



**Restoration of the Habitat Gardens at
Sawmill Multicultural Art and Nature County Park**

2018 Accomplishments and Plans for 2019

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Who are the Friends of Willow Bend Gardens?

The Friends of Willow Bend Gardens is an all-volunteer organization. Its primary purpose is to support the Willow Bend Environmental Education Center by restoring the habitat demonstration gardens used in its programs. Volunteers are of many different backgrounds, from Master Gardeners to students at NAU, CCC, and area high schools. Groups—from service organizations to community restitution programs—contribute a substantial number of hours as well. For all of us, time in the gardens offers the satisfaction of doing something positive for the community and the delight of being outside listening to the birds, seeing the gardens flourish, and sharing our discoveries of blooming flowers and strange insects.

Encounters with garden visitors have shown that our work also benefits local residents and out-of-town visitors. People with all sorts of interests visit the gardens: birders appear at dawn and dusk, local workers enjoy sack lunches in the fresh air, and students read by the waterfall. Seniors come for a stroll, friends meet in the ramada, and parents watch their children explore. Occasionally, former employees of the sawmill drop by and share their stories. Groups of hikers often meet in the gardens before taking the trail to Sinclair Wash, and rest in the ramada afterwards.



In an area of increasing high-density development, the gardens offer a portal into the natural world. According to the Trust for Public Land¹, "Parks are the key to good public health and to the environmental health of cities." Studies reveal that parks within walking distance of neighborhoods not only enhance physical fitness, they can also reduce violent crime, counter stress and social isolation, improve concentration for children with attention deficit disorder, enhance relaxation, and promote self-esteem and resilience.

Summary

2018 was a very successful year for the Friends of Willow Bend Gardens. We enjoyed enthusiastic community support with almost 1,700 hours contributed by volunteers as well as funding provided from several sources. Abundant summer rains helped establish about 700 new plantings, over 600 of them propagated by one of our volunteers in the NAU greenhouse. Our efforts enhanced Willow Bend Environmental Education Center's programming through improvements in the gardens and also by our ongoing, on-site interpretation as well as our presentation of four garden-based educational events.

¹ "A Good Life May Be a Walk in the Park" by Jane Brody, *The New York Times*, Tuesday, December 4, 2018.

Funding and Donations

Community Initiatives Grant, Coconino County Board of Supervisors	\$ 4,966.00
Coconino Master Gardeners Association	392.00
Peter Hilliard/Epiphany Episcopal Church Children's Collection	395.83
Garden Portion of Heritage Fund Grant, Arizona Game and Fish	<u>2,500.00</u>
Total Received	\$8,253.83
Total Spent	<u>\$5,971.26</u>
Amount in Reserve for 2019 ...	\$2,282.57

Non-cash donations

- Bird feeders and ongoing supplies of birdseed and suet: Jay's Bird Barn
- Compost, limestone blocks, and delivery: NAU Facilities Department
- Over 600 plants propagated by volunteer Laura Davis in the NAU Greenhouse
- 36 plants donated by an NAU graduate student from her research project
- 32 milkweeds contributed by the NAU Arizona Milkweeds for Monarchs Program
- Lumber for new garden shed: Coconino County Parks and Recreation Department
- Shed materials: Hope Construction
- Shed hardware: Full Circle Charities.

Volunteers

Total Volunteer Hours Logged = 1,690* Groups included:
American Conservation Experience (ACE) – year-round adults and summer high school volunteers
Making Things Right: Step Up Juvenile Justice Program
NAU MBA Students
NAU Grand Canyon Semester students
Satya Sai International Organization.

**This total does not include hours contributed by:*

Laura Davis – propagated plants; planted and tended the Michael M. Moore Medicinal Plant Garden
Eric and Jane Polingyouma – helped plant the Native Heirloom Garden and visited it frequently
Norm Lowe – installed fixtures and purchased pump to use water collected from the center's roof.

Special Volunteer Days

4-28-2018: *Pruning Event in honor of Arbor Day* – 14 participants—please see page 19.
5-26-2018: *Enhance Wildlife Habitat Day* – 8 volunteers installed bird feeders and drippers and bat and butterfly houses. They also weeded the Pollinator Gardens.
7-27, 7-28, 7-29, 8-24, 8-25: *Planting Days* – 10 volunteers planted approximately 600 plants.

