

Selecting and Using Native Plant Material

Hawaii Seed Bank Partnership



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Priority ONE – March 12, 2020

Selecting and Using Native Plant Material

Why Survey:

- Initiated by the Hawaii Seed Bank Partnership (HBSP) to learn more about ecological restoration in Hawaii to inform seed collection, applied research and the development of information resources in order to further build capacity for restoration in the state.

Purpose:

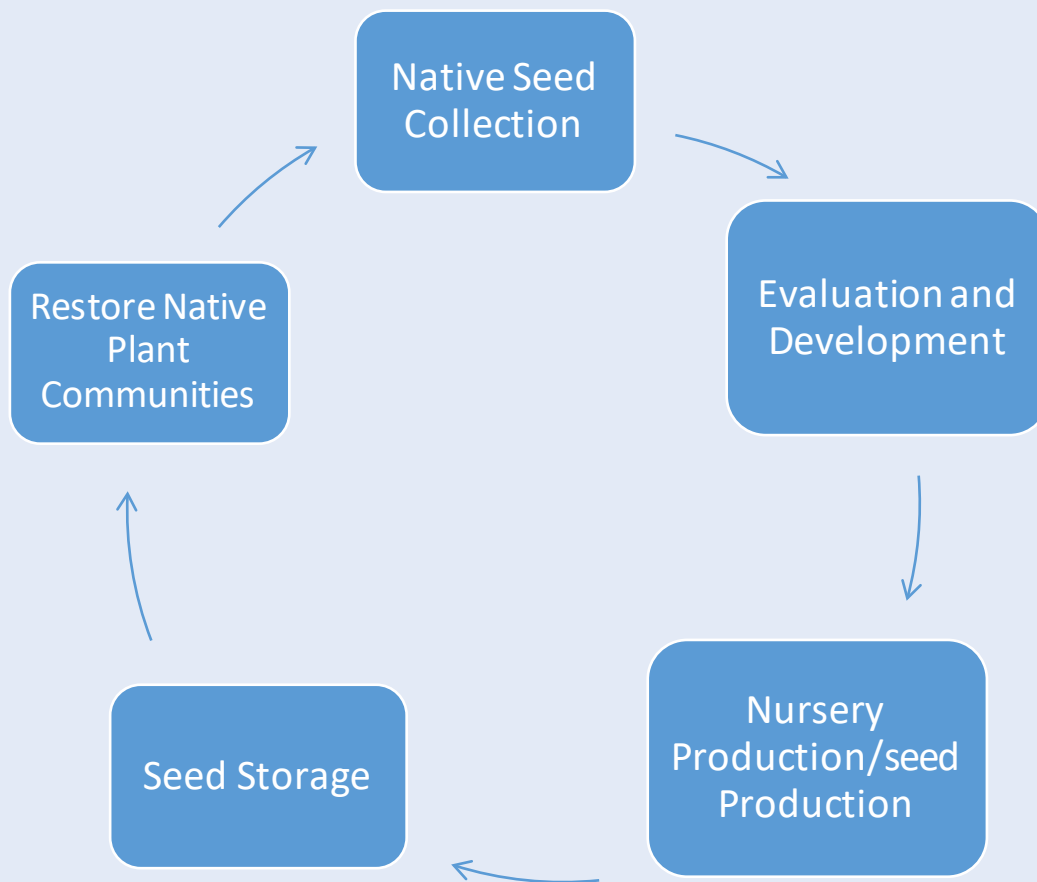
- To better understand what types of native plant materials practitioners are using
- To better understand where practitioners sourcing native plant materials
- To better understand what types of habitats/plant communities practitioners are restoring
- To better understand the diversity of species and frequency of species being used in restoration projects
- To better understand the quantity of native plant materials currently being used (per year) in restoration projects

Selecting and Using Native Plant Material

The Survey:

- Included 20 questions
 - What Islands do you restore on?
 - What kind of habitat?
 - How many total plants do you use in a year?
 - How do you get plants for you project?
 - Do you use direct seed-sowing for restoration?
 - Plants used for Coastal and Strand restoration?
 - Plants used for Dry Forest restoration?
 - Plants used for mesic forest restoration?
 - Plants used for Wet Forest restoration?
 - Plants used for Wetland restoration?
 - Plants used for Bog restoration?
- Target Audience: Restoration community
 - Targeted resource managers from all major programs across the state
 - 27 responded to survey

Native Plant Material Development Process

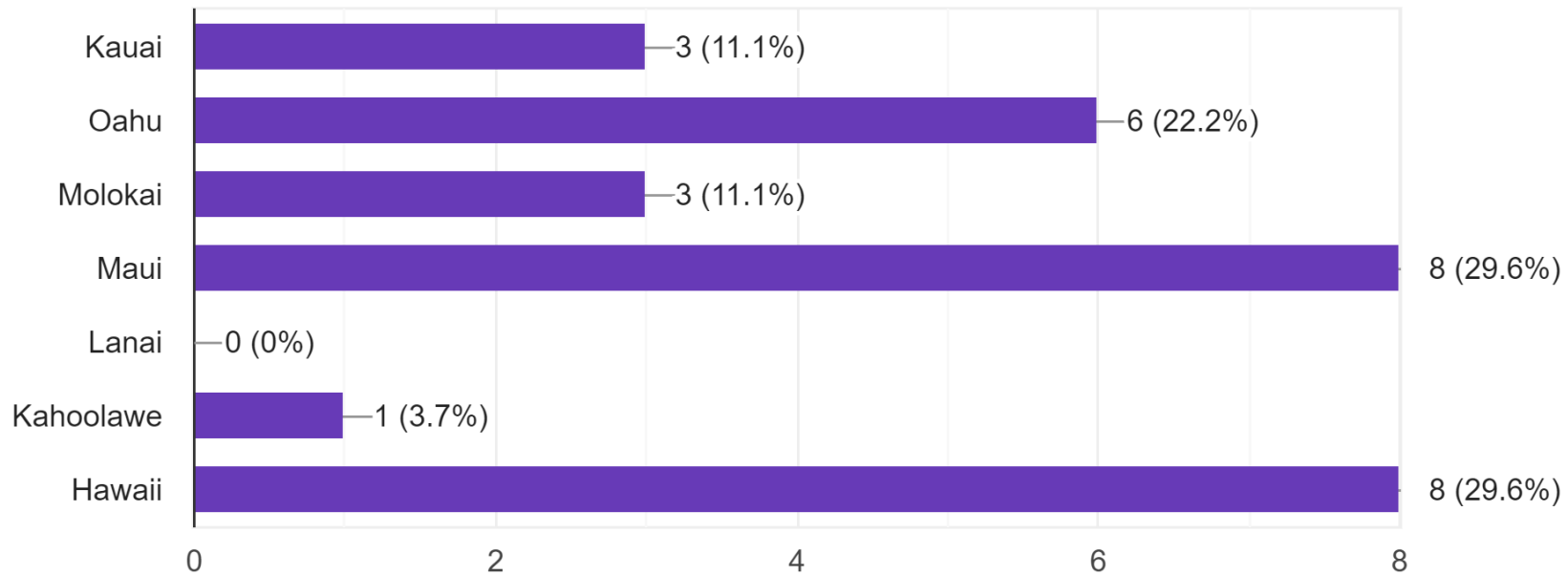


Adapted from BLM Native Plant Materials Development Process

Selecting and Using Native Plant Material

What island/s do you do restoration on?

