

# 2014: Perennial Fruit Integration & Micro-water Harvesting Feature Upgrades

## Site Observations and Species Selection

I made another trip to North Carolina in July of 2014 to visit with my family. I hadn't seen the garden in July since 2011 and was really excited to be there at the height of summer. The weeding we had accomplished in the winter had inevitably led to the spread of some Bermuda grass rhizomes and the mock strawberries had made a run through the garden again as well. As young divisions with small root systems, they proved easy to pull out after a few long days in the garden. The soil had only improved since the winter of 2013 and I am kicking myself for not having videotaped the soil formation in the swales: I could pour an entire 2.5 gallon watering can onto a chunk of soil cut from the bottom of the swale without the water dissolving any visible particles!

After clearing out the grass and mock strawberries, I was struck by quickly the trees were closing the canopy. The goal this summer would be to bring in some young fruiting species to let them gain a foothold before the canopy closed. In addition to being able to take advantage of the improved soil, having a fruiting species as the center of attention each bed would make it easier to focus chop and drop activity. They would also serve as motivation for interacting with each section of the garden in its own right. We also had the good fortune to share in a bonanza of herb and vegetable seeds, ensuring that the herbaceous layer would gain a shot in the arm too!

My good friend who organizes community gardens had convinced a local supermarket chain to donate their "old" seed packets to him rather than see them destroyed. He had thousands upon thousands of seed packets to share with gardeners throughout the county. We were invited over to see his garden and share in the jackpot: bringing home dozens of packets of flowers, herbs, and vegetables that would allow us to "seed lightly and often" with even more diversity than before. These were in addition to the seeds we had on file from years prior: plenty more alfalfa, red clover, crimson clover, and other hardy species to sow even in the middle of summer.

I also saw how lemon balm (*Melissa officinalis*), yarrow (*Achillea millefolium*), oregano (*Oreganum*

*vulgare*), and bee balms (*Monarda spp.*) were all very capable of resisting the rhizomes and stolons of both Bermuda grass and mock strawberries. Having plenty of well established patches of these to divide from and move into new guilds allowed us to plant a testudo-like formation of useful species around any new perennials we would transplant. We also had many echinacea plants with strong crowns that could be divided to bring yet another excellent species into new areas of the garden. Of course, comfrey would also make an appearance to aid in soil development.

With all of this in mind, we perused the catalogue of Edible Landscaping out of Virginia to see what could fit into our little ecosystem. We decided upon paw paws (*Asimina triloba*), both native and European elderberries (*Sambucus canadensis* & *nigra*, respectively), mulberry (*Morus alba*), self-fertile Japanese persimmon on American persimmon rootstock (*Diospyros kaki* on *D. virginiana*), pomegranates, feijoa/pineapple guava (*Acca sellowiana*), and bay leaf (*Laurus nobilis*). The first four types will find homes in the forest garden proper, while the latter three will be planted out into the front yard and south side of the house in the next year or two when we've finalized plans. Those species will survive and fruit in North Carolina, but they do much better if they have a lot of air movement and solar exposure. In addition to these, the poor performance of our blueberries on their small mounds led us to the conclusion that they should be transplanted elsewhere in the garden.

To diversify the structure of the garden even further, we need to put to use the seed for native nitrogen fixing trees and shrubs: black locust (*Robinia pseudoacacia*) and false indigo (*Amorpha fruticosa*) in particular. Heavily stacking these into the system as coppice every 2-3 years will not only bring about a more "forest-like" structure in the garden, but it'll also allow us to pump more nitrogen into the soil without worrying about groundhogs. Redundancy in nitrogen fixation is crucial to the future health of the garden. The few years the garden has been in existence has shown just how much solar energy reaches the garden and should be put to use through over stacking these elements into the forest garden.

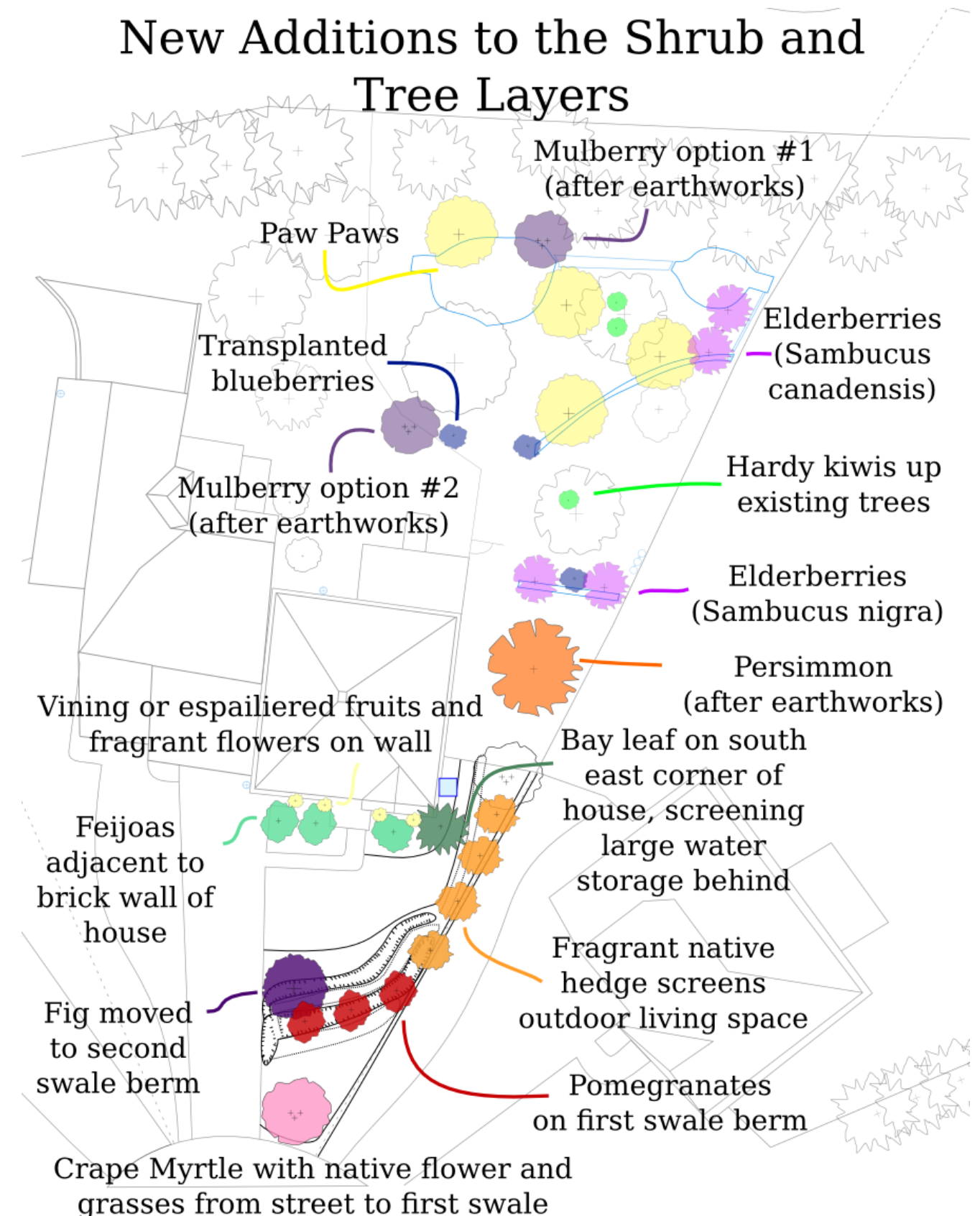
We took a day trip up to Virginia to see the nursery for ourselves and hand pick which plants we wanted to bring home with us. Again we had