Programs Presented

2-11-2018: *Winter Discoveries in the Gardens* – Daisy Scouts
5-25-2018: *What a Plant Knows* – 5th grade, Pine Forest Charter School
6-30-2018: *The Science of Natural Plant Dyes* – Botanical Print Workshop
10-6-2018: *Food Crops of the Americas: The Native Heirloom Garden* – Science Saturday

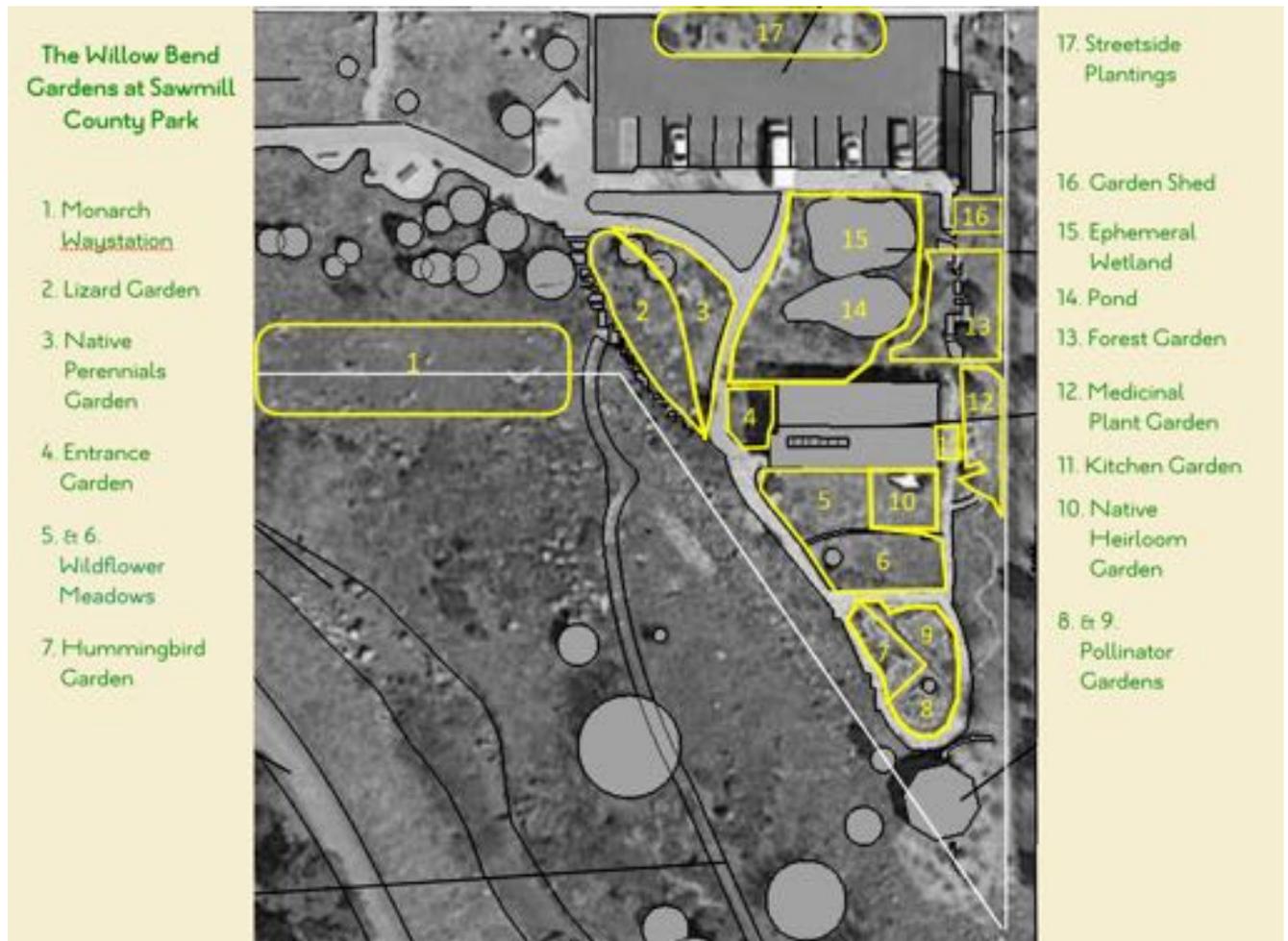
We also interacted with many locals and out-of-town visitors, mostly by identifying plants, insects, and birds, providing gardening advice, and giving directions.