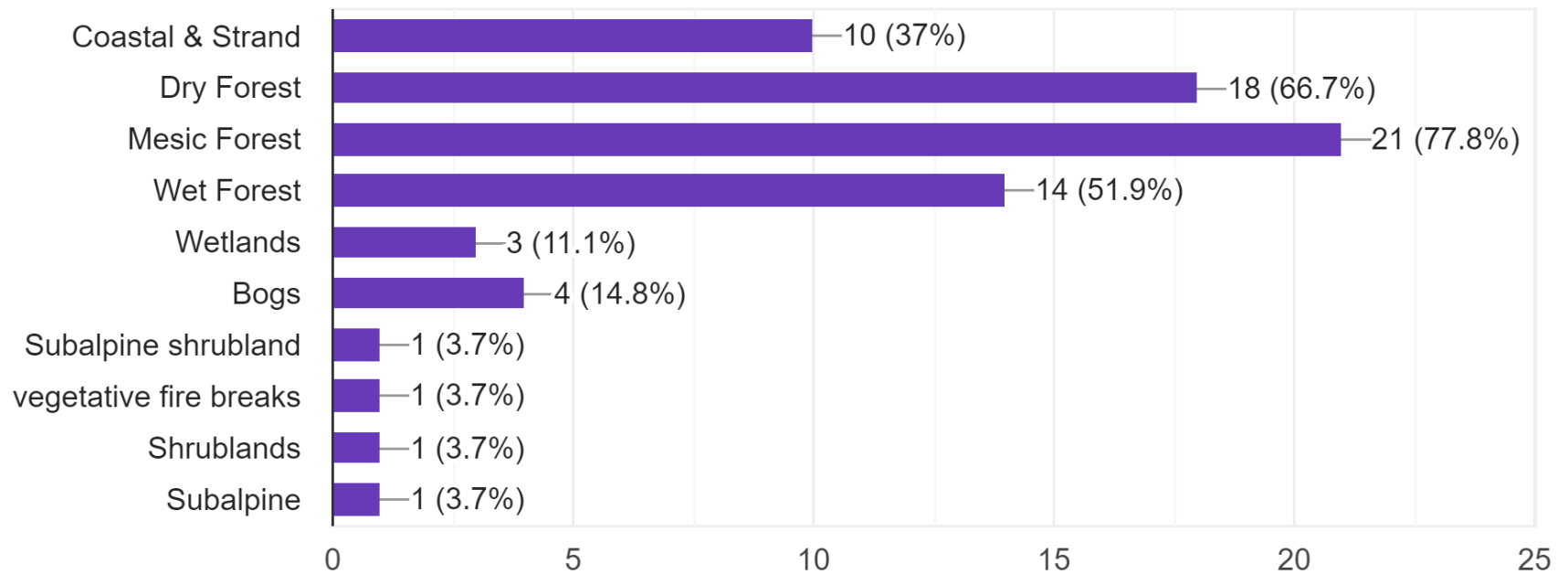
27 responses



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What kind of habitat?

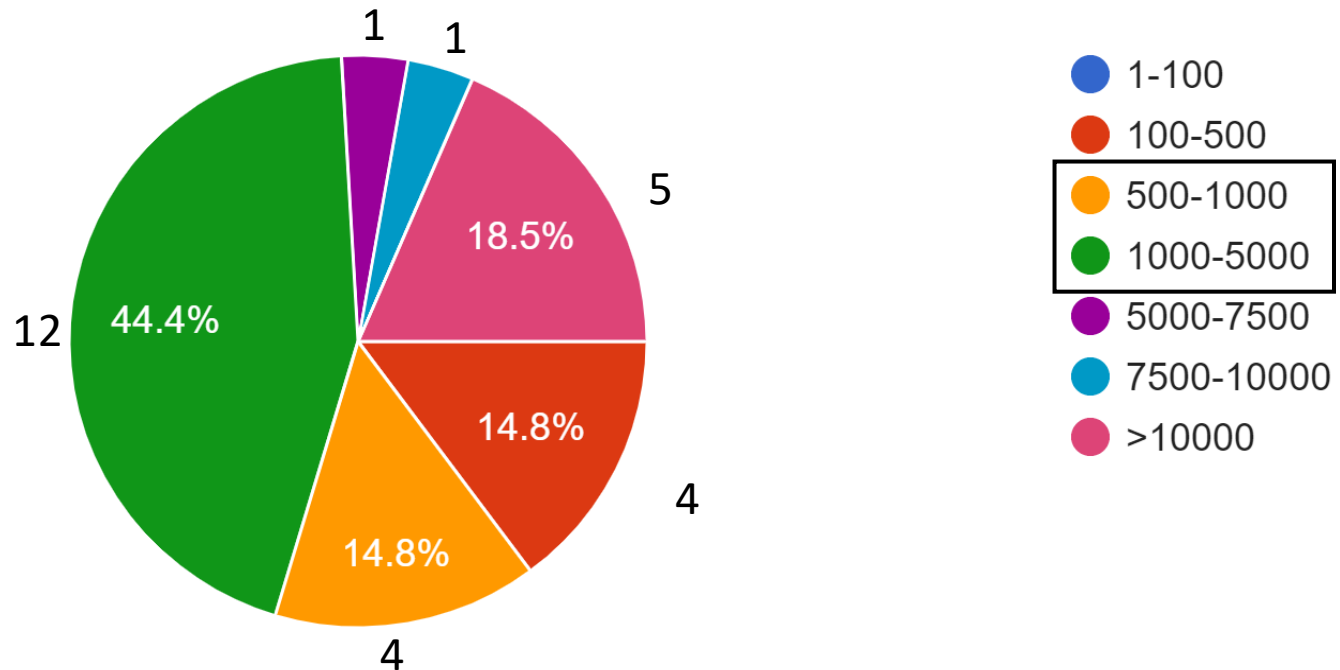
27 responses



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How many total plants do you usually plant in a year?

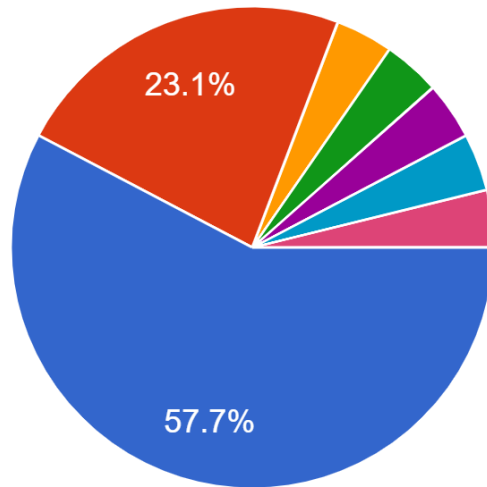
27 responses



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How do you get plants for your project?

26 responses

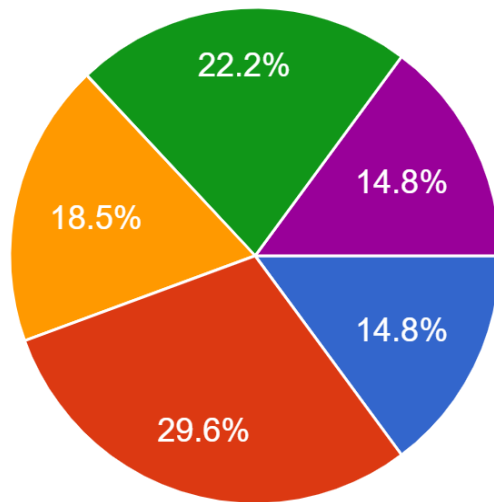


- Grow our own
- Purchase them from a nursery
- We use State nursery, Volcano Rare Plant Facility, and through contractor -...
- Both of the Above
- Partners such as Molokai Land Trust, Kaluapapa National Historical Park, a...
- Supplied by DOFAW
- Laura chapman, Doug okomoto, Greg Mansaker Nurseries, transplants, divis...