a stroke of luck when they offered us some free hardy kiwis (*Actinidia arguta*) to take home. The kiwis were on our list to purchase in the future, but we hadn't quite yet decided where they would go. But free is hard to pass up, even if they were being offered since they lost their tags and it would be difficult to sell plants of unknown sex. So three hardy kiwis were carefully packed away along with 4 "Select" paw paws, 2 native elderberries (Adams and Native #5), 2 European elderberries (Black Lace

and Cut leaf), 3 pomegranates (Austin, Kaj-Acik-Anor, & Parfianka), 1 mulberry (Shangri-La), 1 bay leaf, 1 Japanese persimmon on American rootstock (Wase Fuyu/Matsumoto) and 3 feijoas. Upon our return home, the plants went straight to the shady north side of the house and a vermicompost tea was applied.

Figure 5-1 Front and Backyards with planned new species locations

## New Additions to the Shrub and Tree Layers



## Envisioning the Front Yard

A gradual transition from street to outdoor living space will be created by planting a patch of native wildflowers and grasses (supported with some shade by a crape myrtle, for culturally sanctioned ornamental value) near the road and mailbox. These will cover the electrical infrastructure's main wire and box connection so if work needs to be done, the patch can be easily mowed.

I've included in *Figure 5-2* an illustration of where water harvesting features could be included to support the growth of the pomegranates and figs. Due to the existence of electrical and digital wires underground, these will have to be taken with some precautions. One way to achieve this is for the swales to be dug very shallow, but extra wide. In this way, there is little chance that we will strike any cables while at the same time creating a very subtle earthwork that is more visually appealing than the trench-like swales in the backyard. Because they will be dug much wider, they will double as the main path. Placing two broad swales directly adjacent to one another, connected by a wide spillway, will create a mini forest garden-like system where two well watered mounds are available for planting. The first swale's mound should line up with the grade that leads towards the backyard along the property line. Along this mound I suggest planting native fragrant flowers- either as shrubs or as vines trained to a structure. Pleasant smelling species would make the planned outdoor living space quite enjoyable. They will also visually screen the outdoor living space.

The hot microclimate adjacent to the house will be planted with the feijoas and bay leaf, which will improve the chances of survival if not fruit production. A vertical component can be installed here in the form of espaliered fruit trees or trained vines that will cover the brick of the house: providing additional food production capacity as well as buffering the house's temperatures. A large above ground cistern could be built behind the bay leaf adjacent to the house to capture runoff from the roof and store it as high as possible on the landscape without becoming an eye sore.

A large open space between the house and the swale system would function as the outdoor living room. It could be scaled to accommodate a full size family patio set, or simply a small cafe table for two. It should also be large enough to allow an extra automobile to be parked there when friends and family are over. If deep mulched with wood chip, parking a well maintained vehicle here should

not cause any trouble.

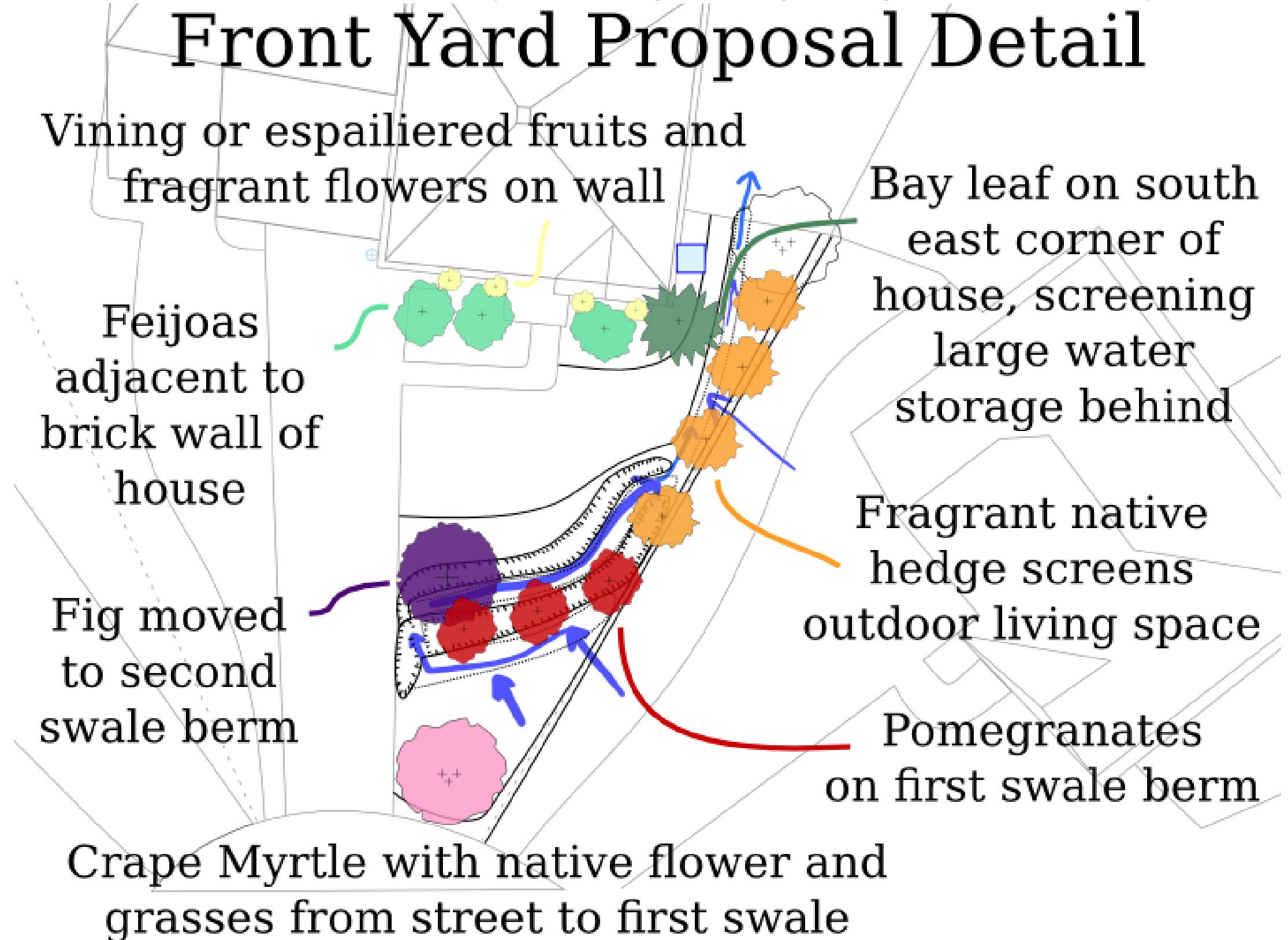
All in all, the proposed design serves to make full use of the hot and dry microclimate available in the front yard while also reclaiming the space from the public eye so that we can enjoy some privacy. The house blocks a lot of the noise from the highway, making the front yard an ideal space for outdoor living.

