# DISCOVERY ISLANDS ECOSYSTEM MAPPING
# 2013-2014 SENSITIVE ECOSYSTEMS FIELD VALIDATION

**Prepared by:**

Ryan Durand, RPBio.
Durand Ecological Ltd.

DIEM DISCOVERY ISLANDS ECOSYSTEM MAPPING

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## Acknowledgements

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# 1.0 Introduction

The Discovery Islands Ecosystem Mapping (DIEM) Project is creating ecosystem maps to provide a comprehensive visual reference that local communities, governments, and land managers can use to better understand the area and enlighten discussions about resources and development. A Sensitive Ecosystem Inventory (SEI) has been created for the study area, largely from existing Terrestrial Ecosystem Mapping (TEM) and Vegetation Resource Inventory (VRI) data. Durand Ecological Ltd. was retained in 2014 to complete a field validation of the SEI mapping.

SEI mapping was created in 1993 by the Canadian Wildlife Service and the BC Conservation Data Centre. It was created in '*response to a need for inventory of at-risk and ecologically fragile ecosystems, and critical wildlife habitat areas on the east side of Vancouver Island.'* Since then, numerous projects have been completed on the Sunshine Coast, Bowen Island, and throughout the Okanagan, and portions of the Fraser Valley. In 2006 a *Standard for Mapping Ecosystems At Risk in British Columbia* was created by the Resource Inventory Standards Committee to promote a standardized process province wide (RISC 2006).

The main purpose of SEI mapping is to describe the ecological diversity of a given area, and determine the type and extent of vulnerable and rare elements (RISC 2006). The SEI standard describes an overview of the assessment process as follows:

> 'The SEI classification uses two primary groupings of ecosystems: ***Sensitive Ecosystems*** and ***Other Important Ecosystems***. Within each of these groups a series of classes and subclasses is defined that provides a general level of ecosystem description that is appropriate for public education and local planning exercises. Sensitive Ecosystem categories are generalised groupings of ecosystems that share many characteristics, particularly ecological sensitivities, ecosystem processes, at-risk status, and wildlife habitat values. Criteria for ecological sensitivity include: ***environmental specificity***, susceptibility to hydrological changes, soil erosion, especially on shallow soils, spread of invasive alien plants, and sensitivity to human disturbance. Other Important Ecosystems have significant ecological and biological values associated with them that can be identified and mapped, although they are not defined as Sensitive Ecosystems because they have been substantially altered by human use. Consideration of Other Important Ecosystems is critical to capturing key elements of biodiversity of some project areas; they sometimes provide recruitment sites for ecosystems at risk or important wildlife habitat requiring recovery or restoration.'

The objectives of the 2014 field survey plan were to:

- Sample the accuracy of the SEI mapping at a survey intensity level 4 with a goal of 20% or more of the polygons sampled.
- Sample of the full range of ecosystem types that occur in the study area.
- Complete conservation evaluation assessments on the full range of ecosystem types, with a focus on ecosystems at risk.

## 2.0 Study Area

The DIEM Project area encompasses the Discovery Islands archipelago, 72,000 terrestrial hectares that includes Quadra, Cortes, Read, Maurelle, Sonora, Stuart, East Redonda, West Redonda and the Rendezvous Islands (Figure 2.1). Cortes Island and the southern portion of Quadra Island were previously mapped Sunshine Coast SEI project (MOE 2005).

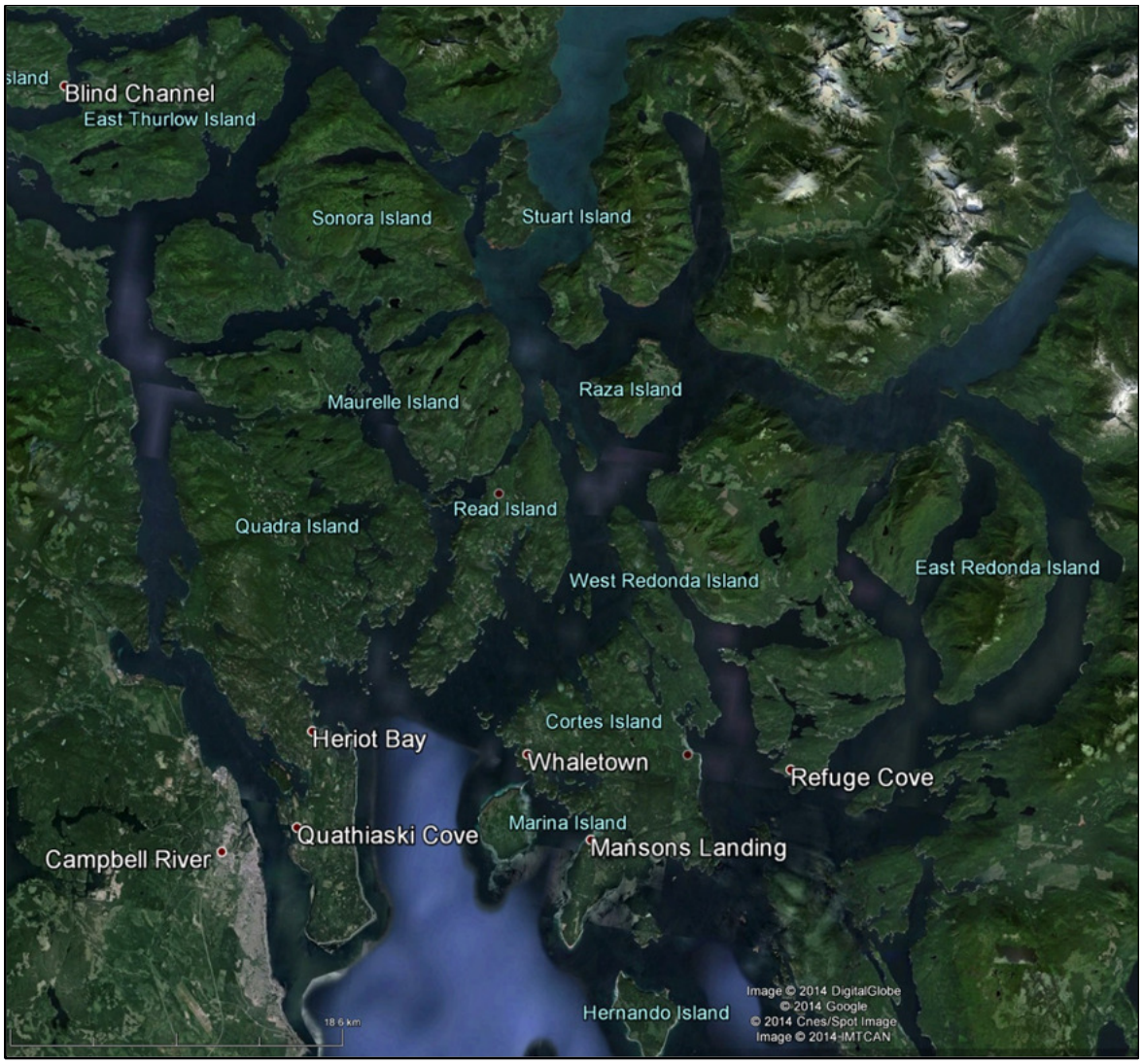


FIGURE 2.1. DIEM SEI STUDY AREA (GOOGLE EARTH 2014)

The DIEM project is located within three Biogeoclimatic Zones the Coastal Western Hemlock (CWH), Mountain Hemlock (MH) and Coastal Mountain Heather Alpine (CMA). Multiple subzone and variants occur, as summarized below (Table 2.1). Section 3.1 contains expanded descriptions of each zone and the potential site series.

TABLE 2.1. BIOGEOCLIMATIC ZONES, SUBZONES AND VARIANTS FOUND IN THE STUDY AREA

| BGC Name | Subzone Name (Variant) | Location |
|---|---|---|
| CMAunp | undifferentiated and parkland | Restricted to a very small portion on the top of East Redonda. |
| CWHdm | dry maritime | Covers all of Stuart, and the majority of Raza, West Redonda and East Redonda. |
| CWHmm1 | very wet maritime (submontane) | Restricted to high elevations of Sonora, Maurelle and Quadra. |
| CWHvm1 | very wet maritime (submontane) | Only on mid to high elevations of East and West Redonda and Raza. |
| CWHvm2 | very wet maritime (montane) | Restricted to higher elevations (small total area) of East and West Redonda and Raza. |
| CWHxm1 | very dry maritime (eastern) | Small portions of the southern ends of Read and West Redonda (and large portions of Quadra and Cortes that we mapped for the Sunshine Coast SEI project). |
| CWHxm2 | very dry maritime (western) | Covers the majority of Sonora, Maurelle, Read and Quadra. |
| MHmm1 | moist maritime (windward) | Only on high elevations of East Redonda. |

## 3.0 Methodology

Field surveys were completed as per provincial methodologies, specifically the Field Guide to Describing Ecosystems in the Field (MOF 2010) and the Standard for Mapping Ecosystems at Risk (RISC 2006). Using the goal of at least 20% of the polygons sampled (survey intensity 4). Full and ground plots included the completion of the Conservation Data Centre conservation evaluation form, while visual plots included a lessor amount of data while still meeting the objectives of the CDC form when possible.

Ground and full plots were assessed using the standard Site Visit Form and portions of the FS882 forms from Describing Ecosystems in the Field and located with a Garmin 60sx GPS. Visual plots were primarily recorded digitally using a custom data collection form on a Panasonic ruggedized tablet with the location digitized directly on ArcPad 10.

Full and ground plots were classified to the site series level, while visuals were primarily classified using the SEI classes and subclasses. Section 3.1 describes the potential site series for the study area based on BGC zones, and Section 3.2 describes the SEI classes and subclasses developed for the project.

## 3.1 BGC Site Series

The following section contains the full range of BGC site series that are recognized in the eight subzones that occur in the study area. Site series, and the process used to name and identify them is described by Green and Klinka (1994) as follows:

> "Within each biogeoclimatic subzone or variant a recurring pattern of sites reflects variation in soil and physiographic properties. These sites are classified based on their potential to produce similar plant communities at late successional stages. Sites with similar vegetation potential also have similar environmental properties, particularly soil moisture and soil nutrient regimes. Site classification units can be identified using these characteristic environmental properties, as well as characteristic stable (e.g., later successional stage) plant communities. It is important to recognize that a particular site classification unit (e.g., FdHw - Salal) can support a variety of plant communities depending on successional stage, but should ultimately result in one kind of near-climax or climax plant community.
>
> Three categories are recognized within the site classification (site association, site series, site type), with site series representing the most commonly used category for field use. Site series encompass sites capable of producing similar late seral or climax plant communities within a biogeoclimatic subzone or variant. A site series is specific to a subzone or variant; however, the stable, late seral or climax plant community encompassed by the site series may occur in more than one biogeoclimatic unit. Site associations represent sites capable of producing similar late seral or climax vegetation over a range of climates. For example, the FdHw - Salal site association spans the CWHmm, CWHdm, and CWHxm subzones. Site types are the most detailed category, representing site series subdivided according to specific soil properties such as texture or depth. The application of site types is generally restricted to detailed studies or management plans.
>
> Site associations are named using one or two tree species, followed by one or two understorey species derived from the near-climax plant community on which they are based. While the species used in the name often reflect the appearance of these communities, they may include less common species to ensure a unique name within the provincial classification.

> Site series use the same name as the site association, preceded by the appropriate biogeoclimatic subzone or variant symbol. For example, CWHxm/FdHw - Salal represents a common site series in the CWHxm subzone. Site series are numbered with a two-digit code, which indicates its position on the edatopic grid. Within a subzone or variant, the zonal site series is always numbered 01. Remaining site series are numbered sequentially from the driest to the wettest, and from nutrient poorest to richest for units with similar moisture regime."

**CMAunp**

The following description of the CMAunp was adapted from the BC Ministry of Forests (2014):

> "The alpine occurs at high elevations throughout British Columbia and has the harshest climate of any of the biogeoclimatic zones in British Columbia. Temperatures are cold for most of the year, with much wind and snow. Temperatures remain low even during the growing season, which has an exceptionally short frost-free period. Mean annual temperatures range from 0° to 4°C, and the average monthly temperature stays below 0°C from 7 to 11 months of the year. The mean temperature of the warmest month is less than 10°C. A great deal of precipitation falls in this zone, mostly as snow.
>
> The Coastal Mountain-heather Alpine Zone (CMA) occurs along the windward spine of the Coast Mountains and the mountains of Vancouver Island and the Queen Charlotte islands where the snowpack is deep and summers are moderated by maritime influences.
>
> The treeline in this environment is lowered by heavy and prolonged snow cover and can be as much as 900 m lower than in the alpine of comparable latitudes in the dry interior. Alpine begins at 1600 m in the south, descending to 1000 m in the north. Though this zone is extensive, the most of the land area is occupied by glaciers or recently exposed bare rock at the elevation of true alpine."

There are no site series recognized in the CMAunp.

**CWHdm**

The following description of the CWHdm was adapted from the BC Ministry of Forests (2014):

> "DISTRIBUTION: The CWHdm occurs at low elevations on the mainland and immediately adjacent islands. It extends from Hardwicke Island in the north to the Chilliwack River in the southeast. Along the Sunshine Coast and lower Fraser Valley it occurs above and adjacent to the CWHxm, respectively. Elevational limits range from sea level (or above CWHxm if present) to approximately 650 m (lower in wetter valleys).

CLIMATE: The CWHdm has warm, relatively dry summers and moist, mild winters with little snowfall. Growing seasons are long, and feature only minor water deficits on zonal sites.

VEGETATION: Forests on zonal sites are dominated by Douglas-fir, western red cedar, and western hemlock. Major understorey species include salal, red huckleberry, *Hylocomium splendens*, *Kindbergia oregana*, *Rhytidiadelphus loreus*, and *Plagiothecium undulatum*. Less common species include dull Oregongrape, vine maple, bracken, and swordfern."

Table 3.1-1 contains a list of site series that are recognized in the CWHdm.

TABLE 3.1-1. CWHDM SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | Status | Site Series Description |
|---|---|---|---|---|---|
| CWH | dm | - | 01 | Blue | Hw - Flat moss |
| CWH | dm | - | 02 | Red | FdPl - Cladina |
| CWH | dm | - | 03 | Blue | FdHw - Salal |
| CWH | dm | - | 04 | Blue | Fd - Sword fern |
| CWH | dm | - | 05 | Blue | Cw - Sword fern |
| CWH | dm | - | 06 | Red | HwCw - Deer fern |
| CWH | dm | - | 07 | Blue | Cw - Foamflower |
| CWH | dm | - | 08 | Red | Ss -Salmonberry |
| CWH | dm | - | 09 | Blue | Act - Red-osier dogwood |
| CWH | dm | - | 10 | Blue | Act - Willow |
| CWH | dm | - | 11 | | Pl - Sphagnum |
| CWH | dm | - | 12 | Blue | CwSs - Skunk cabbage |
| CWH | dm | - | 13 | Red | Cw - Salmonberry |
| CWH | dm | - | 14 | Red | Cw - Black twinberry |
| CWH | dm | - | 15 | Blue | Cw - Slough sedge |
| CWH | dm | - | Wm05 | Blue | Cattail |
| CWH | dm | - | Wb50 | Blue | Labrador-tea / western bog-laurel / peat-mosses |

**CWHmm1**

The following description of the CWHmm1 was adapted from the BC Ministry of Forests (2014):

"DISTRIBUTION: The CWHmm1 is mainly restricted to Vancouver Island where it occurs along the leeward side of the Vancouver Island Ranges above the CWHxm subzone. It also occurs at higher elevations on Quadra, Sonora, and West and East Thurlow islands. It has a discontinuous

distribution, often occurring in the upper portions of valleys draining the eastern slopes of the Vancouver Island Ranges. Elevational limits range from approximately 450 to 700 m (above the CWHxm if present), although it extends lower in isolated cases.

CLIMATE: The CWHmm1 has climatic conditions intermediate between the CWHxm and the CWHvm subzones. It has moist, mild winters and cool but relatively dry summers. Historically, dry summers have occasionally resulted in stand-replacing wildfires, which have contributed to the abundance of Fd in this variant. Climatic data are unavailable for the CWHmm1.