Selecting and Using Native Plant Material

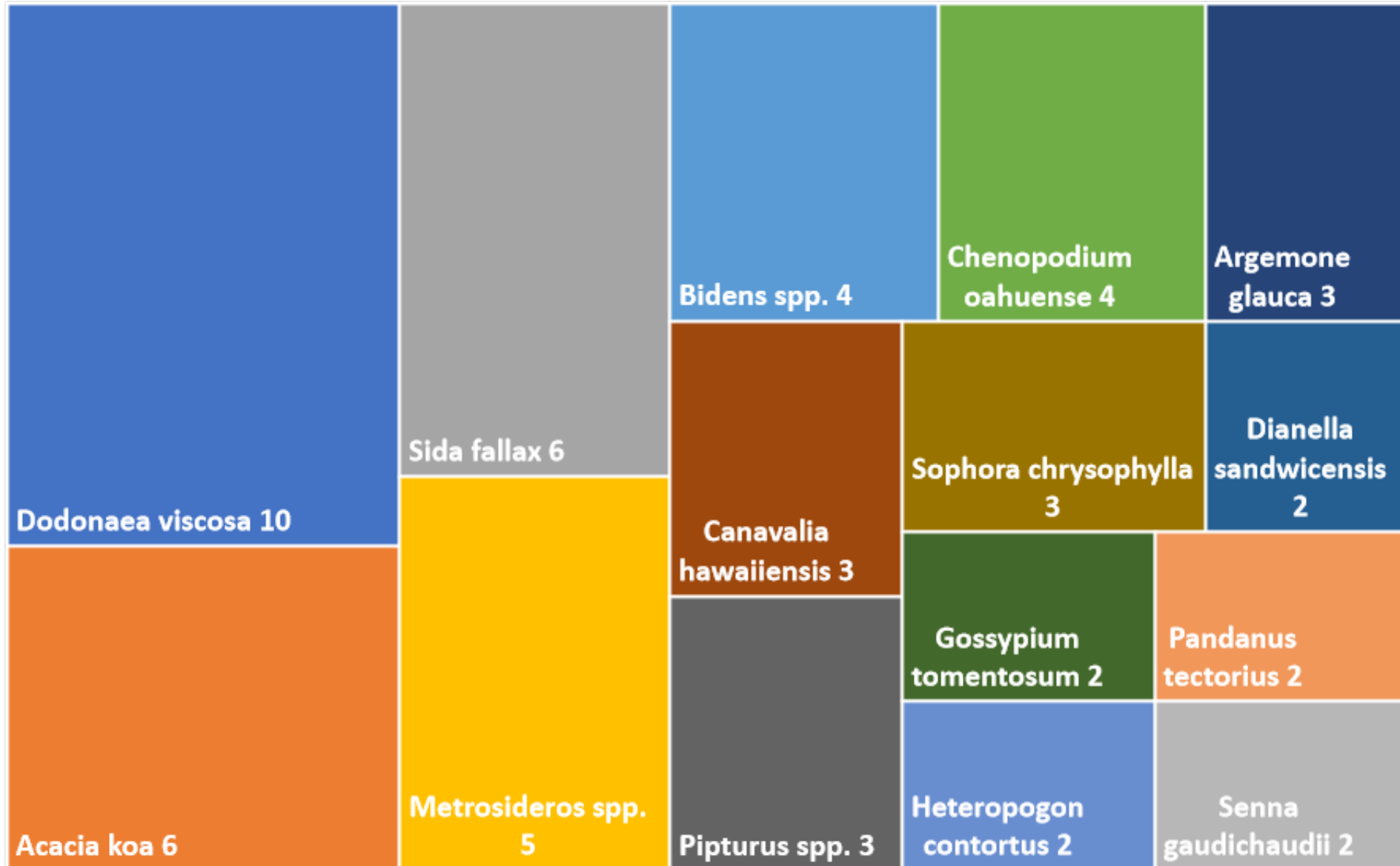
Do you use direct seed-sowing for restoration?

27 responses



- Never
- Rarely (only opportunistically)
- Sometimes (not usually planned)
- Commonly (at least once in every site)
- Always (used in all sites)

15 Top Species used in Seed Sowing



15 Top Species used in Seed Sowing

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
Acacia koa	O	-18C	15+	PY
Argemone glauca	O	-18C	NA	D
Bidens spp.	O	-18C	5-15+	D
Canavalia hawaiiensis	O	-18C	15+	PY
Chenopodium oahuense	O	-18C	10-15	ND
Dianella sandwicensis	FS	5C	10+	D
Dodonaea viscosa	O	-18C	15+	PY
Gossypium tomentosum	O	-18C	10+	PY
Heteropogon contortus	O	-18C	NA	D
Metrosideros spp.	O	-18C	15-20	ND
Pandanus tectorius	NA	NA	NA	D
Pipturus spp.	FS	5C	15-20	D
Senna gaudichaudii	O	-18C	5-10	PY
Sida fallax	O	-18C	20+	D
Sophora chrysophylla	O	-18C	10-15	PY

Seed Sowing: Other species used

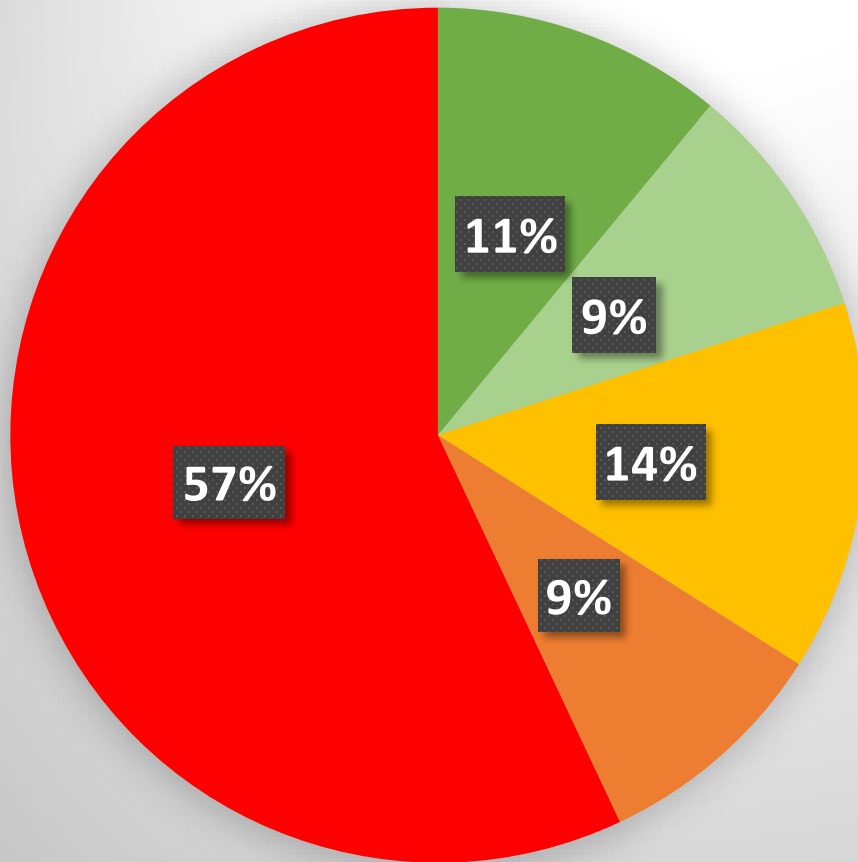
Acacia koaia
Acharanthes splendens var.
splendens
Alyxia stellata
Argyroxiphium sandwicense subsp.
macrocephalum
Capparis sandwichiana
Clermontia spp.
Coprosma spp.
Cyperus hillebrandii
Deschampsia nubigena
Eragrostis variabilis
Erythrina sandwicensis
Hydrangea arguta
Ipomoea indica
Ipomoea pes-caprae subsp.
brasiliensis

Myoporum sandwicensis
Nototrichium sandwicense
Osteomeles anthyllidifolia
Plectranthus parviflorus
Plumbago zeylanica
Polyscias sandwicensis
Sapinus oahuensis
Scaevola gaudichaudiana
Scaevola procera
Seabania tomentosa
Sicyos lasiocephalus
Sporobolus virginicus
Vaccinium spp.
Vigna marina
Vitex rotundifolia
Waltheria indica