Development of this area of the property will be delayed until the plants we purchased are strong enough to be planted out. They are still quite small

and will need at least one year of growth before they can be set out into the ground. This will allow time for me to arrange a trip to visit when I can coordinate the final plan, in addition to allowing a longer period of saving for the necessary monetary outlays to overhaul the entire space all at once.

See the following chapter "Future Projects" for more information.

*Figure 5-2 Front Yard Proposal Detail with planned new species, earthworks, and outdoor living*





## Planting out the Backyard: Tour from South to North

### Backyard Proposal

The proposed plan for the backyard is much more straight forward as the species will be plugged into existing infrastructure and only minor earthworks are necessary to enhance the emerging ecosystem. Work began here as soon as we returned from Virginia with the plants.

Paw paws were chosen as the primary fruit species because they tolerate wet and shady conditions: precisely the kind of space we will be dealing with once the canopy closes. They are also a native species that has very few pests. Additionally, their tropical appearance will create nice contrast with the existing specimen trees. The two sets of elderberries will be planted near one another for best cross pollination. The European elderberries, with their more showy characteristics, will find homes on the first/upper swale's berm. The native varieties, with their more reserved appearance, will greatly improve the wildlife zone near the small/upper pond and harvest the morning sunlight as it streams in from above the neighbor's property.

Our recently acquired mulberry could find a home in a few places. Two options have been depicted in *Figure 5-3*. The first is on the sheet mulched area behind the large/lower pond to gain from the southern exposure and microclimate afforded it by the pond. The downside is that this will be rather shady in the future. So the second option places the mulberry on the south side of the willow oak, where we plan some additional water harvesting infrastructure in the future. With the plan to "limb up" the specimen trees to accommodate the incoming shrub layer (and produce valuable woody material for fungi), planting there will allow it to have very good solar exposure. It would also provide summer afternoon shade to one of the blueberries that needs more water, but perhaps not as much sun.

The hardy kiwi vines could be planted near the specimen trees and allowed to grow high into the canopy. The only downside is that if they grow too well, they may damage the trees in the long run. Due to the multi-stemmed growing habit of the river birches, two kiwis could be planted there to take advantage of the multiple trunks. One other could find a home on the red maple. Both of these tree species are also excellent coppice trees, so if something goes awry, they will readily resprout

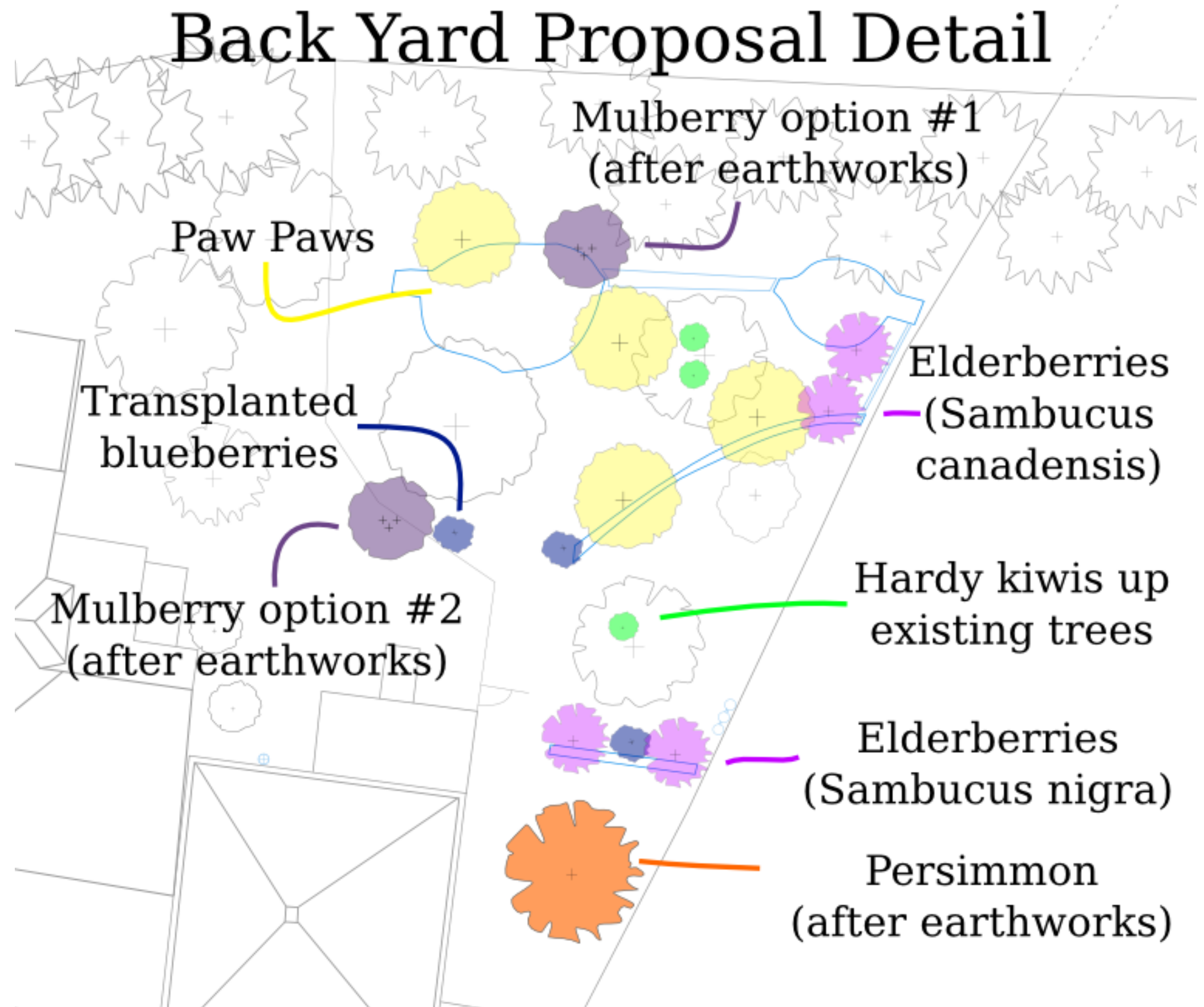
and grow again. Lastly, the Japanese persimmon on American rootstock will become the canopy of the old green guild. We found that even with less than full days' sun, the lack of shade and rhizosphere activity from a tree or shrub has led it to become less than ideal in the forest garden. Earthworks here will be designed to absorb the runoff from the front yard's proposed water harvesting features. Upon