VEGETATION: Forests on zonal sites are dominated by western hemlock, amabilis fir, and Douglas-fir. Shrub layers commonly include red huckleberry, Alaskan blueberry, and, to a lesser extent, salal and dull Oregon-grape. *Hylocomium splendens*, *Rhytidiadelphus loreus*, and *Rhytidiopsis robusta* dominate the well-developed moss layer. Stands established following fire tend to have a greater component of Douglas-fir and its associated understorey vegetation (more salal, dull Oregon-grape, vanilla-leaf, etc.)."

Table 3.1-2 contains a list of site series that are recognized in the CWHmm1.

TABLE 3.1-2. CWHMM1 SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | Status | Site Series Description |
|---|---|---|---|---|---|
| CWH | mm | 1 | 01 | Blue | HwBa - Pipecleaner moss |
| CWH | mm | 1 | 02 | Blue | FdHw - Salal |
| CWH | mm | 1 | 03 | Red | HwCw - Salal |
| CWH | mm | 1 | 04 | Blue | CwHw - Sword fern |
| CWH | mm | 1 | 05 | Red | BaCw - Foamflower |
| CWH | mm | 1 | 06 | Red | HwBa - Deer fern |
| CWH | mm | 1 | 07 | Red | BaCw - Salmonberry |
| CWH | mm | 1 | 08 | | Ss - Salmonberry |
| CWH | mm | 1 | 09 | Blue | Act - Red-osier dogwood |
| CWH | mm | 1 | 10 | | Act - Willow |
| CWH | mm | 1 | 11 | | Pl - Sphagnum |
| CWH | mm | 1 | 12 | Blue | CwSs - Skunk cabbage |
| CWH | mm | 1 | Wf52 | Red | Sweet gale - Sitka sedge |
| CWH | mm | 1 | Wf53 | Red | Slender sedge - White beak-rush |
| CWH | mm | 1 | Wm09 | | Inflated sedge |
| CWH | mm | 1 | Wm51 | Red | Three-way sedge |

**CWHvm1**

The following description of the CWHvm1 was adapted from the BC Ministry of Forests (2014):

> "DISTRIBUTION: The CWHvm1 is the most extensive biogeoclimatic unit in the Vancouver Forest Region. It occurs on the windward slopes of Vancouver Island as far south as Jordan River, and on both sides of Vancouver Island north of Kelsey Bay. Its northern limit on Vancouver Island occurs just north of Port Hardy. On the mainland, the CWHvm1 occurs along the windward slopes of the Coast Mountains, from the Fraser River to the northern boundary of the Vancouver Forest Region. In the south an isolated occurrence is mapped in Garne Creek, 15 km west of Hope; otherwise it only occurs west of Harrison Lake. The elevational limits range from sea level (or above CWHxm or CWHdm if present) to approximately 650 m (600 m on Vancouver Island).
>
> CLIMATE: The CWHvm1 has a wet, humid climate with cool summers and mild winters featuring relatively little snow. Growing seasons are long. Although precipitation is high, it can vary considerably, from lower values in the local rainshadow of northeastern Vancouver Island (Port Hardy, Port Alice, Coal Harbour, and Alice Lake areas), to the highest values where air masses lift over steep mountains (e.g., Ocean Falls).
>
> VEGETATION: Forests on zonal sites are dominated by western hemlock, amabilis fir, and lesser amounts of western red cedar. The understorey generally features a well developed shrub layer dominated by red huckleberry and Alaskan blueberry, and a well-developed moss layer dominated by *Hylocomium splendens* and *Rhytidiadelphus loreus*. Herbs are sparse and include minor amounts of deer fern, five-leaved bramble, bunchberry, and queen's cup. Subdued terrain on the west coast and northern end of Vancouver Island features very old successional stages dominated by western red cedar, western hemlock and salal."

Table 3.1-3 contains a list of site series that are recognized in the CWHvm1.

TABLE 3.1-3. CWHVM1 SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | Status | Site Series Description |
|---|---|---|---|---|---|
| CWH | vm | 1 | 01 | | HwBa - Blueberry |
| CWH | vm | 1 | 01 | | HwBa - Blueberry, Salal |
| CWH | vm | 1 | 02 | | HwPl - Cladina |
| CWH | vm | 1 | 03 | Blue | HwCw - Salal |
| CWH | vm | 1 | 04 | Blue | CwHw - Sword fern |
| CWH | vm | 1 | 05 | | BaCw - Foamflower |
| CWH | vm | 1 | 06 | Blue | HwBa - Deer fern |
| CWH | vm | 1 | 06 | | HwBa - Deer fern, Salal |

| | | | | | |
|---|---|---|---|---|---|
| CWH | vm | 1 | 07 | | BaCw - Salmonberry |
| CWH | vm | 1 | 08 | Blue | BaSs - Devil's club |
| CWH | vm | 1 | 09 | Red | Ss - Salmonberry |
| CWH | vm | 1 | 10 | Blue | Act - Red-osier dogwood |
| CWH | vm | 1 | 11 | | Act - Willow |
| CWH | vm | 1 | 12 | | CwYc - Goldthread |
| CWH | vm | 1 | 13 | | Pl - Sphagnum |
| CWH | vm | 1 | 14 | Blue | CwSs - Skunk cabbage |
| CWH | vm | 1 | 15 | | YcHm - Skunk cabbage |
| CWH | vm | 1 | Wb50 | Blue | Labrador tea - Bog-laurel - Peat-moss |
| CWH | vm | 1 | Wf50 | | Narrow-leaved cotton-grass - Peat-moss |
| CWH | vm | 1 | Wf51 | Red | Sitka sedge - Peat-moss |
| CWH | vm | 1 | Ws06 | Blue | Sitka willow - Sitka sedge |

**CWHvm2**

The following description of the CWHvm2 was adapted from the BC Ministry of Forests (2014):

> "DISTRIBUTION: The CWHvm2 occurs at higher elevations, above the CWHvm1. Elevational limits range from approximately 650-1000 m in the south to 450-800 m in the north. It grades into the MH zone above.
>
> CLIMATE: The CWHvm2 has a wet, humid climate with cool, short summers and cool winters featuring substantial snowfall. Compared with the submontane variant, the CWHvm2 has cooler temperatures, shorter growing seasons, and heavier snowfall, with snowpacks persisting throughout the winter.
>
> VEGETATION: Forests on zonal sites are dominated by western hemlock, amabilis fir, and, to a lesser extent, western red cedar, yellow cedar, and mountain hemlock. The latter two species become more common with increasing elevation and wetter sites. Major understorey species include Alaskan blueberry, five-leaved bramble, *Hylocomium splendens*, *Rhytidiadelphus loreus*, and *Rhytidiopsis robusta."*

Table 3.1-4 contains a list of site series that are recognized in the CWHvm2.

TABLE 3.1-4. CWHVM2 SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | Status | Site Series Description |
|---|---|---|---|---|---|
| CWH | vm | 2 | 01 | | HwBa - Blueberry |
| CWH | vm | 2 | 02 | | HwPl - Cladina |

| | | | | | |
|---|---|---|---|---|---|
| CWH | vm | 2 | 03 | Blue | HwCw - Salal |
| CWH | vm | 2 | 04 | Blue | CwHw - Sword fern |
| CWH | vm | 2 | 05 | | BaCw - Foamflower |
| CWH | vm | 2 | 06 | Blue | HwBa - Deer fern |
| CWH | vm | 2 | 07 | | BaCw - Salmonberry |
| CWH | vm | 2 | 08 | Blue | BaSs - Devil's club |
| CWH | vm | 2 | 09 | | CwYc - Goldthread |
| CWH | vm | 2 | 10 | | Pl - Sphagnum |
| CWH | vm | 2 | 11 | | CwYc - Skunk cabbage |
| CWH | vm | 2 | 12 | | YcHm - Skunk cabbage |
| CWH | vm | 2 | Wf51 | Red | Sitka sedge - Peat-moss |
| CWH | vm | 2 | Wm09 | | Inflated sedge |
| CWH | vm | 2 | Ws06 | Blue | Sitka willow - Sitka sedge |

**CWHxm1 and CWHxm2**

The following description of the CWHxm was adapted from the BC Ministry of Forests (2014):

> "DISTRIBUTION: The CWHxm occurs at lower elevations along the east side of Vancouver Island (above the CDF where present) as far north as Kelsey Bay, and on the islands around southern Johnstone Strait. It also occurs inland on Vancouver Island along major valleys from Nimpkish Valley in the north to Cowichan Valley in the south. On the mainland it extends up the south side of the Fraser River as far as Chilliwack, and along the Sunshine Coast as far as Desolation Sound. Elevational limits range from sea level (or above the CDFmm where present) to approximately 700 m. Near the wetter parts of its distribution, the upper limit is lower (e.g., 150 m on Gambier and Bowen islands, and in the Fraser Valley).
>
> CLIMATE: The CWHxm has warm, dry summers and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites.
>
> VEGETATION: Forests on zonal sites are dominated by Douglas-fir, accompanied by western hemlock and minor amounts of western hemlock. Major understorey species include salal, dull Oregon-grape, red huckleberry, *Hylocomium splendens*, and *Kindbergia oregana*. Less common species include vanilla-leaf, sword fern, twinflower, and bracken."

Table 3.1-5 and 3.1-6 contains a list of site series that are recognized in the CWHxm1 and xm2.

TABLE 3.1-5. CWHXM1 SITE SERIES (MOF 2011)

| BGC | BGC | BGC | Site | Status | Site Series Description |
|---|---|---|---|---|---|

| Zone | Subzone | Variant | Series | | |
|---|---|---|---|---|---|
| CWH | xm | 1 | 01 | Red | HwFd - Kindbergia |
| CWH | xm | 1 | 02 | Red | FdPl - Cladina |
| CWH | xm | 1 | 03 | Blue | FdHw - Salal |
| CWH | xm | 1 | 04 | Blue | Fd - Sword fern |
| CWH | xm | 1 | 05 | Blue | Cw - Sword fern |
| CWH | xm | 1 | 06 | Red | HwCw - Deer fern |
| CWH | xm | 1 | 07 | Blue | Cw - Foamflower |
| CWH | xm | 1 | 08 | Red | Ss - Salmonberry |
| CWH | xm | 1 | 09 | Blue | Act - Red-osier dogwood |
| CWH | xm | 1 | 10 | Blue | Act - Willow |
| CWH | xm | 1 | 11 | Blue | Pl - Sphagnum |
| CWH | xm | 1 | 12 | Blue | CwSs - Skunk cabbage |
| CWH | xm | 1 | 13 | Red | Cw - Salmonberry |
| CWH | xm | 1 | 14 | Red | Cw - Black twinberry |
| CWH | xm | 1 | 15 | Blue | Cw - Slough sedge |
| CWH | xm | 1 | Em03 | Red | Seashore saltgrass Herbaceous Vegetation |
| CWH | xm | 1 | Wb50 | Blue | Labrador tea - Bog-laurel - Peat-moss |
| CWH | xm | 1 | Wf10 | | Hudson Bay clubrush - Red hook-moss |
| CWH | xm | 1 | Wf52 | Red | Sweet gale - Sitka sedge |
| CWH | xm | 1 | Wf53 | Red | Slender sedge - White beak-rush |
| CWH | xm | 1 | Wm05 | Blue | Cattail |
| CWH | xm | 1 | Wm06 | Blue | Great bulrush |
| CWH | xm | 1 | Wm09 | | Inflated sedge |
| CWH | xm | 1 | Wm50 | Blue | Sitka sedge - Hemlock-parsley |
| CWH | xm | 1 | Ws50 | | Hardhack - Sitka sedge |
| CWH | xm | 1 | Ws53 | Blue | Western redcedar-sword fern-skunk cabbage |

TABLE 3.1-6. CWHXM2SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | Status | Site Series Description |
|---|---|---|---|---|---|
| CWH | xm | 2 | 01 | Red | HwFd - Kindbergia |
| CWH | xm | 2 | 02 | Red | FdPl - Cladina |
| CWH | xm | 2 | 03 | Blue | FdHw - Salal |
| CWH | xm | 2 | 04 | Blue | Fd - Sword fern |
| CWH | xm | 2 | 05 | Blue | Cw - Sword fern |
| CWH | xm | 2 | 06 | Red | HwCw - Deer fern |
| CWH | xm | 2 | 07 | Blue | Cw - Foamflower |
| CWH | xm | 2 | 08 | Red | Ss - Salmonberry |
| CWH | xm | 2 | 09 | Blue | Act - Red-osier dogwood |

| | | | | | |
|---|---|---|---|---|---|
| CWH | xm | 2 | 10 | Blue | Act - Willow |
| CWH | xm | 2 | 11 | Blue | Pl - Sphagnum |
| CWH | xm | 2 | 12 | Blue | CwSs - Skunk cabbage |
| CWH | xm | 2 | 13 | Red | Cw - Salmonberry |
| CWH | xm | 2 | 14 | Red | Cw - Black twinberry |
| CWH | xm | 2 | 15 | Blue | Cw - Slough sedge |
| CWH | xm | 2 | Wb50 | Blue | Labrador tea - Bog-laurel - Peat-moss |
| CWH | xm | 2 | Wf52 | Red | Sweet gale - Sitka sedge |
| CWH | xm | 2 | Wf53 | Red | Slender sedge - White beak-rush |
| CWH | xm | 2 | Wm05 | Blue | Cattail |
| CWH | xm | 2 | Wm51 | Red | Three-way sedge |
| CWH | xm | 2 | Ws50 | | Hardhack - Sitka sedge |

**MHmm1**

The following description of the MHmm1 was adapted from the BC Ministry of Forests (2014):

> "DISTRIBUTION: The MHmm1 occurs at high elevations on Vancouver Island and in maritime areas of the mainland coast. The lower elevational limit is between 800 and 1000 m and the upper limit is between 1100 and 1350 m.
>
> CLIMATE: The MHmm1 has long, wet, cold winters and short, cool moist summers. Frozen soils are rare due to the insulating snowpack, but growing season frosts are common. Total snowfall is high, resulting in substantial snowpacks that can persist into July.
>
> VEGETATION: Forests on zonal sites are dominated by Ba and Hm, and, to a lesser extent, yellow cedar. Alaskan blueberry, oval-leaved blueberry, and *Rhytidiadopsis robusta* are prominent in the understorey. Vegetation and stand characteristics in the MHmm1 are strongly influenced by local topography, which affects timing and pattern of snowmelt. Upper elevations grade into discontinuous forests of the parkland subzone (MHmmp1)."

Table 3.1-7 contains a list of site series that are recognized in the CWHdm.

TABLE 3.1-7. MHMM1 SITE SERIES (MOF 2011)

| BGC Zone | BGC Subzone | BGC Variant | Site Series | | Site Series Description |
|---|---|---|---|---|---|
| MH | mm | 1 | 01 | | HmBa - Blueberry |
| MH | mm | 1 | 02 | | HmBa - Mountain-heather |
| MH | mm | 1 | 03 | | BaHm - Oak fern |
| MH | mm | 1 | 04 | | HmBa - Bramble |

| | | | | | |
|---|---|---|---|---|---|
| MH | mm | 1 | 05 | | BaHm - Twistedstalk |
| MH | mm | 1 | 06 | | HmYc - Deer-cabbage |
| MH | mm | 1 | 07 | | YcHm - Hellebore |
| MH | mm | 1 | 08 | | HmYc - Sphagnum |
| MH | mm | 1 | 09 | | YcHm - Skunk cabbage |
| MH | mm | 1 | Wf51 | Red | Sitka sedge - Peat-moss |

## 3.2 SEI Classes and Subclasses

Sensitive Ecosystem (SE) classes represent generalized groupings of ecosystems that share many characteristics, particularly ecological sensitivities, ecological processes, rarity and wildlife habitat values (Iverson and Cadrin 2003). Ecosystems are classed as sensitive in this report if they have one or more of the following attributes:

- are rare or of restricted distribution
- have high biodiversity
- have high values as habitat, especially for known or potentially occurring species at risk
- are sensitive to disturbance and human impacts

Sensitive Ecosystem classes (Table 3.2-1) for DIEM were adopted from previous SEI projects on Vancouver Island (McPhee et al. 2000) and the Central Okanagan (Iverson and Cadrin 2003) as needed.