Notes

This year, Willow Bend staff found the original "Habitat Garden Guide," produced soon after the dedication of the gardens in 2003. This guide helped volunteers understand the intent and purpose of each of the six original gardens: Lizard, Pond, Forest, Wildflower, Hummingbird, and Three Sisters.

Several habitat gardens have been added over the past fifteen years. Each garden or new feature has a number on the map on this page. The account of the gardens that follows the map describes the condition of each at the outset of 2018, a description of our work to improve them during the year, and our plans for maintenance and/or further improvements in 2019.

In addition to the work done on the interpretive gardens, volunteers pruned, weeded, and planted the margins of the overall garden area. Within the stone circle associated with the new arch, volunteers amended the soil and planted wildflowers suited to that sunny, exposed spot. Just north of it, volunteers created terraces on the steeply sloping rim of the peninsula and planted about thirty native grasses and perennial forbs donated by an NAU graduate student. Below the fence between the gardens and the law enforcement parking lot, volunteers weeded the slope between the cottonwood trees and planted several dozen native grasses and perennial forbs. We plan to continue grooming and improving these areas in 2019.



2018 Accomplishments and Plans for 2019

1. Monarch Waystation



2018: Eagle Scout James Dorn continued to care for the Monarch Waystation he created in 2017, on the slope below Willow Bend. Because the previous winter lacked significant precipitation, James visited often from March through July, to water and weed the slope. He added and monitored 10 new milkweeds from the NAU Arizona Milkweeds for Monarchs Program. He also built and installed a wooden bench for visitors. This summer, volunteers noticed monarch butterflies in the gardens for the first time since we began!



2019: Volunteers will care for this garden after James graduates from high school, keeping it watered until the summer rains begin.

2. The Lizard Garden

From the original guide to the gardens: *The south slope of the hill is hot and dry, and is similar to what is found at the southern base of Mt. Elden.*



The Lizard Garden was overgrown with non-native species and no longer provided suitable habitat for lizards. Few native species survived. Volunteer Kathy Flaccus led groups of volunteers on work days to weed and prune this garden. They added a cluster of hedgehog cactus as well as other native plants adapted to hot, dry conditions.



ACE volunteers created a kids' trail for scrambling to the top of the berm.

2019: Plans include continued weeding and pruning as well as adding several species of plants to increase diversity. The irrigation system to this particular garden delivers water to the site but was damaged by an invasive Siberian elm. We would like to eradicate all Siberian elms throughout the gardens and repair this section of the irrigation system.

3. Native Perennials Garden

This garden on the west side of the path to the EE Center entrance was originally intended to represent the Great Basin biome, but it does not provide conditions like those of the Great Basin. It became a very unstable slope, densely overgrown with only a few species of plants that were native or typical of the Great Basin. Friends of Willow Bend Gardens re-conceived this garden as the Native Perennials Garden, a showcase of local flowering plants characteristic of similar habitats in the Flagstaff area that face north/northeast and are sheltered from the wind.

In August, Eagle Scout candidate Bryce Fennell led fellow Scouts, family, and other volunteers in weeding and reinforcing the berm and planting dozens of native plants.

Friends of Willow Bend Gardens volunteers followed up in late autumn by pruning overhanging shrubs, re-stabilizing the berm with more substantial hardscaping, weeding, and deadheading. We added a permanent metal sign designating the gardens as wildlife habitat certified by the National Wildlife Association.



2019: When spring of 2019 arrives, the Native Perennials Garden promises to offer a flowery and attractive western approach to the EE Center. We will weed this slope several times during the coming year and continue to stabilize it as needed.

4. Entrance Garden

This site was overgrown with invasive, thorny shrubs including Woods' rose and New Mexico locust. A giant rabbitbrush had sprouted next to the Environmental Education Center and was partially blocking the entrance. Volunteers—including members of the Satya Sai International Organization on their annual retreat at NAU—dug out the rabbitbrush and weeded shoots of Woods' rose and locust from the space several times. On the advice of The Arboretum's horticulturalist Gayle Nance, we planted four large outdoor pots with plants characteristic of the Lizard, Forest, Wetland, and Wildflower Meadows.