Total Species List: 45 taxa

Coastal & Strand

10 Respondents work in this habitat



Always

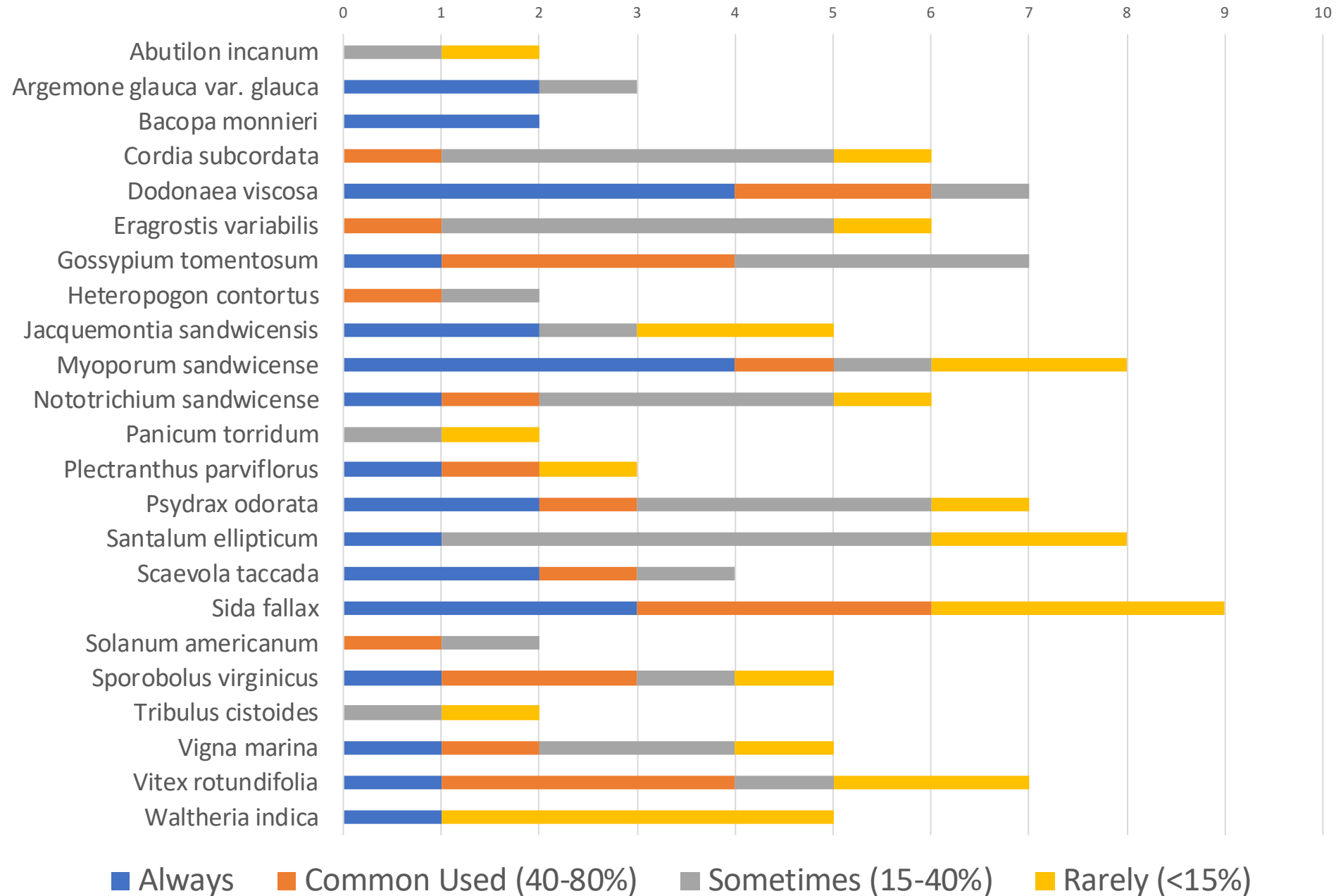
Common Used (40-80%)

Sometimes (15-40%)

Rarely (<15%)

Never

Coastal & Strand



Coastal and Strand: 'Always' used 4+ projects and 'Commonly Used' 5+ projects

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
<i>Cordia subcordata</i>	NA	NA	NA	D
<i>Dodonea viscosa</i>	O	-18C	15+	PY
<i>Eragrostis variabilis</i>	O	-18C	5+	D
<i>Santalum ellipticum</i>	FS	5C	5+	D

Coastal & Strand: Other species used

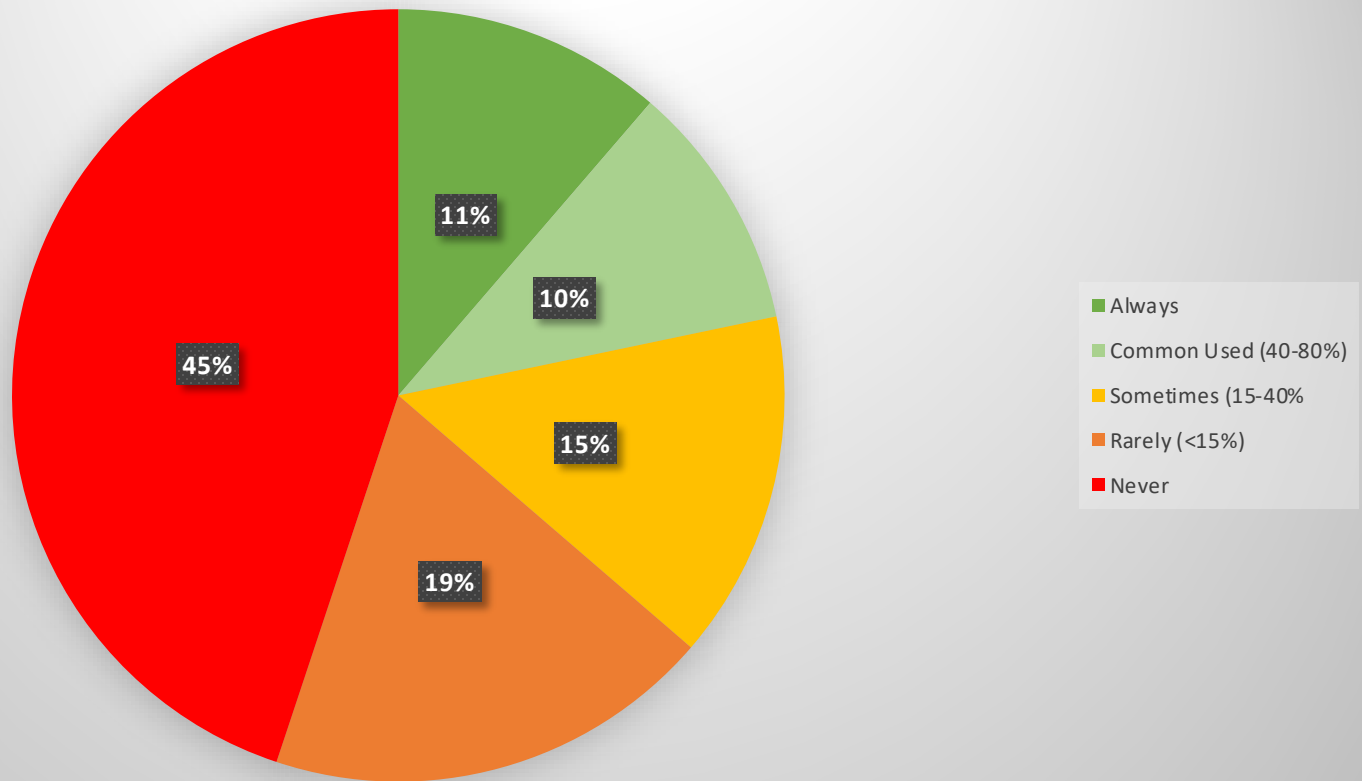
Artemisia sandwicensis
Boerhavia repens
Bolboschoenus maritimus
Cyperus javanicus
Cyperus laevigatus
Fimbristylis cymosa
Ipomoea pescaprae
Lipochaeta succulenta
Lycium sandwicense
Pandanus tectorius
Plumbago zeylanica
Pritchardia remota (T&E)
Sapindus oahuensis
Schoenoplectus tabernaemontani
Sesbania tomentosa (T&E)
Sesuvium portulacastrum
Tephrosia purpurea