Other Important Ecosystems (OIE) provide values such as habitat, wildlife corridors and ecosystem services but in most cases have been modified by human use and are not usually considered as environmentally significant or sensitive as designated SEs (Table 3.2-2).

The Not Sensitive (NS) class is a generalized catch all for all other mapped polygons that do not contain significant ecological values, or contain significant recent of historic disturbance (Table 3.2-3).

TABLE 3.2-1. SEI CLASSES AND SUBCLASSES

| SEI Class | SEI Subclass | Brief Description |
|---|---|---|
| OF: Old Forest | | Forests > 140 yrs |
| OF | co: coniferous | Conifer > 75% of stand |
| OF | mx: mixed | Stand composition > 25% conifer and > 25% broadleaf |
| OF | vo: very old | Forests > 400 yrs |
| MF: Mature Forest | | Forests > 80 yrs, < 140 yrs, > 5 ha |
| MF | co: coniferous | Conifer-dominated (> 75% of stand composition) |

| | | |
|---|---|---|
| MF | mx: mixed | Stand composition > 25% conifer and > 25% broadleaf |
| WD: Woodland | | Dry site, open stands with between 10 and 25% tree cover. Tree species on these sites in the Discovery Islands are usually pine, arbutus and Douglas Fir. Woodlands in this area also tend to occur with herbaceous outcrops. |
| WD | co: coniferous | Conifer > 75% of stand |
| WD | mx: mixed | Conifer > 25% and broadleaf > 25% of composition |
| RI: Riparian | | Ecosystems associated with and influenced by freshwater. Nutrient-rich, rapid tree growth and dense under-stories. Higher soil moisture and light conditions. Indicative vegetation includes salmon berry, devils club, elder berry, red cedar, alder, skunk cabbage, and ferns. |
| RI | ff: fringe | Narrow band near ponds or lake shorelines, or streams with no floodplain. These areas were initially mapped by buffering freshwater atlas streams and lakes by 20m. |
| RI | fh: high bench | High bench floodplain terraces |
| RI | fm: mid bench | Mid bench floodplain terraces |
| RI | fl: low bench | Low bench floodplain terraces |
| RI | gu: gully | Watercourse is in a steep V-shaped gully. Generally dense sword fern slopes with salmon berry beginning toward the foot slope. |
| RI | ri: river | Large river watercourses including gravel bars |
| RI | ca: canyon | Watercourse is within a steep sided U-shaped canyon |
| WN: Wetland | | Terrestrial – freshwater transitional areas. |
| WN | bg: bog | Nutrient-poor wetlands on peat-moss organic soils |
| WN | fn: fen | Groundwater-fed sedge-peat wetlands |
| WN | ms: marsh | Graminoid or forb-dominated nutrient-rich wetlands |
| WN | sp: swamp | Shrub or tree-dominated wetlands |
| WN | sw: shallow water | Permanently flooded, water less than 2m deep at mid-summer. |
| HB: Herbaceous | | Non-forested ecosystems; usually shallow soils, often with bedrock outcrops. In the Discovery Islands this unit is often occurs as relatively small openings within woodland ecosystems. These mossy rock outcrops with grasses and low shrubs are frequent along the rocky shoreline, and higher elevation, south facing slopes. |
| HB | hb: herbaceous | Inland sites dominated by herbs; shrub cover < 20%: generally shallow soils. |
| HB | cs: coastal herbaceous | Influenced by proximity to the ocean: > 20% vegetation cover of grasses, herbs, mosses and lichens |

| | | |
|---|---|---|
| HB | vs: vegetated shoreline | Low-lying rocky shorelines with less than 20% vegetation. |
| HB | sh: shrub | Shrubs > 20% cover, with grasses and herbs. |
| SV: Sparsely Vegetated | | Areas with 5 – 10% vascular vegetation; may have mosses, liverwort and lichen cover. In the Discovery Islands this ecosystem most often occurs along rocky shoreline. |
| SV | cl: cliff | Steep slopes, often with exposed bedrock. |
| SV | ro: rock outcrop | Rock outcrops – areas of bedrock exposure. |
| SV | ta: talus | Dominated by rubbly blocks of rock |
| ES: Estuarine | | Ecosystems at marine, freshwater & terrestrial interface |
| ES | sp: swamp | Treed or shrubby ecosystems |
| ES | md: meadow | Tall forb and graminoid vegetation that develops in the high intertidal and supra-tidal zones of estuaries |
| ES | ms: marsh | Vegetation of salt-tolerant emergent graminoids and succulents, flooded and exposed during most tidal cycles |
| ES | tf: tidal flat | Large flats of silts, sands, or pebbles flooded and exposed in most tidal cycles – macroalgae common |
| IT: Intertidal & shallow sub-tidal | | Ecosystems at marine and terrestrial interface |
| IT | mf | Mudflats |
| IT | bs | Beaches and rocky shorelines |
| IT | el | Intertidal and shallow sub-tidal eelgrass beds |
| FW: Lakes and Ponds (Freshwater) | | |
| FW | la: lake | Open water > than 2 m deep and generally > 50 ha |
| FW | pd: pond | Open water > 2 m deep and generally < 50 ha |
| KA: Karst | | Areas of karst topography. In the Discovery Islands karst areas tend to occur under thick layers of till and support productive forest land. |

TABLE 3.2-2. OIE CLASSES AND SUBCLASSES

| Other important Ecosystem Class | OEI Subclass | Brief Description |
|---|---|---|
| MF: Mature Forest | | Small patches of forest – stands > 80 yrs, < 250 yrs |
| MF | co: coniferous | Conifer > 75% of stand, < 5ha |

| | | |
|---|---|---|
| MF | mx: mixed | Stand composition > 25% conifer and > 25% broadleaf, < 5ha |
| MS: Maturing Second Growth | | Second growth forest stands > 60 yrs, < 80 yrs that lack mature structural stage elements. |
| SG | co: coniferous | Conifer > 75% of stand, < 5ha |
| SG | mx: mixed | Stand composition > 25% conifer and > 25% broadleaf, < 5ha |

TABLE 3.2-3. NS CLASSES AND SUBCLASSES

| Not Sensitive | NS Subclass | Brief Description |
|---|---|---|
| YF: Young Forest | | Large patches of forest – stands > 30 yrs, < 80 yrs |
| YF | co: coniferous | Conifer-dominated (> 75% of stand composition) |
| YF | mx: mixed | Stand composition > 25% conifer and > 25% broadleaf |
| YF | bd: broadleaf | Broad-leaf dominated (> 75% of stand composition) |
| DE: Disturbed Ecosystems | | Areas of permanent or significant disturbance. |
| DE | sh: shrub | Old clearings and logging - Shrubs > 20% cover, with grasses and herbs. |
| DE | ps: pole sapling | Trees > 10 m tall, typically densely stocked, and have overtopped shrub and herb layers; younger stands are vigorous (usually > 15–20 years old) |
| DE | rr: rural residential | Areas of permanent development for residential, commercial or industrial purposes. |
| DE | rz: roads | Roads |

## 4.0 Results

Field verification of the SEI mapping was completed over 6 days from April 27 to May 2, 2013 and 21 days from May 4 to 25, 2014. Visual, ground and full plots were completed on all the main islands in the study area, and several of the smaller islands. Due to access limitations, the majority of the plots were located near the ocean, or within short hikes. With the exception of East Redonda, every island was circled via boat, and the majority of coastal SEI polygons visually verified. Ground and full samples were primarily placed in pre-determined locations in an effort to sample the most intact ecosystems, and the full range of ecosystem types. The inland and higher elevation areas of several islands were not sampled due to access constraints.

## 4.1 BGC Site Series

Tables 4.1-1 and 4.1-2 contain a summary of the number, type and location of sample plots completed for the project, and Figure 4.1-1 presents a map of the plot locations. The site series was determined for each of the full and site visit plots, and occasionally for visual plots. Appendix 1 contains the complete plot data collected at from each full and site visit plot, including site conditions, vegetation, and general wildlife observations.

TABLE 4.1-1. SUMMARY OF NUMBER, TYPE AND BGC SUBZONE OF SAMPLE PLOTS.

| *BEC Subzone* | Number of Plots | | | *Total* |
|---|---|---|---|---|
| | *Full* | *Site Visit* | *Visual* | |
| CMAunp | 0 | 0 | 0 | 0 |
| CWHdm | 1 | 28 | 417 | 446 |
| CWHmm1 | 1 | 8 | 32 | 41 |
| CWHvm1 | 0 | 0 | 28 | 28 |
| CWHvm2 | 0 | 0 | 4 | 4 |
| CWHxm1 | 3 | 15 | 70 | 88 |
| CWHxm2 | 13 | 91 | 1,541 | 1,645 |
| MHmm1 | 0 | 0 | 0 | 0 |
| **Total** | **18** | **142** | **2,092** | **2,252** |

TABLE 4.1-2. SUMMARY OF NUMBER, AND LOCATION OF SAMPLE PLOTS.

| *BEC Subzone* | *Quadra* | *Read* | *Maurelle* | *Sonora* | *Stuart* | *Raza* | *E. Redonda* | *W. Redonda* | *Other* |
|---|---|---|---|---|---|---|---|---|---|
| CMAunp | | | | | | | | | |
| CWHdm | | | | | 77 | 77 | 100 | 183 | 9 |
| CWHmm1 | 7 | | 1 | 33 | | | | | |
| CWHvm1 | | | | | | 14 | 13 | 1 | |
| CWHvm2 | | | | | | 1 | 2 | 1 | |
| CWHxm1 | 9 | 24 | | | | | | 44 | 11 |
| CWHxm2 | 692 | 280 | 259 | 320 | | | | | 94 |
| MHmm1 | | | | | | | | | |
| **Total** | **708** | **304** | **260** | **353** | **77** | **92** | **115** | **229** | **114** |

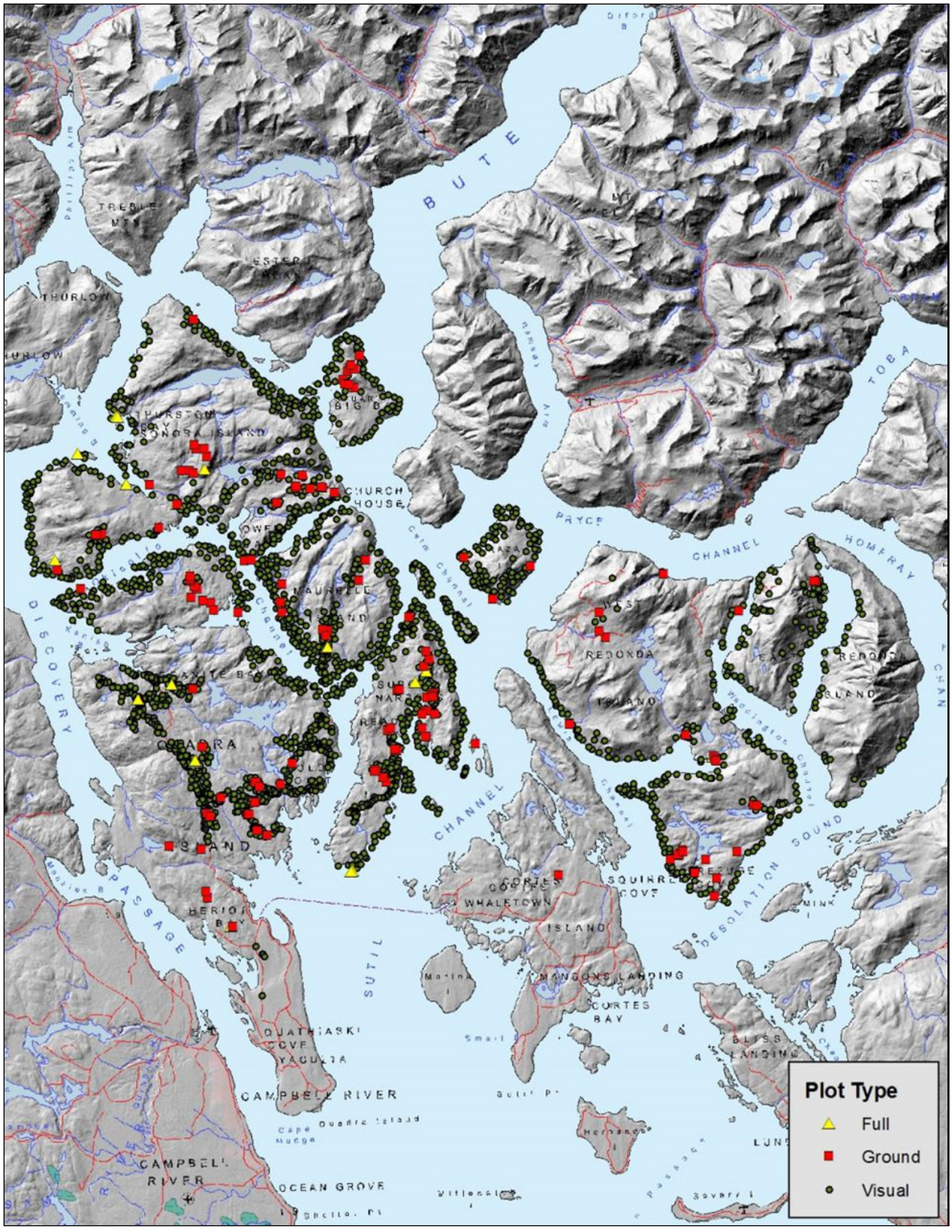


FIGURE 4.1-1. MAP OF SAMPLE PLOT LOCATIONS

## 4.2 SEI Classes and Subclasses

The draft SEI class and subclasses were assessed in the field to determine if:

- they occurred within the study area;
- the descriptions were accurate; and
- they describe all the ecosystem types observed.

The following section provides a summary of the revised SEI classes and subclasses, along with proposed new subclasses and those which were not used. Each class and subclass is described in detail, including representative photographs, site conditions and dominant vegetation.

### Old Forest (OF)

Old Forest are defined as forests where tree ages are mostly 140 years or older. These stands are generally conifer-dominated with complex vertical structure. Three subclasses are recognized:

- **co** – conifer-dominated forest stands (>75% conifer composition) where canopy tree ages mostly 140– 400 years old.

- **mx** – mixture of coniferous and broadleaf trees (<75% coniferous and < 75% broadleaf composition) where canopy tree ages mostly 140 – 400 years old.

- **vo – very old:** canopy trees are mostly 400 years old or older.

To date, only the OF:co subclass has been identified in the DIEM study area. The OF class is generally represented in three different situations:

1. Small patches to large, continuous stands of high elevation old forests with little to no sign of human disturbances. These OF stands are generally located in difficult areas to access (higher elevation and rocky areas) and typically contain trees of lesser timber value. They were likely either too far from the ocean, or too poor quality at the time, to have been logged to date. However, relative to the forest cover that remains on much of the DIEM study area, they are becoming increasing valuable and being targeted by conventional or heli-logging. Figure 4.2-1 presents an OF located on higher elevations of Sonora Island. While the individual trees in these stands are not as large or impressive as lower elevation stands, the lack of any significant disturbance indicates they are intact old forests.

2. Small patches in marginal areas (rocky outcrops, wet depressions) where previous logging was either difficult, or the trees were considered to be inferior at the time. Figure 4.2-2 shows an example of a small OF patch in a wet, swampy area on Read Island that remains relatively intact, while all of the surrounding area was logged at least once.

3. Small components of young or mature forests. This is one of the more common types of OF remaining on many of the islands. Small patches of old trees, or more often individual old vets that were not logged during the first pass in the early 1900s, were found sporadically through an otherwise young stand. These areas are typically not considered to be old growth stands as they represent a small portion of the total number of trees in a given area. Figure 4.2-3 represents a remnant old tree in an otherwise young stand on Read Island that is typical of this situation.