one of the mounds within this new system will sit the persimmon to fuel its massive fruit potential. The tree will provide a lot of mid day shade to the area around the red maple, which will greatly increase the feel of a forest.

A strong pattern that emerges from this proposal is that the gardens throughout the property will have shade during the hottest periods

of the day, but strong solar access in the morning and the evening due to the north-south alignment of the trees. This pattern should allow the growth of species with strongly varied sun needs.

Figure 5-3 Backyard Proposal Detail with planned new species





### Planting Out & Upgrading Water Harvesting Infrastructure

From the deck in the backyard, the garden looks ready for a shrub layer. The soil has improved greatly in just three years and with the every increasing pace by which the existing trees close the canopy, time is running short to give some shade tolerant species a head start. Our strongest herbaceous patches are probably those situated between the oak and willow

(center left), with strawberries, echinacea, roses, and herbs being joined by a new paw paw that summer.

The large pile of grass in the foreground is evidence of the preparatory work that precluded transplanting. A pile of soil next to it is from more Zai bowls that were dug along the fence. This soil will be put to use building up mounds in the persimmon guild in the future.

Also photographed from the deck, the area around the first/upper swale has areas of perennial

*Photograph 5-1 The forest garden after two weeks of planting, transplanting, and removal of undesirable species. July 24th, 2014*



*Photograph 5-2 Even the first/upper swale looks a little dry without any afternoon shade from trees or shrubs. Elderberries transplanted onto the berm. July 24th, 2014*



herb production as well as some annual vegetables. It was a dry year, but even so the difference between the area watered by the swale (left) and the upslope area (right) is quite stark. This is one reason why choosing dry soil tolerant species like oregano and lemon balm for ground covers makes a lot of sense: dry years don't stop them from doing their job and being on a slope means that they have good drainage in wet years. The persimmon will find a home upslope with its own earthworks.

A wider view of the space that will be developed into a persimmon guild. With water harvesting earthworks, this area will recover quickly judging by the health of the areas under the influence of swales and ponds. There are still many desirable species hidden amongst the grass. Some volunteer red maple saplings will be allowed to grow for a short time to help improve the soil and inevitably add a lot of woody material to the garden when the time comes.

*Photograph 5-3 Old green guild in need of some remediation through the presence of a tree layer. July 24th, 2014*





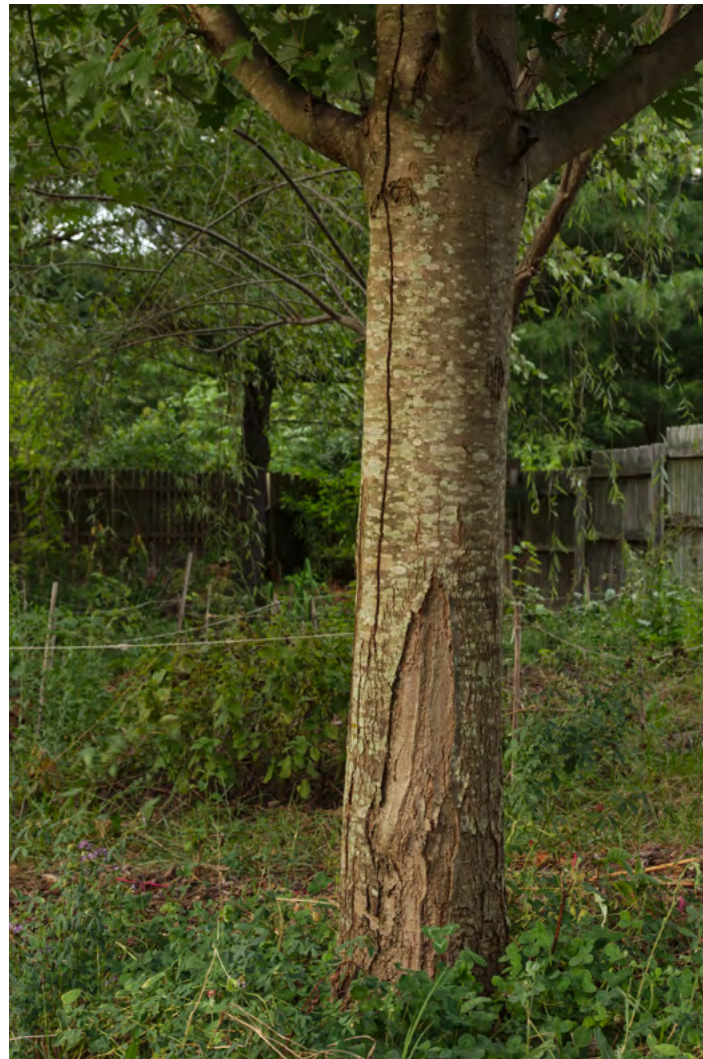
The only readily apparent nutrient deficiency in the garden was in the old green guild: many of the plants were yellowing and had lack luster growth. On the left, plants were given a diluted urine boost for nitrogen and phosphorus, while those on the right were not. The uptake of the nitrogen was rapid enough that within the two weeks the difference was noticeable. More nitrogen fixers will be needed in this area to remedy the situation.

