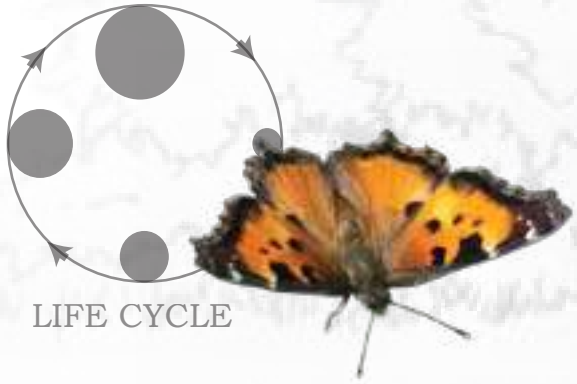
And Then There Were Butterflies

Using Butterfly Life Histories to Design for Urban Butterfly Habitat Gardens

Chad Hawthorne



LIFE CYCLE

NEEDS

BEHAVIORS

Butterfly Gardening can be approached in three ways

- Focusing only on the flying adults
  - Planting Flowers
- Focusing on the flying adults & caterpillars
  - Planting Flowers
  - Planting Host Plants
- Focusing on the process of ecological restoration
  - Planting Flowers
  - Planting Host Plants
  - Habitat structuring

I chose to blend them, but always consider the following

- Butterfly Life Histories
  - Butterfly Life Cycle
    - egg
    - caterpillar
    - chrysalis
    - adult
  - Butterfly Needs
    - sunlight
    - water
    - shelter
    - food
    - reproduction
  - Butterfly Behaviors
    - puddling
    - basking
    - nectaring
    - perching
    - patrolling

Why Butterfly Gardening?

- Beauty
  - Add a dimension of movement and color
- Stewardship
  - Promotes ecological responsibility & thought
- Ecological Value
  - They are pollinators
  - They serve as a food source for other animals
- Ambassadors of the insect world
- Indicators of environmental health

Goals of a Butterfly Habitat Garden

- Strive for diversity within your garden
- Use native plants when possible
- The bigger the garden the better
- Garden for the butterflies that will most likely occur within your area
- Learning

A very beautiful yard (zero butterfly benefit)

A very beautiful meadow (tremendous butterfly benefit)

Ten Principles of Butterfly Gardening

Principle 1 Grow plenty of flowers: Most adult butterflies use flowers are their primary food source. Make sure that flowering plants are plentiful throughout the butterfly flight season as certain butterfly species occur early in the year and certain species occur late in the season.

Principle 2 Grow the right hostplants: Many butterfly species have specific species of plants that they feed on as caterpillars. Most of these hostplants are native species and the butterflies have co-evolved with these plant species.

Principle 3 Plant a variety of plants within the garden: Most successful habitat gardens have more than twenty different species of flowering plants, hostplants, and plants that serve as shelter and cover. The more species of plants the more diverse your garden will be.

Principle 4 No pesticides: Even herbicides and harsh fertilizers can be harmful. Pesticides which target specific species can still have catastrophic effects on the entire garden. Natural pest control is always best and the more diverse the garden the greater the chance of balance will be achieved within the insect community.

Principle 5 Know what species of butterflies live in your area: Many butterfly species that occur regionally may not dwell where the garden resides. Walking the area and making a list of what flies where is garden is helps the designer to select the exact butterfly species and the exact hostplants to lure them.

Principle 6 Provide plenty of sunshine: Butterflies are cold blooded, they need plenty of sunshine and warmth to carry out their basic life processes. Creating pockets of warmth through windbreaks and shelter can encourage butterflies to use and perhaps stay within the garden. Open spaces or basking stones help butterflies get warm and stay warm.

Principle 7 Arrange plants strategically. Massing flowering plants encourages butterflies to find and then stay within the space. Spreading the hostplants out encourages the butterflies to disperse their eggs and caterpillars so predators can't find them in one easy place.

Principle 8 Provide water and minerals: Butterflies, especially males use wet patches of earth to hydrate and gain precious minerals for reproduction. Providing puddling stations helps address this vital stage in butterfly life cycle needs.

Principle 9 Let the garden be wild. Butterflies like it messy or at least in a human perspective of messy. This need for leaves to remain in planting beds and grass to be left unmowed and shrubs to be untrimmed is vital, as many hibernating butterflies in the adult, chrysalis, egg, and caterpillar stages will often be hiding within these unkempt areas during winter.

Principle 10 Experiment: Don't think that all well laid design plans will result in successfully encouraging butterflies to visit or live within your garden. Each microclimate that is created within the garden may take considerable experimentation to achieve desired results.

Adapted from Tom Terrific Ten Commandments of Butterfly Gardening
@ www.butterflygardening.org

Phase One
Building the Palette

Step One
Determine Habitats

- Wet Prairie
- Upland Prairie
- Oak Savanna
- Woodland
- Riparian Forest
- Upland Forest

Which habitat type will the garden represent?

Place Habitat Here

Step Two
Determine Butterflies

Quickguide
(Butterfly to Habitat)

Which butterflies live in the habitat?

Color Plates
(Butterflies)
Form a list of appropriate butterfly species.

Butterfly Palette Here

Step Three
Determine Hostplants

Quickguide
(Butterfly to Hostplants)

What butterflies use which hostplants?

Quickguides
(Hostplants to Habitat)

Which hostplants grow in the habitat?

Color Plates
(Hostplants)
Refine a list of hostplants based on butterfly use & habitat occurrence.

Hostplant Palette Here

Step Four
Determine Nectar Sources

Quickguide
(Nectar Source to Habitat)

Which nectar plants grow in the habitat?

Color Plates
(Keep as many flowering plants as the garden can support)

Nectar Source Palette Here

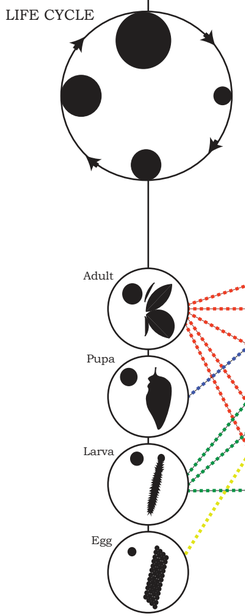
Move to Phase Two

- **Habitat Palette**
- **Butterfly Palette**
- **Hostplant Palette**
- **Nectar Source Palette**

Here, an example of selecting a design palette for a wet prairie design is demonstrated.

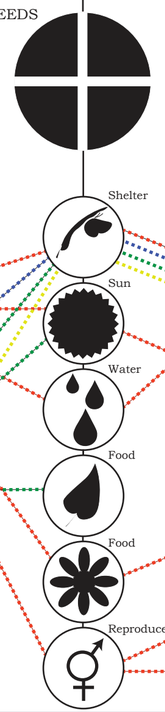
Phase Two
Designing for Butterfly Life Histories

Step One
Identify Life Cycle Stage



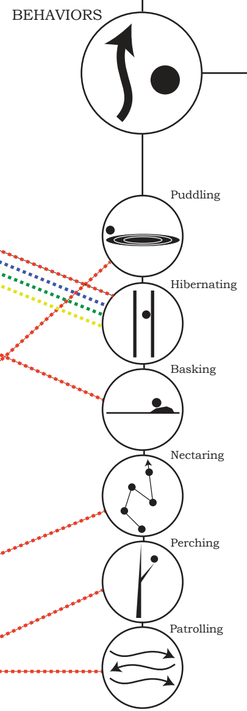
Life Cycle icons drive design decisions based on the life cycle stage.

Step Two
Address Butterfly Needs



Need icons drive design based on site considerations.

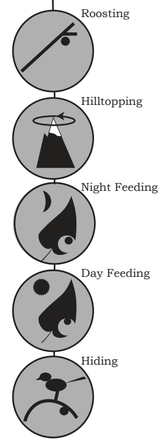
Step Three
Address Specific Behaviors



Behavior icons drive design based on butterfly environment interactions.

Phase One & Phase Two complete the process

Behavior icons in grey represent behaviors that occur when behavior icons in white are addressed, thus behaviors in grey require no design interventions.



	Typology	Canopy Layer	Shrub Layer	Ground Layer
	Upland Dry Prairie	0-5% Very Sparse Tree Cover Oregon White Oak Black Hawthorn Ponderosa Pine (see colorplates for complete lists)	Low and Patchy Vegetation Blue Elderberry Pacific Serviceberry Red-flowering Currant (see colorplates for complete lists)	95-100% Cover Dominated by Grasses and Forbs Roemer's Fescue Lemmon's Needlegrass Kincaid's Lupine (see colorplates for complete lists)
	Wet Prairie	0-5% Very Sparse Tree Cover Oregon Ash Scouler's Willow Cascara (see colorplates for complete lists)	Low and Patchy Vegetation Western Spirea Red-Twig Dogwood Pacific Ninebark (see colorplates for complete lists)	95-100% Cover Dominated by Grasses and Forbs Tufted Hairgrass Rosy Checkermallow Douglas Aster (see colorplates for complete lists)
	Oak Savanna	5-30% Tree Cover Oregon White Oak California Incense Cedar Ponderosa Pine (see colorplates for complete lists)	Low and Patchy Vegetation 10% of savanna floor cover Snowberry Oceanspray Nootka Rose (see colorplates for complete lists)	70-95% Cover of Grasses and Forbs except under Trees Roemer's Fescue California Oatgrass Western Goldenrod (see colorplates for complete lists)

Figure 3.10 Habitat Types: Wet Prairie, Upland Prairie, Oak Savanna

Habitat: Traditional Vegetation

	Typology	Canopy Layer	Shrub Layer	Ground Layer
	Upland Forest	Over 60% Dense Tree Cover Bigleaf Maple Western Red Cedar Douglas fir (see colorplates for complete lists)	Various Low to High Vegetation Evergreen Huckleberry Lewis's Mock orange Pacific Ninebark (see colorplates for complete lists)	Low to Moderate or Seasonally High California Fescue Pacific Bleedingheart Red Columbine (see colorplates for complete lists)
	Riparian Forest	Over 60% Dense Tree Cover Red Alder Scouler's Willow Black Cottonwood (see colorplates for complete lists)	Various Low to high Vegetation Nootka Rose Red-Twig Dogwood Pacific Ninebark (see colorplates for complete lists)	Low to Moderate or Seasonally High Bigleaf Lupine Alaska Brome Stream Violet (see colorplates for complete lists)
	Woodland	26-59% Tree Cover Oregon White Oak California Incense Cedar Ponderosa Pine (see colorplates for complete lists)	Low to High Snowberry Oceanspray Nootka Rose (see colorplates for complete lists)	Moderate to High or Seasonally High Meadow birdsfoot trefoil California Fescue Pearly Everlasting (see colorplates for complete lists)

Butterfly species confirmed for the Willamette Valley and West Linn

Butterfly species on the planet (roughly 17,500)
Butterfly species in the United States (roughly 750)
Butterfly species in Oregon (roughly 150)

Pacific Northwest Willamette Valley **65**

Within Wild Areas and Preserves **56**

Within West Linn **20**

(This is me hunting for them for the past 10 years)

1. Western Tiger Swallowtail
2. Pale Tiger Swallowtail
3. Anise Swallowtail
4. Woodland Skipper
5. West Coast Lady
6. Propertius Skipper
7. Satyr Comma
8. Cabbage White
9. American Painted Lady
10. Silvery Blue
11. Echo Blue
12. Red Admiral
13. Painted Lady
14. Lorquin's Admiral
15. Grey Hairstreak
16. California Sister
17. Mylitta Crescent
18. Common Checkered Skipper
19. Common Wood Nymph
20. Ochre Ringlet
21. (ok, admittedly I found a monarch in 2020)

The Guidebook: Butterfly Abundance List

No.	Species Name	Average number of individuals encountered per year across 36 sites (0 10 20 30 40 50 100 200 300 400 500+)	Ave/Day	Abundance
1.	Tiger Swallowtail	398	11/day	Common
2.	Anise Swallowtail	20	<1/day	Uncommon
3.	Pale Swallowtail	12	<1/day	Uncommon
4.	Clodius Parnassian	22	<1/day	Uncommon
5.	Orange Sulphur	703	19/day	Common
6.	Cabbage White	656	18/day	Common
7.	Western White	1 (Not seen every year)	<1/day	Rare
8.	Marginated White	4 (Not seen every year)	<1/day	Rare
9.	Ochre Ringlet	2146	59/day	Abundant
10.	Common Wood Nymph	1196	33/day	Abundant
11.	Common Checkered Skipper	377	10/day	Common
12.	Arctic Skipper	1 (Not seen every year)	<1/day	Rare
13.	Silver-Spotted Skipper	1 (Not seen every year)	<1/day	Rare
14.	Propertinus Skipper	83	2/day	Fairly Common
15.	Woodland Skipper	1037	33/day	Abundant
16.	Sachem Skipper	2021	56/day	Abundant
17.	Dun Skipper	152	4/day	Fairly Common
18.	Sonora Skipper	75	2/day	Fairly Common
19.	Juba Skipper	2 (Not seen every year)	<1/day	Rare
20.	Monarch	1 (Not seen every year)	<1/day	Rare
21.	Great Copper	1 (Not seen every year)	<1/day	Rare
22.	Grey Hairstreak	133	4/day	Fairly Common
23.	Cedar Hairstreak	2 (Not seen every year)	<1/day	Rare
24.	Hedgerow Hairstreak	12	<1/day	Uncommon
25.	Western Tailed Blue	3 (Not seen every year)	<1/day	Rare
26.	Eastern Tailed Blue	791	21/day	Abundant
27.	Acmon Blue	9	<1/day	Uncommon
28.	Fender's Blue	30	<1/day	Uncommon
29.	Silvery Blue	174	4/day	Fairly Common
30.	Spring Azure	179	5/day	Common
31.	Variable Checkerspot	39	<1/day	Uncommon
32.	Great Spangled Fritillary	3 (Not seen every year)	<1/day	Rare
33.	Mourning Cloak	11	<1/day	Uncommon
34.	California Tortoiseshell	50	1/day	Irruptive
35.	Lorquin's Admiral	96	2/day	Fairly Common
36.	California Sister	88	2/day	Fairly Common
37.	Mylitta Crescent	251	6/day	Common
38.	Field Crescent	414	11/day	Locally Common
39.	Red Admiral	13	<1/day	Uncommon
40.	West Coast Lady	3 (Not seen every year)	<1/day	Rare
41.	Painted Lady	124	3/day	Fairly Common
42.	American Lady	4 (Not seen every year)	<1/day	Rare
43.	Satyr Comma	9	<1/day	Uncommon
44.	Common Buckeye	1 (Not seen every year)	<1/day	Rare
45.	Brown Elfin	0 (Not seen every year)	<1/day	Rare
46.	Pine Elfin	0 (Not seen every year)	<1/day	Rare
47.	Pine White	1 (Not seen every year)	<1/day	Rare

Table 3.2 Butterfly census data based on NABA Eugene/Springfield Chapter census counts from 2001-2017

The Design: Selecting the Butterfly Palette List

Select Common Butterfly Species

Butterfly Habitat Garden Habitats

No. Eugene Butterfly Species	Common Status	Target Butterfly Species	Wet Prairie Species	Savanna Species
1. Tiger Swallowtail	Common →	1. Tiger Swallowtail	1. Tiger Swallowtail	1. Tiger Swallowtail
2. Anise Swallowtail	Uncommon		5. Orange Sulphur	5. Orange Sulphur
3. Pale Swallowtail	Uncommon		6. Cabbage White	6. Cabbage White
4. Clodius Parnassian	Uncommon		9. Ochre Ringlet	9. Ochre Ringlet
5. Orange Sulphur	Common →	5. Orange Sulphur	10. Common Wood Nymph	10. Common Wood Nymph
6. Cabbage White	Common →	6. Cabbage White	11. Common Checkered Skipper	11. Common Checkered Skipper
7. Western White	Rare		14. Propertinus Skipper	14. Propertinus Skipper
8. Marginated White	Rare		15. Woodland Skipper	15. Woodland Skipper
9. Ochre Ringlet	Abundant →	9. Ochre Ringlet	16. Sachem Skipper	16. Sachem Skipper
10. Common Wood Nymph	Abundant →	10. Common Wood Nymph	17. Dun Skipper	17. Dun Skipper
11. Common Checkered Skipper	Common →	11. Common Checkered Skipper	18. Sonora Skipper	18. Sonora Skipper
12. Arctic Skipper	Rare		22. Grey Hairstreak	22. Grey Hairstreak
13. Silver-Spotted Skipper	Rare		26. Eastern Tailed Blue	26. Eastern Tailed Blue
14. Propertinus Skipper	Fairly Common →	14. Propertinus Skipper	29. Silvery Blue	29. Silvery Blue
15. Woodland Skipper	Abundant →	15. Woodland Skipper	30. Spring Azure	30. Spring Azure
16. Sachem Skipper	Abundant →	16. Sachem Skipper	35. Lorquin's Admiral	35. Lorquin's Admiral
17. Dun Skipper	Fairly Common →	17. Dun Skipper	37. Mylitta Crescent	37. Mylitta Crescent
18. Sonora Skipper	Fairly Common →	18. Sonora Skipper	41. Painted Lady	41. Painted Lady
19. Juba Skipper	Rare			
20. Monarch	Rare		Upland Prairie Species	Woodland Species
21. Great Copper	Rare			
22. Grey Hairstreak	Fairly Common →	22. Grey Hairstreak	1. Tiger Swallowtail	1. Tiger Swallowtail
23. Cedar Hairstreak	Rare		5. Orange Sulphur	6. Cabbage White
24. Hedgerow Hairstreak	Uncommon		6. Cabbage White	9. Ochre Ringlet
25. Western Tailed Blue	Rare		9. Ochre Ringlet	10. Common Wood Nymph
26. Eastern Tailed Blue	Abundant →	26. Eastern Tailed Blue	10. Common Wood Nymph	11. Common Checkered Skipper
27. Acmon Blue	Rare		11. Common Checkered Skipper	14. Propertinus Skipper
28. Fender's Blue	Rare		14. Propertinus Skipper	15. Woodland Skipper
29. Silvery Blue	Fairly Common →	29. Silvery Blue	15. Woodland Skipper	16. Sachem Skipper
30. Spring Azure	Common →	30. Spring Azure	16. Sachem Skipper	17. Dun Skipper
31. Variable Checkerspot	Uncommon		17. Dun Skipper	18. Sonora Skipper
32. Great Spangled Fritillary	Rare		18. Sonora Skipper	22. Grey Hairstreak
33. Mourning Cloak	Uncommon		22. Grey Hairstreak	26. Eastern Tailed Blue
34. California Tortoiseshell	Irruptive		26. Eastern Tailed Blue	29. Silvery Blue
35. Lorquin's Admiral	Fairly Common →	35. Lorquin's Admiral	29. Silvery Blue	30. Spring Azure
36. California Sister	Fairly Common →	36. California Sister	30. Spring Azure	35. Lorquin's Admiral
37. Mylitta Crescent	Common →	37. Mylitta Crescent	35. Lorquin's Admiral	36. California Sister
38. Field Crescent	Locally Common	38. Field Crescent	37. Mylitta Crescent	37. Mylitta Crescent
39. Red Admiral	Uncommon		41. Painted Lady	41. Painted Lady
40. West Coast Lady	Rare			
41. Painted Lady	Fairly Common →	41. Painted Lady		
42. American Lady	Rare			
43. Satyr Comma	Uncommon			
44. Common Buckeye	Rare			