FIGURE 4.2-1. OLD YELLOW CEDAR CONIFER FOREST ON SONORA ISLAND.

FIGURE 4.2-2. OLD FOREST ON READ ISLAND.

FIGURE4.2-3. OLD VETERAN DOUGLAS-FIR ON READ ISLAND.

## Mature Forest (MF)

Mature Forests are generally >80 and < 250 years old, with no disturbance for at least 80 years. These forests are not typically as structurally complex as old forest ecosystems, but can function as essential habitat areas for many wildlife species and as primary connections between ecosystems in a highly fragmented landscape. A minimum polygon size of 5 ha is proposed for inclusion in the MF sensitive ecosystem class. MF polygons of <5ha would be considered an Other Important ecosystem. Two subclasses are recognized:

- **co** – conifer dominated (> 75% coniferous species).

- **mx** – mixed conifer and deciduous (<75% coniferous and < 75% broadleaf composition).

To date, very little MF:mx has been identified in the DIEM study area. This result is expected in a landscape that is dominated coniferous forests where mixed and broadleaf stands are general an early seral feature. No MF:mx forests were sampled with a full or ground/site plot.

MF:co is relatively common in the study area, with 34 full or ground/site sample plots located in MF:co and over 400 visual plots. The vast majority of the MF is second growth forests. Some sites were classified as MF due to structural attributes; however the lack of an obvious disturbance history may indicate that they are in fact old forests growing on low productivity, marginal sites, that will never produce large, old trees. The MF is typically dominated by western red cedar, western hemlock, and/or Douglas-fir. Western hemlock is typically more abundant that expected due to the significant disturbance history of most stands. Site conditions, disturbance, and understory vegetation is varied base on location, topography and proximity to the ocean or human habitation. Figure 4.2-4 (Sonora Island) is representative of a typical MF stand, with larger maturing trees common, along with multiple other age classes. Figure 4.2-5 (Sonora Island) is a less common occurrence; a high elevation stand with no obvious disturbance history, but lacking the structural complexity that would classify it as an OF.

FIGURE 4.2-4. MATURE CONIFER FOREST ON SONORA ISLAND.

FIGURE 4.2-5. MATURE YELLOW CEDAR CONIFER FOREST ON SONORA ISLAND.

## Woodland (WD)

Woodlands are open forests, generally between 10 and 30% tree cover. They are found on dry sites, typically on south facing slopes of rocky knolls and bedrock-dominated areas. The stands can be conifer dominated or mixed conifer and arbutus stands, and because of the open canopy, will often include non-forested herbaceous openings, on shallow soils and bedrock outcroppings. Two subclasses are recognized:

- **co** – conifer dominated ecological woodlands (greater than 75% coniferous composition).

- **mx** – mixed conifer and broadleaf ecological woodlands (minimum of 25% composition of each group comprises the total tree cover)

In addition to the two subclasses, there is significant difference to the WD that occurs near the coast, versus those that occur inland and in higher elevations. Coastal woodland (either conifer or mixed) often contains a much high diversity of shrubs and herbs, and those that occur on ocean edge, often have richly vegetated seepage sites. Coastal woodlands are typically mixed in the southern portion of the study area, while Arbutus is largely or totally absent in the north (Figure 4.2-6). Interior and higher elevation woodlands are less likely to contain arbutus and are therefore typically only Wd:co. They generally occur on much dryer sites and have little herbaceous diversity and more lichen species than moss species (Figure 4.2-7). No interior sites had the rich seepage sites that were relatively common on coastal occurrences.

Woodland in general contained a large portion of primary forest that has either never been logged, or only a small percentage was logged. Due to the generally shallow, poor soils and exposed locations, trees are small and often stunted, and although they are likely quite old, they cannot be classified as old forest.

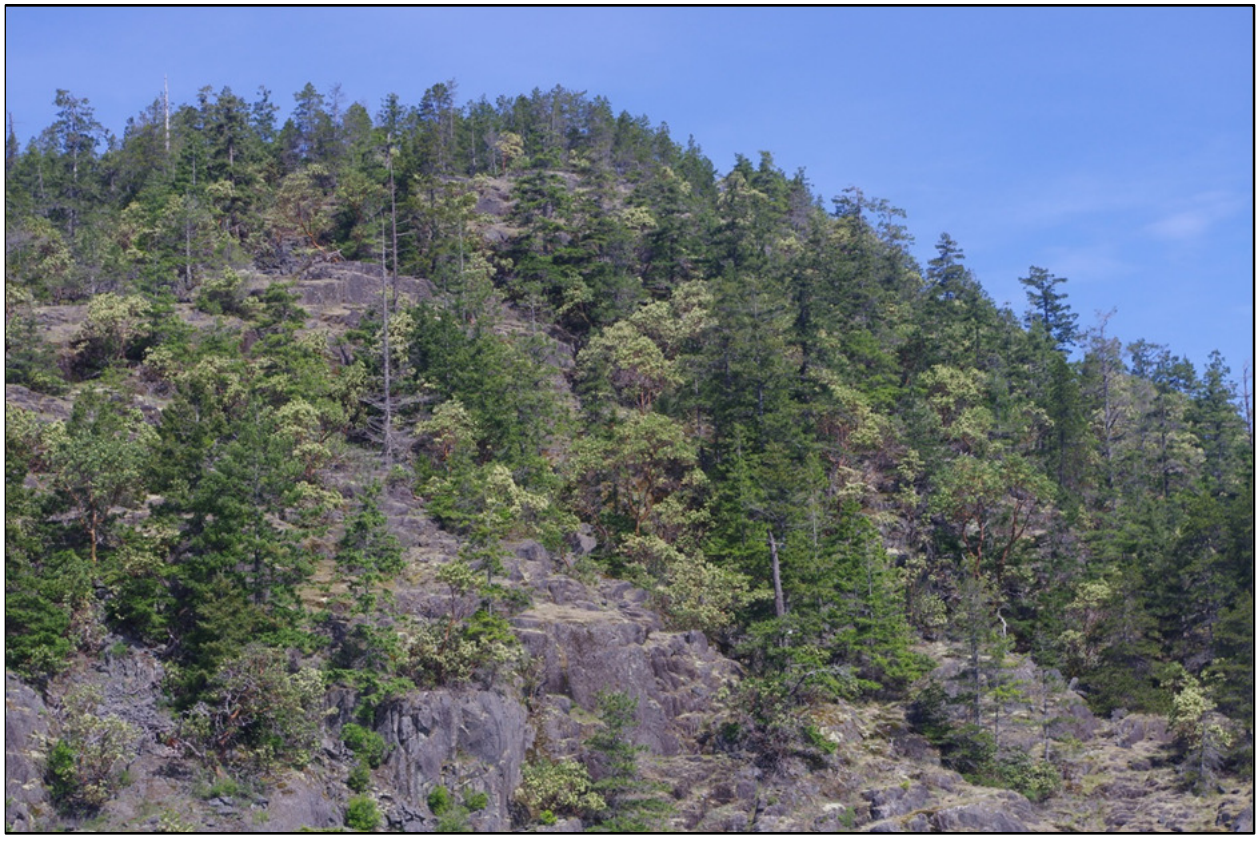

FIGURE 4.2-6. COASTAL MIXED WOODLAND ON WEST REDONDA ISLAND.

FIGURE 4.2-7. INTERIOR CONIFER WOODLAND ON READ ISLAND.

## Riparian (RI)

The Riparian class includes ecosystems that are associated with and influenced by freshwater such as along rivers, streams, creeks, and fringes around lakes. These ecosystems are influenced by factors such as erosion, sedimentation, flooding and/or subterranean irrigation due to proximity to the water body. This class includes all structural stages, i.e., structural stages 1 through 7. These ecosystem types often occurs as a fringe or gully due to generally smaller stream systems. They often include salmonberry, red elder berry, devils club, red alder, red cedar, and skunk cabbage. Seven subclasses are recognized:

- **fl** – low bench floodplain: flooded at least every other year for moderate periods of growing season; plant species adapted to extended flooding and abrasion, low or tall shrubs most common.

- **fm** – medium bench floodplain: flooded every 1-6 years for short periods (10-25 days); deciduous or mixed forest dominated by species tolerant of flooding and periodic sedimentation.

- **fh** – high bench floodplain: only periodically and briefly inundated by high waters, but lengthy subsurface flow in the rooting zone; typically conifer-dominated floodplains of larger coastal rivers.

- **ff** – fringe: narrow linear communities along open water bodies (rivers, lakes and ponds) where there is no floodplain, irregular flooding but generally more regular subsurface flooding of rooting zone.

- **gu** – gully riparian: watercourse is within a steep sided V-shaped gully or ravine; generally only minimal area of flooding but gully is important due to proximity to water and sensitive due to steeper slopes.

- **ca –** canyon**:** watercourse is within a steep sided U-shaped canyon; generally only minimal area of flooding but canyon is important due to proximity to water, steep valley walls, and somewhat unique microclimate of canyon.

- **ri** – river: river and associated gravel bars, if wide enough to be mapped.

Low, medium and high bench floodplains were infrequent in the study area, and never extensive (Figure 4.2-8 and 4.2-9). The typically occurred near the mouth of larger creeks and were normally captured in the RI:ff subclass. Floodplains were generally young to mature in age, and predominantly second growth with a significant history of logging. All site series that were identified in floodplain ecosystem are ecosystems-at-risk.

The RI:ff subclass encompassed a wide range of ecosystem types and structural stages (Figure 4.2-10). As it was created via buffering watercourse and water features from the provincial Fresh Water Atlas, it is more of a reflection of potential riparian areas, rather than mapping of vegetation communities that are adapted to or dependent on the adjacent watercourse. Fluvial fringes ranged from small floodplain forests, to mesic to wet forested areas adjacent to watercourses, ponds and lakes, to dry, rocky slopes adjacent to larger waterbodies, or more often, combinations of all three.

Gullies and canyons were found infrequently in the study area, with only a single observation of a canyon that was large enough to be mapped (Figure 4.2-11). The River subclass was used extensively, but it was applied to any moving linear watercourse, from small streams to large creeks. Large rivers, especially those that would develop prominent gravel bars, do not occur in the study area.

FIGURE 4.2-8. LOW BENCH FLOODPLAIN ON READ ISLAND.

FIGURE 4.2-9. MEDIUM BENCH FLOODPLAIN ON READ ISLAND.

FIGURE 4.2-10. FLUVIAL FRINGE ON WEST REDONDA ISLAND.

FIGURE 4.2-11. CANYON ON WEST REDONDA ISLAND.

## Wetland (WN)

Wetland ecosystems are found where soils are saturated by water for enough time that the excess water and resulting low oxygen levels influence the vegetation and soil. The water influence is generally seasonal or year-round and occurs either at or above the soil surface or within the root zone of plants. Wetlands are usually found in areas of flat or undulating terrain. They encompass a range of plant communities that includes western red cedar/skunk cabbage swamps, cattail marshes, sweet gale fens, and peat-moss dominated bogs. Estuarine vegetation is in a separate Class for this SEI to emphasize the different flooding frequency (mostly diurnal) and water chemistry (brackish). Therefore, the wetland class is for freshwater wetlands only. Five subclasses are recognized:

- **bg** – bog: acidic, nutrient-poor wetlands that characteristically support peat-mosses and ericaceous shrubs such as Labrador tea and bog-rosemary. Being generally isolated from

mineral rich groundwater or surface water, their primary source of water and nutrients is from rainfall.

- **fn** – fen: underlain by sedge or brown moss peat, fens are closely related to bogs. In addition to rainfall, fens receive mineral and nutrient-enriched water from upslope drainage or groundwater. Thus a broader range of plants, including shrubs and small trees, is able to grow.

- **ms** – marsh: characterized by permanent or seasonal flooding by nutrient-rich waters. May include some areas of diurnal flooding of fresh water above the normal high high-tide, due to high river water levels. Examples include freshwater marshes that are dominated by rushes, sedges or grasses.

- **sp** – swamp: wooded wetlands dominated by 25% or more cover of flood-tolerant trees or shrubs. Characterized by periodic flooding and nearly permanent sub-surface waterflow through mixtures of mineral and organic materials, swamps are high in nutrient, mineral and oxygen content.

- **sw** – shallow water: wetlands characterized by water less than 2 m in depth in mid-summer; transition between deep water bodies and other wetland ecosystems (i.e. bogs, swamps, fens, etc.); often with vegetation rooted below the water surface.

Wetlands represented the majority of the intact and fully functioning ecosystems within the DEIM study area. All five SEI subclasses are well represented and occur on most islands. In general, the bogs and fens had the least amount of disturbance, while many swamps were historically logged and continue to be logged. Marshes occurred in a variety of states, ranging from pristine, to heavily modified by historic draining and farming, to wetlands that had little obvious physical disturbance, but were dominated by introduced species such as reed canarygrass. Shallow water wetlands were generally found to be intact and have little human disturbance.

Bog wetland typically occurred as either a easily classifiable Wb50 (blue-listed Labrador tea – bog laurel – peat-moss) or various forms of an unclassifiable bog association that contained similar species to the WB50, but also included species such as stunted shorepine, western hemlock, or salal. Bogs in general were in excellent condition, but often occurred in wetland complexes with the outer forested areas showing signs of historic logging. Figure 4.2-12 shows an example of an intact bog complex on Quadra Island.

FIGURE 4.2-12. BOG WETLAND QUADRA ISLAND.

Fen wetlands occurred predominately as the Wf52 association (sweet gale – Sitka sedge), which is a red-listed ecosystem in the CWHxm2, but not considered to be at-risk in the CWHdm where it was also identified on multiple occasions. This wetland type often occurred in large extents, and was typically complexed with marsh wetlands in the wetter interior and forested swamp fringes. Figure 4.2-13 presents one of the largest occurrences of the sweet gale – Sitka sedge association on Maurelle Island. Several small, unclassified fens that were dominated by sedges were also identified in the study area (Figure 4.2-14).

FIGURE 4.2-13. SWEET GALE FEN WETLAND ON MAURELLE ISLAND.

FIGURE 4.2-14. UNCLASSIFIED FEN WETLAND ON QUADRA ISLAND.

Marsh wetlands were common on all islands in the study area, but rarely extensive, and typically occurred as a small component (located in the wet interiors) of larger complexes. Marshes also often occurred as small to large fringes around ponds and lakes. Four marsh associations were identified, along with numerous types that could not be classified due to disturbance or modifications:

- Wm01 – beaked sedge – water sedge
- Wm05 – cattail
- Wm06 – great bulrush (Figure 4.2-15)
- Wm50 – Sitka sedge – hemlock-parsley (Figure 4.2-16)

FIGURE 4.2-15. BULRUSH MARSH WETLAND (RIGHT SIDE OF PHOTO) ON QUADRA ISLAND.

FIGURE 4.2-16. MARSH WETLAND ON QUADRA ISLAND.

Swamps were the most common wetland type found in the study area, and also the wetland type that was the most often disturbed. Five swamp associations were identified, along with multiple unclassified types that were highly modified or disturbed:

- Ws50 – pink spirea - Sitka sedge
- Ws52 – Red alder - Skunk cabbage
- Ws53 / CWHxm2 12 (blue –listed) – Western redcedar - Sword fern - Skunk cabbage
- Ws54 (blue –listed) – Western redcedar - Western hemlock - Skunk cabbage
- CWHxm2 15 (blue –listed) – Western redcedar - Slough sedge
- CWHxm1/CWHxm2/CWHdm 00 – unclassified swamps

In general, the Ws50 swamps were undisturbed, while the treed swamps were disturbed more often than not. Figure 4.2-17 shows the most common type of swamp found in the study area, a blue-listed

Ws53. While this is a listed ecosystem, many of the Ws53 that were sampled were in too poor of shape to be considered a viable ecosystem-at-risk.

FIGURE 4.2-17. SWAMP WETLAND ON QUADRA ISLAND.