Total Species List: 40 taxa

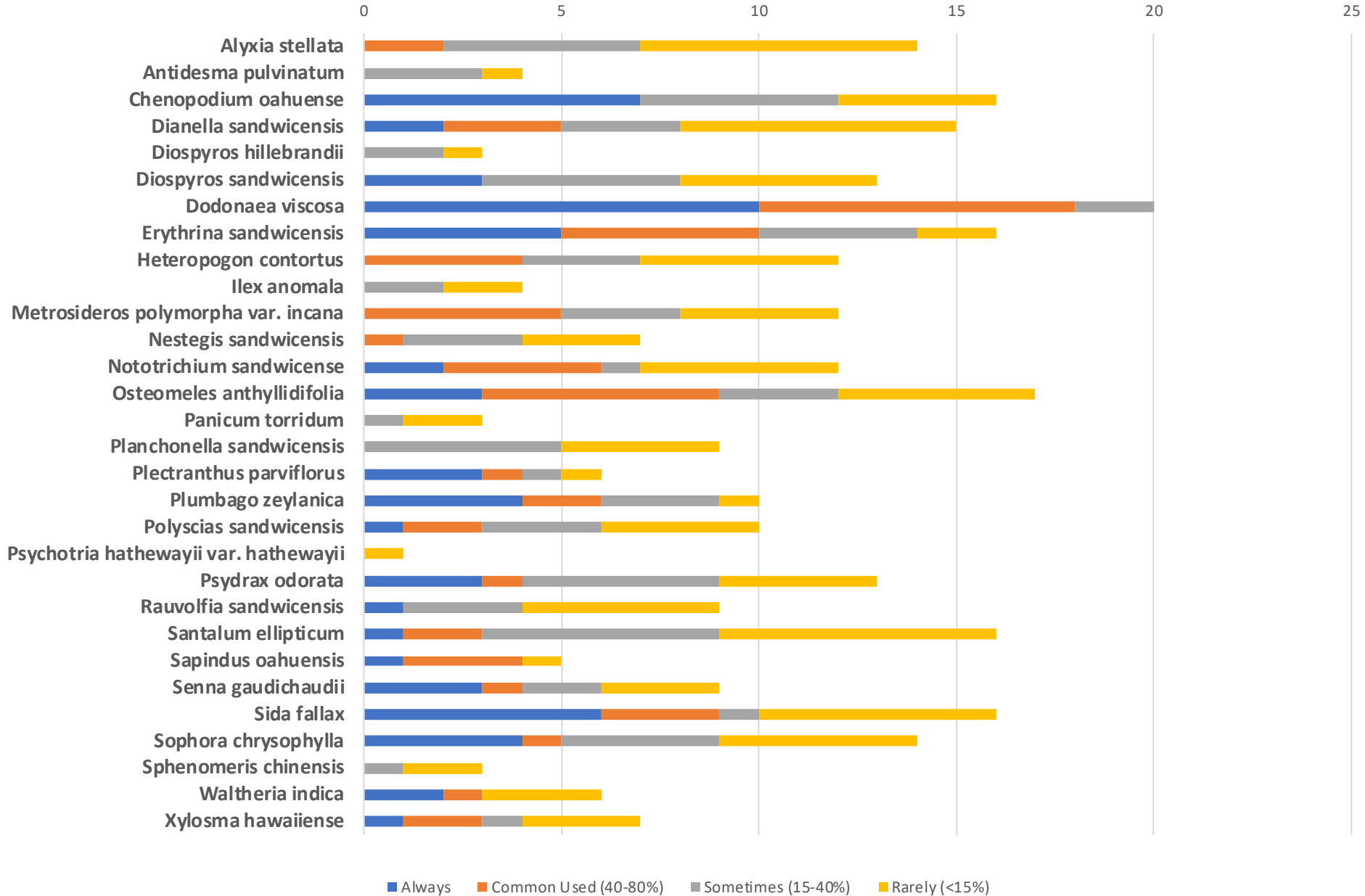
Dry Forest



Frequency of Survey Plants used for Dry Land Forest Restoration



Dry Forest



Dry Forest: Species 'Always' used 5+ projects

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
Chenopodium oahuense	O	-18C	10-15	ND
Dodonea viscosa	O	-18C	15+	PY
Erythrina sandwicensis	O	-18C	10+	PY
Sida fallax	O	-18C	20+	D

Dry Forest: Other species used

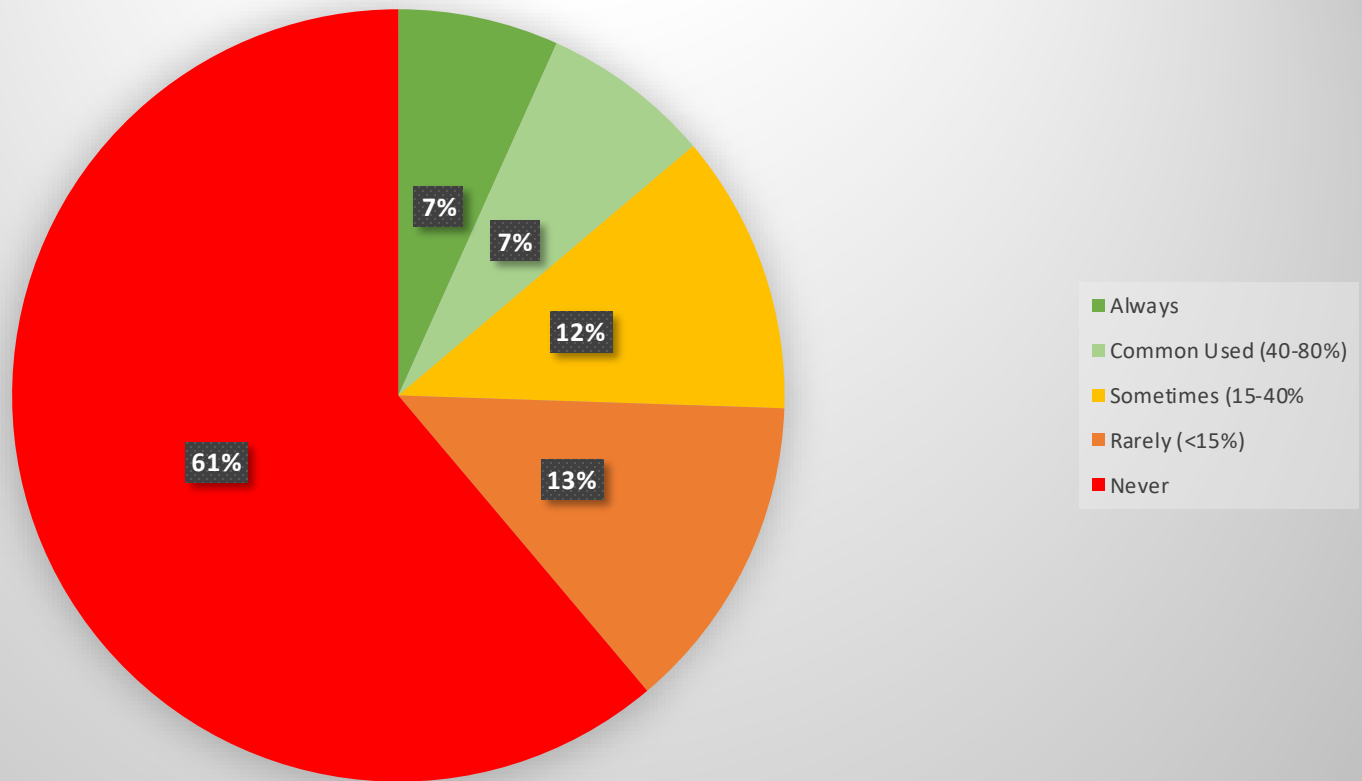
Acacia koa
Acacia koaia
Bidens menziesii
Canavalia hawaiiensis
Capparis sandwicensis
Charpentiera obovata
Cocculus trilobus
Euphorbia olowaluana
Hibiscus kokio subsp. kokio
Hibiscus waimeae var. waimeae
Ipomoea indica
Ipomoea pes-caprae subsp. brasiliensis
Ipomoea tuboides
Leptechophylla tameiameia
Melanthera subcordata
Mezoneuron kavaiense (T&E)
Myoporum sandwicensis
Myrsine lanaiensis
Peperomia leptostachya
Pittosporum hosmeri
Santalum paniculatum
Sapindus saponaria