Table 4.1 Butterfly Selection Process

Methodology for chosing specific Butterfly Species

Feeding (Based on both adult and larval feeding sellectivity)

- Generalists
- Specialists

Occurrence (Based on literature and local butterfly censuses)

- Rare
- Common

Focus Species (Based on suggested butterfly gardening species targeting)

1. Western Tiger Swallowtail
2. Pale Tiger Swallowtail
3. Anise Swallowtail
4. Woodland Skipper
5. Dun Skipper
6. Propertius Skipper
7. Satyr Comma
8. Cabbage White
9. Eastern Tailed Blue
10. Silvery Blue
11. Echo Blue
12. Red Admiral
13. Painted Lady
14. Lorquin's Admiral
15. Grey Hairstreak
16. California Sister
17. Orange Sulphur
18. California Tortoiseshell
19. Common Wood Nymph
20. Ochre Ringlet

Papilio rutulus (Western Tiger Swallowtail)

Papilio eurymendon (Pale Tiger Swallowtail)

Papilio zelicaon (Anise Swallowtail)

Ochlodes sylvanoides (Woodland Skipper)

Polygonia satyus (Satyr Comma)

Pieris rapae (Cabbage White)

Strymon melinus (Gray Hairstreak)

Erynnis proertius (Proprtius Duskywing)

Vanessa cardui (Painted Lady Butterfly)

Vanessa atalanta (Red Admiral)

Vanessa virginiensis (American Painted Lady)

Vanessa annabella (West Coast Lady)

Glaucopsyche lygdamus (Silvery Blue)

Celastrina echo (Echo Blue Butterfly)

Cercyonis pegala (Common Wood Nymph)

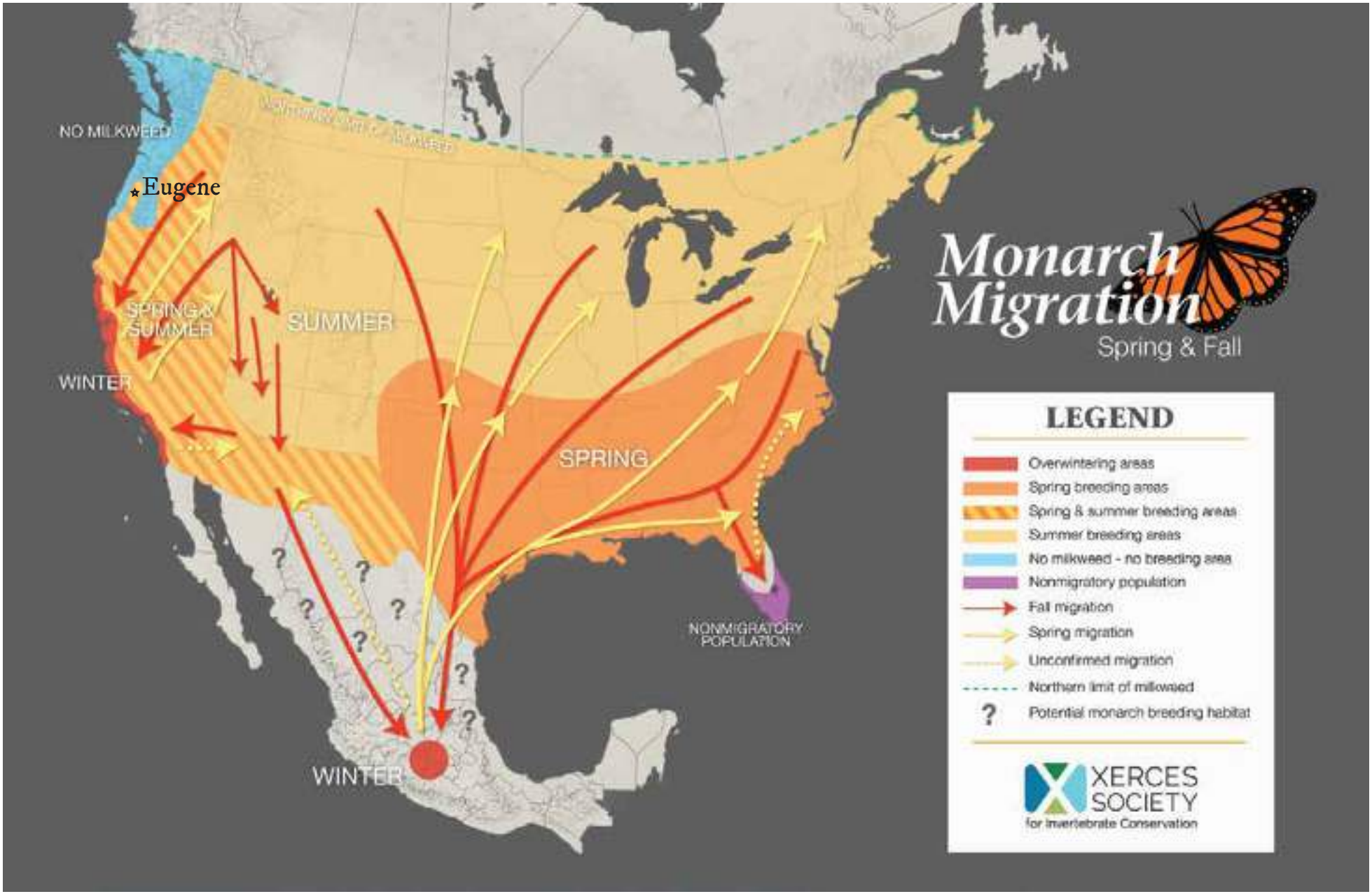
Coenonympha tullia (Ochre Ringlet)

Adelpha bredowii (California Sister)

Limenitis lorquini (Lorquin's Admiral)

Phyciodes mylitta (Mylitta Crescent)

Pyrgus communis (Common Checkered Skipper)


NO MILKWEED
Eugene
SPRING & SUMMER
SUMMER
WINTER
SPRING
NONMIGRATORY POPULATION
WINTER
Monarch Migration
Spring & Fall
LEGEND
Overwintering areas
Spring breeding areas
Spring & summer breeding areas
Summer breeding areas
No milkweed - no breeding area
Nonmigratory population
Fall migration
Spring migration
Unconfirmed migration
Northern limit of milkweed
Potential monarch breeding habitat
XERCES SOCIETY
for Invertebrate Conservation

Butterfly Color Plates Explained

Common name

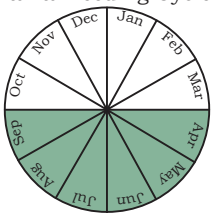
Scientific name

Painted Lady

Vanessa cardui

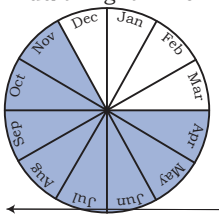
Image of the adult butterfly. Use This image to track references to design considerations throughout this document.

Larval Feeding Cycle



The months in green are probable periods when caterpillars of this species can be found feeding in the field. Factors such as unseasonable weather can effects feeding times.

Adult Flight Time



The months in blue are probable periods when adult of this species can be found flying in the field. Factors such as unseasonable weather can effects flight times.

Plate number. Use this number to reference this species on other images and charts.

Wingspan:

Maximum adult size

Describes key identifiable wing features.

Description: Dorsal side is orange with the orange fading to pink in the forewing with black mottling and white spots in the upper corner. Ventral aspect is mottled grey with cream patches and a row of five eyespots in the lower boarder of the hindwing.

Most commonly occurring in these areas, however, species may be found in other areas.

Habitat: Upland forest clearings, riparian forest clearings, open woodlands, savanna, upland prairie, wet prairie and urban gardens.

Color plates. These colors correlate with the habitat quick-guides for cross referencing and choosing appropriate species to match potential habitat gardens.

Common or uncommon.

Abundance: “Common”

Number of generations/year.

Broods: Four

Conservation Status: Secure

Typical habits and behavior that adults display. Use this to maximize design and improve observational opportunities.

Adult behavior: Each spring, massive migrations of painted ladies fly north from Mexico and California to repopulate the region. Adults are fast and explore new territories looking for mates. In the fall, adults migrate south. Both sexes are avid flower visitors. Males perch low to the ground waiting for females to fly by.

Juvenile traits and tendencies. Use this to design and maintain garden.

Larval behavior: Larvae are solitary feeders building webbed nests to hide in. Caterpillars are covered with spines for protection from predators. No overwintering.

Food plants for larvae.

Host Plants: Thistles and mallows

Suggestions for design and decision making process.

Design Considerations: Plant a wide range of flowers that will provide blooms from early in the season until late fall.

Design Level: Easy, as adults explore new territory.

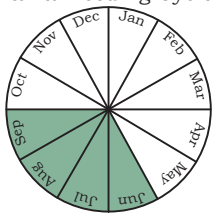
- Upland Forest
- Riparian Forest
- Woodland
- Savanna
- Upland Prairie
- Wet Prairie
- Cultivated Beds

Note: See habitat section for details.

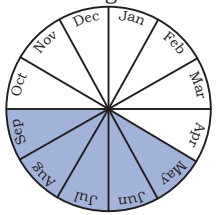
Western Tiger Swallowtail

Papilio rutulus

Larval Feeding Cycle



Adult Flight Time



Wingspan:

Description: Both upper and underside of both males and females are a conspicuous bright yellow with bold black stripes, making the butterfly very visible from great distances.

Habitat: Forests clearings, riparian corridors, woodlands, savanna, mixed prairie, and urban gardens.

Abundance: Common. One of the most abundant and visible butterflies within the Eugene area.

Broods: One.

Conservation Status: Secure

Adult behavior: Males patrol every habitat from forest clearings to urban neighborhoods, slowly gliding through established flight-ways. Some perching occurs on taller vegetation. Especially fond of hilltopping, males circle and battle each other in a tireless aerial display. Males puddle.

Larval behavior: Caterpillars, are solitary and use eyespot patterns for defense to ward off predators. Caterpillar wanders off of hostplant to pupate on vegetation near the ground. Chrysalis overwinters.

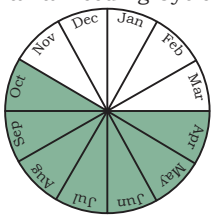
Host Plants: Maples, ash, willows, cottonwoods, alder, apple, and birch.

Design Considerations: The host plants can serve as windbreaks, backdrops, and shade. Plant mid summer flowering plants.

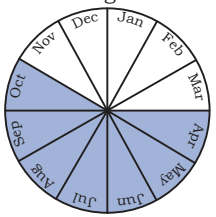
Anise Swallowtail

Papilio zelicaon

Larval Feeding Cycle



Adult Flight Time



Wingspan:

Description: Smaller and deeper yellow than the Tiger Swallowtail, with dominant black bands on the forewing and large orange eyespots on the hind wings.

Habitat: Forest clearings, riparian corridors, open woodlands, savanna, mixed prairies and hilltops.

Abundance: Uncommon. Although common as a species, the Anise Swallowtail is infrequently seen in urban areas.

Broods: Two to Three depending on the year

Conservation Status: Secure

Adult behavior: Males are fond of puddling with other individual butterflies and are commonly encountered on hilltops and bluffs. Hilltopping is common for the Anise Swallowtail, males are very territorial and can be seen chasing other species of butterflies from established territories.

Larval behavior: Larvae are solitary feeders and use scent glands secreted by specialized organs to defend themselves. Caterpillars can wander long distances off of the hostplant before pupating on low lying stems. Chrysalis overwinters.

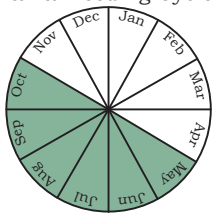
Host Plants: Hostplants are in the parsley family, both native and garden cultivated species and varieties.

Design Considerations: A vegetable garden which grows anise, dill, fennel, and parsley are great ways to attract female butterflies.

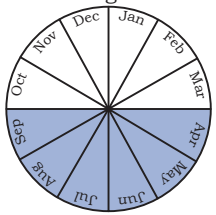
Pale Swallowtail

Papilio eurymendon

Larval Feeding Cycle



Adult Flight Time



Wingspan:

Description: White to creamy white with bold black stripes. Hindwing has a long black tail.

Habitat: Upland forest openings, riparian corridors, woodlands, moist canyons, hilltops, open meadows.

Abundance: “Uncommon”, although not as frequently found in the valley. Much more common in more mountainous areas and higher elevations.

Broods: One

Conservation Status: Secure

Adult behavior: Males frequently puddle and are often found hilltopping. Males patrol open meadows and river corridors in search of females. When hilltopping, males battle other species of butterflies. Both sexes visit flowers.

Larval behavior: Caterpillars are solitary leaf feeders. Use eyespot patterns, scent and camouflage to ward off predators. Chrysalis overwinters on hostplant.

Host Plants: Wide variety of shrubs and trees; cascara, ceanothus, cherry, hawthorn, alder, apple, spiraea, serviceberry, and oceanspray.

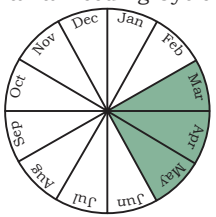
Design Considerations: Provide a puddling area near nectar sources. Hostplants are trees and shrubs, thus can be used as design elements to provide shelter and act as a backdrop. Schools in the South Hills may find more success in attraction this butterfly.

Clodius Parnassian

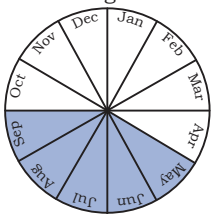
Parnassius clodius

Photo 3.1

Larval Feeding Cycle



Adult Flight Time



Wingspan:

Description: Off white scales give way to clear bands on the forewings that lack scaling thus giving the wing a transparent quality.

Habitat: Upland forest clearings, riparian forest and woodlands, moist meadow clearings.

Abundance: “Uncommon”. Although common as a species in mountainous areas, the parnassian is rarely seen in the valley.

Broods: One

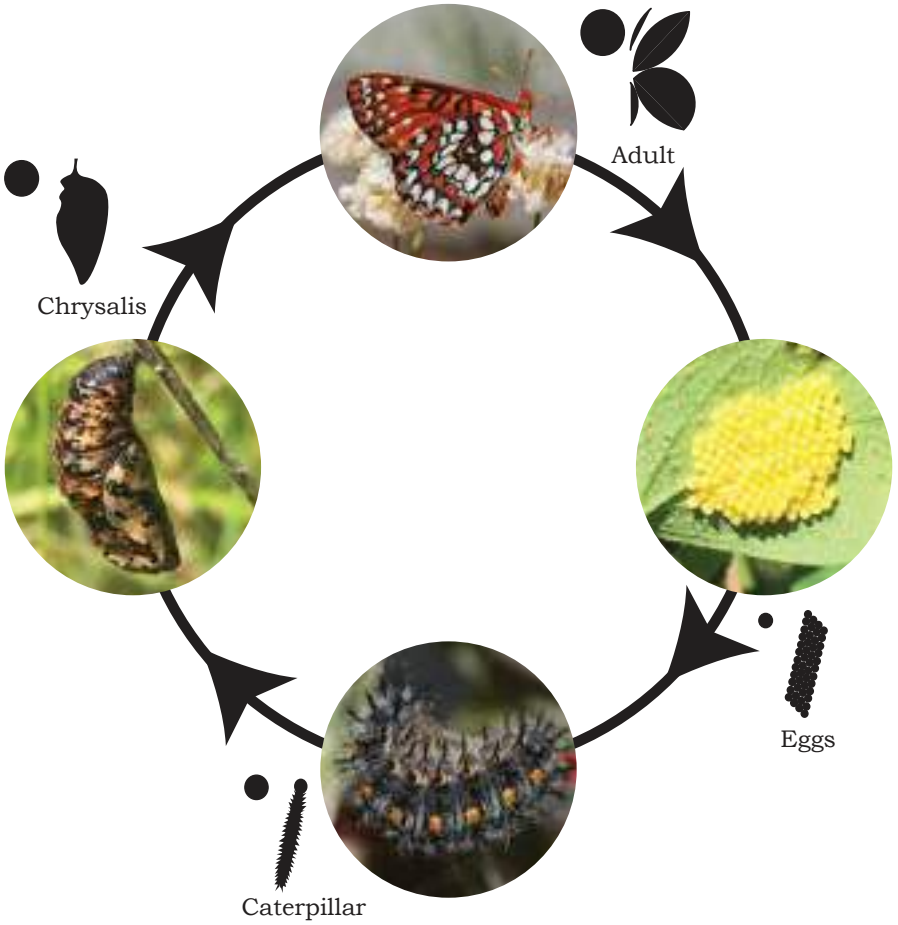
Conservation Status: Secure

Adult behavior: Both sexes visit flowers and patrol open spaces looking for mates.

Larval behavior: Caterpillars are specialist leaf feeders. Caterpillars are solitary feeders, wandering off to hide in leaves and duff on the forest floor only returning to feed at night to avoid detection from predatory birds. During the day caterpillars hide in leaf debris off of the hostplant. Both eggs and Chrysalis overwinter. Pupates at the base of host.

Host Plants: Western Bleedingheart.

Design Considerations: Because of its rarity in the Eugene area, designs should use the hostplant as an attractive addition to shady areas within the butterfly garden but not expect frequent parnassian usage. Leave last season’s leaves in place around host for the overwintering pupae.



Life Cycle of butterflies

1. Egg-

All butterflies start out their life in the form of an egg. This egg is laid externally from the female either on or near a suitable food supply for the soon to be developing caterpillar. Since most butterfly species are host plant specific, the female butterfly is very particular about the host plant she chooses to lay her eggs upon. Some species of butterflies lay their eggs on the underside of the host plant leaf, some lay their eggs on the top side of leaves, some species lay their eggs on flowers, and some species lay their eggs near the plant but not directly on the plant.