2019: Once the layout of features planned for the nearby Arizona Game and Fish Watchable Wildlife Experience has been determined, we plan to install two stone benches for visitors and add in-ground plantings. We will continue to weed the site.

5. and 6. Wildflower Meadows

Grassy expanses in the Flagstaff area have the potential to sustain as much as eight times the biodiversity of forested areas. But because the two sections of meadow at Willow Bend are heavily used for environmental education activities, the soil is compacted and only a few native and non-native invasive plants survive. Volunteers removed invasive clover and excessive ragweed and yarrow, then heavily seeded the meadows with native forbs and grasses during the rainy season to foster a more lush and diverse flora. In addition, ACE volunteers dug up and moved a birdfeeder pole that was cemented beside the trail to Sinclair Wash to Garden 6, where it may be viewed from inside the center at any time of year.



This picture dates from before we treated the Wildflower Meadows. We didn't take "after" pictures because the seeds hadn't sprouted and there wasn't yet much to see.

2019: We expect good results from our weeding and seeding efforts in the coming spring and summer but also expect more weeding will be necessary in 2019 to defeat the clover and ragweed. We intend to plant clusters of native perennials in small areas near the shrubs and sundial, where they will be protected from foot traffic.

7. Hummingbird Garden

A snowberry shrub had exuded toxins into the soil of the Hummingbird Garden, eliminating all native plants except for a few persistent ones that are not attractive to hummingbirds. Years of attempting to discourage the snowberry with weed cloth had not been successful, and so garden volunteers completely reconceived, rebuilt, and replanted this garden. Our first step was to remove all stone edging, plants, signs, and a few flagstones from the space.

From June 26 - 29, Oregon-based master stone artisan Alan Ash led a wall-building workshop. Twelve participants from around the country built a 96' long, 1-1/2' wide retaining wall of white Kaibab Limestone and Arizona Red (Moenkopi) sandstone.

Eagle Scout candidate Peter Hilliard and his fellow Scouts then filled the retaining wall with topsoil and planted several dozen hummingbird-friendly native perennials, mostly plants propagated by volunteer Laura Davis. Abundant summer rains successfully established the new plants. Adult volunteers followed up by adding groups of geologically-interesting "nurse rocks" and a pole for a hummingbird feeder.



2019: Because the soil is now fresh, loose, and free of weed seeds, we expect this garden to be relatively easy to maintain by weeding. It will require supplementary watering in early summer.

8. Small Pollinator Garden

This was the first garden volunteers worked on in the spring of 2018. Years of a leaky pipe combined with the prolific seeding of a few native plants had resulted in a dense mass of American vetch, common yarrow, and two or three species of ragwort. Volunteers weeded the area repeatedly, pruned back the shrubs, pulled out suckers from the nearby cottonwood trees, and repaired the stone border. They amended the soil, planted about 40 native plants, and mulched the site. The garden now has much greater diversity to attract a wider range of pollinators.



2019: This garden will require frequent weeding to constrain the plants mentioned above. We plan to create an 8- to 10-inch border of bare soil between the garden and the surrounding paths to discourage encroachment by dandelions and ragweed.

9. Large Pollinator Garden

Friends of Willow Bend Gardens weeded and mulched this garden in 2017. However, by the end of 2018, it was again badly overgrown and had little diversity in plants.



Early 2017



Late 2017

2019: Eagle Scout candidate Connor Perkins has chosen this garden for his Scout project. In 2019, Connor will organize his team of fellow Scouts, families, and other volunteers. They will remove all desirable native plants and keep them in pots in a protected area, then weed the site, amend the soil, plant native pollinator-friendly perennials propagated by volunteer Laura Davis, re-plant the stored native perennials, and mulch the garden with coir.