Shallow water wetlands were common, but almost always occurred as small portions of wetland complexes, mainly along the shallow margins of ponds Figure 4.2-18). Direct physical disturbance of theses wetlands were uncommon, however beaver modifications were common. Shallow water wetlands are not generally classified to specific associations, but rather lumped into a single ecosystem type. Vegetation and site conditions varied significantly, with yellow pond-lily and numerous species of pondweed or water shield also a common occurrence, along with a variety of other aquatic or emergent species.

FIGURE 4.2-18. SHALLOW WATER WETLAND ON QUADRA ISLAND.

## Herbaceous (HB)

The herbaceous class comprises non-forested ecosystems (i.e., less than 10% tree cover) associated with coarse textured, shallow soils intermixed with bedrock outcrops. Natural disturbances (wind or wave action) are common. This class includes a variety of natural ecosystems such as large, bedrock-controlled openings within forested areas, coastal headlands, shorelines vegetated with grasses and herbs, sometimes low shrubs, and moss and lichen communities on rock outcrops. In the DIEM study area this class most commonly occurs as mossy rock outcrops within woodland ecosystems. It also occurs frequently along the islands typically rocky shoreline. Four subclasses are recognized:

- **hb** – herbaceous: central concept of the category; non-forested, less than 10% tree cover, generally shallow soils, often with exposed bedrock; predominantly a mix of grasses and forbs, but also lichens and mosses.

- **cs** – coastal herbaceous: criteria as for 'hb' but influenced by proximity to ocean; windswept shoreline and slopes; > 20% vegetation of grasses, herbs, mosses and lichens.

- **vs** – vegetated shoreline: low-lying rocky shoreline, soil pockets in rock cracks and crevices; salt-tolerant vegetation, generally with < 20% vegetation cover.

- **sh** – shrub component: > 20 % of total vegetation cover is shrub cover, with grasses and herbs.

The herbaceous subclass was a common occurrence throughout the DIEM study area (Figure 4.2-19). It was generally small in extent and complexed with woodlands, and less frequently other forested subclasses. Quite often, especially in areas mapped using TEM, the HB:hb was incorporated into other ecosystem types and not pulled out as a distinct unit.

FIGURE 4.2-19. HERBACEOUS ON QUADRA ISLAND.

Coastal herbaceous was also a common occurrence (Figure 4.2-20) that varied considerably in extent and floral diversity. It ranged from dry rocky areas that were similar in composition of the HB:hb, to wet, floristically diverse areas with rich soils. As with the Hb:hb, it typically occurred with the WD, and occasionally with other forested classes. Vegetated shoreline (Figure 4.2-21) was less common than the HB:cs, and restricted to low-lying rocky areas that were strongly influence by salt spray and occasional wave action.

The shrub component of the SV class was not observed during field surveys. There is a potential for this subclass to occur, but it is likely restricted to small areas that are not readily apparent.

FIGURE 4.2-20. COASTAL HERBACEOUS ON GORGES ISLAND (WALSH COVE PROVINCIAL PARK)

FIGURE 4.2-21. VEGETATED SHORELINE ON READ ISLAND.

## Sparsely Vegetated (SV)

The sparsely vegetated class include areas of low vascular vegetation cover, generally 5 – 10 percent, but may be greater in some areas. They may have high cover of mosses, liverworts and lichens, but skeletal soils and moisture deficits limit the potential for substantial tree or shrub growth. The SV class occurs throughout the study area, from cliffs along the ocean, to high elevation rock outcrops and small talus slopes. Four subclasses are recognized:

- **cl** – cliff: steep to very steep slopes, often with exposed bedrock; may include steep-sided sand bluffs.

- **ro** – rock outcrop: exposed bedrock, usually at the top of knolls or on portions of steeper slopes.

- **ta** – talus: generally steep slopes comprised of rubbly blocks of rock.

- **st** – spit: finger-like extension of beach, comprised of sand or gravel deposited by longshore drifting; low to moderate cover of salt-tolerant grasses and herbs.

Cliffs were found through the study area, and ranged from small rock exposures near the ocean, to rock faces several hundred metres in height, such as Figure 4.2-22 on West Redonda Island. Vegetation on cliff ecosystems is sparse and generally restricted to small ledges and cliffs, yet large trees shrubs often occur. Rock outcrops are district ecological units, but they typically occur complexed with woodland and/or herbaceous classes. They are sparsely to non-vegetated and limited to low cover of mosses and lichens. Talus slopes were observed in the upper elevations of East Redonda and Sonora Islands, but the distance and access difficult precluded confirmation. A distinct spit ecosystem was not observed during the field surveys.

FIGURE 4.2-22. CLIFF ON WEST REDONDA ISLAND.

## Estuarine (ES)

Estuarine ecosystems are found at the confluence of rivers with the sea where they are influenced by occasional or diurnal tidal inundation and brackish water. The vegetation reflects the brackish water conditions to varying degrees, depending on the position in the estuary and the magnitude of freshwater outflow. Estuarine ecosystems are distinguished from intertidal ecosystems by the degree of freshwater input – intertidal ecosystems are influenced by saltwater tidal inundation with little to no freshwater input, except by rainfall runoff. Four subclasses are recognized:

- **sp** – estuary swamp: treed or shrubby ecosystems in brackish lagoons, on channel and estuary edges with occasional tidal flooding and waterlogged, slightly saline soils**.**

- **md –** estuary meadow: found in the high intertidal zone of estuaries where tidal flooding occurs less frequently than daily and is tempered by freshwater mixing. Species composition is relatively diverse, typically with a mix of graminoids and forbs.

- **ms –** estuary marsh: intertidal ecosystem that is flooded and exposed during most tidal cycles; usually simple communities dominated by salt-tolerant emergent graminoids and succulents.

- **tf** – estuary tidal flat: large flats of silts, sands or pebbles, flooded and exposed in most tidal cycles; macroalgae common.

No estuary swamps were identified during the field surveys. Estuary meadows (Figure 4.2-23) and marshes (Figure 4.2-24) were infrequent and small (often too small to appear on the SEI mapping). Several large tidal flats were observed, particularly an extensive on East Redonda (Figure 4.2-25).

FIGURE 4.2-23. ESTUARY MEADOW ON READ ISLAND.

FIGURE 4.2-24. ESTUARY MARSH ON WEST REDONDA ISLAND.

FIGURE 4.2-25. ESTUARY TIDAL FLATS ON EAST REDONDA ISLAND.

## Intertidal & Shallow sub-tidal (IT)

Mudflats, beaches and rocky shorelines influenced by diurnal tidal cycles with little to no freshwater input (primarily through rainfall runoff). The intertidal ecosystems link the marine and terrestrial environments. Three subclasses are recognized:

- **mf** – mudflats
- **bs** – beaches and shorelines
- **el** – intertidal & shallow subtidal eelgrass beds

Both mudflats and beaches and shorelines (Figure 4.2-26) are typically un-vegetated or sparsely vegetated with a variety of salt tolerant species. Beaches and shorelines are relatively common in the study area, but generally restricted to small protected bays and inlets on an otherwise rock dominated shoreline. Mud flats are also uncommon, and generally devoid of vegetation.

FIGURE 4.2-26. ROCKY, SPARSELY VEGETATED BEACH ON STUART ISLAND.

Eelgrass beds were also uncommon and rarely extensive. Figure 4.2-27 shows the largest eelgrass bed found in the study area on Read Island.

FIGURE 4.2-27. INTERTIDAL EELGRASS ON READ ISLAND.

## Lakes & Ponds (FW)

Freshwater ecosystems include bodies of water such as lakes and ponds that usually lack floating vegetation. Ponds of various sizes are quite common in the DIEM study area, while lakes occur less frequently. Two subclasses are recognized:

- **la** – lake: naturally occurring, static body of open water greater than 2 m deep and generally greater than 50 ha, with little to no floating vegetation

- **pd** – pond: naturally occurring, small body of open water, greater than 2 m deep and generally less than 50 ha, with little to no floating vegetation (Figure 4.2-28).

FIGURE 4.2-28. FRESHWATER POND AND HARDHACK SWAMP COMPLEX ON QUADRA ISLAND.

## Other Important Ecosystems

Other Important Ecosystems are mapped to identify important elements of biodiversity or recruitment sites for ecosystems at risk or important wildlife habitat requiring recovery or restoration.

### Young Forest (YF)

Forests generally >30 – 40 yrs old and < 80 yrs old. Young forests can be important habitat areas for many wildlife species and serve as primary connections between ecosystems in a highly fragmented landscape. These are also possible recruitment areas for mature and old forests. Three subclasses are recognized:

- **co** – conifer dominated (> 75% coniferous species).
- **mx** – mixed conifer and deciduous (<75% coniferous and < 75% broadleaf composition).

- **bd** – broadleaf dominated (>75% broad-leaved species).

All three subclasses were observed during the field studies, with YF:co (Figure 4.2-29 and 4.2-30) being one of the most common SEI subclasses observed. Young forests are generally second growth forests, although occasionally stands that may be third growth were observed. Natural young forests were no observed.

FIGURE 4.2-29. YOUNG (2ND OR 3RD GROWTH) CONIFER FOREST ON QUADRA ISLAND.

FIGURE 4.2-30. YOUNG CONIFER FOREST ON WEST REDONDA ISLAND.

## 5.0 Recommendations

The following recommendations pertain to the DIEM SEI classification system and changes that could be made to the classes and subclasses:

- The OF:mx subclass could be removed from the SEI classification system, as it is unlikely to occur in the study area due to the lack of old bigleaf maple throughout most of the study area. Bigleaf maple is the only deciduous species that would be expected to form a mixed old growth stand in the study area.

- OF:vo should be retained in the classification system, but it is unlikely to ever be used. Although it may very well exist in small area, data do not exist to accurately determine if a given stand is over 400 years in age.

- The woodland class and subclasses are good and one of the easiest and most accurate classes to map, however as mentioned in the section, the woodland that occurs in the south and near the ocean is significantly different that the one that occurs in the north and at higher elevations. Splitting it into a coastal and interior class may be useful, however the existing mapping and imagery are likely not sufficient to do it at this time.

- RI:ff is problematic, as there is no consistent buffer size that can be used on the Freshwater Atlas features that accurately depicts active riparian areas. It is a useful subclass to retain in the mapping, but the definition could be altered to remove the irregular flooding and subsurface flooding of the rooting zone, and make it a more generalized riparian zone definition.

- RI:gu and RI:ca could be combined into a single subclass. They both have similar ecological functions and the data required to accurately differentiate a steep cully from a rock canyon is not available. It would likely be more accurate to map them as a single subclass at this time. As well, canyons are likely small in size and length in the study area in general, as only one was observed during the field studies.

- RI:ri should be modified to represent small to moderate-sized creeks and streams. Rivers do not occur in the study area, and gravel bars are generally restricted to the mouth and/or estuary portions of the watercourses. The subclass should be kept in the SEI system, but the meaning of it adapted for the DIEM study area.

- SV:st was not observed during the field studies. Spits may occur (and do occur in the southern portion of the study area that were not surveyed for this project), but they are likely not of sufficient size to be mapped. The subclass could be retained in the SEI system for future use if needed.

- HB:sh was not observed during the study area, and it not likely to occur in a large enough area to be mapped and/or accurately separated from adjacent subclasses. This subclass could be removed from the SEI classification for DIEM.

- ES:sp were not observed during the field surveys. It may occur at the mouth of some of the larger creeks, but it is likely small in extent and very difficult to separate from the adjacent floodplain or riparian ecosystems. The subclass could be retained in the SEI system for future use if needed.

- HB:cs and HB:vs could be combined into a single subclass as there was not a significant difference between the two types. Also it is not certain that the two subclasses could be reliably separated by either modelling existing mapping or via airphoto interpretation.

- The Maturing Second Growth and Disturbed Ecosystems classes and subclasses should be removed from the DIEM SEI system at this time. While the subclasses would be useful, existing data and mapping are not sufficient to apply these classifications in any meaningful or comprehensive manner across the study area.