2. The Caterpillar-

A caterpillar's chief concern is eating. Caterpillars have chewing mouth parts and will consume most any part of the fleshy parts of their host plant including leaves, stems, and flowers. The caterpillar grows rapidly. As it outgrows its old skin it molts, sheds its old skin and increases in size.

Caterpillars generally spend most of their life cycle on a single host plant. However, there are many species in whose caterpillars move about their environment in search of new food supplies.

3. The Chrysalis-

Pupation is where the insect changes from a mobile feeding caterpillar into a sedentary non-feeding chrysalis.

Generally, the caterpillar will attach itself to a suitable surface by means of a silk threads and begin to shed its outer skin for the last time. This time the skin gives way to a shell-like structure, the chrysalis. Within the chrysalis, the caterpillar is changing into a butterfly. Some butterfly species can spend an entire winter in the chrysalis phase (diapause), only to hatch when weather conditions become warm and favorable.. However, during the warm months, most butterfly species typically spend 1-2 weeks as a chrysalis and then hatch to become flying adults.

4. The Adult-

The most conspicuous phase of the butterfly's life cycle is the adult. Here the adult butterfly encloses (hatches) from the chrysalis as a winged insect. The butterfly emerges with its wings small and undersized, like a deflated balloon. Once hatched, the butterfly quickly pumps fluid through a series of veins. This pumping of fluids expands the wings into their full form. It takes only minutes to fill the wings and increase them to their appropriate size but will take a couple hours for the wings to harden and become flight ready.

3.4 Selecting the Host Plants

Establishing what species of butterflies will likely visit your butterfly garden is a key to the overall success of the butterfly garden. To increase the likelihood of successfully attracting and keeping butterfly species within the designed garden space, carefully selecting plants that will meet the various life cycle stages of the butterfly is paramount. For the developing caterpillar, that plant is the host plant.

Host Plant defined-

"A species of plant or plants, that do to their chemical structure, are suitable for female butterflies to oviposit their eggs upon and subsequently nourish the growing caterpillars".

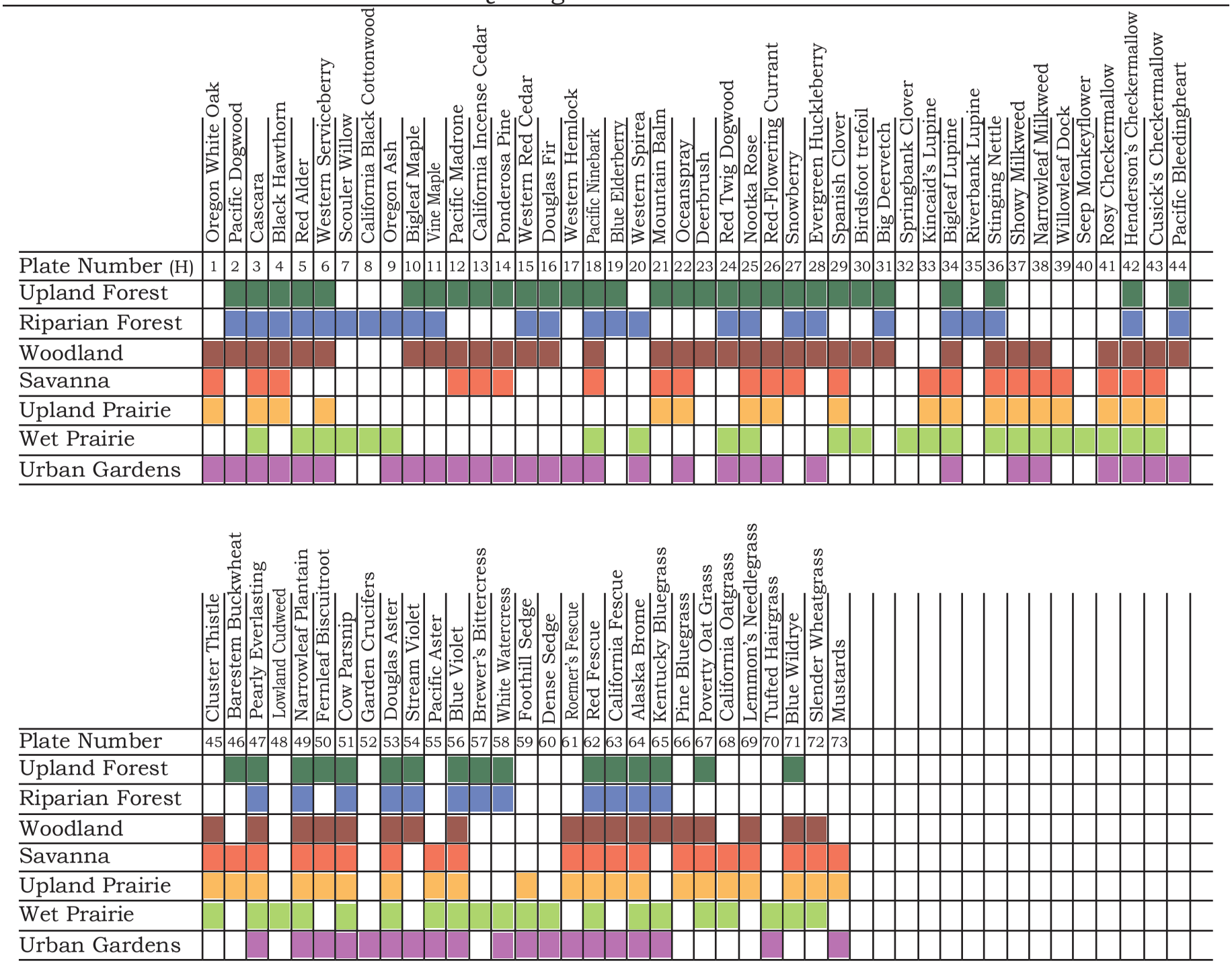
The feeding needs of butterflies are complex. Juvenile butterflies, called caterpillars, feed on the fleshy leaves, stems and flower parts of their host plants. The butterfly species which have a limited array of host plants that provide the proper nutrition to see a caterpillar through development to adulthood, are considered feeding specialists. The Monarch butterfly which feeds exclusively on plants in the milkweed family, is considered a feeding specialist. Whereas the Western Tiger Swallowtail butterfly, which uses a vast variety of broad-leaf trees, across a broad spectrum of plant genera, can be considered a feeding generalist.

The degree of specificity of caterpillar feeding patterns can affect the level of butterfly occurrence within a habitat. Many butterfly species whose host plant choice range is more varied, can move across habitats and establish breeding populations at a greater frequency than those species which are feeding specialists. Knowing which host plants attract certain butterflies, is the central focus of this section of the butterfly garden.

Despite rare encounters within Northern Oregon, the Monarch butterfly is a considered a commonly occurring butterfly, and is considered a feeding specialist.

In the case of the Fender's Blue butterfly, the butterfly is limited to where its host plant, the Kincaid's Lupine thrives, the upland prairies of the Willamette Valley. Such a limited host plant range restricts the movement of the butterfly, leading the rarity of the butterfly. Thus, planting milkweed patches in your habitat garden would more likely see positive butterfly visitation from Monarch butterflies, than the planting of Kincaid Lupines to bring in Fender's Blue butterflies (Fig. 3.14).

Figure 3.14 The specialist Monarch is a commonly occurring species found across North America, the specialist Fender's Blue is confined to the Willamette Valley.


Oregon White Oak
Pacific Dogwood
Cascara
Black Hawthorn
Red Alder
Western Serviceberry
Scouler Willow
California Black Cottonwood
Oregon Ash
Bigleaf Maple
Vine Maple
Pacific Madrone
California Incense Cedar
Ponderosa Pine
Western Red Cedar
Douglas Fir
Western Hemlock
Pacific Ninebark
Blue Elderberry
Western Spirea
Mountain Balm
Oceanspray
Deerbrush
Red Twig Dogwood
Nootka Rose
Red-Flowering Currant
Snowberry
Evergreen Huckleberry
Spanish Clover
Birdsfoot trefoil
Big Deervetch
Springbank Clover
Kincaid's Lupine
Bigleaf Lupine
Riverbank Lupine
Stinging Nettle
Showy Milkweed
Narrowleaf Milkweed
Willowleaf Dock
Seep Monkeyflower
Rosy Checkermallow
Henderson's Checkermallow
Cusick's Checkermallow
Pacific Bleedingheart
Plate Number (H)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
Upland Forest
Riparian Forest
Woodland
Savanna
Upland Prairie
Wet Prairie
Urban Gardens
Cluster Thistle
Barestem Buckwheat
Pearly Everlasting
Lowland Cudweed
Narrowleaf Plantain
Fernleaf Biscuitroot
Cow Parsnip
Garden Crucifers
Douglas Aster
Stream Violet
Pacific Aster
Blue Violet
Brewer's Bittercress
White Watercress
Foothill Sedge
Dense Sedge
Roemer's Fescue
Red Fescue
California Fescue
Alaska Brome
Kentucky Bluegrass
Pine Bluegrass
Poverty Oat Grass
California Oatgrass
Lemmon's Needlegrass
Tufted Hairgrass
Blue Wildrye
Slender Wheatgrass
Mustards
Plate Number
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
Upland Forest
Riparian Forest
Woodland
Savanna
Upland Prairie
Wet Prairie
Urban Gardens

Rosa nutkana
Nootka Rose
Rosaceae
H: 3-6’ W: spreads
Type: Shrub

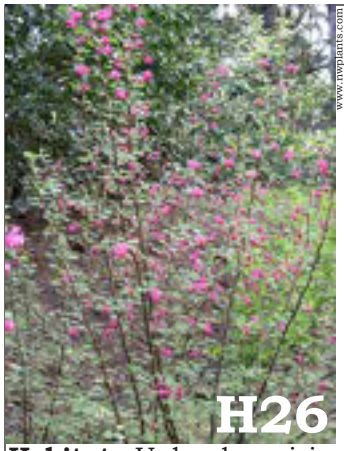
Butterflies That Use Host

Habitat: Upland prairie, wet prairie, savanna, woodland, upland forest, riparian forest
Design Uses: Moist meadows and forest clearings. Highly scented, plant near where people gather but far enough from trails because of the thorns they produce.

Symphoricarpos albus
Common Snowberry
Caprifoliaceae
H: 3-4’ W: spreads
Type: Shrub

Butterflies That Use Host

Habitat: Savanna, woodland, upland forest, riparian forest
Design Uses: Best in massings, as shrubs form a low thicket. Plant massings on the edges of forest clearings for butterflies. Birds eat the fruit, but are toxic to humans.



Ribes sanguineum
Red-Flowering Currant
Grossulariaceae
H: 8-10’ W: 10’
Type: Shrub

Butterflies That Use Host

Habitat: Upland prairie, savanna, woodland, open upland forest
Design Uses: Plant on forest edges where prairie meets woodlands. Plant singly or in groups of three where people gather. Use as an intermediate vegetation layer between grasses and trees.

Vaccinium ovatum
Evergreen Huckleberry
Ericaceae
H: 3-15’ W: 3-15’
Type: Shrub

Butterflies That Use Host

Habitat: Moist woodlands, upland forest, riparian forest
Design Uses: Useful in both open sunny locations where it stays under 5 feet tall, or within shady woodlands where it reaches to 15 feet tall. Fruit is edible to humans.

Lotus unifoliolatus

Spanish Clover

Fabaceae

H: 6-18” W: 6-18”

Type: Annual forb

Died-own in the late

Butterflies That Use Host

Habitat: Upland prairie, wet prairie, savanna, woodland, upland forest clearings

Design Uses: Moist meadows. Place seed along pathways where short vegetation is likely to prevail. Place hostplant were people can see butterflies visiting the plant.

Lotus pinnatus

Meadow birdsfoot trefoil

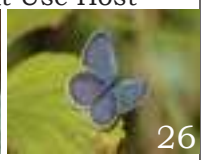
Fabaceae

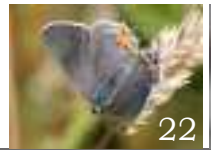
H: 8-18” W: 8-18”

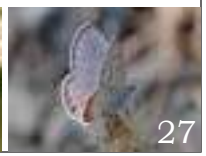
Type: Perennial

Die-down in summer

Butterflies That Use Host







Habitat: Wet prairie, wet meadow within woodlands, upland forest,

Design Uses: Moist meadows. Dry the summer. Best placed away from trails and areas where camas, allium, and annual yellow monkeyflowers thrive in vernal areas.

Lotus crassifolius

Big Deervetch

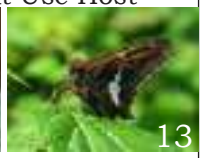
Fabaceae

H: 1-4’ W: 1-4’

Type: Perennial forb

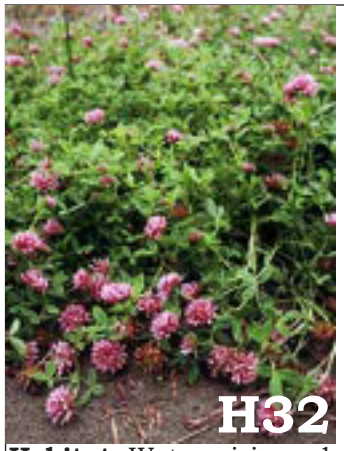
Died-own in the late fall

Butterflies That Use Host



Habitat: Moist woodland, upland forest, riparian forest

Design Uses: Plant in clearings along mixed forest edges where soils are likely to retain or receive moisture. Use at the base of established oaks, along streambanks or pathways to observe feeding larvae.



Trifolium willdenowii

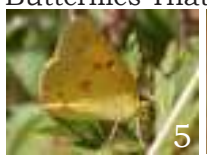
Springbank Clover

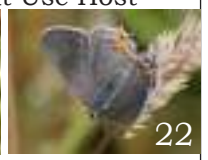
Fabaceae

H: 6-12” W: spreads

Type: Perennial

Butterflies That Use Host





Habitat: Wet prairie and vernal pools

Design Uses: Moist meadows in areas where water collects during the cooler months. Combine this clover with monkeyflower, tufted hairgrass, camas, onion, Spanish clover and low growing plants.

Lupinus sulphureus
Kincaid's Lupine

Fabaceae
H: 15-30" W: 15-30"
Type: Perennial

Die-down in the fall

Butterflies That Use Host

Habitat: Upland prairie, wet prairie, savanna
Design Uses: Plant lupines patches alongside mule's ears and checkermallows and with low growing fescue grasses in areas where some moisture remains in the soil.

Lupinus rivularis
Riverbank Lupine

Fabaceae
H: 3' W: 3'
Type: Perennial

Butterflies That Use Host

Habitat: Riparian forest streambanks where flooding is prone
Design Uses: Gravely soil and distributed areas along stream systems. This lupine can be set in front of willows and be combined with bright yellow tarweeds.

Lupinus polyphyllus
Bigleaf Lupine

Fabaceae
H: 1-2' W: 1-2'
Type: Perennial

Die-down in the fall

Butterflies That Use Host

Habitat: Upland prairie, wet prairie, savanna, woodland, upland forest, riparian forest
Design Uses: Moist meadows, but drought resistant. Create open landscape rooms with oaks and conifers. Combine with mule's ears to contrast blue.

Urtica dioica
Stinging Nettle

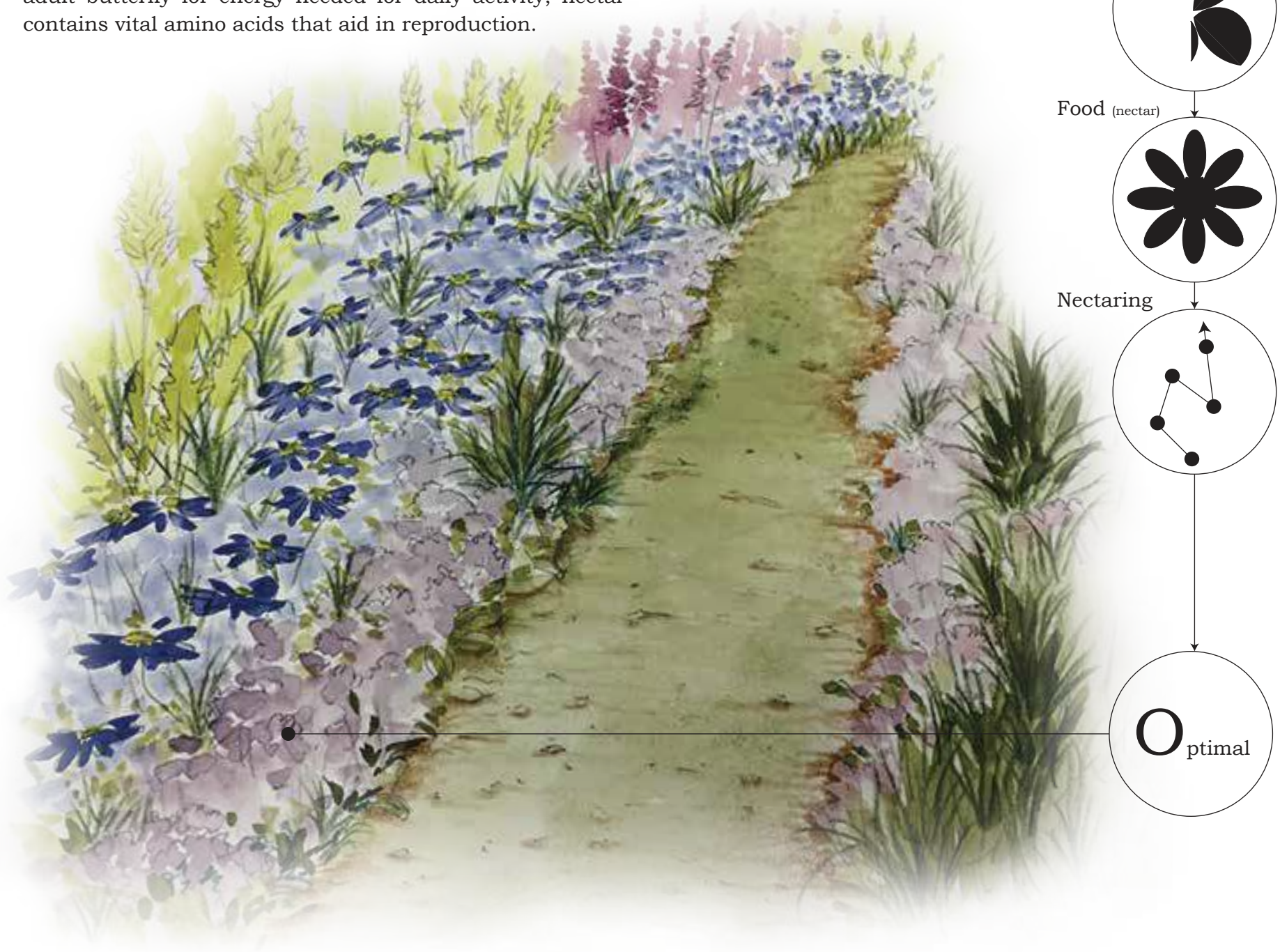
Urticaceae
H: 3-9' W: 3-9'
Type: Perennial

Die-down in winter

Butterflies That Use Host

Habitat: Upland prairie, wet prairie, savanna, woodland, upland forest, riparian forest
Design Uses: Vital to butterflies as a hostplant, stinging nettle causes skin rashes. Place plant in remote areas of the garden where people do not come in contact with the

Perhaps the most familiar component of the butterfly garden is the flower. Flowers produce a sweet, carbohydrate rich liquid called nectar. Not only does nectar sustain the adult butterfly for energy needed for daily activity, nectar contains vital amino acids that aid in reproduction.