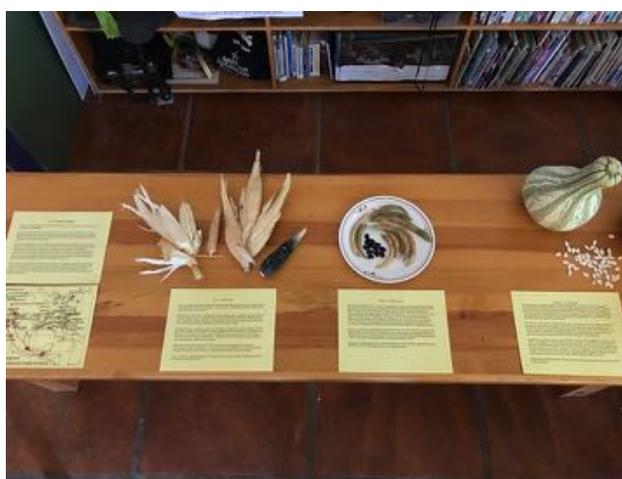
As a final touch, either Connor or our volunteer group will consult NAU Entomology graduate student Lindsay McCabe about installing pollinator-friendly features—possibly an "Air Bee n' Bee" (insect hotel).

10. Native Heirloom Garden

This was the third year of the resurrected "Three Sisters Garden" described in the long-lost gardens guide. The original Three Sisters Garden had entirely disappeared by 2015. In 2016, volunteers Bob Baer and Hopi elder Eric Polingyouma cleared the site, amended the soil, and planted seeds, but had meager success in raising indigenous food plants.

In 2017, Bob, Eric, and other volunteers cleared a new site with better exposure, amended and cultivated the soil, and planted and tended food plants propagated by Laura Davis from seeds provided by Eric. The yield was much better than in the previous year. In 2018, the team repeated the process and volunteers also buried two terracotta ollas filled with water to maintain soil moisture at depth.

The results in 2018 were spectacular. Indigenous peoples' cultivars of sunflower, corn, beans, amaranth, squash, and tomatillos thrived and for the first time, a strain of traditional Hopi cotton produced mature bolls. The garden was colorful and showy, attracting lots of favorable attention from visitors. On the October 6 Science Saturday, the Friends of Willow Bend Gardens displayed the produce and provided information to the public about contributions of indigenous farmers that enhance modern cuisine world-wide.



2019: Bob Baer, Eric Polingyouma, and Laura Davis will repeat their successful strategies in the coming year.

11. Kitchen Garden and Rooftop Water Collection System

Volunteer Bob Baer worked with at-risk youth from the County Step Up Juvenile Justice Program to prepare the soil and plant kitchen crops next to the back door of the EE Center. Step Up participants could visit the garden and have the satisfaction of seeing their efforts transformed into fresh and nourishing foods.

2019: With approval of the new Step Up coordinator, Bob will work with these youth on this garden again.

Across the doorstep from the Kitchen Garden, volunteer Norm Lowe made modifications so that the two large water-collection tanks on the eastern corners of the EE Center may be used by volunteers to water the gardens. He installed gauges, standpipes, and faucets and connected the two tanks to one another so they can be switched when one or the other is empty. Norm also purchased a small pump to provide enough pressure to water all parts of the gardens from this spot.

2019: Water collected from the EE Center rooftop will be used to water the Native Heirloom and Michael M. Moore Medicinal Plant Gardens. Seasonal overflow will be directed to the pond or to a swale garden planned for the area across from the wildflower meadow to the south.

12. Michael M. Moore Medicinal Plant Garden

Volunteer Laura Davis is under contract with the Southwest School of Botanical Medicine to serve as the Curator of the Michael M. Moore Medicinal Plant Garden. Laura propagated dozens of native plants with medicinal properties for the MMM Medicinal Plant Garden this year. She also rescued and transplanted a considerable number of plants from the garden's former location at Olivia White Hospice, where a new roundabout was to take their place by fall of 2018. For safety, ACE volunteers fitted flagstones from the site of the Hummingbird Garden into a gap in the flagstone path through the MMM Medicinal Plant Garden.



2019: Southwest School of Botanical Medicine Curator Laura Davis and volunteers will weed, groom, and tend for this garden. Laura also plans to install an arbor and plant medicinal vines to climb it. In addition, she will begin developing an interpretive guide and program for the MMM Medicinal Plant Garden.