*Photograph 5-4 (right) Nitrogen deficiency in lemon balm in the old green guild. July 24th, 2014*



When the project first began, the red maple was struggling, due to the poor environmental conditions, to heal itself from bark splitting (*Photograph 2-6 p.*). Now, after three and a half years, the tree looks to have healed itself. Our intense soil revitalization efforts have allowed it to gain access to the nutrients and water it desperately needed, as well as finally having an opportunity to partner with healthy mycorrhizal networks. The tree is extremely vigorous now. Even if none of the other plans would come to fruition, the effort was worth it. Red maples may be the most common tree in North America, but

they are still living beings. Nursing this tree back to health has been a gratifying experience. Of course, the garden also gains quite a lot by having this tree alive and doing its thing! The amount of mulch it creates every year with its leaf litter in addition to the enormous amount of energy it must be putting into the soil food web cannot be under appreciated; especially in light of how the one section of the garden without a tree layer looks in comparison to the maple's surroundings. *Edible Forest Gardens Vol. 2* notes that maples may be dynamic accumulators of potassium- a critical nutrient.



*Photograph 5-5 Red maple appears to have fully healed. July 24th, 2014*



*Photograph 5-6 Portrait of the red maple. July 24th, 2014*



*Photograph 5-7 Strawberries growing in the shade of the red maple and willow after removal of mock strawberries. Echinacea was also inter planted to help consolidate these patches from future encroachment. July 24th, 2014*



*Photograph 5-8 Same location as 5-6 offering general view of the understory of the red maple and willow. Chia, red clover, white clover, echinacea, strawberries, tomatoes, peppers, comfrey, oregano, alfalfa, and others. July 24th, 2014*





Photograph 5-9 “Adams” native elderberry on lower swale with comfrey behind for scale. July 24th, 2014



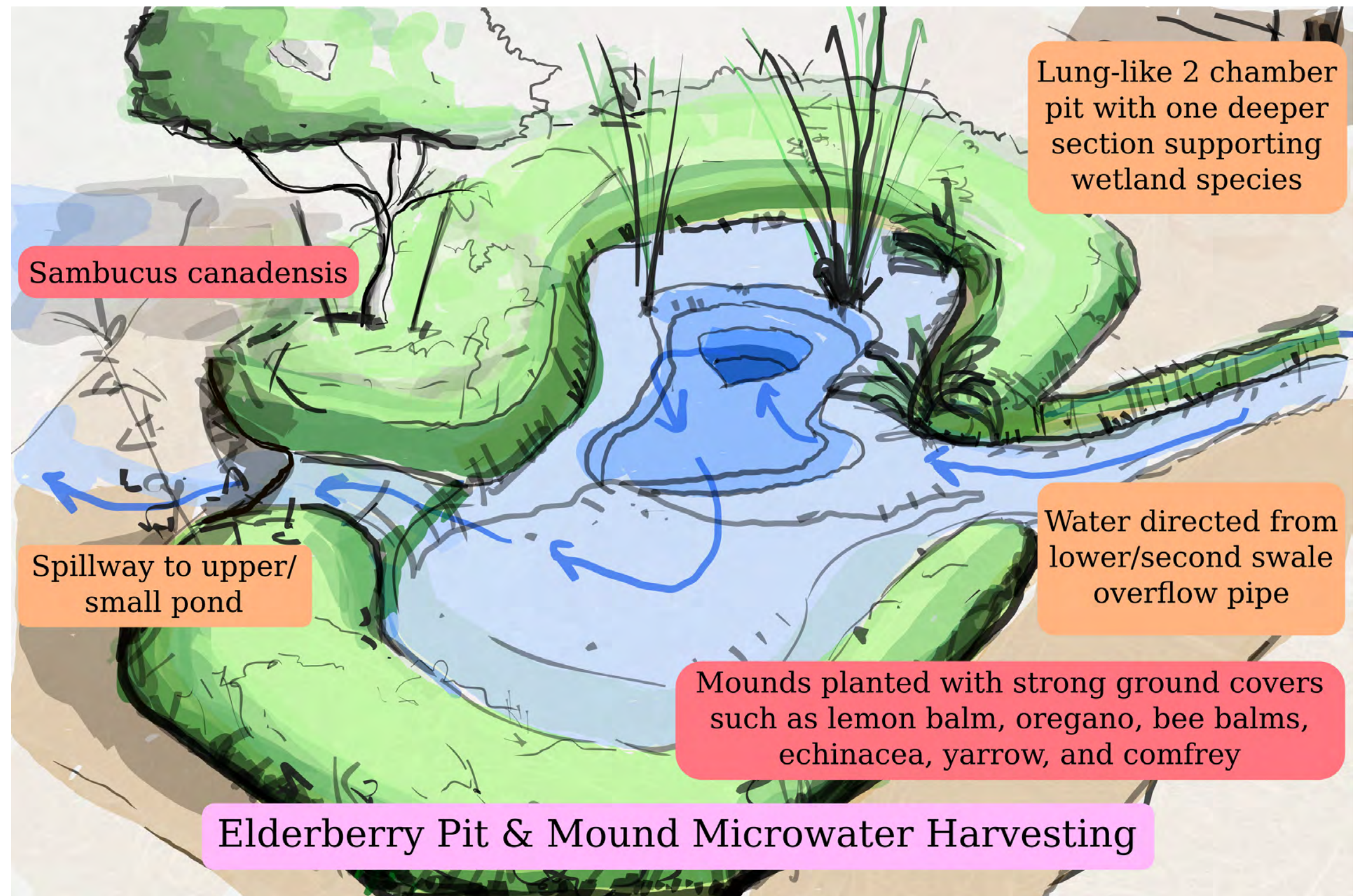
Photograph 5-10 Native #5 guild planted and mulched with bed opposite sown with vegetables. July 24th, 2014



Photograph 5-11 “Native #5” Elderberry in its new Pits & Mounds water harvesting guild. July 24th, 2014

A small “Adams” variety native elderberry perched on the second/lower swale’s mound will be able to take great advantage of the increased hydration, if we can keep it alive. Perhaps it was too small to plant, but elderberries are very hardy and take to being disturbed well so we will see in the next year if it survived. To improve pollination, we needed to devise a microwater harvesting feature nearby to accommodate the second native elderberry.

The little system we implemented is my favorite of all the new earthworks we dug that summer. The bed we chose to renovate had been completely taken over by mock strawberries and



was at risk of being subsumed again, as well as being rather discomfiting to work in because of its proximity to known poison ivy plants. Additionally, it gets a lot of sun (and is therefore dry) while watching the water from the second/lower swale shoot directly down to the small pond just behind and below it. By using a pits & mounds strategy, we are able to put any excess water from the swale to use one more time before it goes into the ponds.