**Total Species List:
52 taxa**

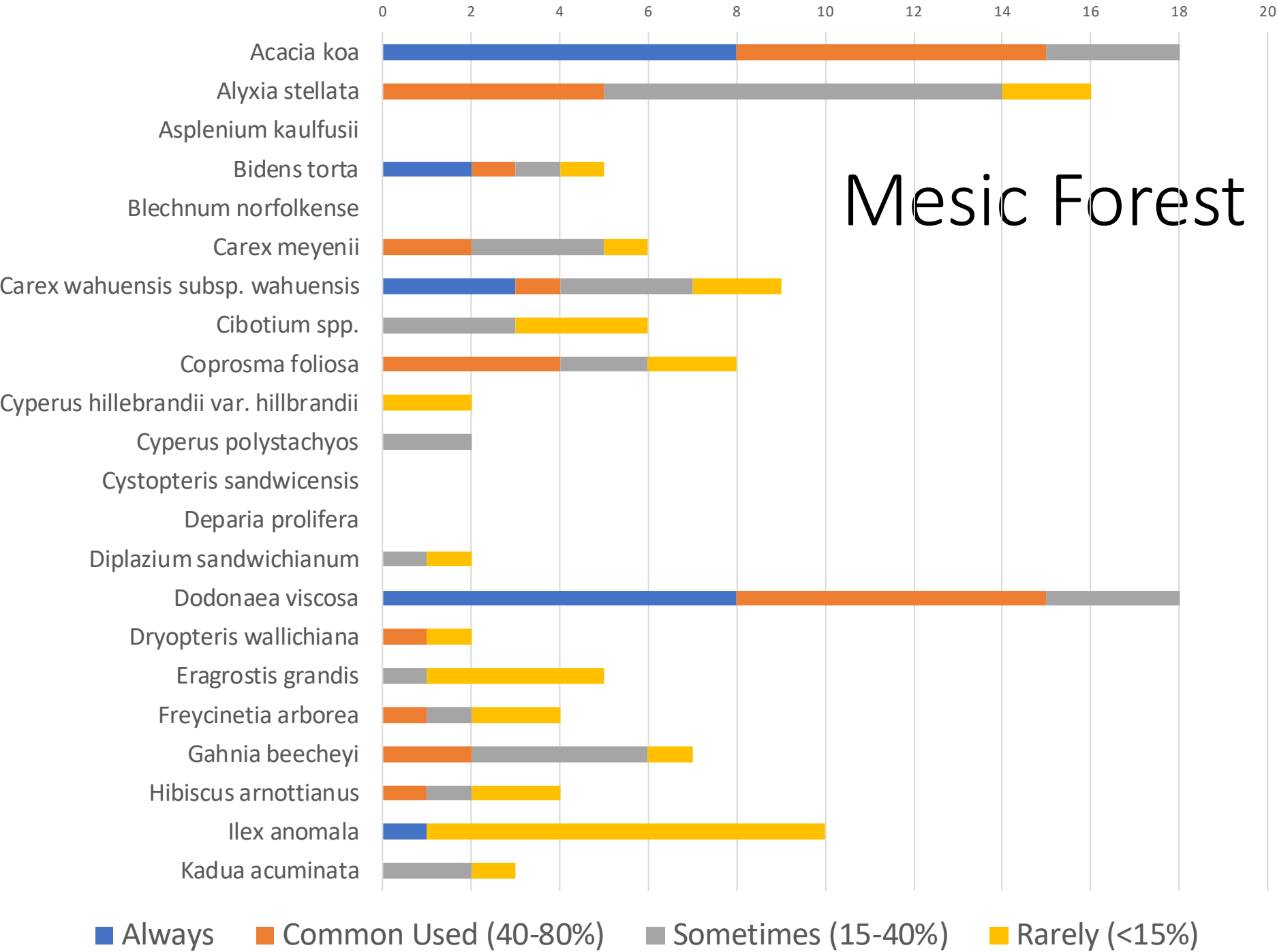
Mesic Forest



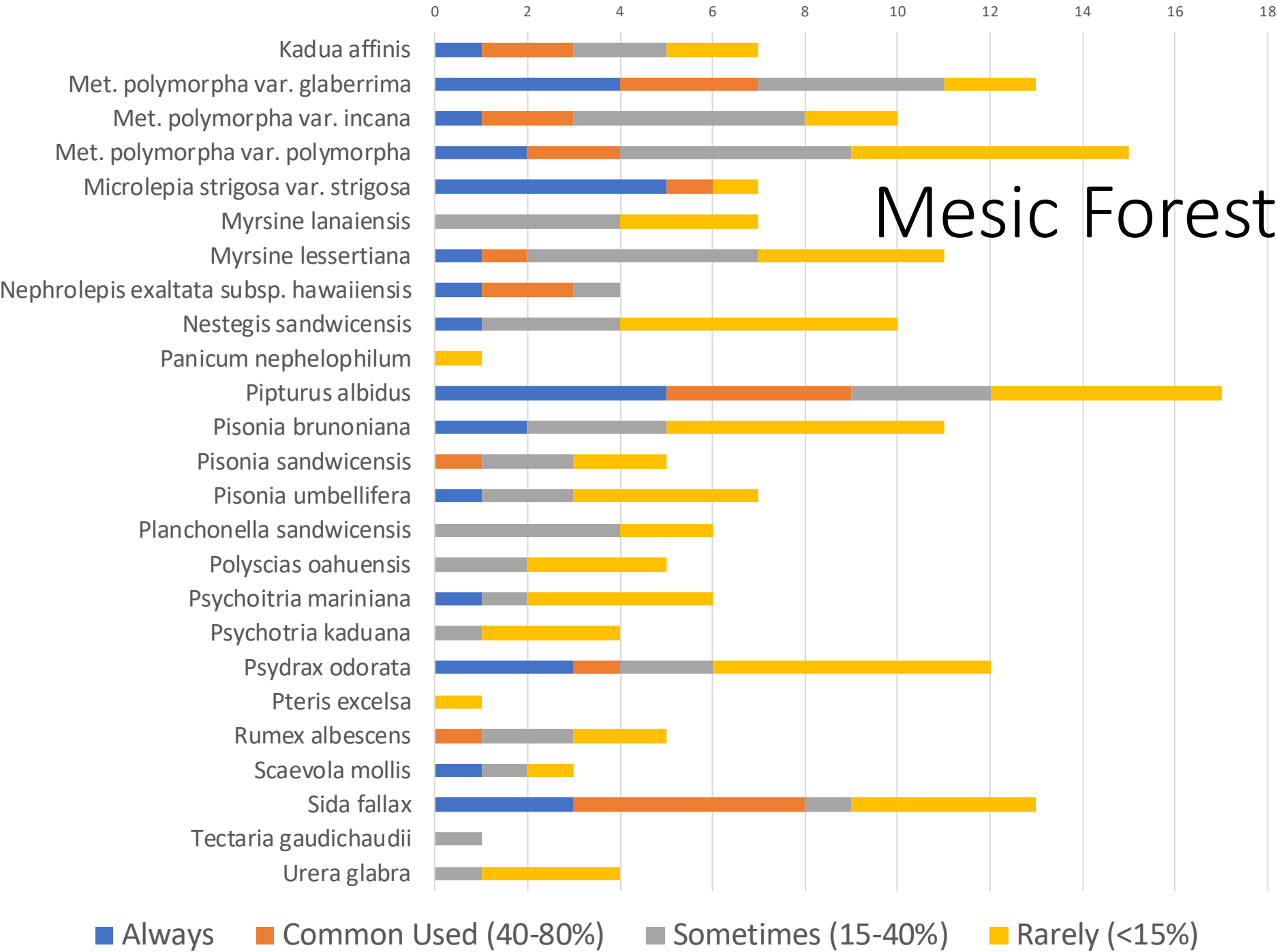
Frequency of Survey Plants Used in Mesic Forest Restoration



Mesic Forest



Mesic Forest



Mesic: 'Always' used by 4+

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
Acacia koa	O	-18C	15+	PY
Dodonea viscosa	O	-18C	15+	PY
Met. Polymorpha var. glaberrima	O	-18C	15-20	ND
Microlepidia strigosa var. strigosa	NA	NA	NA	NA
Pipturus albidus	FS	5C	15-20	D

Mesic Forest: Other species used

Acacia koaia
Antidesma platyphyllum
Antidesma pulvinatum
Bidens menziesii
Bidens sandwicensis
Bobea elatior
Canavalia spp.
Cheirodendron trigynum
Chrysodracon aurea
Chrysodracon auwahiensis
Clermontia kakeana
Clermontia spp.
Coprosma ernodeoides
Coprosma rhyncocarpa
Coprosma waimea
Cyperus laevigatus
Dianella sandwicensis
Dubautia arborea
Dubautia plantaginea
Eragrostis variabilis
Gossypium tomentosum
Heteropogon contortus
Hibiscus arnottianus subsp. immaculatus (T&E)
Hibiscus arnottianus subsp. punaluuensis
Hydrangea arguta
Ipomoea spp.
Jacquemontia sandwicensis