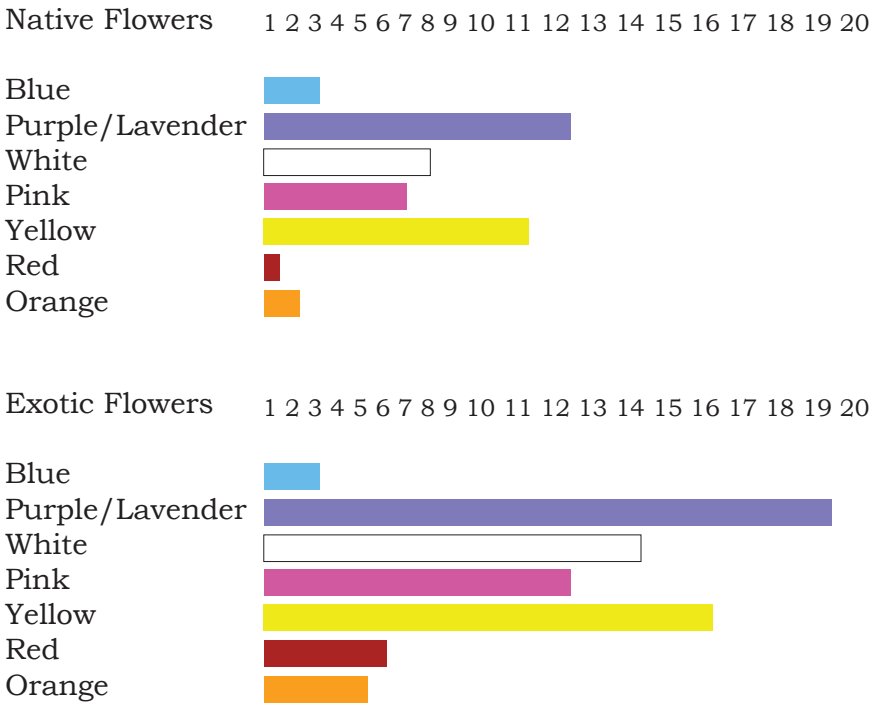
The color of the flower is a vital consideration for flower choice for the butterfly garden. Butterflies are extremely color sensitive and possess the ability to see color better than any other animal.

But exactly what colors of flowers do butterflies prefer?

The following chart below shows the spatial range of flower color preference based on nectar source visitation lists and in-field observation flower to butterfly visitation studies. This graph demonstrates that both native and exotic flower color, attract butterflies at nearly the exact same ratios.

The native flower list comprised of 50 flower species, the exotic flower list comprised of 75 flower species. The purpose was to examine butterfly flower visitation based on color. Results show butterflies universally prefer the same colored flowers regardless of the flower's origin (Fig 3.18).

What colors of flowers do butterflies prefer?



Butterflies see across a light wavelength spectrum that includes ultraviolet light. This ability to detect ultraviolet light allows butterflies to detect flower colors that human color perception.

Some flowers have nectar guides that are visible to the human eye and often give the flower petals a characteristic dark ring around the center. However, many flowers have nectar guides that are invisible to the human eye and can only be seen under the ultraviolet spectrum of light.

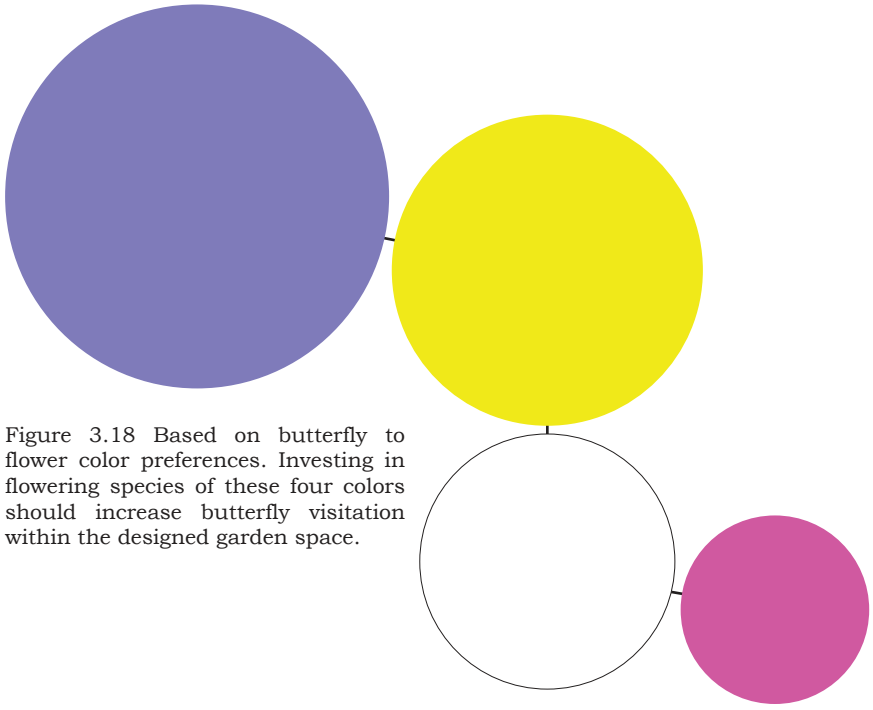
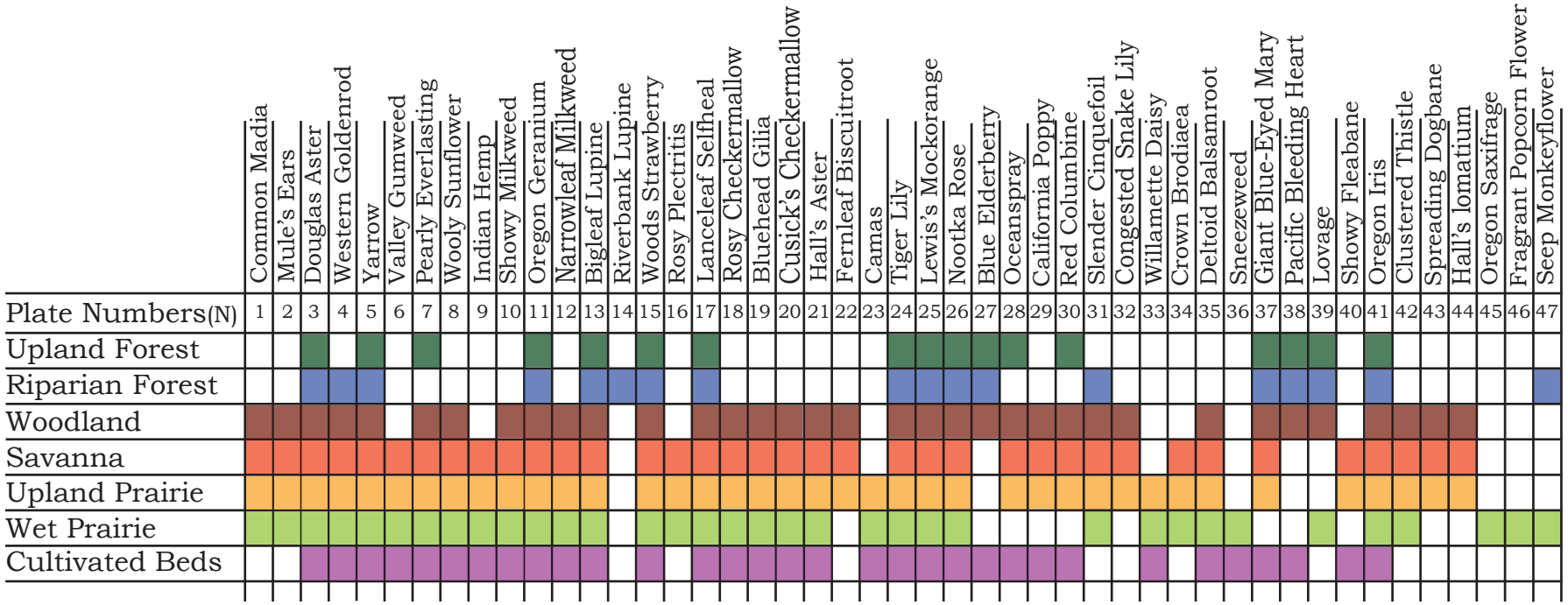


Figure 3.18 Based on butterfly to flower color preferences. Investing in flowering species of these four colors should increase butterfly visitation within the designed garden space.

Nectar Sources: Natives



Much like the butterfly to habitat and the hostplant to habitat quickguides, the native nectar source to habitat quickguide is a chart designed to help the reader identify what native flowering plants match up well to the proposed habitat garden themes.

Many of the flowering plant species on this chart can be found across a multitude of habitats, thus they are very versatile for design use. However, some plants, like the Riverbank Lupine will be limited to habitats where water has shaped the habitat and deep gravely soils predominate.

The quickguide is designed to give the designer a fast plant palette to chose from. Accessing the native nectar source color plates is the next step. The color plates have detailed information concerning cultural needs of the plants, bloom time, height and width, plant communities that these plants grow well with and more.

Because we are designing for butterfly habitat gardens, and not intensive restoration programming, there should be a fair amount of creativity and experimentation in choosing plant palettes for the garden. The advantage to the quickguide is to give the designer a fast and easy to reference starting point for forming these plant palettes.

Though the quickguide only addresses native flowering species, and the color plates only provide information concerning these native flowers, I do support and advocate for the use of exotic flowering plant species that have proven themselves a valuable nectar resource for native butterflies when native flowering species begin to fall out of season and nectar sources begin to deplete. A list of preferred exotic nectaring plants has been provided at the back of the color plate section.

Nectar Sources : Exotics

Native Flowers vs Exotic Flowers

"*Native plants have formed symbiotic relationships with native wildlife over thousands of years, and therefore offer the most sustainable habitat. A plant is considered native if it has occurred naturally in a particular region, ecosystem, or habitat without human introduction.*"

"Exotic plants that evolved in other parts of the world or were cultivated by humans into forms that don't exist in nature do not support wildlife as well as native plants."

-National Wildlife Federation

Most exotic flowers will never become an ecological competitor with native vegetation. However, some exotic flowering species can become invasive and out compete native vegetation, disrupting ecosystems. The images below represent of a group of invasive flowering plants in Oregon.


Blackberry


Butterfly Bush


Queen Anne's Lace


Teasel


Pennyroyal


Canada Thistle

Butterflies benefit from native flowers that drive the food reward/pollination relationships. Butterfly gardens have also benefited from the addition of carefully selected cultivated exotic flower plants to extend the bloom season when native flowers begin to fade from productive nectaries. Careful selection and thus incorporation of exotic flower species can make a positive impact on native butterflies. The following is a small sample of some proven productive nectar sources that will serve butterfly needs, without perturbing the native ecosystem within Oregon's wild lands.


Echinacea


English Lavender


Tall Verbena


Zinnia


Bird’s-foot trefoil


White Clover


Red Clover


Queen Anne’s Lace


Blackberry


Butterfly Bush


Tansy


Common Danelion


Canada Thistle


Teasel

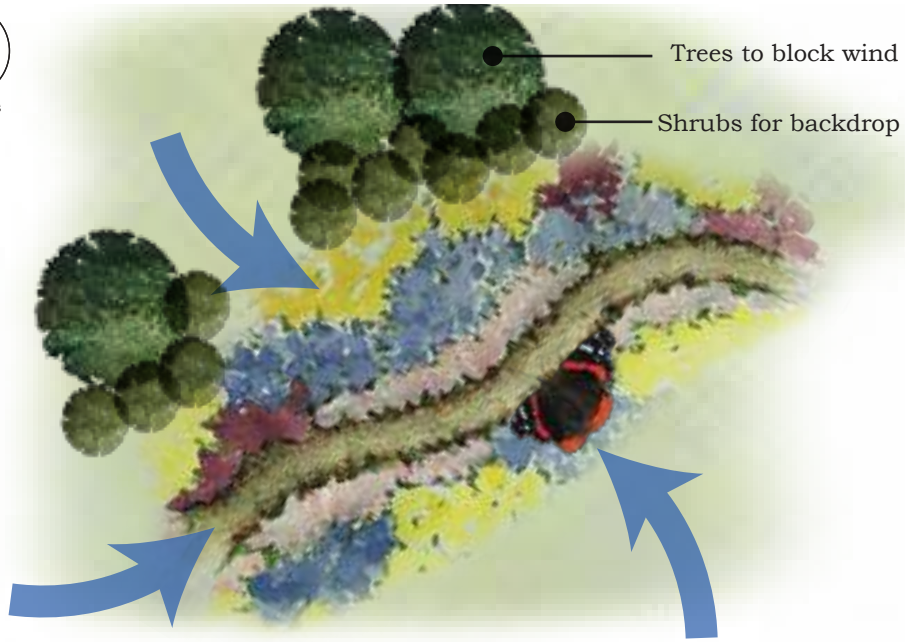

Pennyroyal


Mullein


Knapweed

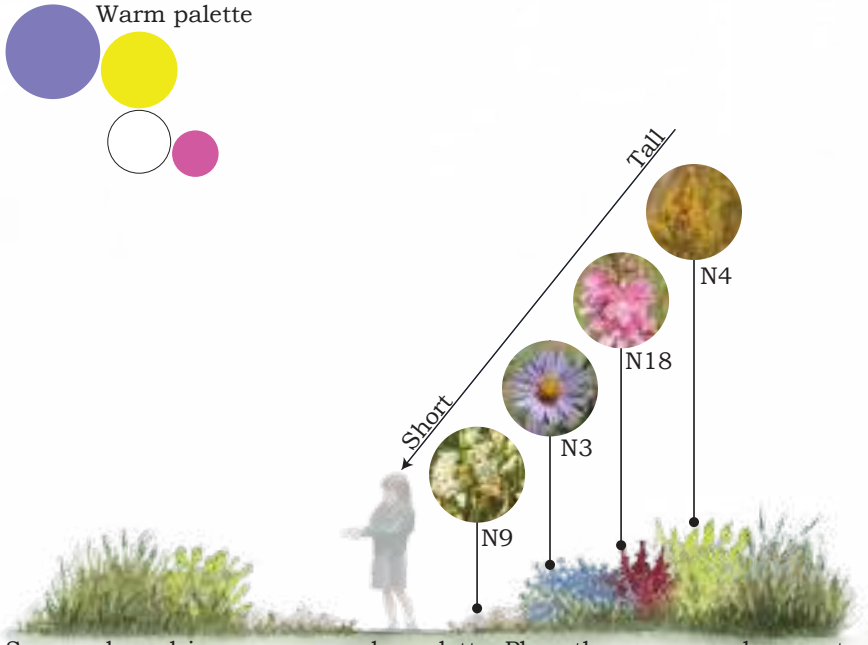

Bull Thistle


Ox-eyed Daisy

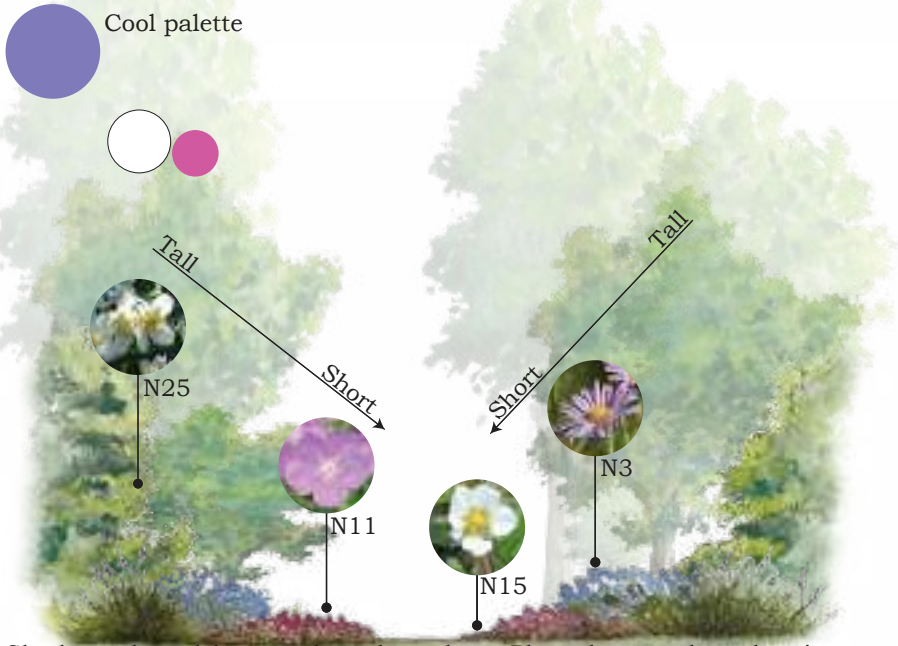


Prairie/Savanna Nectar Massing Design: Full sun exposure. Place color massings of flowers in groups to catch the eye of butterflies.

Woodland/Forest Nectar Massing Design: Dappled sun exposure. Place color massings in open sunny clearing along trails.