Water is now directed into a pit with varied depths, creating different ecological niches for diverse species. The elderberry, a “Native #5” variety, has been planted on the mound just above

Figure 5-4 Elderberry Pit & Mound Microwater Harvesting. Note: Native #5 simply means this is a vegetative clone of a native elderberry that was selected for vigor and fruit production by the nursery.

the deepest part of the pit, so it will be encouraged to grow deep roots to access this water feature. Ringing the elderberry are lemon balm crowns we transplanted from around the garden. One particularly large specimen was planted on the spillway to quickly hold this feature with its roots. We also transplanted quite a few crowns of bee balm and echinacea on the wings of the mound to increase pollinators and grow into a strong ground cover. In addition, oregano and yarrow were chosen to round out the spreading ground cover. Yarrow’s thick root system and matting behavior was chosen to shore up the small channel that directs water into the system.

Together, these species should prevent the bed from being totally taken over by mock strawberries or Bermuda grass. In order to take advantage of any water borne nutrient, we also transplanted some comfrey crowns into the wetter portions of the pit, where their thick foliage could also slow down water. The deepest portion was planted with some iris crowns from the ponds. Lastly, we overseeded with alfalfa, red clover, crimson clover, lettuce, chives, basil, tomatoes, and other summer herbs and vegetables to quickly colonize the exposed ground inside the pit.





Photograph 5-12 "Select" paw paw situated in the shade of a river birch, with the swale mound's comfrey at hand for chop and drop. July 24th, 2014



Photograph 5-13 "Select" paw paw with rose and strawberries with the most sun exposure adjacent to the second/lower swale's western edge. Note that this same paw paw is barely visible in Photograph 125. July 24th, 2014

The canopy species for both the elderberries just mentioned and the following paw paws is the easternmost river birch. Its crown spreads over half the old four sisters guild and the two elderberries are planted right about where its drip line begins. It is on this side of the garden that yet another of our plants found a home.

We decided to plant two of our "Select" paw paws in the beds adjacent to the second/lower swale's mound. Here, they would have access to the beds we double dug two years prior and the improved soil conditions that have not yet translated to the swale mound proper. Paw paws tolerate shady conditions and therefore can be planted in the shade of our dominant trees. "Select" paw paws are seedlings from paw paws that have exhibited vigor, good fruiting, and other desirable and even "superior" characteristics. They are not clones and so we have the opportunity to experience four wildly different kinds of fruit from these! Paw paws are simply cool.

This first specimen was, once again, ringed with lemon balm, yarrow, and other hardy ground

covers. We did not have to dig any special water harvesting features for it, but we did dig out a small mound and watering bowl.

The other paw paw planted adjacent to the second/lower swale rounds out the open space between all of the existing trees. Like the first paw paw described, it is a "Select" variety and it will benefit from the line of comfrey planted along the swale mound. This patch of the old four sisters is also holding out well against the mock strawberries and Bermuda grass with a rose, strawberries, phlox, lemon balm, echinacea, and clover as the main species. As with its twin on the east side of the river birch, it was planted on a mound with watering dish. It will be interesting to compare the performance of this paw paw with the others, which are planted in much shadier conditions.

Photographs 5-13 and 5-14 show the strawberry, echinacea, and herb patches that are across the path from the second paw paw we planted. These have produced abundant fruit and continue to thrive even with mock strawberry incursions.

Photograph 5-14 Strawberry patch (foreground) with new paw paw across the path. This is one of the most well established areas in the garden. July 24th, 2014



Photograph 5-15 A closer look at the above patch. July 24th, 2014





## Paw paw Pit & Mound Microwater Harvesting

Compaction from crossing the pathways offers perfect location for dual spillways

Water directed into pit by arms of mound

Strong ground covers of red clover, lemon balm, comfrey, and yarrow transplanted onto mound