13. Forest Garden

In late summer, volunteers decided to find out what might be concealed in the thickets of locust, willow, cottonwood, and wild rose that had overtaken the west side of the Forest Garden. In removing most of these shoots—often extracting them with our "Pullerbear"—volunteers found remnants of an appealing garden including an arrangement of enormous boulders and a few long-forgotten native plants. We also removed bags of old clothes, sleeping gear, and pieces of rotting wood. We planted scores of natives in this garden to bloom throughout the season, and vining woodbines at the bases of ponderosas and the fence. We planted three large pots with native plants characteristic of the local forest, to protect them from foot traffic and bloom earlier than the plants we put in the ground. We made a winding trail for young explorers from the main path to the avenue of leafy trees alongside of Environmental Education Center, and left a large area on the Forest Garden's east side open for EE Center staff to use for outdoor educational activities.



2019: Volunteers will maintain the Forest Garden by weeding and grooming it. We will also work with Willow Bend environmental educators to enhance the east side of the garden for their programs.

14. Pond Garden

The Pond has deteriorated since its original construction. Only a few native aquatic plants remain. The pond sustains just a few insect larvae and no amphibians. Shrubs and willow shoots were obscuring it from view. Boulders introduced in recent years have reduced water volume, resulting in a pH imbalance and abundance of algae. Weeds and decomposing plant debris further degrade the potential of the pond as wildlife habitat. Mechanical features (pump, etc.) are in bad condition. The pond liner is exposed and deteriorating.



2019: Friends of Willow Bend Gardens are consulting with aquatic ecologist David Ward of the US Geological Survey Grand Canyon Monitoring and Research Center. David has built a number of successful ponds in the Flagstaff area, in which he raises native fish for his research and restoration projects. With David's help, Friends of Willow Bend Gardens is developing a proposal to create a safe, attractive pond with a thriving ecosystem of aquatic plants, insects, amphibians, and fish, encircled by pollinator-friendly native riparian plants. We will present this proposal to the Coconino County Parks and Recreation Department and Coconino County Board of Supervisors, with the intention of completing the work in 2019.

15. Seasonal (Ephemeral) Wetland

The wetland was overwhelmed by native rabbitbrush and willows. There is little diversity of other plants. Volunteers pruned or removed the invasive shrubs, de-thatched the grassy areas, and pruned the Bebb willows to improve their health and appearance. We cut down the coyote willows to observe the pond's present condition and allow the public to view and enjoy the pond.



2019: Volunteers will continue grooming the seasonal wetland. If the plan to renovate the pond is approved, we expect some disturbance to occur in the wetland and will restore and improve it. Volunteer Laura Davis is propagating native ephemeral wetland plants to aid in restoring the area.

16. Garden Shed

In 2017, Willow Bend staff identified the need for a shed to hold gardening tools and supplies that were being stored in the Environmental Education Center. Volunteers Barry Brenneman and Bob Baer met with Parks and Recreation staff to agree on the site, design, and materials for a shed. They obtained donations of supplies and materials and built the shed in a matter of weeks. Garden volunteers moved long-handled tools, a set of shelves, sacks of soil amendments, and several carrier tubs of hand tools, gloves, birdfeeders, and birdseed from the EE Center into the shed, freeing up considerable space in the center. We also cleared away everything that was stored along the center's back wall, moved the woodpile to a safer place along the fence, and staged a community giveaway of a 10' x 15' heap of old tools, outdated cabinets, and other surplus items.



2019: Barry and Bob will install a metal grate as an entrance ramp, as well as shelves and baskets for storing all tools up off the floor of the shed. They have obtained the necessary materials and will complete the work in spring of 2019.

17. Streetside Plantings

Shrubs planted in the area between the Willow Bend parking lot and Sawmill Road were overgrown and encroaching on the Willow Bend sign and parking spaces. Some shrubs had invaded the area as seedlings. In March, Friends of Willow Bend Gardens purchased high-quality pruning shears, loppers, and saws with a grant from the Coconino Master Gardeners Association. In April, volunteer Bill Akens of Morning Dew Landscaping supervised sixteen volunteers already trained in pruning as they trimmed, and in some cases, removed the shrubs in the area. Their work revealed a number of perennial flowering plants as well as the sandstone sign for the Willow Bend Environmental Education Center, creating an attractive first impression and access to more parking spaces for visitors to the center and gardens.



2019: The shrubs will require further pruning in spring as well as ongoing maintenance. A few are thickened and distorted and may need to be removed.