## 6.0 References

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# 7.0 Appendices

## 7.1 Appendix 1. Raw Sample Plot Data

| Plot # | Island | Project ID | Plot Type | Date | Surv. | Easting | Northing | BGC | SS | Status | SEI | SMR | SNR | Elevation (m) | Slope (%) | Aspect | Mesoslope |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC007 | Cortes | DIEM | G | 4/28/2013 | RD | 360166 | 5554331 | CWHxm1 | 01 | Red | MF:co | 4 | C | 124 | 20 | 312 | Lower Slope |
| ER002 | East Reonda | DIEM | G | 5/6/2014 | RD, CE | 376383 | 5571535 | CWHdm | 05 | Blue | MF:co | 4 (5) | D- | | 5 | 30 | Toe |
| ER001 | East Reonda | DIEM | G | 5/6/2014 | RD, CE | 376477 | 5571525 | CWHdm | Ws52 | | WN:sp | 7 | D | | 0 | 0 | Depression |
| WR005 | Gorges Island | DIEM | G | 5/7/2014 | RD, CE | 371762 | 5569947 | CWHdm | 00 | | HB:hb | 1 | A | 3 | 10 | 180 | Mid Slope |
| DC025 | Maurelle | DIEM | G | 5/1/2013 | RD | 343989 | 5571605 | CWHxm2 | 02 | Red | WD:co | 1 | A | 131 | 60 | 240 | Crest |
| MI101 | Maurelle | DIEM | G | 5/20/2014 | RD | 346520 | 5569832 | CWHxm2 | 03 | Blue | WD:co | 1 | A | 183 | 80 | 200 | Upper Slope |
| DC024 | Maurelle | DIEM | G | 5/1/2013 | RD | 344089 | 5570965 | CWHxm2 | 05 | Blue | MF:co | 4 (5) | D | 84 | 7 | 300 | Mid Slope |
| DC026 | Maurelle | DIEM | G | 5/1/2013 | RD | 344148 | 5572673 | CWHxm2 | 05 | | YF:co | 5 | D | 137 | 5 | 280 | Level |
| MI002 | Maurelle | DIEM | G | 5/16/2014 | RD, CE | 349250 | 5573953 | CWHxm2 | 05 | | YF:co | 4 (5) | D | 77 | 0 | 0 | Level |
| MI102 | Maurelle | DIEM | G | 5/20/2014 | RD, CE | 346660 | 5569449 | CWHxm2 | 05 | Blue | MF:co | 4+ | D | 117 | 0 | 0 | Level |
| MI003 | Maurelle | DIEM | G | 5/16/2014 | RD | 349281 | 5573939 | CWHxm2 | 08 | Red | RI:fh | 8 | D | 83 | 0 | 0 | Level |
| MI001 | Maurelle | DIEM | G | 5/16/2014 | RD, CE | 348783 | 5572739 | CWHxm2 | 12 | Blue | WN:sp | 8 | D | 87 | 0 | 0 | Level |
| MI103 | Maurelle | DIEM | F | 5/20/2014 | RD, CE | 346763 | 5568783 | CWHxm2 | 12 | Blue | WN:sp | 7 | D | 93 | 0 | 0 | Level |
| MI100 | Maurelle | DIEM | G | 5/20/2014 | RD | 346779 | 5569790 | CWHxm2 | Wf52 | Red | WN:fn | 8 | D | 68 | 0 | 0 | Level |
| DC023 | Octopus Islands | DIEM | G | 5/1/2013 | RD | 341416 | 5571099 | CWHxm2 | 00 | | HB:cs | 4+ | C+ | 3 | 0 | 999 | Level |
| Penn Island 01 | Penn | DIEM | G | 5/10/2014 | RD, CE | 355459 | 5562547 | CWHxm1 | 01 | | YF:co | 4 (3) | C (B) | 23 | 12 | 50 | Mid Slope |
| DC001 | Quadra | DIEM | G | 4/27/2013 | RD | 338833 | 5553842 | CWHxm1 | 00 | | WN:sw | 8 | C | | 0 | 999 | Depression |
| DC008 | Quadra | DIEM | F | 4/29/2013 | RD | 340227 | 5552060 | CWHxm1 | 00 | | HB:hb | 0 | B | 176 | 54 | 244 | Upper Slope |
| DC009 | Quadra | DIEM | G | 4/29/2013 | RD | 340318 | 5552013 | CWHxm1 | 03 | | YF:co | 1 | C- | 191 | 14 | 38 | Upper Slope |
| DC002 | Quadra | DIEM | G | 4/27/2013 | RD | 338778 | 5554228 | CWHxm1 | Ws54 | | WN:sp | 7 | D+ | 99 | 0 | 999 | Depression |
| QI007 | Quadra | DIEM | G | 5/17/2014 | RD | 338453 | 5566569 | CWHxm2 | 00 | | WN:sw | 8 | B (A) | 96 | 0 | 0 | Depression |
| QI011 | Quadra | DIEM | G | 5/19/2014 | RD | 341976 | 5560735 | CWHxm2 | 00 | | HB:hb | 0 | A | 37 | 75 | 160 | Upper Slope |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QI019 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 339793 | 5571715 | CWHxm2 | 00 | | WN:sp | 8 | C | 55 | 0 | 0 | Depression |
| DC006 | Quadra | DIEM | G | 4/28/2013 | RD, LK | 339918 | 5559895 | CWHxm2 | 01 | | YF:co | 4 | C | 108 | 2 | 160 | Lower Slope |
| QI004 | Quadra | DIEM | G | 5/17/2014 | RD | 338922 | 558975 | CWHxm2 | 01 | | YF:co | 4 | C | 176 | 8 | 60 | Mid Slope |
| QI008b | Quadra | DIEM | F | 5/17/2014 | RD | 337182 | 5566904 | CWHxm2 | 01 | | YF:co | 4 | C | 115 | 18 | 220 | Mid Slope |
| QI012 | Quadra | DIEM | G | 5/19/2014 | RD | 342065 | 5560758 | CWHxm2 | 01 | Red | MF:co | 4 (3) | C | 38 | 35 | 172 | Mid Slope |
| QI019b | Quadra | DIEM | G | 5/21/2014 | RD | 331936 | 5572926 | CWHxm2 | 01 | | YF:co | 4 | C | 14 | 40 | 310 | Upper Slope |
| QI026 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338598 | 5572121 | CWHxm2 | 01 | Red | MF:co | 4 | C | 194 | 45 | 360 | Upper Slope |
| DC027 | Quadra | DIEM | G | 5/2/2013 | RD | 338610 | 5556810 | CWHxm2 | 03 | | YF:co | 2 | B | 133 | 25 | 118 | Upper Slope |
| QI014 | Quadra | DIEM | G | 5/19/2014 | RD | 342629 | 5557506 | CWHxm2 | 03 | Blue | WD:co | 1 | A | 114 | 25 | 150 | Crest |
| QI022 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338837 | 5572772 | CWHxm2 | 03 | Blue | OF:co | 1 | C | 64 | 10 | 200 | Crest |
| QI018 | Quadra | DIEM | G | 5/19/2014 | RD | 341575 | 5558824 | CWHxm2 | 05 | Blue | MF:co | 4 (5) | D | 100 | 15 | 275 | Mid Slope |
| QI028 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 339972 | 5571294 | CWHxm2 | 05 | Blue | MF:co | 4 | D | 57 | 0 | 0 | Level |
| QI010 | Quadra | DIEM | F | 5/17/2014 | RD | 338426 | 5562251 | CWHxm2 | 06 | Blue | MF:co | 5 | C | 113 | 0 | 0 | Level |
| QI015 | Quadra | DIEM | G | 5/19/2014 | RD | 342036 | 5557789 | CWHxm2 | 12 | Blue | WN:sp | 8 | D | 52 | 0 | 0 | Level |
| QI017 | Quadra | DIEM | G | 5/19/2014 | RD | 341508 | 5558800 | CWHxm2 | 12 | Blue | WN:sp | 8 | D | 86 | 0 | 0 | Level |
| QI025 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338588 | 5573374 | CWHxm2 | 12 | Blue | WN:sp | 7 | D | 61 | 0 | 0 | Level |
| QI002 | Quadra | DIEM | G | 5/17/2014 | RD | 341956 | 5559507 | CWHxm2 | 12 / Ws53 | Blue | WN:sp | 8 | D | 40 | 0 | 0 | Level |
| QI003 | Quadra | DIEM | G | 5/17/2014 | RD | 339029 | 5558979 | CWHxm2 | 12 / Ws53 | Blue | WN:sp | 8 (7) | D | 177 | 0 | 0 | Level |
| QI009 | Quadra | DIEM | F | 5/17/2014 | RD | 338380 | 5562121 | CWHxm2 | 13 | Red | RI:fm | 7 | D | 101 | 0 | 0 | Level |
| DC004 | Quadra | DIEM | G | 4/28/2013 | RD, EF, LK | 344334 | 5561817 | CWHxm2 | 15 | Blue | WN:sp | 7 | D+ | 144 | 0 | 999 | Depression |
| QI008 | Quadra | DIEM | F | 5/17/2014 | RD | 335123 | 5566076 | CWHxm2 | Wb50 | Blue | WN:bg | 8 | A | 176 | 0 | 0 | Depression |
| QI021 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338981 | 5572597 | CWHxm2 | Wb50 | Blue | WN:bg | 8 | A | 65 | 0 | 0 | Depression |
| QI024 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338572 | 5573197 | CWHxm2 | Wb50 | Blue | WN:bg | 8 (7) | A | 52 | 0 | 0 | Level |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QI005 | Quadra | DIEM | G | 5/17/2014 | RD | 339215 | 5558781 | CWHxm2 | Wf52 | Red | WN:fn | 8 | C | 152 | 0 | 0 | Depression |
| QI020 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338957 | 5572609 | CWHxm2 | Wf52 | Red | WN:fn | 8 | B | 62 | 0 | 0 | Depression |
| QI023 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 338589 | 5573108 | CWHxm2 | Wf52 | Red | WN:fn | 8 | D | 43 | 0 | 0 | Level |
| QI027 | Quadra | DIEM | G | 5/24/2014 | RD, CE | 339325 | 5571895 | CWHxm2 | Wf52 | Red | WN:fn | 8 | C | 56 | 0 | 0 | Level |
| QI006 | Quadra | DIEM | G | 5/17/2014 | RD | 338917 | 5563040 | CWHxm2 | Wf53 | Red | WN:fn | 8 | D {C} | 92 | 0 | 0 | Depression |
| DC003 | Quadra | DIEM | G | 4/27/2013 | RD | 336676 | 5557067 | CWHxm2 | Wm01 | | WN:ms | 8 (7) | D+ | 157 | 0 | 999 | Depression |
| QI016 | Quadra | DIEM | G | 5/19/2014 | RD | 341477 | 5558763 | CWHxm2 | Wm50 | Blue | WN:ms | 7 | C | 89 | 0 | 0 | Level |
| DC005 | Quadra | DIEM | G | 4/28/2013 | RD | 343531 | 5560529 | CWHxm2 | Ws50 | | WN:sp | 8 | C+ | 4 | 0 | 999 | Depression |
| QI001 | Quadra | DIEM | G | 5/17/2014 | RD | 341989 | 5559546 | CWHxm2 | Ws50 | | WN:sp | 8 | D | 39 | 0 | 0 | Level |
| QI013 | Quadra | DIEM | G | 5/19/2014 | RD | 342266 | 5560452 | CWHxm2 | Ws50 | | WN:sp | 8 | D | 34 | 0 | 0 | Level |
| Raza 003 | Raza | DIEM | G | 5/14/2014 | RD, CE | 355209 | 5573854 | CWHdm | 01 | | MF:co | 4 | C | 41 | 32 | 200 | Mid Slope |
| Raza 002 | Raza | DIEM | G | 5/14/2014 | RD, CE | 356871 | 5571267 | CWHdm | 02 | Red | WD:mx | 0 | A | 12 | 75 | 172 | Upper Slope |
| Raza 01 | Raza | DIEM | G | 5/14/2014 | RD, CE | 359247 | 5573164 | CWHdm | 03 | Blue | MF:co | 1 | B | 41 | 80 | 115 | Mid Slope |
| Read 22 | Read | DIEM | F | 5/13/2014 | RD, CE | 347610 | 5555124 | CWHxm1 | 00 | | HB:hb | 0 | A | 6 | 0 | 0 | Crest |
| Read 21 | Read | DIEM | F | 5/13/2104 | RD, CE | 347729 | 5555166 | CWHxm1 | 02 | Red | WD:mx | 0 | A | 36 | 20 | 120 | Mid Slope |
| Read 08 | Read | DIEM | G | 5/11/2014 | RD, CE | 353063 | 5564419 | CWHxm2 | 12 | | WN:sp | 7 | D | 83 | 0 | 0 | Level |
| DC013 | Read | DIEM | G | 4/30/2013 | RD | 350199 | 5563579 | CWHxm2 | 00 | | ES:md | 6 | E(F) | 3 | 0 | 999 | Level |
| DC020 | Read | DIEM | G | 4/30/2013 | RD | 350968 | 5566033 | CWHxm2 | 00 | | WN:bg | Wet | B | 21 | 0 | 999 | Depression |
| Read 15 | Read | DIEM | G | 5/12/2014 | RD, CE | 349968 | 5560433 | CWHxm2 | 00 | | WN:sp | 7 | C (D) | 13 | 0 | 0 | Level |
| Read 16 | Read | DIEM | G | 5/12/2014 | RD, CE | 349803 | 5560700 | CWHxm2 | 00 | | WN:sp | 8 | D | 17 | 0 | 0 | Level |
| DC017 | Read | DIEM | G | 4/30/2013 | RD | 350580 | 5562323 | CWHxm2 | 01 | | YF:co | 3 | B | | 45 | 380 | Lower Slope |
| Read 03 | Read | DIEM | G | 5/10/2014 | RD, CE | 352706 | 5565456 | CWHxm2 | 01 | | YF:mx | 5 (4) | C | 63 | 0 | 0 | Level |
| Read 06 | Read | DIEM | G | 5/11/2014 | RD, CE | 352633 | 5564629 | CWHxm2 | 01 | Red | MF:co | 3 | B [C] | 67 | 25 | 273 | Toe |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC010 | Read | DIEM | G | 4/29/2103 | RD | 352514 | 5563099 | CWHxm2 | 02 | Red | WD:co | 2 | B | 97 | 60 | 999 | Crest |
| DC016 | Read | DIEM | G | 4/30/2013 | RD | 350733 | 5562318 | CWHxm2 | 02 | Red | WD:co | 1 | B (A) | 23 | 50 | 180 | Crest |
| Read 12 | Read | DIEM | G | 5/11/2014 | RD, CE | 352526 | 5567374 | CWHxm2 | 02 | Red | WD:co | 0 | 1 | 401 | 90 | 188 | Crest |
| DC010b | Read | DIEM | G | 4/29/2013 | RD | 352466 | 5563070 | CWHxm2 | 03 | | DE:sh | 3 | C | 84 | 20 | 140 | Upper Slope |
| Read 07 | Read | DIEM | G | 5/11/2014 | RD, CE | 352331 | 5564452 | CWHxm2 | 03 | | YF:co | 2 | B | 60 | | | Upper - Crest |
| Read 09 | Read | DIEM | G | 5/11/2014 | RD, CE | 352997 | 5565492 | CWHxm2 | 03 | Blue | OF:co | 2 | B | 70 | 90 | 240 | Upper - Crest |
| Read 10 | Read | DIEM | F | 5/11/2014 | RD, CE | 351978 | 5566436 | CWHxm2 | 03 | Blue | OF:co | 2 | C | 174 | 40 | 120 | Upper Slope |
| Read 11 | Read | DIEM | F | 5/11/2014 | RD, CE | 352667 | 5567044 | CWHxm2 | 03 | Blue | OF:co | 1 | B | 293 | 80 | 140 | Upper Slope |
| Read 13 | Read | DIEM | G | 5/11/2014 | RD, CE | 352872 | 5567761 | CWHxm2 | 03 | Blue | OF:co | 2 (3) | C | 432 | 10 | 60 | Mid Slope |
| Read 04 | Read | DIEM | G | 5/10/2014 | RD, CE | 352639 | 5565460 | CWHxm2 | 04 | Blue | MF:co | 2 (3) | C | 51 | 55 | 230 | Upper Slope |
| Read 19 | Read | DIEM | G | 5/12/2014 | RD, CE | 349259 | 5561129 | CWHxm2 | 04 | Blue | WD:co | 2 | D | 53 | | | Crest |
| DC012 | Read | DIEM | G | 4/29/2013 | RD | 352525 | 5564647 | CWHxm2 | 05 | Blue | OF:co | 4 (5) | D © | 70 | 10 | 214 | Mid Slope |
| Read 20 | Read | DIEM | G | 5/12/2014 | RD, CE | 350570 | 5562419 | CWHxm2 | 05 | Blue | MF:co | 4 | C (D) | 47 | 6 | 80 | Lower Slope |