*Asimina triloba*

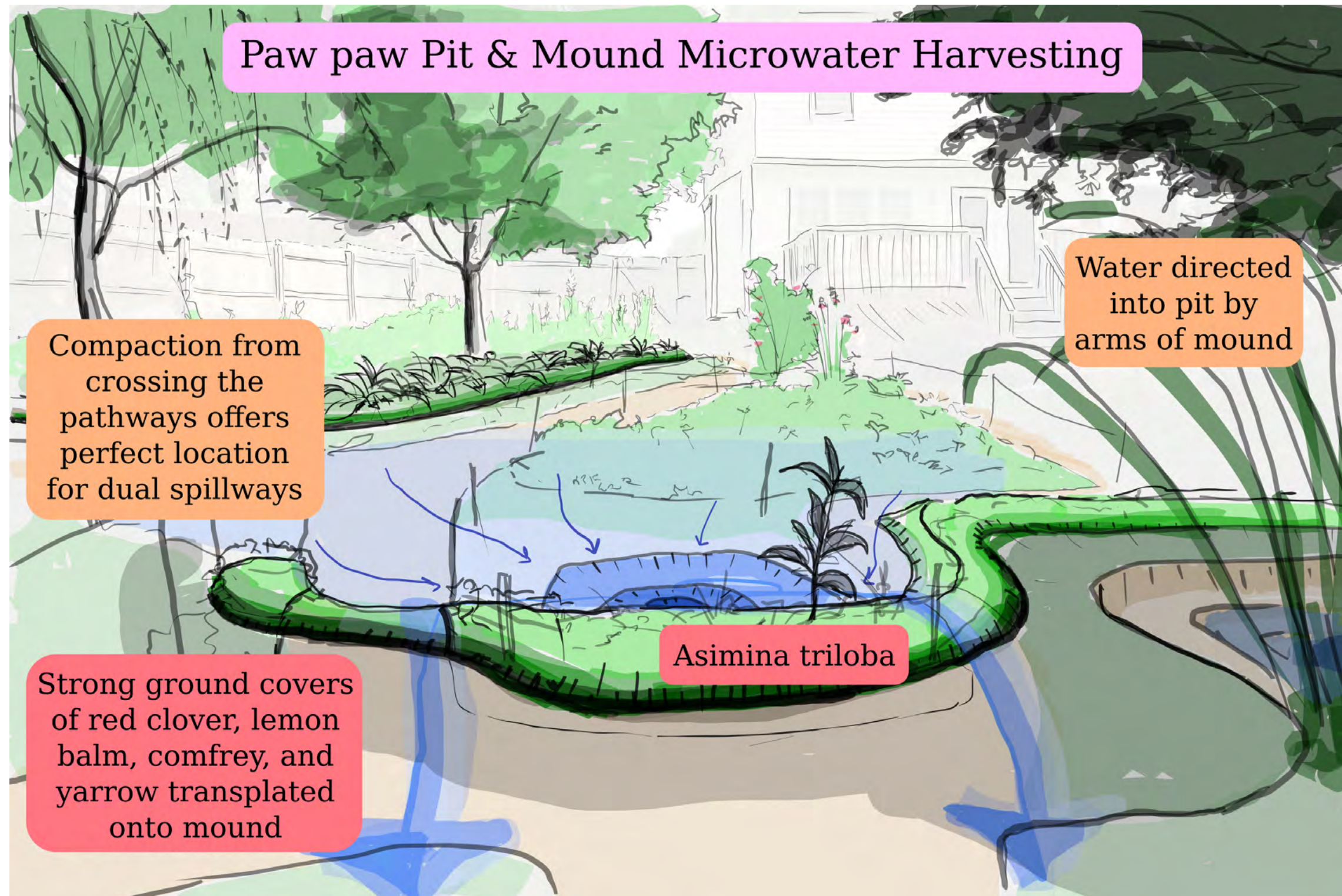


Figure 5-5 Paw paw Pit & Mound Microwater Harvesting

Moving to the west side of the same river birch, we planted another “Select” paw paw at the bottom end of one of the largest beds in the entire garden. The southern end of the bed, which is also up the slope, is one of the most well-formed polycultures in the garden so far with strawberries, lemon balm, oregano, hyssop, cilantro, and echinacea. The planting location, on the other hand, had been stripped of vegetation by the ground hog since it had a productive patch of red clover sown there in 2011-2012-mid 2013. Largely empty, this area was a perfect location for another water harvesting intervention.

If you recall to the summer of 2011, straight line winds accompanied incredibly strong downpours which broke over the second swale and scoured this patch of the old four sister’s guild (Photograph 2-28 p. 50-51). Even since then, the patch has seen a little more of the destructive side of water than we would like. So, taking advantage of the lack of vegetation and its apparent abundance of water, we made a very simple pits & mounds water harvesting feature to benefit one of the “Select” paw paws.

A shallow pit was dug inside the bed and the soil used to build a mound whose berm attaches to the pond’s small mounded edge and extends

towards the river birch. The two arms of the mound are almost parallel to the contour, but slightly moving uphill so that they capture and runoff and direct it towards the pit. As pathways border the bed itself and the mounds needed to cross these paths, we intentionally created these as dual spillways in case of an extreme rain event. The paw paw itself was situated near the middle of the mound and surrounded by lemon balm, oregano, yarrow, and many red clover crowns. Into the pit we planted comfrey again to serve as nutrient accumulators and chop and drop for the paw paw. Since this microwater harvesting feature is not directly



Photograph 5-16 “Select” Paw paw atop the mound in its Pits & Mounds guild. July 24th, 2014



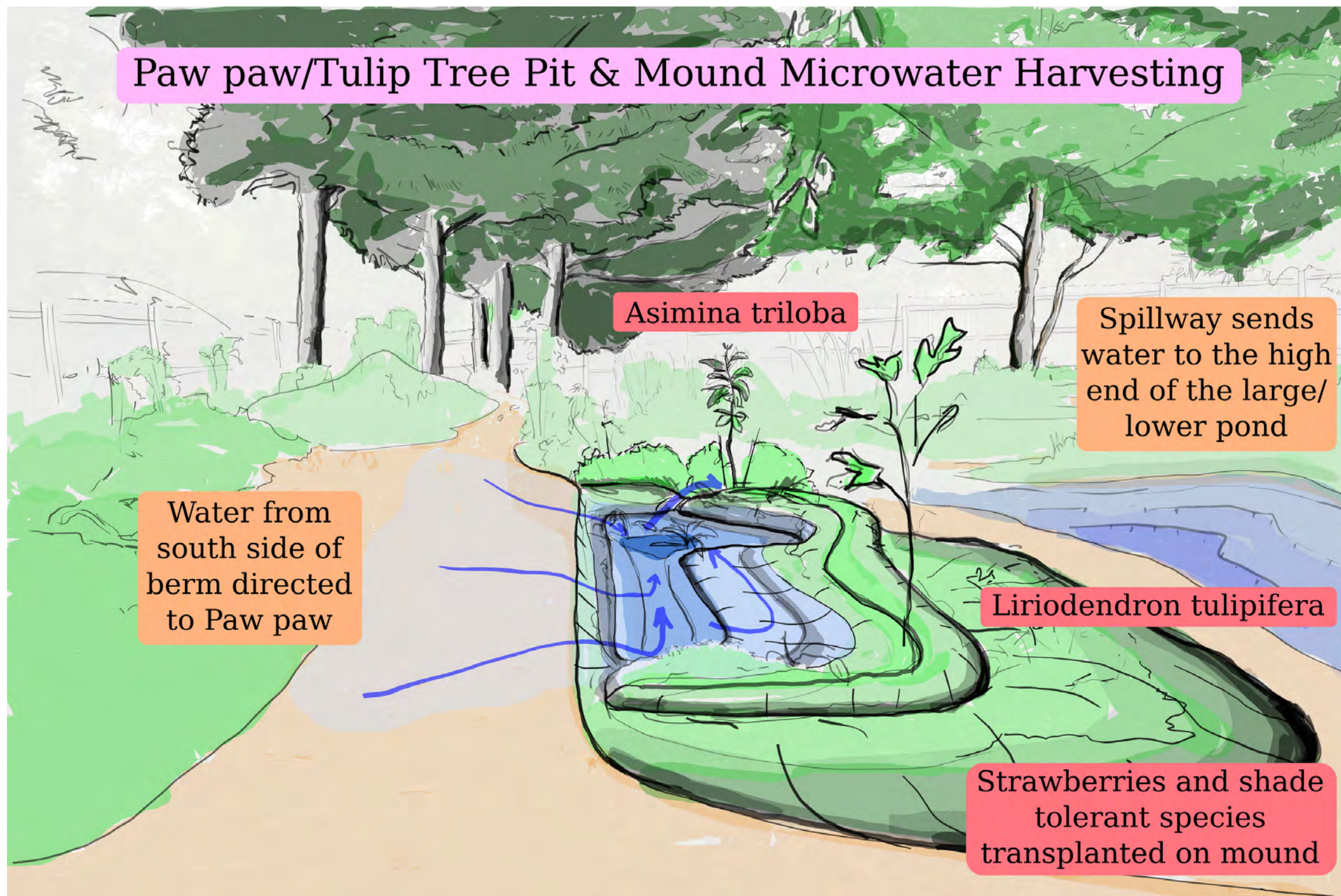
Photograph 5-17 View of the new guild looking east. July 24th, 2014



Photograph 5-18 “Select” paw paw situated in deep shade between a river birch (off camera, left) and willow oak (off camera, right). Note the false indigo nitrogen fixing native shrub (center right foreground). I’ve advised the family to germinate as many as possible next spring and increase the shrub layer’s density, since they are excellent performers and will quickly change the garden’s architecture for the better. July 24th, 2014

connected to any other water harvesting features, we chose not to plant any wetland species like we did with the “Native #5” elderberry described earlier. Bare ground was once again sown with clovers, vegetables, and herbs then watered in.