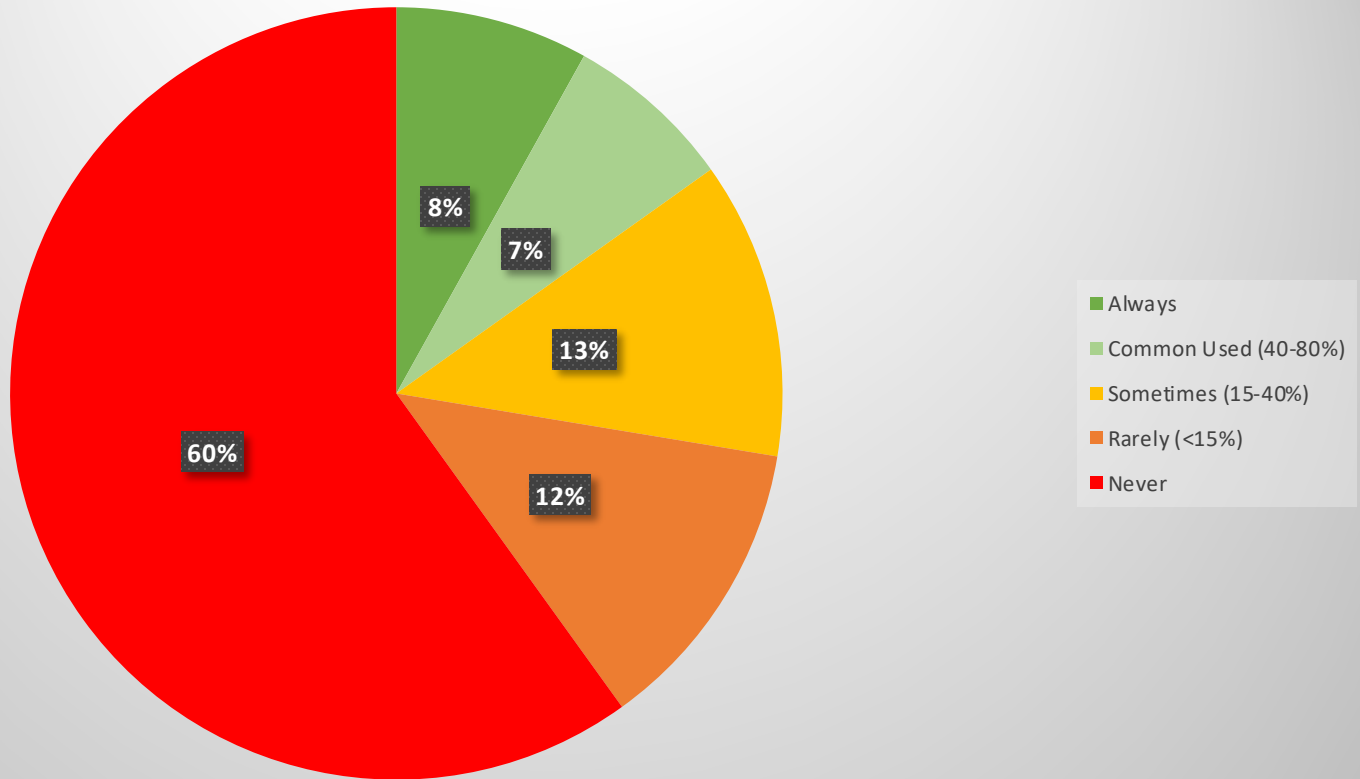
Labordia kaalae
Lepidium bidentatum
Nothocestrum breviflorum (T&E)
Osteomeles anthylidifolia
Pittosporum argentifolium
Pittosporum glabrum
Pittosporum kauaiensis
Plumbago zeylanica
Pritchardia hillebrandii
Pseudognaphalium sandwicense var. molokaiense
Psychotria hawaiiensis
Rauvolfia sandwicensis
Rubus hawaiiensis
Santalum haleakalae
Sapindus saponaria
Scaevola gaudichaudiana
Scaevola gaudichaudii
Scaevola procera
Schiedea hookeri (T&E)
Solanum sandwicensis (T&E)
Sophora chrysophylla
Vaccinium reticulatum
Vitex rotundifolia
Wikstroemia furcata
Wikstroemia oahuensis
Wikstroemia uva-ursi

**Total
Species
List: 100
taxa**

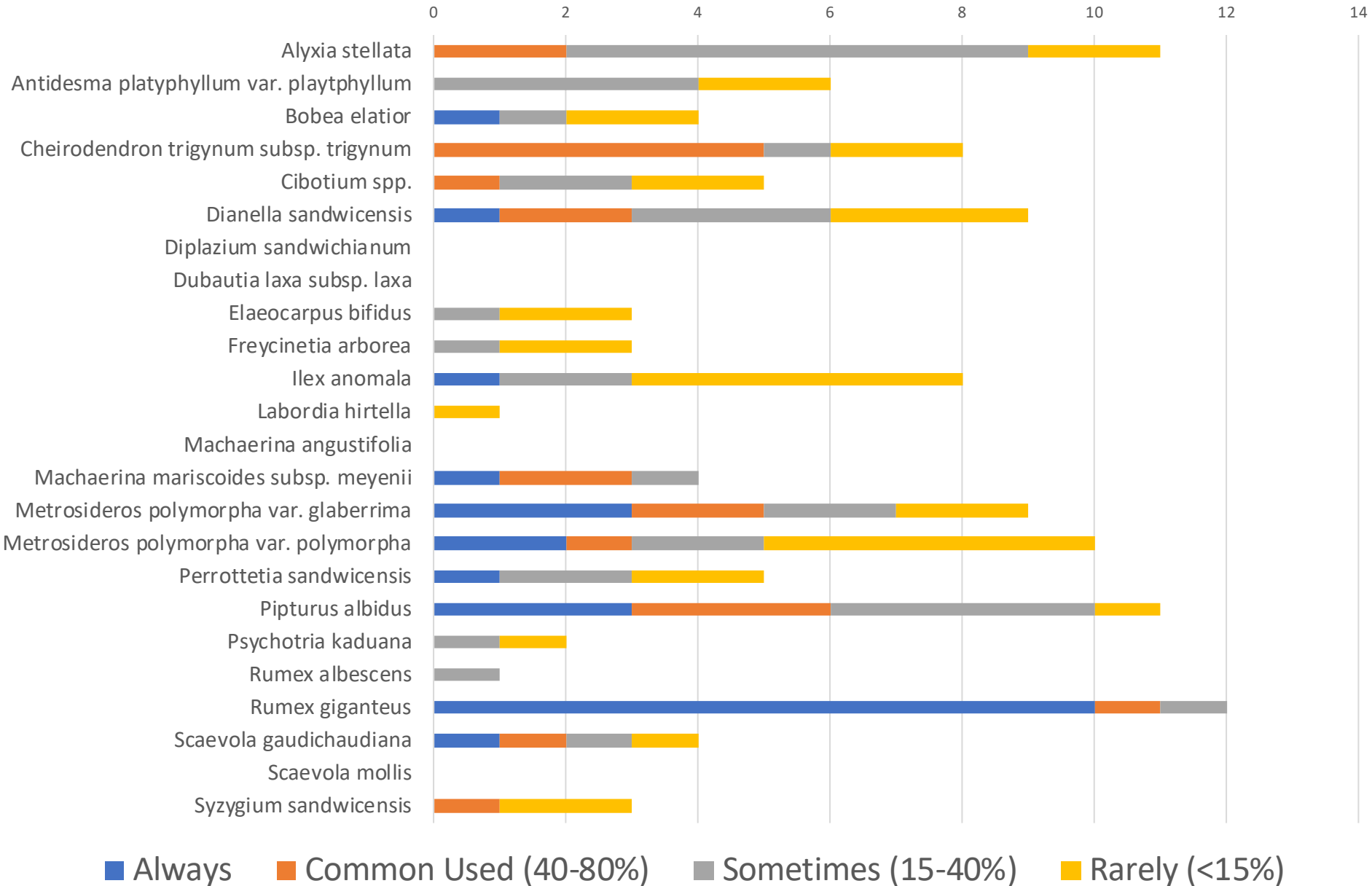
Wet Forest



Frequency of Survey Plants Used in Wet Forest Restoration



Wet Forest



Wet Forest: 'Always Used' 2+ projects and 'Commonly Used' 2+ projects

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
<i>Alyxia stellata</i>	SL	-18C/5C	<1	D/ND
<i>Cheirodendron trigynum</i> ssp. <i>trigynum</i>	NA	5C	10+	D
<i>Dianella sandwicensis</i>	FS	5C	10+	D
<i>Machaerina mariscoides</i> ssp. <i>meyenii</i>	FS	5C	NA	NA
<i>Metrosideros polymorpha</i> var. <i>glaberrima</i>	O	-18C	15-20	ND
<i>Metrosideros polymorpha</i> var. <i>polymorpha</i>	O	-18C	15-20	ND
<i>Pipturus albidus</i>	FS	5C	15-20	D
<i>Rumex giganteus</i>	O	NA	NA	D

Wet Forest: Other species used

Acacia koa
Alyxia stellata
Astelia menziesiana
Carex wahuensis subsp. wahuensis
Cheirodendron trigynum subsp. trigynum
Clermontia hawaiiensis
Coprosma montana
Coprosma rhynchocarpa
Dubautia plantaginea
Hibiscus arnottianus subsp. punaluuenis
Kadua affinis
Metrosideros polymorpha var. pumila
Myrsine lessertiana
Osteomeles anthyllidifolia
Pittosporum glabrum
Pittosporum hosmeri
Pritchardia martii
Psychotria mariniana

Rubus hawaiiensis
Santalum paniculatum
Scaevola chamissoniana
Sophora chrysophylla
Sphenomeris chinensis
Vaccinium reticulatum

**Total Species List:
46 taxa**

Wetlands and Bog: Species Used

Wetlands

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
Carex alligata	FS	5C	5+	D
Cyperus javanicus	FS	5C	15+	D
Cyperus laevigatus	NA	NA	NA	NA
Carex echinata	FS	NA	NA	NA
Marsilea villosa	NA	NA	NA	NA