| Read 50 | Read | DIEM | G | 5/20/2014 | RD, CE | 351749 | 5570397 | CWHxm2 | 05 | Blue | MF:co | 4 | D | 42 | 30 | 265 | Lower Slope |
| Read 02 | Read | DIEM | G | 5/10/2014 | RD, CE | 352869 | 5565562 | CWHxm2 | 07 | | YF:mx | 5 | D+ | 36 | 0 | 0 | Level |
| Read 17 | Read | DIEM | G | 5/12/2014 | RD, CE | 349282 | 5561211 | CWHxm2 | 07 | Blue | MF:co | 5 | D | 45 | 3 | 90 | Level |
| DC015 | Read | DIEM | G | 4/30/2013 | RD | 350389 | 5563698 | CWHxm2 | 08 | Red | RI:fh | 5 | D | 13 | 0 | 999 | Toe |
| Read 01 | Read | DIEM | G | 5/10/2014 | RD, CE | 353033 | 5565725 | CWHxm2 | 12 | | WN:sp | 6 | D | 48 | 0 | 0 | Level |
| Read 18 | Read | DIEM | G | 5/12/2014 | RD, CE | 349359 | 5561121 | CWHxm2 | 12 | Blue | WN:sp | 7 | D+ | 42 | 3 | 86 | Level |
| DC021 | Read | DIEM | G | 4/30/2013 | RD | 351010 | 5565996 | CWHxm2 | 12 / Ws54 | Blue | WN:sp | 6 | D | 35 | 0 | 999 | Level |
| DC014 | Read | DIEM | G | 4/30/2013 | SL | 350209 | 5563559 | CWHxm2 | Em02 | Red | ES:ms | 7 | F | 2 | 0 | 124 | Level |
| DC018 | Read | DIEM | G | 4/30/2013 | RD | 350881 | 5565951 | CWHxm2 | Wb50 | Blue | WN:bg | VW | A | 28 | 0 | 999 | Level |
| Read 14 | Read | DIEM | G | 5/11/2014 | RD, CE | 352702 | 5568273 | CWHxm2 | Wb50 | Blue | WN:bg | 8 | A (B) | 428 | 0 | 0 | Depression |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC019 | Read | DIEM | G | 4/30/2013 | RD | 350943 | 5565985 | CWHxm2 | Wm01 | | WN:ms | 8 | D | 32 | 0 | 999 | Depression |
| DC011 | Read | DIEM | G | 4/29/2013 | RD | 352276 | 5563636 | CWHxm2 | Ws | | WN:sp | 6 (7) | D | 112 | 0 | 999 | Depression |
| Sonora 74 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 339270 | 5581136 | CWHmm1 | 00 | | WN:bg | 8 | A | 518 | 0 | 0 | Depression |
| Sonora 64 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 332983 | 5576153 | CWHmm1 | 01 | | YF:co | 4 | C | 303 | 0 | 0 | Level |
| Sonora 69 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 338801 | 5579780 | CWHmm1 | 01 | Blue | OF:co | 3 | C | 449 | 10 | 32 | Level |
| Sonora 73 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 339782 | 5581079 | CWHmm1 | 01 | Blue | OF:co | 4 | C | 611 | 20 | 270 | Mid Slope |
| Sonora 63 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 333070 | 5576106 | CWHmm1 | 02 | Blue | WD:co | 1 | B | 264 | 80 | 140 | Upper Slope |
| Sonora 70 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 339062 | 5579670 | CWHmm1 | 02 | Blue | WN:co | 0 | 1 | 500 | 80 | 125 | Crest |
| Sonora 72 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 339890 | 5580630 | CWHmm1 | 06 | Red | OF:co | 5 | C (D) | 663 | 0 | 0 | Level |
| Sonora 75 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 339151 | 5581339 | CWHmm1 | 06 | Red | OF:co | 5 | C | 524 | 20 | 240 | Toe |
| Sonora 71 | Sonora | DIEM | F | 5/23/2014 | RD, CE | 339751 | 5579863 | CWHmm1 | 07 | Red | OF:co | 5 | D | 566 | 10 | 200 | Gully |
| Sonora 58 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 343990 | 5577653 | CWHxm2 | 00 | | WN:sp | 8 | D | 39 | 0 | 0 | Level |
| Sonora 60 | Sonora | DIEM | F | 5/22/2014 | RD, CE | 337995 | 5577850 | CWHxm2 | 00 | | WN:bg | 7 | A | 36 | 0 | 0 | Depression |
| Sonora 61 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 337957 | 5577799 | CWHxm2 | 00 | | WN:sp | 8 | C | 36 | 0 | 0 | Depression |
| Sonora 02 | Sonora | DIEM | F | 5/13/2014 | RD, CE | 334940 | 5579147 | CWHxm2 | 01 | Red | MF:co | 4 | C | 29 | 8 | 200 | Mid Slope |
| Sonora 04 | Sonora | DIEM | F | 5/13/2014 | RD, CE | 334565 | 5583274 | CWHxm2 | 01 | Red | OF:co | 4 | C | 56 | 28 | 109 | Mid Slope |
| Sonora 53 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 345256 | 5578572 | CWHxm2 | 01 | Red | MF:co | 4 | C | 172 | 70 | 200 | Mid Slope |
| Sonora 56 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 346744 | 5578489 | CWHxm2 | 01 | | YF:co | 4+ | C | 454 | 5 | 30 | Upper Slope |
| Sonora 57 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 347538 | 5578131 | CWHxm2 | 01 | Red | MF:co | 4 | C | 423 | 50 | 80 | Mid Slope |
| Sonora 62 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 333324 | 5576173 | CWHxm2 | 01 | | YF:co | 2 | C | 240 | 65 | 100 | Mid Slope |
| DC022 | Sonora | DIEM | G | 5/1/2013 | RD | 341937 | 5574197 | CWHxm2 | 02 | Red | WD:co | 1 | B | 18 | 58 | 150 | Upper Slope |
| Sonora 06 | Sonora | DIEM | G | 5/16/2014 | RD | 342364 | 5574230 | CWHxm2 | 02 | Red | WD:co | 0 | A | 21 | 80 | 170 | Mid Slope |
| Sonora 03 | Sonora | DIEM | F | 5/13/2014 | RD, CE | 334485 | 5583309 | CWHxm2 | 03 | Blue | MF:co | 2 | C | 105 | 0 | 0 | Crest |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sonora 66 | Sonora | DIEM | F | 5/22/2014 | RD, CE | 330438 | 5574707 | CWHxm2 | 03 | Blue | MF:co | 1 | B | 170 | 90 | 180 | Mid Slope |
| Sonora 68 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 338368 | 5579829 | CWHxm2 | 03 | Blue | MF:co | 2 | B | 298 | 10 | 160 | Mid Slope |
| Sonora 01 | Sonora | DIEM | F | 5/13/2104 | RD, CE | 332097 | 5581135 | CWHxm2 | 05 | | YF:co | 5 | D | 10 | 3 | 240 | Lower Slope |
| Sonora 76 | Sonora | DIEM | G | 5/23/2014 | RD, CE | 336363 | 5579024 | CWHxm2 | 05 | Blue | MF:co | 4 | D | 19 | 30 | 180 | Lower Slope |
| Sonora 05 | Sonora | DIEM | G | 5/16/2014 | RD, CE | 339428 | 5588943 | CWHxm2 | 06 | Blue | MF:co | 5 | C | 36 | 65 | 345 | Lower Slope |
| Sonora 51 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 345286 | 5578453 | CWHxm2 | 07 | Blue | OF:co | 6 | D (E) | 140 | 3 | 0 | Mid Slope |
| Sonora 54 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 346112 | 5578433 | CWHxm2 | 07 | Blue | MF:co | 6 | D | 293 | 3 | | Level |
| Sonora 50 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 345648 | 5579234 | CWHxm2 | 12 | Blue | WN:sp | 8 | C+ | 244 | 0 | 0 | Level |
| Sonora 65 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 330567 | 5574099 | CWHxm2 | 12 | Blue | WN:sp | 8 | D | 57 | 0 | 0 | Level |
| Sonora 59 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 344370 | 5579335 | CWHxm2 | 12 / Ws54 | | WN:sp | 8 | C+ | 107 | 0 | 0 | Level |
| Sonora 67 | Sonora | DIEM | G | 5/22/2014 | RD, CE | 336832 | 5576418 | CWHxm2 | 13 | Red | RI:fm | 7 | D | 12 | 0 | 0 | Level |
| Sonora 55 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 346834 | 5578438 | CWHxm2 | Wb50 | Blue | WN:bg | 8 | A | 445 | 0 | 0 | Depression |
| Sonora 52 | Sonora | DIEM | G | 5/21/2014 | RD, CE | 345202 | 5578501 | CWHxm2 | Wf52 | Red | WN:fn | 8 | C+ | 130 | 0 | 0 | Depression |
| SI001 | Stuart | DIEM | G | 5/15/2014 | RD, CE | 348671 | 5585452 | CWHdm | 00 | | WN:fn | 8 | C (B) | 65 | 0 | 0 | Level |
| SI005 | Stuart | DIEM | G | 5/15/2014 | RD, CE | 348882 | 5585807 | CWHdm | 00 | | WN:bg | 8 | A | 44 | 0 | 0 | Depression |
| SI007 | Stuart | DIEM | G | 5/15/2014 | RD | 348444 | 5584695 | CWHdm | 01 | | YF:co | 3 | C | 87 | 70 | 250 | Mid Slope |
| SI008 | Stuart | DIEM | G | 5/15/2014 | RD | 349006 | 5584429 | CWHdm | 01 | | MF:co | 4 | C | 252 | 5 | 240 | Level |
| SI009 | Stuart | DIEM | G | 5/15/2014 | RD | 348696 | 5584622 | CWHdm | 01 | Blue | OF:co | 4 | C | 197 | | | Mid Slope |
| SI003 | Stuart | DIEM | G | 5/15/2014 | RD, CE | 349103 | 5585569 | CWHdm | 03 | Blue | MF:co | 2 | B | 137 | 70 | 270 | Upper Slope |
| SI004 | Stuart | DIEM | G | 5/15/2014 | RD, CE | 349409 | 5586361 | CWHdm | 03 | Blue | WN:co | 1 | A | 17 | 30 | 105 | Mid Slope |
| SI002 | Stuart | DIEM | G | 5/15/2014 | RD, CE | 348848 | 5585632 | CWHdm | 05 | Blue | MF:co | 4 (5) | D | 73 | 75 | 260 | Toe |
| SI006 | Stuart | DIEM | G | 5/15/2014 | RD | 348371 | 5584930 | CWHdm | 12 | Blue | WN:sp | 8 | D | 26 | 5 | 200 | Level |
| WR007 | West Redonda | DIEM | F | 5/8/2014 | RD, CE | 369824 | 5561172 | CWHdm | 00 | | WN:bg | 8 | B | 47 | 0 | 0 | Depression |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WR009 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 369953 | 5560992 | CWHdm | 00 | | WN:sp | 8 | C (D) | 50 | 0 | 0 | Depression |
| WR018 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367742 | 5555563 | CWHdm | 00 | | WN:sw | 8 | D | 113 | 0 | 0 | Gully |
| WR008 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 369892 | 5561185 | CWHdm | 01 | | YF:co | 4 | C | 40 | 0 | 0 | Level |
| WR021 | West Redonda | DIEM | G | 5/10/2014 | RD, CE | 361204 | 5563522 | CWHdm | 01 | Blue | MF:co | 4 (5) | C+ | 57 | 35 | 200 | Lower Slope |
| WR011 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 368225 | 5562554 | CWHdm | 03 | Blue | MF:co | 2 (3) | C | 60 | 40 | 20 | Upper Slope |
| WR006 | West Redonda | DIEM | G | 5/7/2014 | RD, CE | 367276 | 5572375 | CWHdm | 05 | | YF:co | 4 (5) | D | 20 | 65 | 30 | Lower Slope |
| WR022 | West Redonda | DIEM | G | 5/10/2014 | RD, CE | 361223 | 5563467 | CWHdm | 05 | Blue | RI:ff | 5 (4) | D | 16 | 0 | 0 | Level |
| WR010 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 369988 | 5560897 | CWHdm | 06 | Red | RI:ff | 5 | C | 25 | 0 | 0 | Gully |
| WR100 | West Redonda | DIEM | G | 5/14/2014 | RD, CE | 363299 | 5570190 | CWHdm | 06 | | YF:co | 5 | C (D) | 323 | 15 | 170 | Lower Slope |
| WR003 | West Redonda | DIEM | G | 5/7/2014 | RD | 372185 | 5558155 | CWHdm | 07 | Blue | MF:co | 5 | D | 10 | 0 | 0 | Toe |
| WR101 | West Redonda | DIEM | G | 5/14/2014 | RD, CE | 363624 | 5568647 | CWHdm | 12 | Blue | WN:sp | 8 | D | 181 | 0 | 0 | Depression |
| WR004 | West Redonda | DIEM | G | 5/7/2014 | RD | 372370 | 5558087 | CWHdm | Wf52 | | WN:fn | 7 | D | | 0 | 0 | Level |
| WR102 | West Redonda | DIEM | G | 5/14/2014 | RD, CE | 363257 | 5569039 | CWHdm | Wf52 | | WN:fn | 8 | D | 189 | 0 | 0 | Depression |
| WR002 | West Redonda | DIEM | G | 5/6/2014 | RD, CE | 369754 | 5553781 | CWHxm1 | 00 | | WN:sp | 7 (6) | D | 109 | 0 | 0 | Depression |
| WR017 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367433 | 5555314 | CWHxm1 | 00 | | WN:ms | 8 | D | 79 | 0 | 0 | Level |
| WR013 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 371073 | 5555345 | CWHxm1 | 01 | | YF:co | 3-4 | C (B) | 45 | 5 | 270 | Mid Slope |
| WR020 | West Redonda | DIEM | G | 5/9/2104 | RD | 368431 | 5554155 | CWHxm1 | 02 | Red | WD:mx | 1 | A | 18 | 0 | 0 | Crest |
| WR001 | West Redonda | DIEM | G | 5/6/2014 | RD, CE | 369577 | 5552700 | CWHxm1 | 02 / 00 | Red | WD:mx | 2 | B | 4 | 75 | 145 | Lower Slope |
| WR019 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367778 | 5555481 | CWHxm1 | 03 | Blue | MF:co | 2 (3) | B [C] | 82 | 45 | 220 | Upper Slope |
| WR012 | West Redonda | DIEM | G | 5/8/2014 | RD, CE | 369144 | 5554950 | CWHxm1 | 06 | Blue | MF:co | 4 (5) | C+ | 47 | 7 | 310 | Lower Slope |
| WR015 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367547 | 5555247 | CWHxm1 | 06 | Blue | MF:co | 5 (4) | C | 70 | 2 | 0 | Toe |
| WR016 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367601 | 5555358 | CWHxm1 | 12 / Ws54 | Blue | WN:sp | 7 | D | 47 | 0 | 0 | Level |
| WR014 | West Redonda | DIEM | G | 5/9/2104 | RD, CE | 367023 | 5555013 | CWHxm1 | Em03 | Red | ES:ms | 7 | D (E) | 0 | 0 | 0 | Toe |