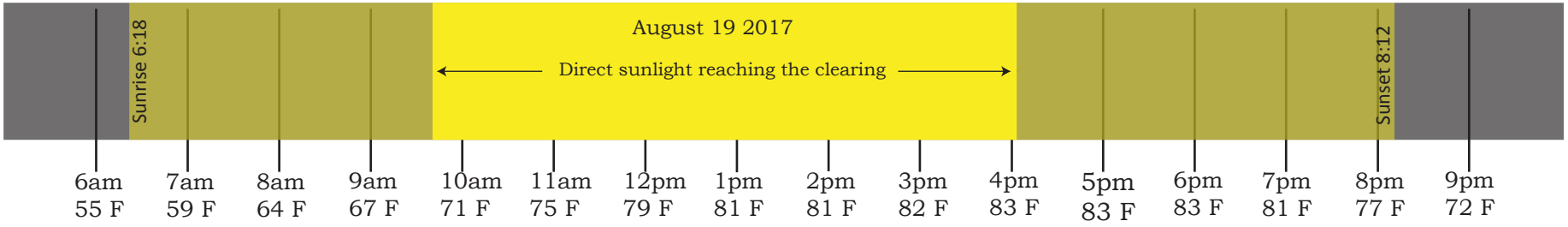


Sun gardens drive a warmer color palette. Place these warm colors next to cooler colors to compliment and bring attention to cooler colors.



Shade gardens drive a cooler color palette. Place these cooler colors in masses according to their height. Tallest to the back, shortest to the trail.

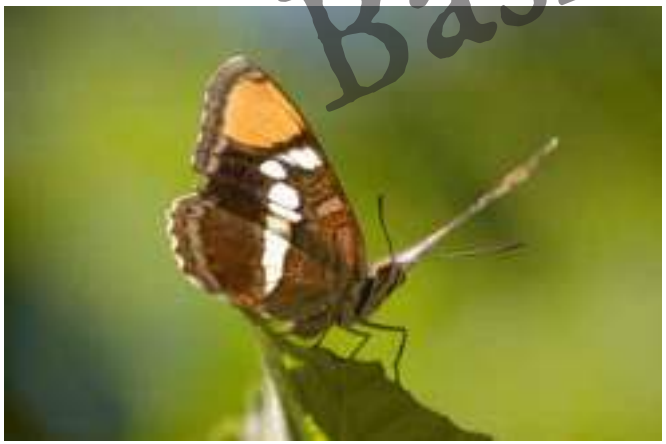
NEEDS



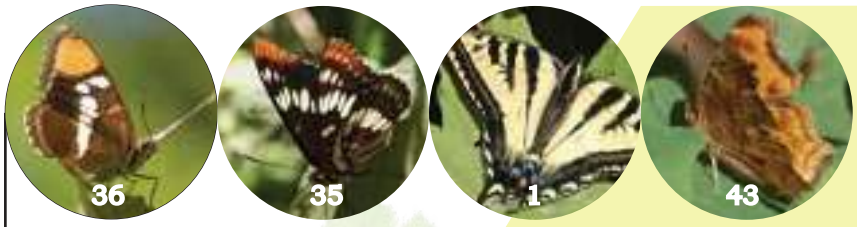
Total Adults	**0**	**0**	**1**	**27**	**73**	**75**	**60**	**64**	**40**	**22**	**15**	**5**	**2**	**0**	**0**	**0**
Basking/Perching	0	0	1	14	32	33	13	5	6	4	2	4	2	0	0	0
Nectaring	0	0	0	13	41	42	47	59	34	18	13	0	0	0	0	0
Reproduction	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm

Sunlight

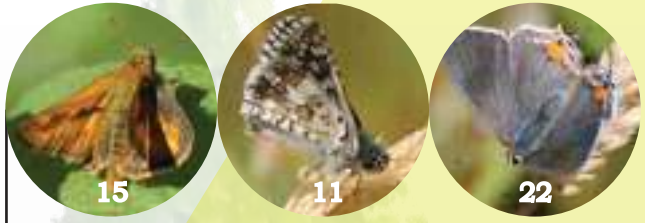


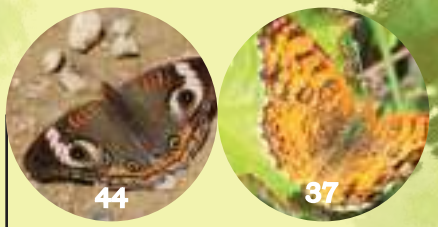

Basking




Many butterfly species who perch on vegetation or gravel pathways also use these same areas to bask and take in the warmth of the sun. As you travel along a forest path, prairie trail or urban garden, look for butterflies at rest upon rocks, leaves and pathways.





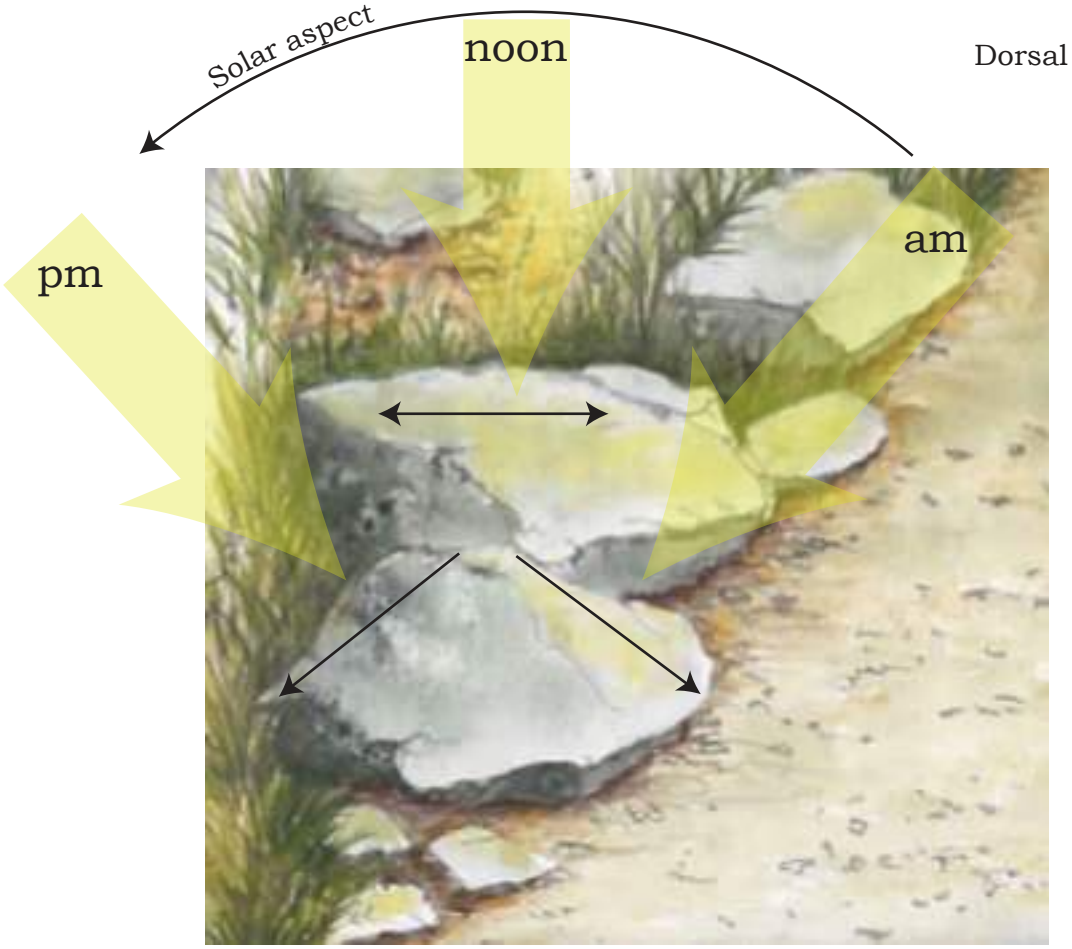
Because butterflies have a visual acuity distance of approximately 12 feet, creating basking areas that provide sunny areas of a 10-15 foot area should promote butterfly basking while engaging in perching behavior simultaneously.

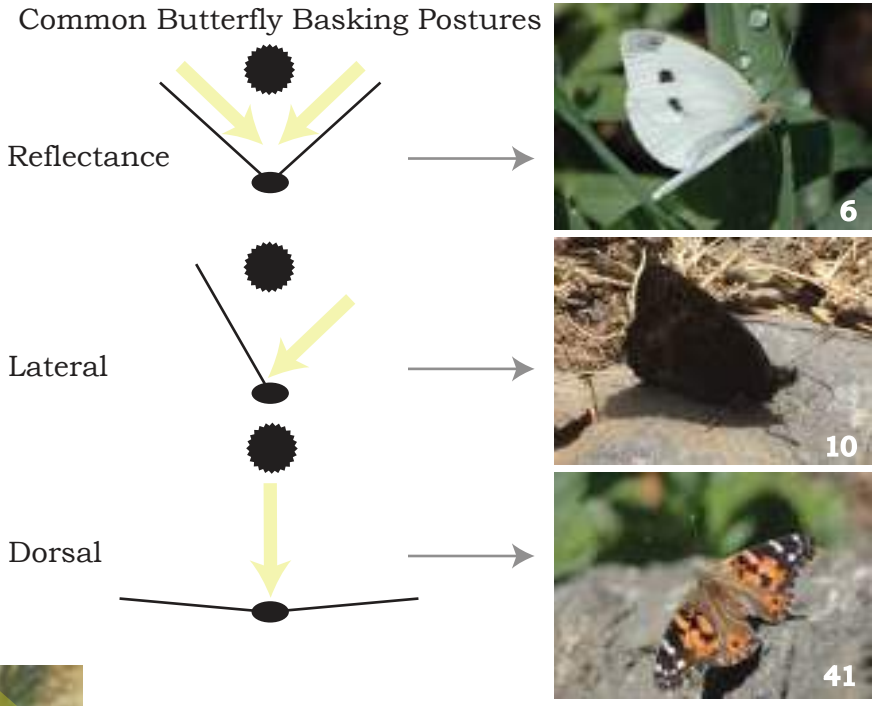
10-15 Feet

Basking stones are an excellent design feature to place in sunny locations within the garden. The stones absorb heat and provide a reflective surface that radiates heat back into the butterfly's body.

Most literature suggests placing stones in a sunny location that receives at least six hours of sun. Dark colored stones such as basalt absorb and thus retains heat longer than lighter colored stones, giving off heat at a higher rate.

Its not understood if angling a stone towards the sun is more effective. Most writings call for a flat surface. So experiment and see if angled stones work in your garden.





Because butterflies are inactive at night and solar radiation is unavailable, butterflies lose body temperature as they rest. In the morning butterflies seek sunny patches to regain the heat lost from the evening roosting.

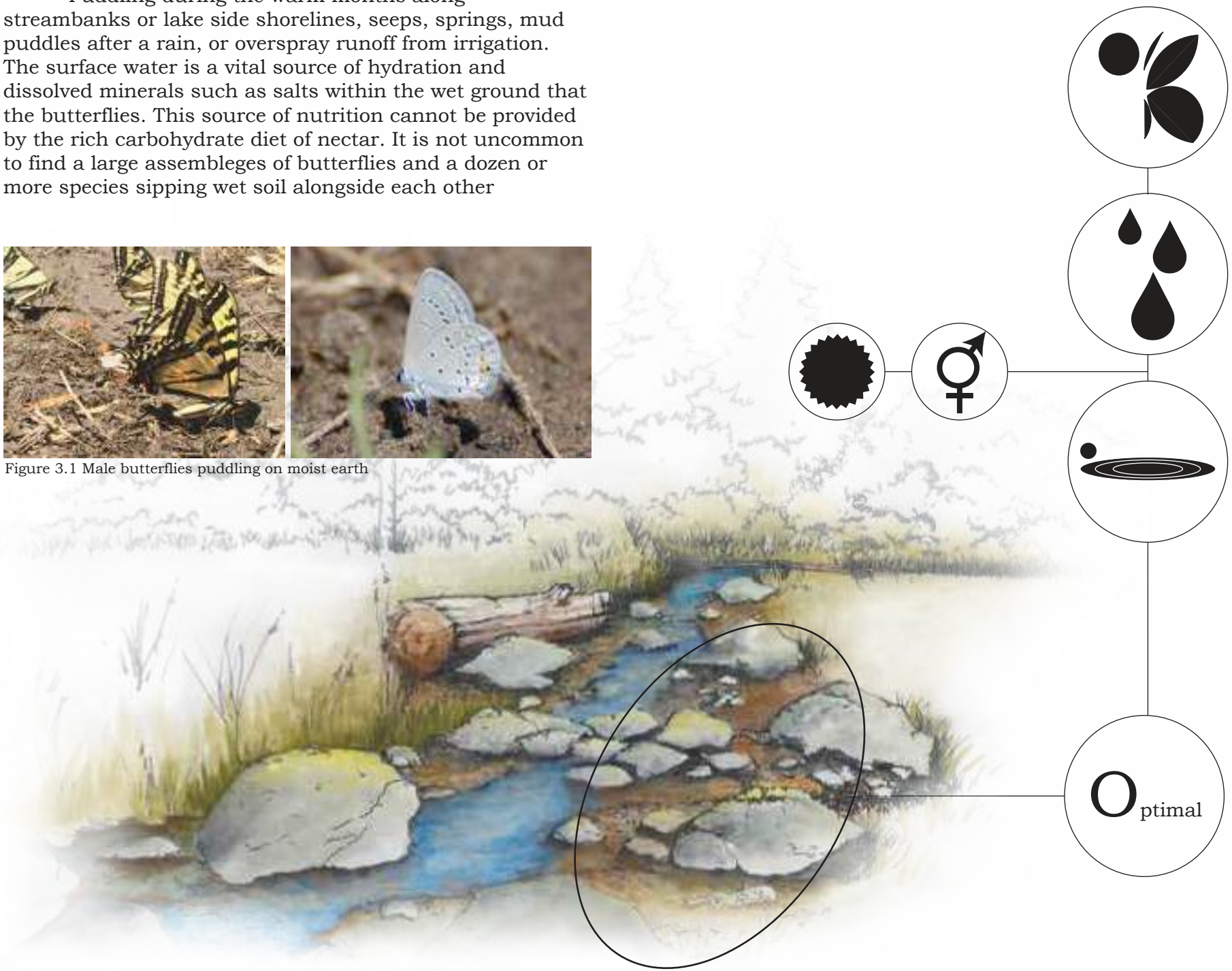
Placing basking stones, gravel pathways or patches of broad-leaf vegetation near roosting areas for early morning basking is a vital component to butterfly basking design consideration.

Different species display different basking postures to gain and retain body heat. Basking habitat also changes from species to species. Many species will bask at ground level during the early hours of the morning and then move into their respective daily habits of feeding, patrolling and perching, mixing basking into the daily routine to maintain body temperature.

Puddling

Puddling during the warm months along streambanks or lake side shorelines, seeps, springs, mud puddles after a rain, or overspray runoff from irrigation. The surface water is a vital source of hydration and dissolved minerals such as salts within the wet ground that the butterflies. This source of nutrition cannot be provided by the rich carbohydrate diet of nectar. It is not uncommon to find a large assembleges of butterflies and a dozen or more species sipping wet soil alongside each other

Figure 3.1 Male butterflies puddling on moist earth









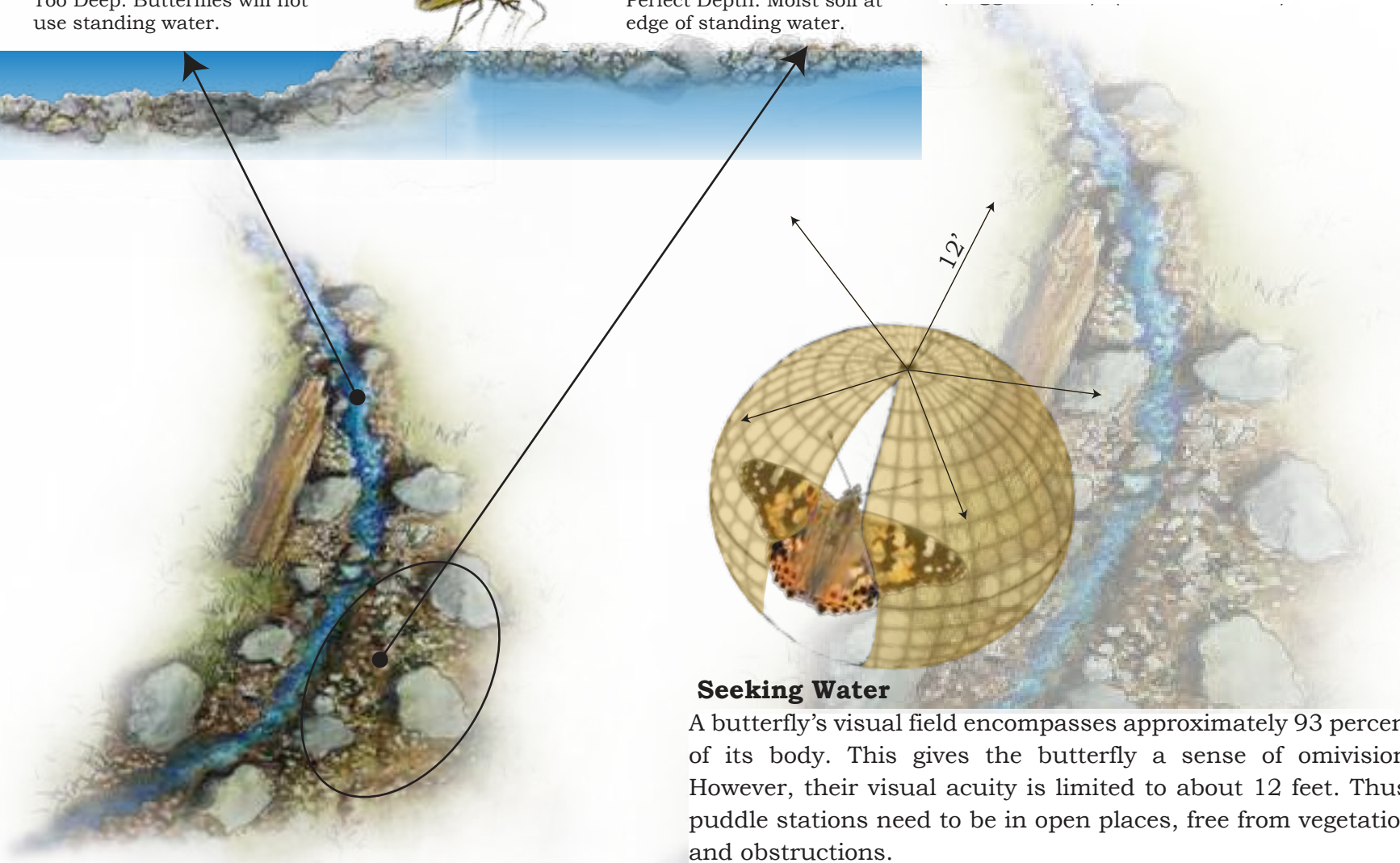


Puddling Considerations

Thinking about water depth

Butterflies can't swim or wade into water, thus they avoid any standing water. Wet sand or moist earth instead of standing water is sufficient for puddling.