Wetlands and Bog: Species Used

Bog

Taxa	Storage Behavior	Storage Temp.	Recollection interval	Dormancy
<i>Argyroxiphium grayanum</i>	NA	NA	NA	NA
<i>Carex alligata</i>	FS	5C	5+	D
<i>Clermontia samuelii</i> subsp. <i>samuelii</i>	FS	5C	NA	NA
<i>Machaerina angustifolia</i>	FS	5C	10+	D/ND
<i>Metrosideros polymorpha</i> var. <i>pumila</i>	O	-18C	15-20	ND

Useful Outcomes of Survey

- On which Islands is restoration taking place and how many projects
- In which habitats projects are focusing their restoration efforts
- Estimated quantity of plant materials used per year and by project
 - 129,500 plants/yr
- Better understanding of how projects are sourcing plant materials
 - Grow your own (57.7%), Purchase from commercial nursery (23.1%), obtain from state, federal or non-profit nursery (19.2%)
- Better understanding of how frequently projects are using direct seed-sowing in restoration
 - Working species list generated- 45 taxa
- Generated working species lists for habitats most frequently restored
 - Mesic Forest= 100 taxa
 - Dry Forest= 52 taxa
 - Wet Forest= 46 taxa
 - Coastal and Strand= 40 taxa

Useful Outcomes of Survey: Potential workhorse Spp.

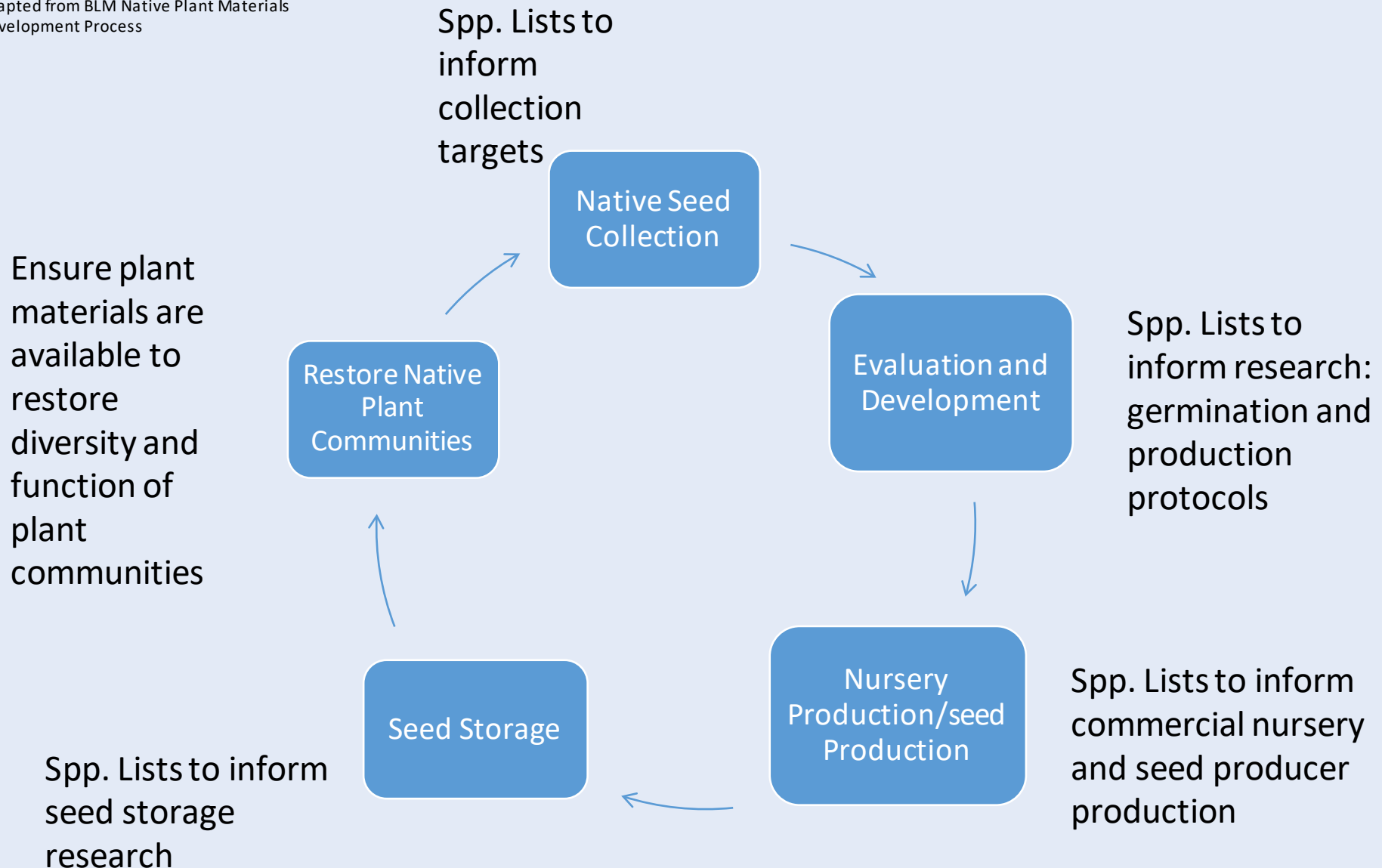
Listed Species	Habitat Type	Current Use by Mangers
<i>Alyxia stellata</i>	Dry/ Mesic/ Wet	Dry/ Wet
<i>Dodonaea viscosa</i>	Costal/ Dry /Mesic	Costal/ Dry /Mesic
<i>Heteropogon contortus</i>	Coastal/ Dry	Coastal/ Dry
<i>Nototrichium sandwicense</i>	Coastal/Dry	Coastal/Dry
<i>Panicum torridum</i>	Coastal/Dry	Coastal/Dry
<i>Plectranthus parviflorus</i>	Coastal/ Dry	Coastal/ Dry
<i>Psydrax odorata</i>	Coastal/ Dry	Coastal/ Dry
<i>Santalum ellipticum</i>	Coastal/ Dry	Coastal/ Dry
<i>Sida Fallax</i>	Costal/ Dry /Mesic	Coastal
<i>Waltheria indica</i>	Coastal/ Dry	Coastal/ Dry
<i>Ilex anomala</i>	Dry/Mesic/Wet	Mesic/ Wet

Useful Outcomes of Survey: Potential workhorse Spp.

Listed Species	Habitat Type	Current Use by Mangers
<i>Nestegis sandwicensis</i>	Dry/ Mesic	None
<i>Planchonella sandwicensis</i>	Dry/ Mesic	None
<i>Cibotium</i> spp.	Mesic/ Wet	Wet
<i>Diplazium sandwichianum</i>	Mesic/ Wet	Wet
<i>Freycinetia arborea</i>	Mesic/ Wet	None
<i>Pipturus albidus</i>	Mesic/ Wet	Mesic/wet
<i>Polyscias sandwicensis</i>	Dry/ Mesic	Dry
<i>Met. polymorpha</i> var. <i>glaberrima</i>	Mesic/ Wet	None
<i>Met. polymorpha</i> var. <i>polymorpha</i>	Mesic/ Wet	Wet
<i>Psychotria kaduana</i>	Mesic/ Wet	Wet
<i>Rumex albescens</i>	Mesic/ Wet	Wet

Native Plant Material Development Process

Adapted from BLM Native Plant Materials Development Process



Useful Outcomes of Survey: Identifying factors limiting access to native plant materials

- Species never used?
 - Coast and Strand (57%)
 - Dry forest (45%)
 - Mesic (61%)
 - Wet forest (60%)
 - Why?
 - Spp. not appropriate for restoration? Don't think so
 - Access to seed and other propagules?
 - Lack of adequate germination and production protocols
- Are we only using species that are opportunistically available? Are there species we want but can't use?
- Are we happy with the quantity of plant materials available?
 - 129,500 plants/yr
 - Is this the max. programs can accommodate?
 - OR, are we limited by facilities, information, commercial nursery availability?

Next Steps

- Expand survey efforts
 - Target smaller restoration efforts, i.e. fish pond restoration and other nonprofit/community efforts
- Revise survey to include specific questions related to capacity, availability, and use of native plant materials
- Use results to inform seed and other propagule collection
- Use results to inform applied research: Dormancy, seed storage, seed based restoration application, protocol development in order to build capacity
- Disseminate results, coupled with biological information (User's Guide) to conservation community to inform use, collection, storage and propagation