Photograph 5-19 “Select” paw paw on the berm with an elongated bed for its dedicated guild. July 24th, 2014



Photograph 5-20 View of the new guild looking east. July 24th, 2014



Photograph 5-21 “Select” paw paw in the deep shade of the willow oak, river birches, and white pines in a patch we had created by sheet mulching in 2012. July 24th, 2014

Figure 5-6 Paw paw/Tulip Tree Pit & Mound Microwater Harvesting

Moving north to the other side of the large pond brings us to the last of the four “Select” paw paws we planted that summer. The area we had sheet mulched back in 2012 had been taken over by Bermuda grass and mock strawberries that had come in from the pathway. After pulling as many of these plants out, we noticed that the soil had developed quite well (as it should considering the very thick layer of wood mulch it had). But since relatively little was thriving there, it was another opportunity to do some microwater harvesting.

Since the location sits on the southern slope of the engineered berm, it has a fairly sizable

catchment area, whose runoff was only being intercepted by the heavy wood mulch. As this broke down, without a strong living ground cover, any significant precipitation event could see all of the water simply flow into the lower/large pond. By digging yet another pit, this time in an elongated fashion, we created the opportunity to catch this water and put it to use watering our paw paw. We saw that there was a tulip tree (*Liriodendron tulipifera*) growing at the west end and decided to use it as the anchor for the other side. Tulip trees are the tallest native hardwood in the southeastern United States and have an interesting habit of growing in a

columnar fashion until they break the canopy before producing any branches, so they are highly prized as a timber species. They also have beautiful flowers and leaves which are quite unique. It can always be coppiced at some point if it begins to become a problem.

The spillway for this microwater harvesting feature was again placed near the paw paw and anchored with strong lemon balm crowns. Bee balm, yarrow, and oregano also found their way into their usual locations on the mounds and in the pit itself to shore up the earth. On the larger southern side of the mound, we planted echinacea and

strawberries together. Inside the pit, more comfrey was transplanted and cover crops sown to increase diversity.

This paw paw will test the shade tolerance limits of the species.





Photograph 5-22 Blackberries ripening. Their canes are supported by twine attached to the fence and bamboo stakes. July 24th, 2014



Photograph 5-23 Blackberries being consumed by June bugs (*Cotinis nitida*). We still managed to harvest enough to enjoy fresh fruit for a few weeks before they got out of hand. July 24th, 2014

One of the most prolific plants we have are the canes of thornless blackberries we planted back before learning about permaculture. We've tried to move them elsewhere, but of course, have not been very successful. With almost no attention, they fruit quite extensively and we were able to have many fresh black berries during my stay. Until the June bugs moved in, anyway! Since we are the only game in town when it comes to berries and food (along with not spraying), they decided to gorge themselves on our crop. If you startle them, they spray a foul smelling substance all over the berries and render them inedible. Our hope is that as we have more black berries and predators move into the garden that their populations will be somewhat controlled by natural predators.

Even though it didn't have any berries, one of the blueberries transplanted onto a mini hugel mound back in 2011 was putting on some new growth. I think that they will be well served by being transplanted to locations with more water in the spring/early summer, as reliable water is necessary for good fruit set in blueberries.

Due to poor soil development on the swale mounds proper, we also mulched them with wood chips to hopefully restart that process. Additionally, this section of the swale was revamped with "steps" as outlined in Drawing #2. For a dry summer, things look quite well established and with some care, the garden should continue to thrive as the rewards of diversification reveal themselves.



Photograph 5-24 Blueberry on mini hugel mound. We didn't get around to removing the mock strawberries that dominate the herbaceous layer here while I was visiting. July 24th, 2014



Photograph 5-25 Second/lower swale with three steps. July 24th, 2014





Photograph 5-26 Late afternoon summer's light contrasting with shade from trees. July 24th, 2014

#### Backyard Conclusions

After two weeks of hard work and dedication, we managed to not only set back those difficult species, but also to introduce new species into the garden while enhancing our water harvesting features at the same time. Planning and implementing mainframe design features in the first year allowed us to observe and make informed upgrades. Swales and pathways offered an excellent framework from which to design small details that will only improve the emerging forest garden's functions. Maintaining these gains will be easier with the knowledge that desired species should be over seeded on a continual basis from around April until the end of September or even early October.

All of the new edible species need to have a close eye kept on them to prevent other species from overtaking them and to prevent water stress. Now that there are desired edible species throughout the garden, regular checks on each section will have a more specific focus than simply supporting living ground covers.

The many pioneer trees that have volunteered throughout the garden, mostly red maples and river birches, can easily be cut to one standard trunk and then coppiced when the trunks

are of some useful size, say for mushroom growing, soil staking, bed lining, etc. By coppicing them, the soil gains a large amount of soil organic matter through rhizodeposition and the rest of the garden will gain more sunlight. Pulsing carbon into the soil like this is a great way to make use of volunteer species rather than attempt eradication. Regular patrols for emerging poison ivy will help control this dangerous species before it can grow strong root systems and become a serious problem. These patrols will have to be maintained indefinitely as the species is native and readily spread by birds. No section of the garden should be made off limits.

Care with the timing of chop and drop of comfrey is also necessary to align its needs with available moisture. In a good year, up to 7 or 8 cuttings are possible from mid April until September. However, dry years will mean that the plants need more rest and should be allowed to recover fully before being cut again. The same goes for any other desired "chop and drop" species, like the horsetails which can be harvested on a more regular basis to maintain the pathways around the ponds. The opposite, of course, applies to undesired species which can be cut and used for mulch as often as possible to exhaust their root systems.

Generally, then, maintenance revolves

around the management of species through cutting and seed sowing. Propagation of more native species over the winter and transplanting late the following year is also recommended to make full use of the seeds we have on hand. Particular attention should be paid to increasing the number of native aquatic species so that water quality increases and the ponds become more attractive.

All in all, the spread of strong ground

covers throughout the garden makes it so that the garden should be relatively easy to maintain. If the trimming of pathways proves to be too difficult, running the string trimmer machine with extra care for the boundaries of the beds could be used instead of the mower, which needs too much space to run. By keeping the bamboo stakes and twine tight and in order, the cutting of these beds by machine should be relatively risk free.

Photograph 5-27 *Echinacea purpurea* flowering with less than a full day's sun. July 24th, 2014