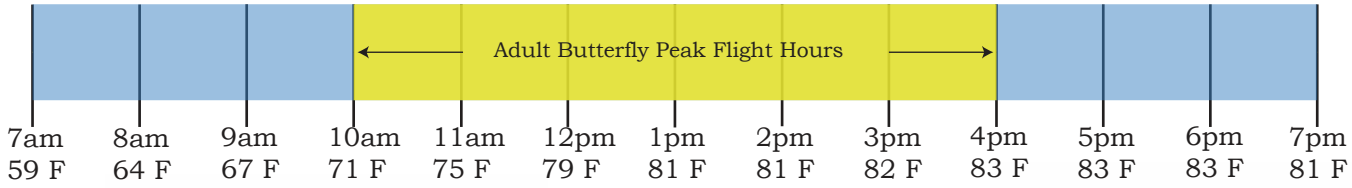
Male butterflies are especially fond on wet earth, as the sodium and amino acids found within the mineral deposits of the soils are paramount for sperm development and maturation. These nutrients are then transferred to the female during mating which helps in the survivability of the egg clutch.

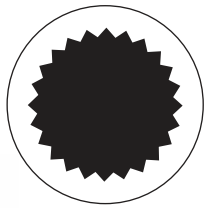


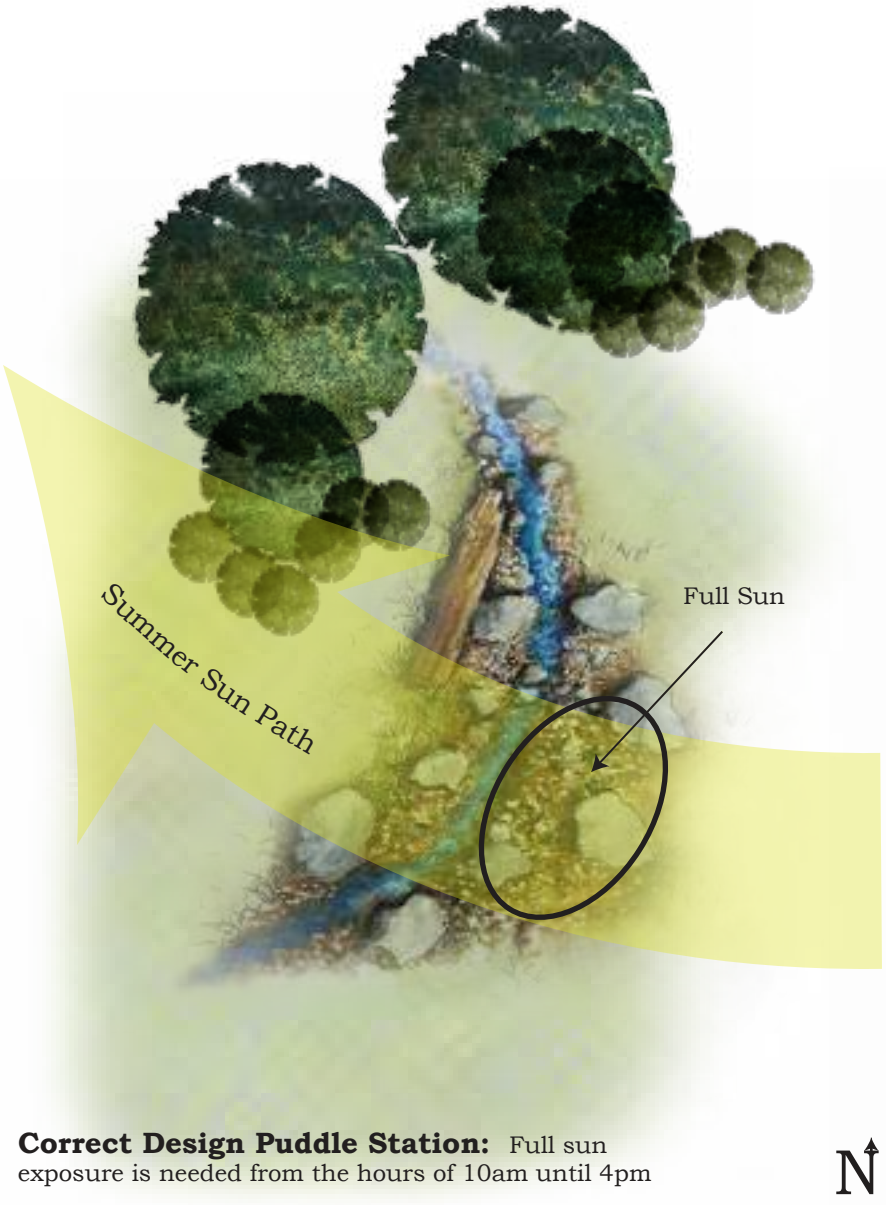
Seeking Water

A butterfly's visual field encompasses approximately 93 percent of its body. This gives the butterfly a sense of omivision. However, their visual acuity is limited to about 12 feet. Thus, puddle stations need to be in open places, free from vegetation and obstructions.

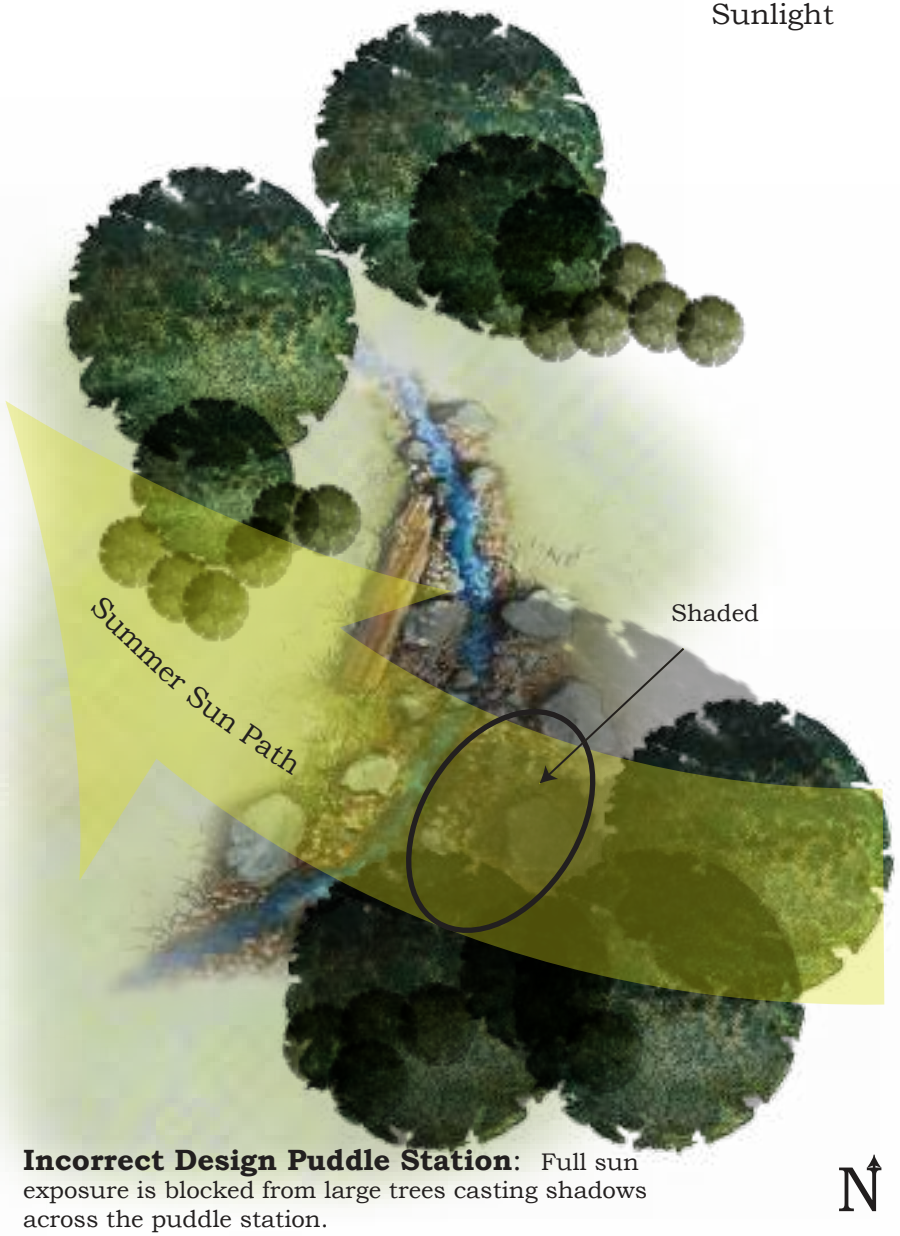
Puddling Considerations





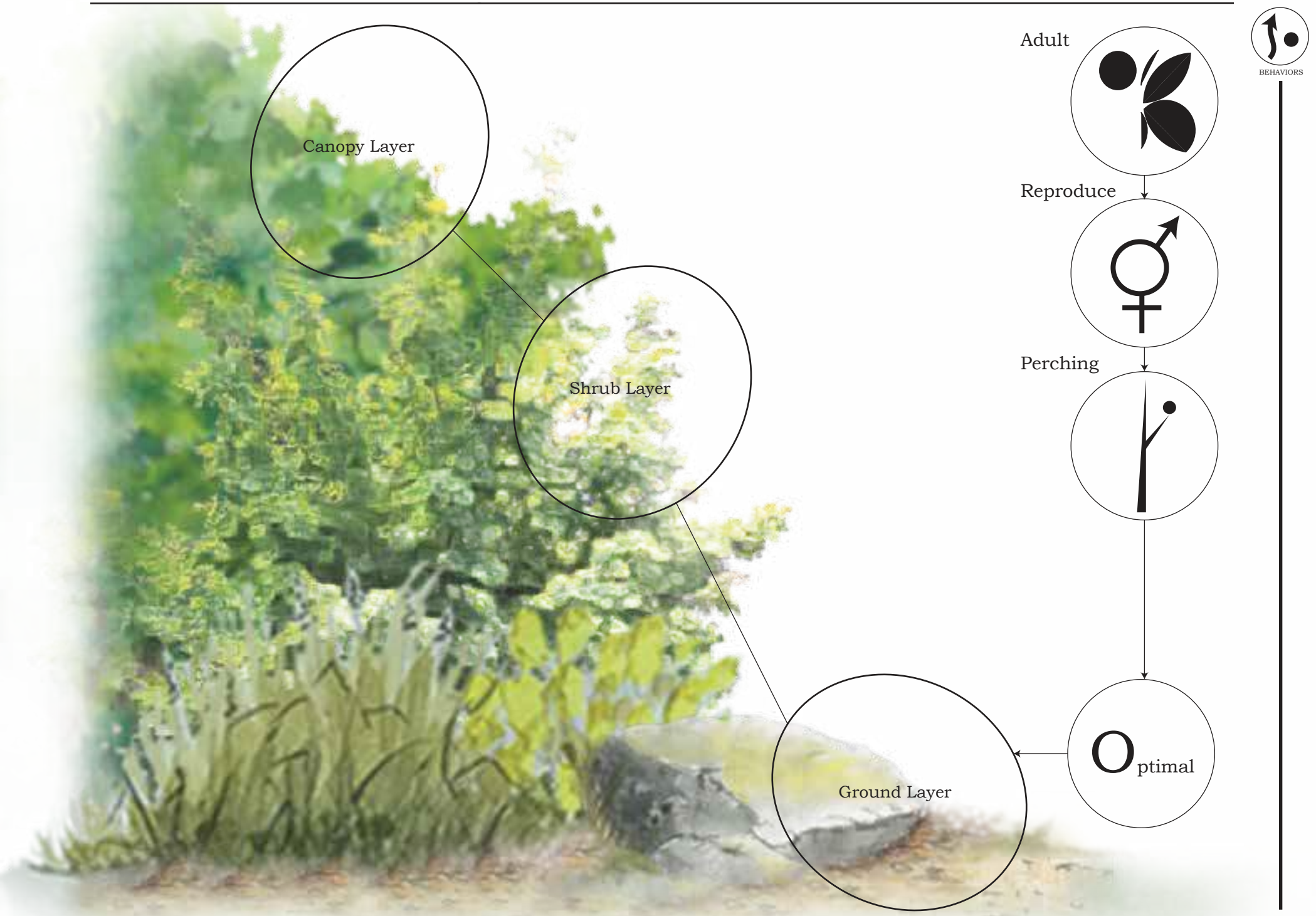


Correct Design Puddle Station: Full sun exposure is needed from the hours of 10am until 4pm

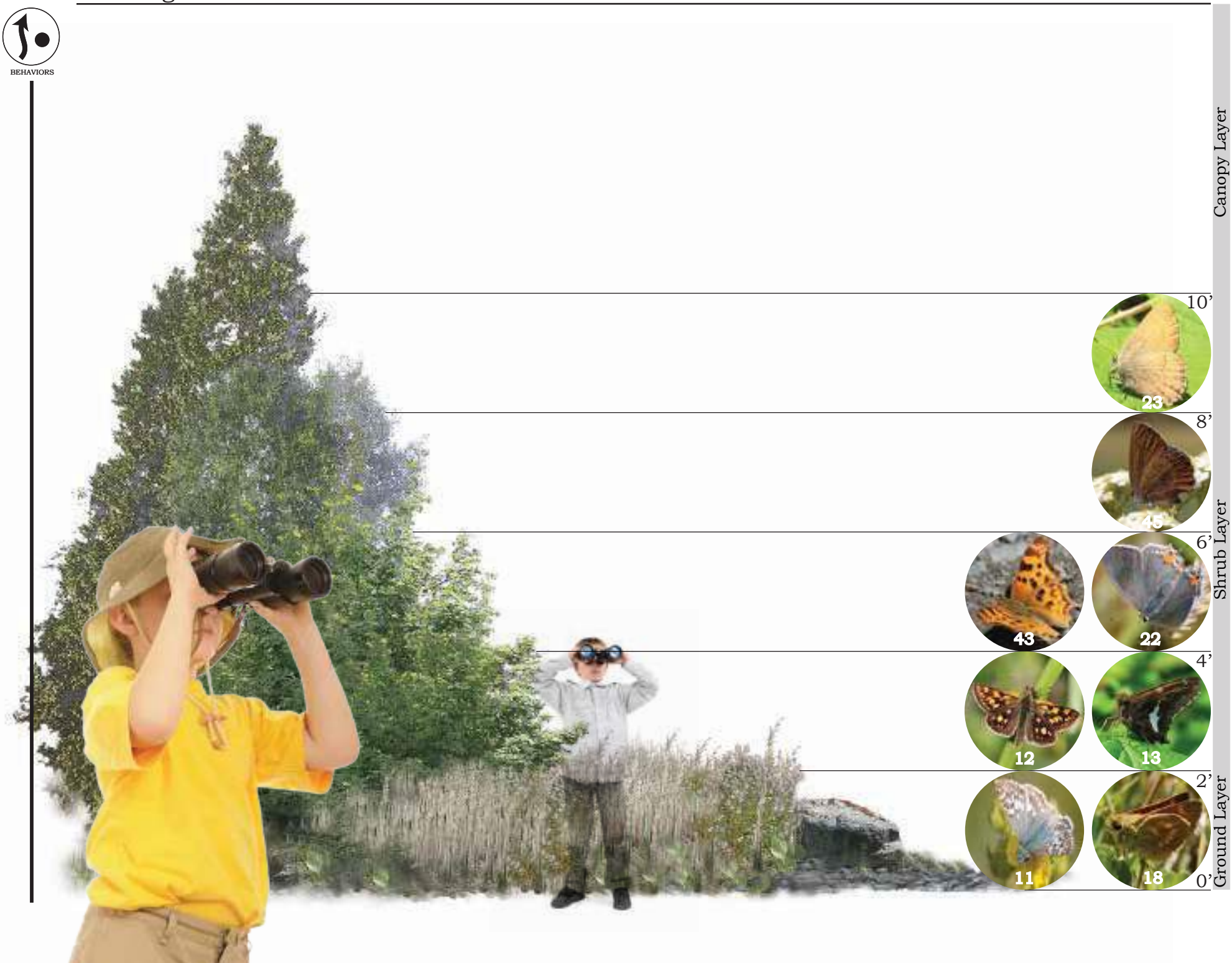


Incorrect Design Puddle Station: Full sun exposure is blocked from large trees casting shadows across the puddle station.

