 

## 9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Medium** confidence in this answer based on the available literature.

### Answer / Justification:

Wild plants often produce thorns along stems and branches in both the native and introduced range to combat herbivory. The species is thorny in its native habitat though the 'Bradford' cultivar is thornless. F1 hybrids have the potential to become thorny though. This poses a moderate threat to animals or humans when the plant forms dense thickets.

### Reference(s):

- Vincent, M. A. (2005). On the Spread and Current Distribution of *Pyrus calleryana* in the United States. *Castanea*. 70, 20–31.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
-



## 10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeners* has a **Very High** confidence in this answer based on the available literature.

### Answer / Justification:

"*P. calleryana* can also form dense, thorny thickets, especially from the root sprouts of abandoned trees. These thickets, which are impenetrable to humans, may provide cover for birds and small mammals." "Callery pear often produces thorny thickets as it escapes into marginal and disturbed areas, and appears to be reproducing readily in the wild." "It often forms dense thickets, and these are often thorny, since thornless cultivars appear to retain genes for thorniness that may be expressed as genes recombine in their progeny"

### Reference(s):

- Vincent, M. A. (2005). On the Spread and Current Distribution of *Pyrus calleryana* in the United States. *Castanea*. 70, 20–31.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
- 

## Reproductive Strategies (Questions 11 - 17)

### 11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screeners* has a **High** confidence in this answer based on the available literature.

### Answer / Justification:

The species re sprouts from any existing trunk or root system, however this is not a primary means of spread for the species. "A single tree can spread rapidly by seed and vegetative means forming a sizeable patch within several years."



**Reference(s):**

- Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
  - Texas Invasives (0). Texas Invasives - *Pyrus calleryana*.
- 

**12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?**

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screeener* has a **Very Low** confidence in this answer based on the available literature.

**Answer / Justification:**

While the plant can resprout from the roots there is no evidence that this is a common method of reproduction.

**Reference(s):**

- [Anonymous] .
- 

**13. Does the species (or cultivar or variety) commonly produce viable seed?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

The observation was originally made about the 'Bradford' cultivar that it only rarely produced viable fruit. Since *P. calleryana* is self-incompatible the 'Bradford' variety alone would not produce viable seed. More recently, 'Bradford' trees have been observed to produce abundant viable fruit, likely due to the high numbers of other varieties planted in close proximity. "Averaged across all cultivars, 56% of seeds were viable...all cultivars appear to be highly productive as maternal parents" Second generation hybrids between cultivars had no difference in seed production or seed size. Germination is high in all varieties, though 'Bradford' had the lowest germination with 68%.



**Reference(s):**

- Hardiman, N. A., & Culley T. M. (2010). Reproductive success of cultivated *Pyrus calleryana* (Rosaceae) and establishment ability of invasive, hybrid progeny. *American Journal of Botany*. 97, 1698–1706.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
- 

**14. Does this plant produce copious viable seeds each year (> 1000)?**

**Answer / Justification:**

"seeds...are produced in frequent large fruit set" though no indication of number of seeds was found.

**Reference(s):**

- Vincent, M. A. (2005). On the Spread and Current Distribution of *Pyrus calleryana* in the United States. *Castanea*. 70, 20–31.
- 

**15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **High** confidence in this answer based on the available literature.

**Answer / Justification:**

Seeds possess secondary dormancy if exposed to warm temperatures in late winter. Seeds may require a period of cold temperatures prior to germination. 'Bradford' had 68% germination after 45 days of cold stratification in a study comparing reproductive success of cultivated *Pyrus calleryana*.



**Reference(s):**

- Vincent, M. A. (2005). On the Spread and Current Distribution of *Pyrus calleryana* in the United States. *Castanea*. 70, 20–31.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
  - Hardiman, N. A., & Culley T. M. (2010). Reproductive success of cultivated *Pyrus calleryana* (Rosaceae) and establishment ability of invasive, hybrid progeny. *American Journal of Botany*. 97, 1698–1706.
- 

**16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

Begins flowering at about 3 years of age.

**Reference(s):**

- Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
- 

**17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **High** confidence in this answer based on the available literature.

**Answer / Justification:**

Fruits mature in late autumn (August to October). Flowers are produced in March and April. There is often a second flowering in September to October in drought or disease stressed trees.



**Reference(s):**

- Vincent, M. A. (2005). On the Spread and Current Distribution of *Pyrus calleryana* in the United States. *Castanea*. 70, 20–31.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
- 

**Dispersal (Questions 18 - 20)**

**18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?**

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screeener* has a **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

"Heavier fruits may be more deirable to frugivores (Wheelwrith, 1993); consequently, these cultivars may potentially have more seeds dispersed into natural areas." The 'Bradford' cultivar had the heaviest seeds of the 9 cultivars tested, though its fruit mass was not significantly different than all but 3 cultivars. Fruits are consumed by a variety of birds. *Pyrus calleryana* fruit is also consumed by birds, albeit mostly by introduced European starlings. "Its success as an invader results from its capacity to produce copious amounts of seed that are dispersed by birds and possibly small mammals..."

**Reference(s):**

- Hardiman, N. A., & Culley T. M. (2010). Reproductive success of cultivated *Pyrus calleryana* (Rosaceae) and establishment ability of invasive, hybrid progeny. *American Journal of Botany*. 97, 1698–1706.
  - Culley, T. M., & Hardiman N. A. (2007). The Beginning of a New Invasive Plant: A History of the Ornamental Callery Pear in the United States. *Bioscience*. 57, 956–964.
  - Texas Invasives (0). Texas Invasives - *Pyrus calleryana*.
-



**19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?**

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screeener* has a **Medium** confidence in this answer based on the available literature.

**Answer / Justification:**

There is no evidence for this.

**Reference(s):**

- [Anonymous] .
- 

**20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?**

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screeener* has a **Low** confidence in this answer based on the available literature.

**Answer / Justification:**

There is no evidence for this.

**Reference(s):**

- [Anonymous] .
- 

**Total PRE Score**

**PRE Score:** 19 -- Reject (high risk of invasiveness)

**Confidence:** 78 / 100

**Questions answered:** 19 of 20 -- Valid (80% or more questions answered)



## **PRE Score Legend**

The PRE Score is calculated by adding the point totals for each (answered) question.

< 13 : accept (low risk of invasiveness)

13 - 15 : evaluate further

> 15 : reject (high risk of invasiveness)

## **Questions Answered Legend**

It is important to answer at least 16 questions to consider a PRE Score as "valid".

>= 16 : valid (80% or more questions answered)

<= 15 : invalid (not enough questions answered)

## **Organization Ownership and Content Privacy**

**Organization:** 2017 Farm Bill PRE Project

**Content Privacy:** Public





## **Evaluation Reviewers**

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

- Hans Landel

December 18, 2017

This evaluation has a total of 1 reviewer(s).



## **Evaluation Issues**

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email [PlantRight@suscon.org](mailto:PlantRight@suscon.org) if additional action is required to resolve open issues.

There are currently no issues associated with this evaluation.



## **About PRE and this Plant Evaluation Report**

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (<https://pre.ice.ucdavis.edu>) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, [PlantRight@suscon.org](mailto:PlantRight@suscon.org), requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (<http://www.suscon.org/>) and a USDA Farm Bill grant.