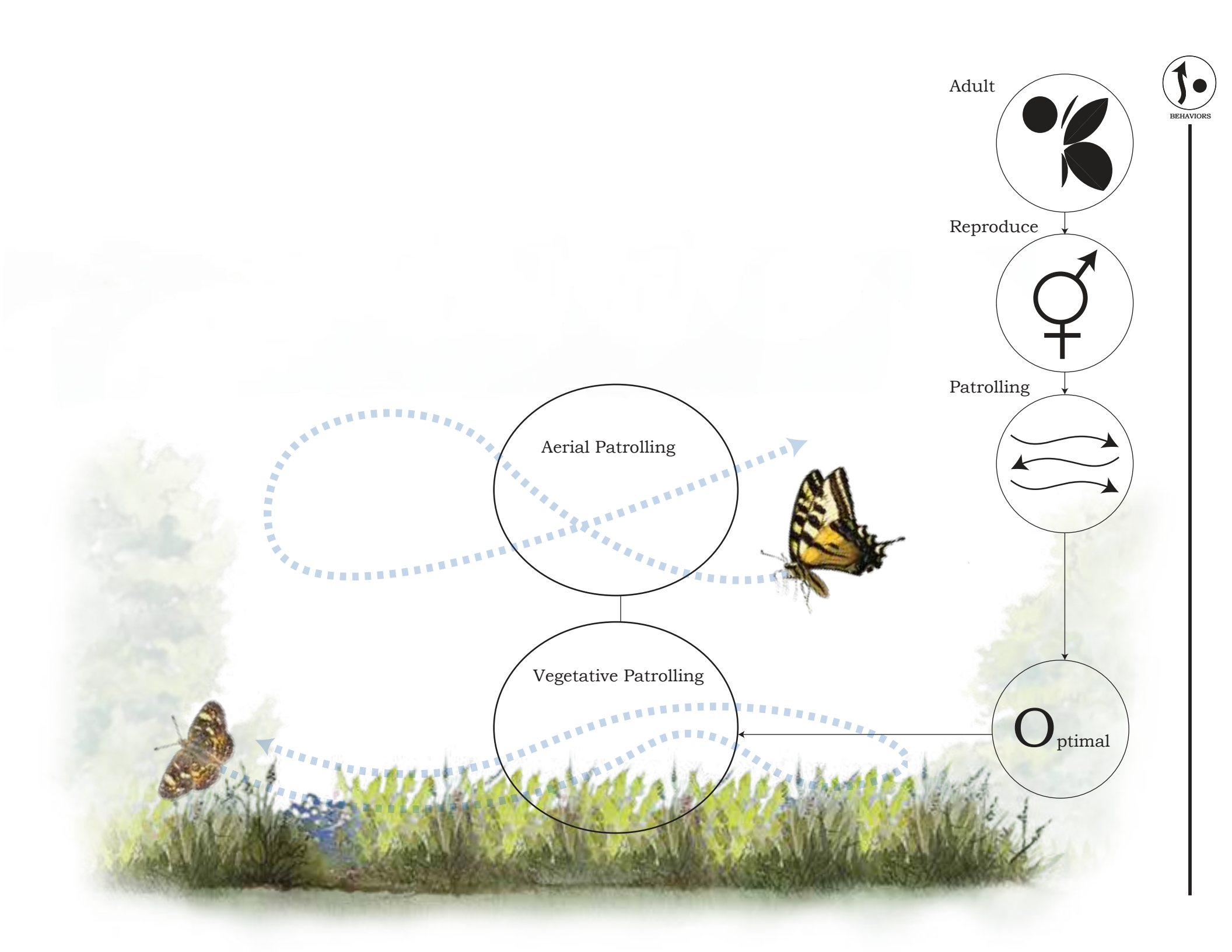
Perching


Canopy Layer
Shrub Layer
Ground Layer
Adult
Reproduce
Perching
Optimal

Perching


Canopy Layer
10’
23
8’
45
Shrub Layer
6’
43
22
4’
12
13
Ground Layer
2’
11
18
0’

Perching


Adult
Reproduce
Patrolling
Aerial Patrolling
Vegetative Patrolling
Optimal

Shelter from Rain

Broad leave can slow and trap anywhere from 10-40% of the rain that might otherwise fall to lower vegetation. Some butterfly species will take advantage of these denser canopies during storm events, while others will ride out a storm deep within grasses or forbs. Broad leaves give a distinct umbrella-like advantage for shelter, a feature that this pine tree can not provide.

Shelter from Heat

During hot weather, butterflies run the risk of overheating from both ambient temperatures and friction caused by muscular contraction during flight. To reduce their bodies temperature, butterflies must take rest. One strategy that butterflies will use, is the seeking of shaded areas within their habitat during peak heat hours, as shaded areas can range up to 15 degrees cooler than in the sun.

Creating shade in the garden then becomes a must, but too much shade will compromise the goal of a sunny garden space. Performing a shade analysis will help the designer know exactly where to place shade trees, based on the tree's projected hight to the angle of the sun during the warmest times of the day, thus a shadow length can be calculated to determine optimal shade tree placement (Fig. 3.15).

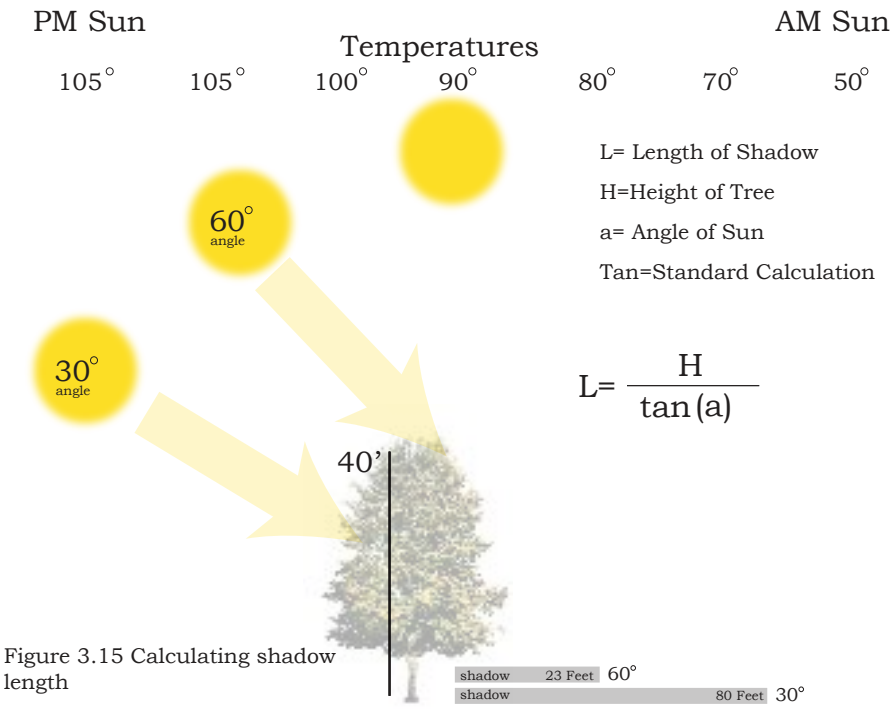


Figure 3.15 Calculating shadow length

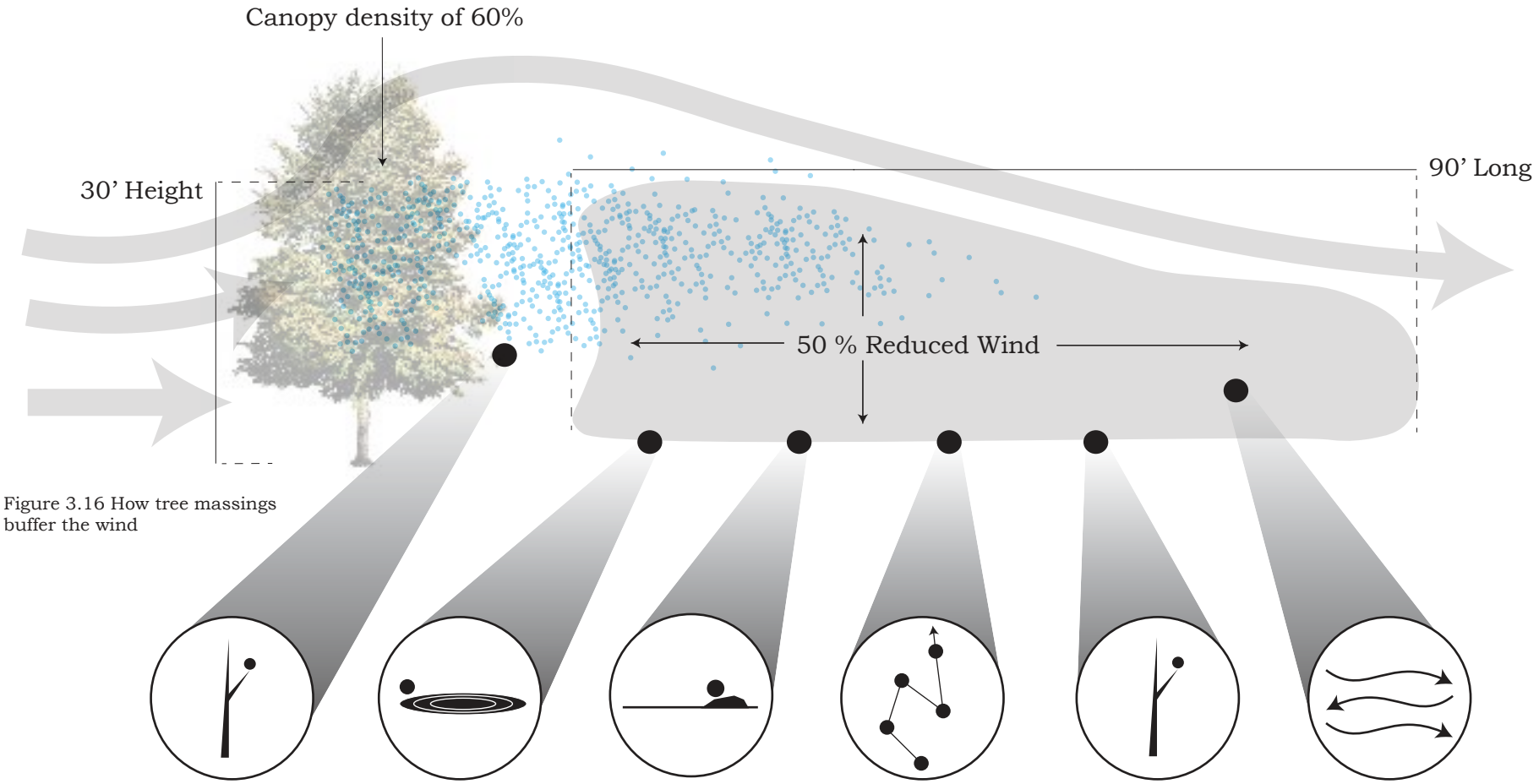


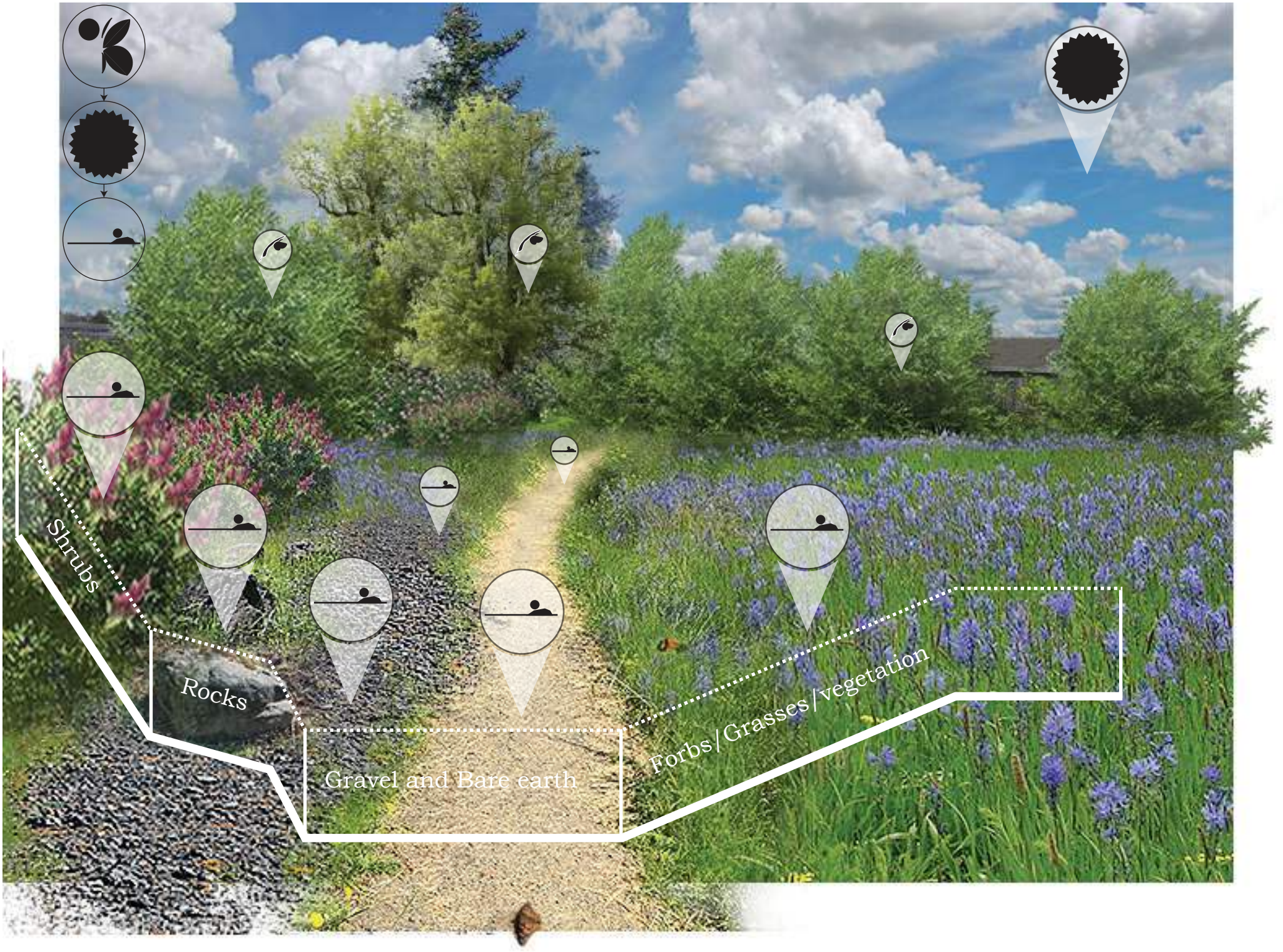
Figure 3.16 How tree massings buffer the wind

As a rule, trees and shrubs can reduce wind velocity of up to 50 percent for a distance of 10 to 20 times the height of the canopy. Of course, this buffer begins to lose efficacy the further you travel from the buffer. The greatest protection occurs within the first 3-10 times distance from the massing. Thus, a stand of shrubs at 10 feet tall reduces the wind speed the greatest from 30 to 100 feet from the massing.

The density of canopy needs to be roughly 60 percent to reduce wind effectively. Too dense of a vegetative windbreak, can cause the wind to push up and over the massing. When this happens, the wind speed on the leeward side of the buffer can accelerate, causing more wind across the garden space.

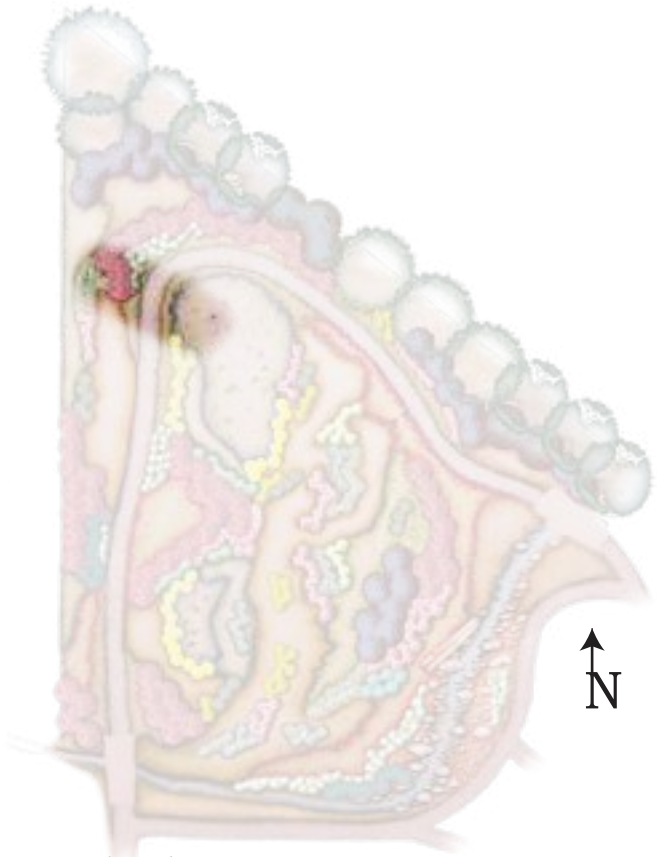
By providing wind protection in the appropriate proportions, nectaring plants, basking zones, perching and patrolling stations and puddling stations are more likely to be utilized by butterflies.

Site Design (Basking Station)

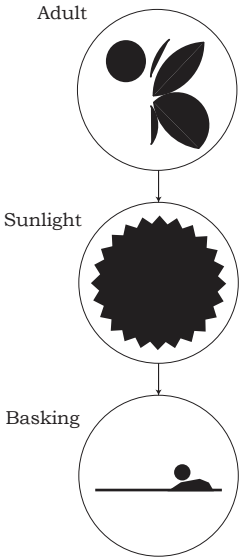


Basking Station

The Design: The Basking Station



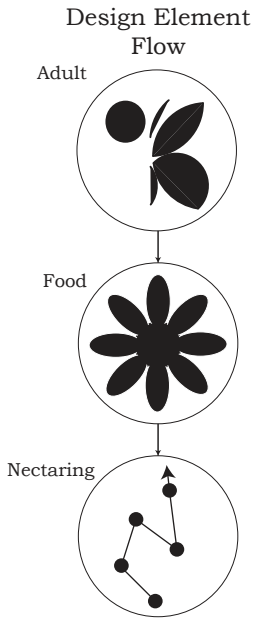
Design Element Flow



Current Conditions

Basking Station

The Design: The Nectar Drifts and Color Blocks



Current conditions

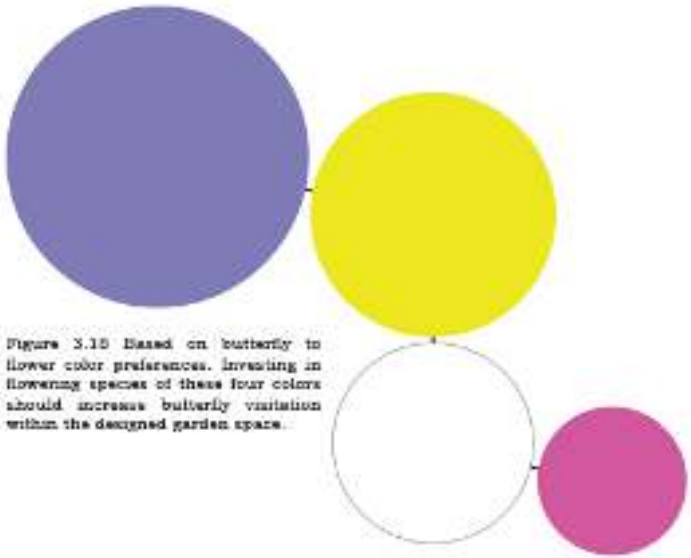
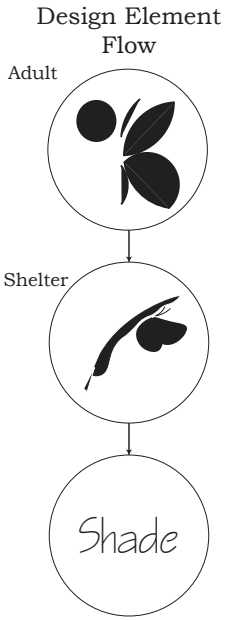


Figure 3.10 Based on butterfly to flower color preferences. Investing in flowering species of these four colors should increase butterfly variation within the designed garden space.

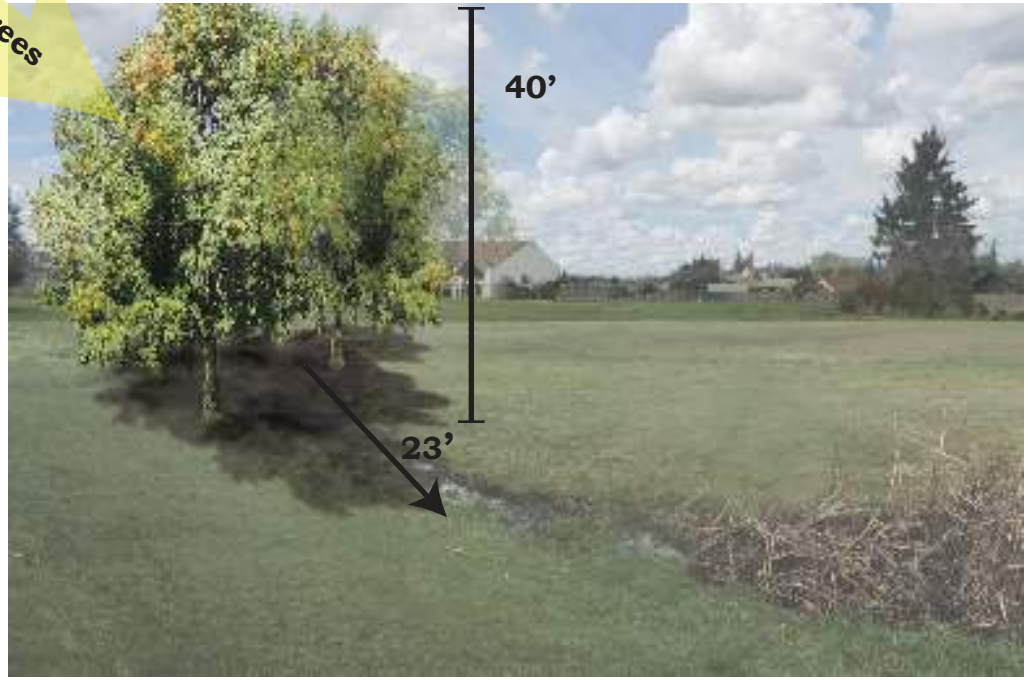
Color block and drift plantings



Current Conditions

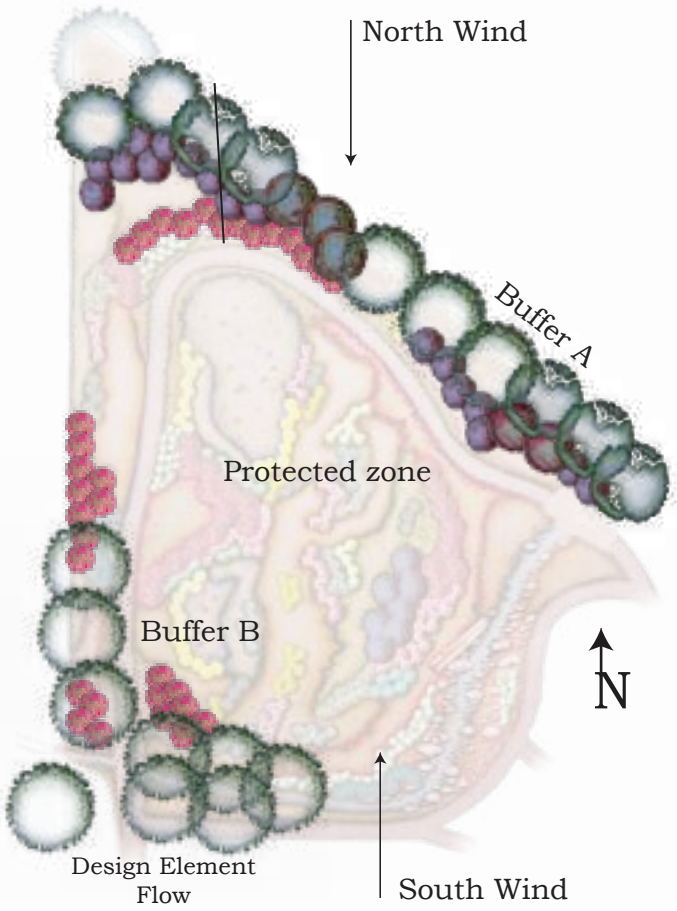
$$L = \frac{\text{height}}{\tan(a)}$$

Note: See Figure 3.15 on page 150 for an explanation on how to calculate shade coverage.

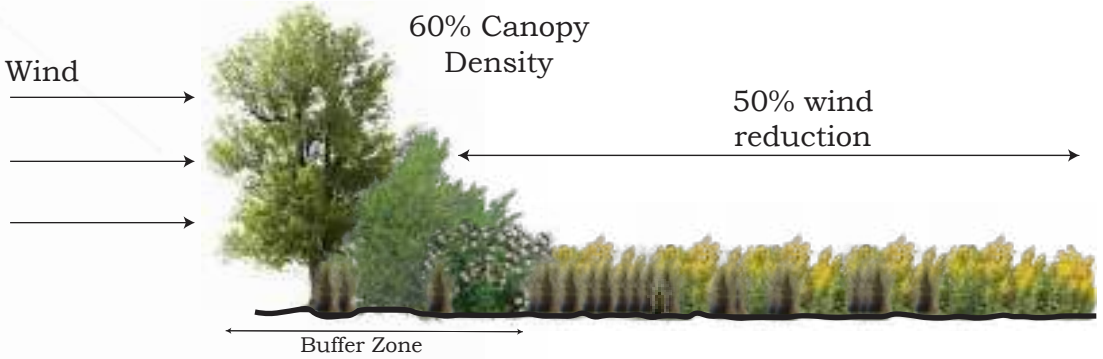


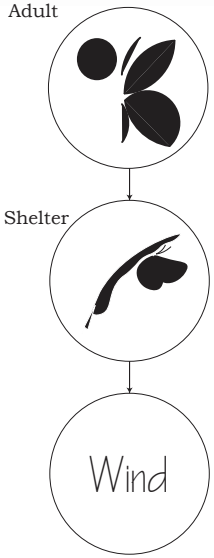
Calculating sun angle helps determine tree placement and shadow.

The Design: The Need for Wind Shelter

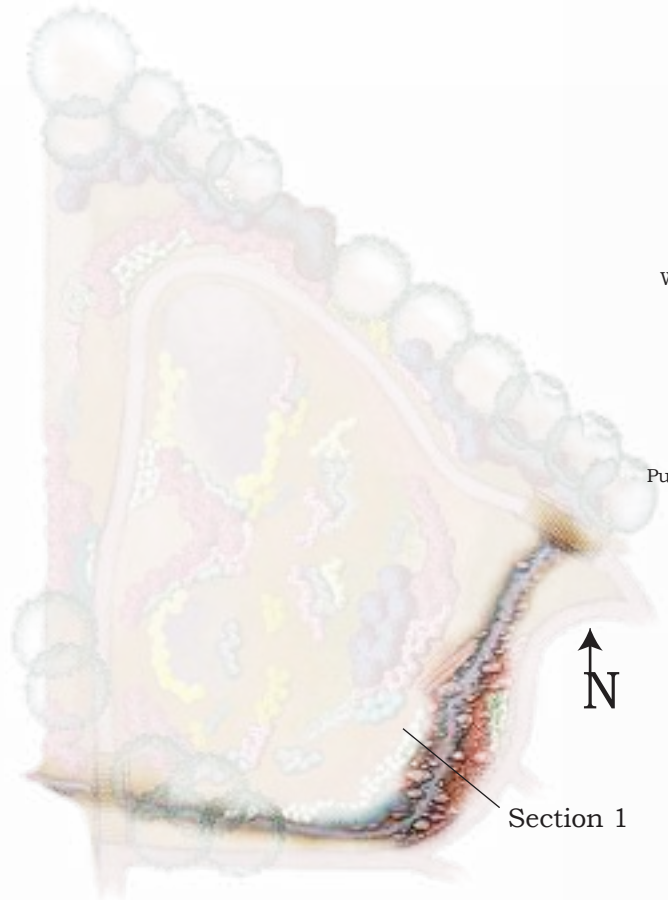


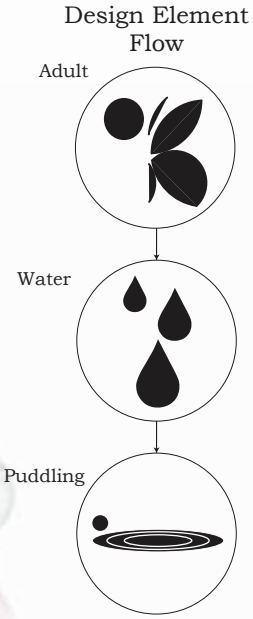
Current Conditions



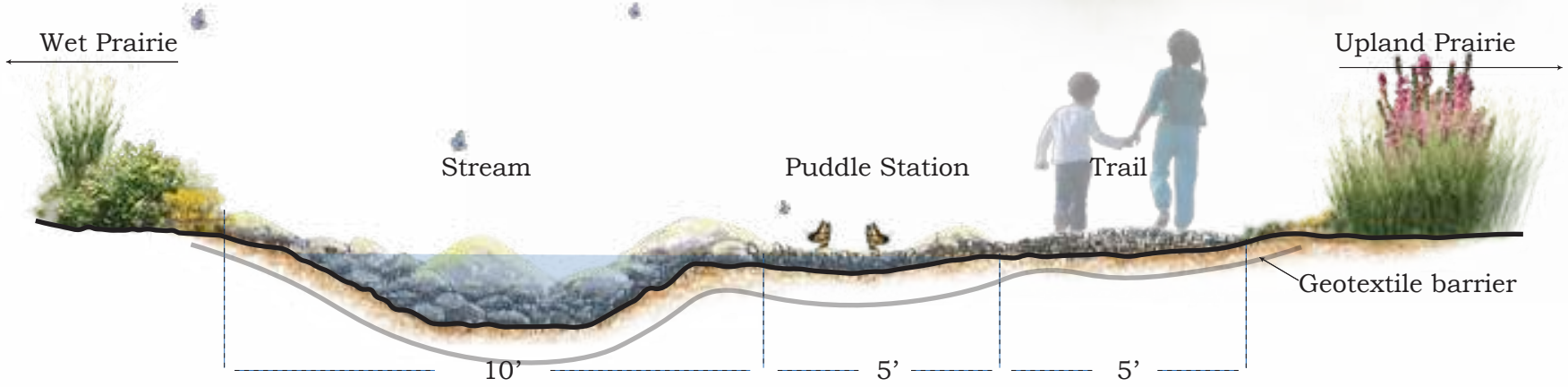


Buffer A: Calmer Conditions

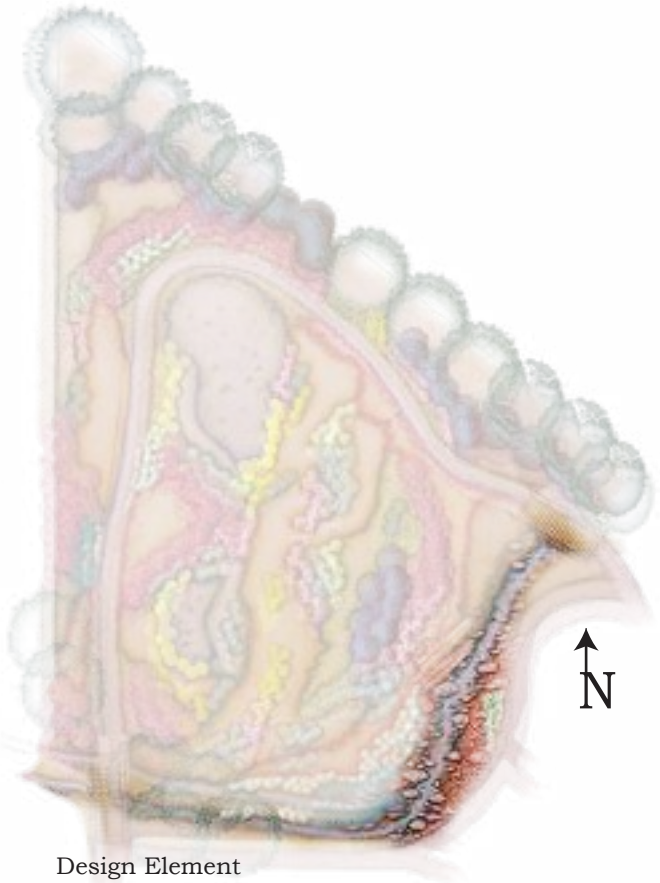

N
Section 1


Design Element
Flow
Adult
Water
Puddling

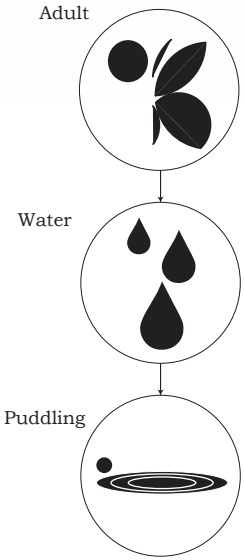
Section 1


Wet Prairie
Upland Prairie
Stream
Puddle Station
Trail
Geotextile barrier
10’
5’
5’

The Design: The Puddle Station



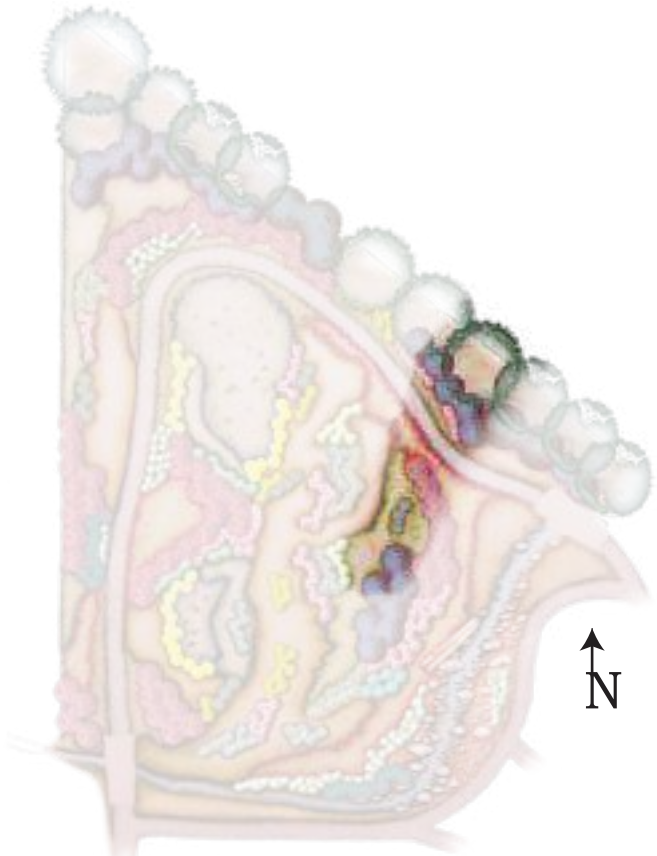
Design Element Flow



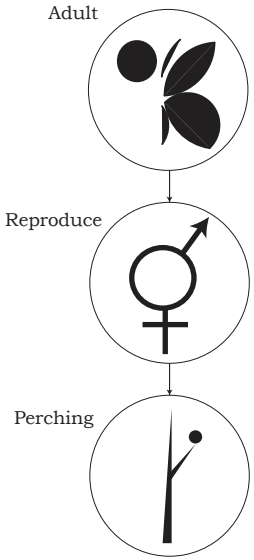
Current Conditions

Puddle Station with trail

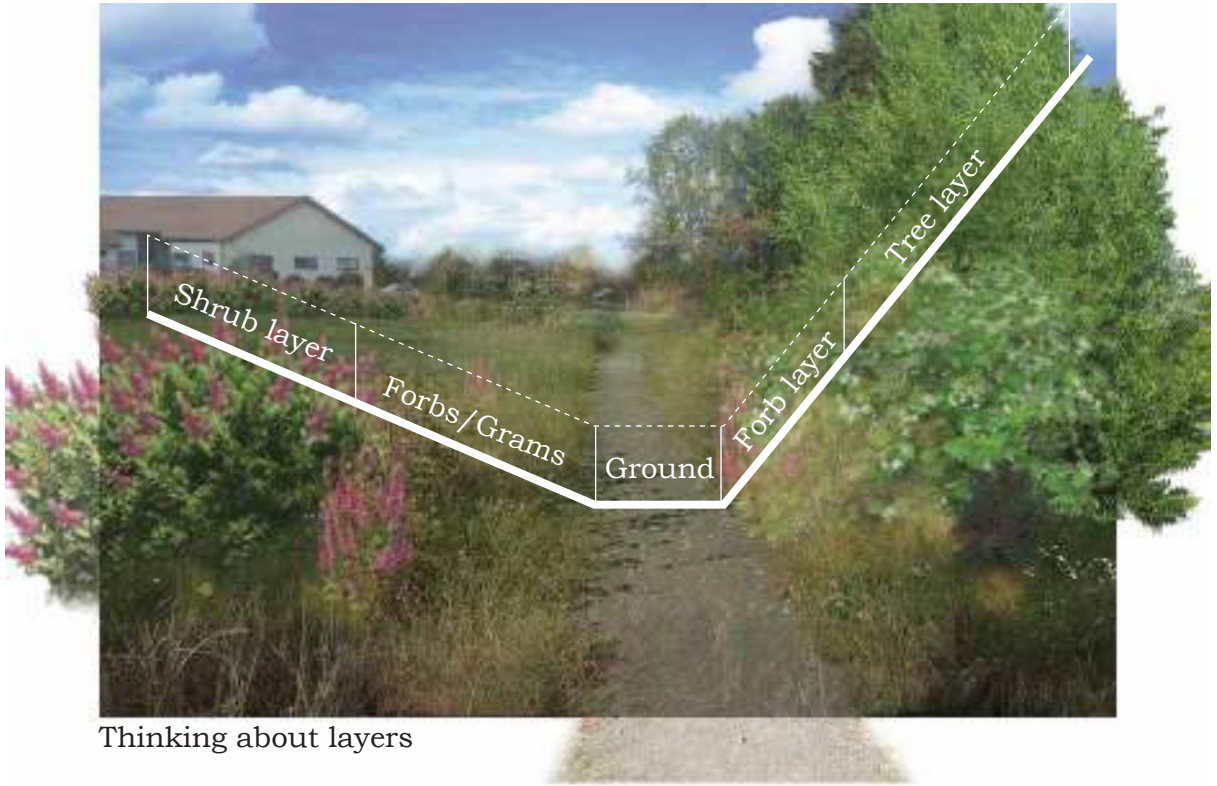
The Design: The Perching Station



Design Element Flow



Current Conditions



Thinking about layers