| Plot # | Mineral Soil Texture | Surface Shape | Floodplain | Exposure | Site Disturb. | Texture 1 | Surf. Mat. 1 | S. Exp. 1 | Drainage - Mineral Soils | Humus - Organic Form | Humus Thickness | Ah | Ae | Soil Depth (cm) | R.Z.Coarse Frag. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC007 | L | CC | | | | sz | M | hj | W | | | | | | 20-35 |
| ER002 | SiL | ST | | | Harvest | sz | MG | bj | I | Mull | >5 | 17 | | >100 | 20 |
| ER001 | | CV | | | | h | O | bd | V | Humic | | | | 40+ | 0 |
| WR005 | | ST | | Wind / Salt spray / Water spray | N/A | | R | j | X | | 0 | 0 | | 0 | 50+ |
| DC025 | SL | CV | | | | zs | R | rs | X | | | | | | 35-70 |
| MI101 | SiL | CV | | N/A | N/A | z | R | r | X | Mull | 2 | 6 | | 10-20 | 35+ |
| DC024 | L | ST | | | | zs | | jb | M | Mor | | | | | <20 |
| DC026 | L | ST | | | | zs | C | bj | I | | | | | | <20 |
| MI002 | L | ST | | N/A | Harvest | sz | M | b | M | Mull | 10 | 5 | | >40 | <5 |
| MI102 | L | ST | | N/A | Fire / Old harvest | sz | C | bt | W | | 2 | 6 | | >40 | 15 |
| MI003 | SiL | ST | Yes | N/A | Harvest | s | $F^A$ | p | I | Mull | 5 | 3 | | >30 | 10 |
| MI001 | | CC | | N/A | Harvest | m | O | vp | V | Mesic | | | | >40 | 0 |
| MI103 | | ST | | | Harvest | | O | bp | V | Humic | 2 | | | >50 | 0 |
| MI100 | | ST | | N/A | N/A | | O | bp | V | Humic | | | | >100 | 0 |
| DC023 | Si | ST | | | Salt Spray | z | M | x | M | | | | | | 35-70 |
| Penn Island 01 | LS | CV | | Wind | Fire / Harvest / Soil dist | sz | M | x | W | Mull | 2 | 3 | | >40 | >15 |
| DC001 | Si | CC | | | | | M | d | V | | | | | | <20 |
| DC008 | Si | CV | | | | z | C | xrs | P | | | | | | 35-70 |
| DC009 | SL | CV | | | | sz | M | wj | W | Mor | | | | | 20-35 |
| DC002 | Si | CC | | | | zs | $F^A$ | p | P | | | | | | <20 |
| QI007 | | ST | | | | m | O | d | V | Mesic | | | | >40 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QI011 | Si | CV | | N/A | N/A | | R | r | X | Mull | 3 | 2 | | 5 | 0 |
| QI019 | | CC | | N/A | Harvest | | O | bd | V | Mesic | | | | >60 | 0 |
| DC006 | Si | CC | | | | zs | M | bj | M | | | | | | <20 |
| QI004 | L | ST | | N/A | Harvest | zs | M | bj | M | Mull | 6 | 2 | | >40 | 15 |
| QI008b | SL | CV | | | Harvest | sz | M | bj | W | Mull | 3 | 4 | | 40+ | 20 |
| QI012 | SiL | CV | | | Old Harvest | | M | bj | W | Mull | 2 | 3 | | >40 | 15 |
| QI019b | L | CV | | N/A | Fire / Harvest | | C | v | W | Mull | 3 | 5 | | >30 | 20 |
| QI026 | L | CC | | N/A | Fire | z | C | bm | W | Mull | 5 | 3 | | >40 | 35 |
| DC027 | SL | CV | | | | sd | C | abc | R | | | | | | >70 |
| QI014 | LS | CV | | N/A | N/A | | R | r | X | Mull | 1 | 2 | | 15 | 35 |
| QI022 | SL | CV | | N/A | N/A | s | M | x | R | Moder | 5 | | 3 | 20 | 25 |
| QI018 | SiL | CC | | | Harvest | sz | M | bj | M | Mull | 7 | 4 | | >40 | 15 |
| QI028 | SiCL | ST | | N/A | N/A | z | M | bj | M | Mull | 3 | 2 | | >40 | 5 |
| QI010 | Si | ST | | | | z | M | bj | I | Moder | 3 | | 2 | 40+ | 0 |
| QI015 | | CC | | N/A | N/A | h | O | bp | V | Humic | | | | >100 | 0 |
| QI017 | | ST | | N/A | Old Harvest | | O | b | V | Humic | | | | >80 | 0 |
| QI025 | | CC | | N/A | N/A | | O | vp | P | Humic | | | | >40 | 0 |
| QI002 | SiL | CC | | | Harvest | z | M | bd | V | Mull | 1 | 15 | | >80 | 5 |
| QI003 | SiL | CC | | | Harvest | z | M | bj | P | Mull | 1 | >20 | | >60 | 0 |
| QI009 | SiL | ST | Yes | | | s | FA | p | P | Mull | 5 | | 3 | 40 | 10 |
| DC004 | Si | CC | | | | h | O | v | V | Humic | | | | | <20 |
| QI008 | | CC | | | | | O | b | V | Fibric | | | | 100+ | 0 |
| QI021 | | CC | | N/A | N/A | | O | bd | V | Fibric | | | | >80 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QI024 | | ST | | N/A | N/A | | O | bp | V | Fibric | | | | >50 | 0 |
| QI005 | | ST | | | N/A | m | O | bp | V | Mesic | 2 | | | >80 | 0 |
| QI020 | | CC | | N/A | N/A | | O | bd | V | Fibric | | | | >80 | 0 |
| QI023 | | ST | | N/A | N/A | | O | bp | V | Humic | | | | >50 | 0 |
| QI027 | | CC | | N/A | Harvest | | O | bp | V | Mesic | | | | >50 | 0 |
| QI006 | | ST | | | | m | O | pd | V | Mesic | | | | >100 | 0 |
| DC003 | | CC | | | | h | O | vd | V | Humic | | | | | <20 |
| QI016 | | ST | | N/A | N/A | m | O | bp | V | Mesic | | | | >100 | 0 |
| DC005 | | CC | | | | | Oh | b | V | Mesic | | | | | <20 |
| QI001 | | ST | | | Old Pasture | h | O | bp | V | Humic | | | | >100 | 0 |
| QI013 | | ST | | N/A | Old Pasture | h | O | p | V | Humic | | | | 40+ | 0 |
| Raza 003 | SL | CV | | N/A | Fire / Harvest | sz | M | bj | W | Moder | 7 | | 2 | >40 | 15 |
| Raza 002 | LS | CV | | Wind | N/A | | R | r | X | Mull | 1 | 2 | | 5-10 | >50 |
| Raza 01 | SL | ST | | N/A | Harvest | s | C | v | R | Moder | 2 | | 2 | >40 | >30 |
| Read 22 | | CC | | | | z | R | r | R | | 0 | 1 | | 2 | 65 |
| Read 21 | LS | CV | | Wind / SalSpray | | zs | C | x | R | Mull | 2 | 2 | | 15 | 25 |
| Read 08 | SiL | ST | | N/A | Fire / Harvest | z | M | b | P | Mull | 4 | 9 | | >50 | 5 |
| DC013 | SiL | ST | | | | z | W | pv | P | | | | | | <20 |
| DC020 | | CC | | | | mesic | O | hp | V | Mesic | | | | | |
| Read 15 | | CC | | N/A | Old Pasture? | m | O | p | P | Mesic | | | | >30 | 0 |
| Read 16 | | ST | | | Old Pasture? | h | O | p | V | Humic | | | | >40 | 0 |
| DC017 | L | CC | | | | sz | C | vs | R | Mor | | | | | 35-70 |
| Read 03 | L | ST | | N/A | Fire / Harvest / Cat Roads | zs | M or WG | bp | W - M | Mull | 8 | 3 | | >50 | 10 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Read 06 | SL | CC | | N/A | Harvest | sz | C | vj | W | Mull | 3 | 6 | | >50 | 30 |
| DC010 | LS | CV | | | | | R | rs | R | | | | | | 35-70 |
| DC016 | L | CV | | | | sz | C | v | R | Mor | | | | | 35-70 |
| Read 12 | SiL | CV | | Wind | N/A | z | R | r | X | Mull | 2 | 2 | | 5-10 | 75 |
| DC010b | SL | CV | | | | zs | M | w | W | | | | | | 20-35 |
| Read 07 | SL | CV | | N/A | Harvest | sz | C | x | R | Mull | 3 | 3 | | >35 | >35 |
| Read 09 | SL | CV | | N/A | N/A | sz | M | x | R | Mull | 4 | 2 | | >30 | 40 |
| Read 10 | SL | CV | | | | sz | C | v | R | Mull | 2 | 3 | | 12 | 40 |
| Read 11 | LS | CV | | | | | C | v | R | Mull | 3 | 2 | | >15 | 25 |
| Read 13 | SL | ST | | N/A | N/A | sz | C | bj | W | Mull | 3 | 3 | | >40 | 15 |
| Read 04 | SiL | ST | | N/A | Fire / Harvest | sz | C | vm | W - R | Mull | 4 | 5 | | 30-40 | 30 |
| Read 19 | SL | CV | | N/A | N/A | s | C | x | R | | 1 | >15 | | >30 | 30 |
| DC012 | L | ST | | | | z | M | bj | M | | | | | | <20 |
| Read 20 | LS | ST | | N/A | Harvest | sz | M | bj | M | Mull | 3 | 8 | | >50 | 25 |
| Read 50 | L | CV | | Wind | Harvest | s | M | bj | W | Mull | 2 | 10 | | >40 | 10 |
| Read 02 | L | ST | | N/A | Fire / Harvest | zs | WG | p | I | Mull | 4 | 4 | | >60 | <10 |
| Read 17 | SiL | ST | | N/A | Old Fire / Harvest | sz | M | bj | M | Mull | 2 | 6 | | >50 | 15 |
| DC015 | SiL | ST | Yes | | | z | WG | pB | I | | | | | | <20 |
| Read 01 | SiCL | ST | Yes | N/A | Harvest | zc | F | p | I | Mull | 2 | 12 | | >50 | 5 |
| Read 18 | SiL | ST | | | Harvest | sz | M | bj | P | Mull | 2 | 25 | | >50 | 5 |
| DC021 | SiL | ST | | | | zs | | bh | I | Mor | | | | | <20 |
| DC014 | SiCL | ST | | | Tidal | zs | W | p | P | | | | | | <20 |
| DC018 | | CC | | | | fibric | O | bhp | V | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Read 14 | | CC | | N/A | Old Fire | | O | d | V | Humic | | | | 80 | 0 |
| DC019 | | CC | | | | | O | vd | V | Mesic / Humic | | | | | |
| DC011 | | CC | | | | h | O | v | P | Humic | | | | | |
| Sonora 74 | | CC | | N/A | N/A | fibric | O | bd | V | Fibric | | | | >60 | 0 |
| Sonora 64 | SL | ST | | N/A | Fire / Harvest | sz | M | b | W | Moder | 5 | | 2 | >40 | 30 |
| Sonora 69 | L | CC | | N/A | N/A | s | M | bm | W | Mull | 6 | 2 | | >40 | 10 |
| Sonora 73 | SiL | ST | | N/A | N/A | zs | M | bj | M | Mull | 8 | 5 | | >40 | 5 |
| Sonora 63 | LS | CV | | Wind | N/A | sz | M | x | X | Moder | 3 | | 1 | 15-20 | 25 |
| Sonora 70 | SiL | CV | | Wind | N/A | zs | R | rk | X | Mull | 2 | 2 | | 2 | 25 |
| Sonora 72 | SiL | CC | | N/A | N/A | z | M | bp | I | Mull | 10 | 5 | | >40 | 5 |
| Sonora 75 | L | CC | | N/A | N/A | sz | M | bm | M | Mull | 8 | 3 | | >40 | 10 |
| Sonora 71 | L | CC | | Wind | | s | M | bm | I | Mull | 6 | 2 | | 40+ | 10 |
| Sonora 58 | | ST | | N/A | Harvest | m | O | bj | V | Mesic | | | | 40+ | 0 |
| Sonora 60 | | CC | | | | | O | bd | V | Fibric | | | | 100+ | 0 |
| Sonora 61 | | CC | | | | | O | bd | V | Fibric | | | | 100+ | 0 |
| Sonora 02 | SiL | ST | | | | sz | M | bj | W | Mull | 5 | 5 | | 40+ | 5 |
| Sonora 04 | SL | ST | | | Harvet | sz | M | bj | W | Morder | 6 | | 2 | 60+ | 10 |
| Sonora 53 | SiL | CV | | | | sz | C | bm | W | Mull | 15 | 5 | | >40 | 30 |
| Sonora 56 | | CV | | N/A | Fire | sz | M | v | M | Moder | 6 | | 2 | >40 | 20 |
| Sonora 57 | SL | ST | | N/A | Harvest | s | C | v | W | Moder | 8 | | 2 | >40 | 15 |
| Sonora 62 | L | CC | | | Harvest | szr | C | bk | W | Moder | 6 | | 2 | 40+ | 30 |
| DC022 | SiL | CV | | | | z cobble | C | x | R | | | | | | 35-70 |
| Sonora 06 | L | CV | | Wind / Saltspray | N/A | s | R | rs | X | Mull | 2 | 2 | | >20 | 35 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sonora 03 | SL | CV | | | | sz | M | vj | R | Mull | 8 | 2 | | 40+ | 15 |
| Sonora 66 | SL | ST | | | Fire | sk | C | vs | R | Moder | 5 | | 2 | 30+ | 40 |
| Sonora 68 | LS | CV | | N/A | N/A | s | M | bj | R | Moder | 20 | | 8 | >45 | 30 |
| Sonora 01 | SiL | CV | | | | zs | M | bj | M | Mull | 2 | 10 | | 40+ | 10 |
| Sonora 76 | SiL | ST | | | Fire / Harvest | | WG | bj | M | Mull | 6 | 3 | | >40 | 5 |
| Sonora 05 | L | CV | | Wind | Windthrow | s | C | bm | R | Moder | 4 | | 2 | >40 | 25 |
| Sonora 51 | SiL | ST | | N/A | N/A | z | $F^{l}$ | f | I | Mull | 12 | 10+ | | <50 | 0 |
| Sonora 54 | SiL | ST | | N/A | Fire / Harvest | z | M | bj | P | Mull | 2 | >10 | | >40 | 10 |
| Sonora 50 | | CC | | N/A | N/A | m | O | bj | V | Mesic | | | | >50 | 0 |
| Sonora 65 | | CC | | N/A | Harvest | h | O | b | V | Humic | | | | >40 | 0 |
| Sonora 59 | | ST | | | | | O | bj | VP | Mesic | | | | 40+ | 0 |
| Sonora 67 | SiL | ST | Yes | N/A | Harvest | sz | $F^{l}$ | p | I | Mull | 2 | 5 | | >40 | 0 |
| Sonora 55 | | CC | | N/A | N/A | | O | bd | V | Fibric | | | | 40+ | 0 |
| Sonora 52 | | CC | | N/A | N/A | | O | bd | V | Mesic | | | | >100 | 0 |
| SI001 | | ST | | | | m | O | vp | V | Mesic | | | | 0-40 | 0 |
| SI005 | | CC | | N/A | N/A | f | O | d | V | Fibric | | | | 40+ | 0 |
| SI007 | SiL | ST | | N/A | Fire / Harvest | sz | C | bm | W | Mull | 2 | 3 | | >40 | 20 |
| SI008 | L | ST | | N/A | Fire | sz | M | bj | M | Moder | 4 | 2 | | >35 | 20 |
| SI009 | L | CV | | N/A | Fire | | C | bm | W | Moder | 2 | 3 | | >40 | 20 |
| SI003 | SL | ST | | | Fire / Harvest | z | C | vm | R | Mull | 2 | 2 | | 40+ | 40 |
| SI004 | SL | CV | | Wind | N/A | s | C | v | R | | 3 | 2 | | 10-20 | 40 |
| SI002 | SiL | ST | | Wind | N/A | sz | C | bm | M | Mull | 3 | 8 | | >40 | >35 |
| SI006 | SiL | ST | | N/A | Fire / Harvest / Soil dist. / other | sz | M or WG | bj | P | Mull | 2 | 5 | | >40 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WR007 | | CC | | | Harvest | m | O | vd | V | Mesic | 0 | | | | 0 |
| WR009 | | CC | | N/A | Harvest / Beaver | h | O | v | V | Humic | | | | 40+ | 0 |
| WR018 | | CC | | N/A | Other | | O | d | V | Humic | | | | | |
| WR008 | L | ST | | N/A | Harvest | sz | M | bj | M | Mull | 3 | 11 | | >50 | 10 |
| WR021 | SL | ST | | N/A | Fire / Harvest | zs | M | bj | W | Mull | 2 | 4 | | >50 | 20 |
| WR011 | SL | ST | | N/A | Fire | sz | C | v | W | Mull | 8 | 7 | | >30 | 35 |
| WR006 | SiL | ST | | Wind | Harvest | k | C | vb | W | Mull | 2 | 15 | | >40 | 10 |
| WR022 | SiL | ST | Yes | Water spray | Fire / Harvest | sz | M | jp | I | Mull | 5 | 7 | | >30 | 20 |
| WR010 | SL | CC | Yes | N/A | Harvest | sg | GM | v | I | Mull | 2 | | 4 | >50 | 20 |
| WR100 | SiL | CC | | | Harvest / spacing | sz | M | bj | M | Mull | 5 | 5 | | >40 | 15 |
| WR003 | SiL | ST | | N/A | Harvest | sz | M | j | I | Mull | 7 | 18 | | >80 | 5 |
| WR101 | | CC | | N/A | Fire / Harvest | | O | v | P | Humic | 2 | | | >50 | 0 |
| WR004 | | ST | | N/A | Harvest | h | O | pj | P | Humic | | | | >80 | 0 |
| WR102 | | CC | | | | humic | O | bd | V | Humic | | | | >50 | 0 |
| WR002 | | CV | | N/A | Fire / Harvest | mesic | O | x | P | Mesic | | | | >80 | 5 |
| WR017 | | ST | | N/A | Harvest | h | O | d | V | Humic | | | | 40+ | 0 |
| WR013 | SL | ST | | N/A | Fire / Harvest | sz | MG | j | M | Moder | 6 | | 2 | >80 | 30 |
| WR020 | LS | CV | | Wind / Saltspray | N/A | | R | r | X | Mull | 3 | 2 | | 10 | 35 |
| WR001 | LS | CC | | Wind / Salt spray | N/A | k | C | xv | R | Moder | 2 | 1 | | 10 | >50 |
| WR019 | SL | CV | | | Harvest | zs | C | x | W | Mull | 4 | 4 | | >30 | >40 |
| WR012 | L | CC | | N/A | Fire / Harvest | sz | M or MG | bj | M | Mull | 5 | 10 | | >50 | 15 |
| WR015 | SL | ST | | N/A | Harvest | sz | MG | j | M | Mull | 3 | 5 | | >50 | 15 |
| WR016 | SiCL | ST | | N/A | Fire / Harvest | z | MG | bj | P | Mull | 3 | 14 | | >50 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WR014 | SiL | CC | | Wind / Saltspray | | | MG | j | V | Mull | 1 | 6 | | 20 | >30 |

| Plot # | Rooting Depth | Gleying - Mottles | Seepage | Rest. Layer (cm) | Restrict Type | Structural Stage | Canopy Composition | Success Status | Crown Closure | Tree (A) % | Shrub (B) % | Herb (C) % | Moss/Lichen (D) % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC007 | | | | | | 6 | mC | | 20 | 20 | 60 | T | 75 |
| ER002 | | N/A | N/A | N/A | | 6 | tC | MS | 35 | 35 | 15 | 40 | 65 |
| ER001 | | | | | W | 2b | | | 0 | 0.1 | 5 | 35 | 5 |
| WR005 | | | | 1 | L | 1a | | | 0 | 0 | 1 | 3 | 5 |
| DC025 | | | | 10 | L | 5 | iC | | 10 | 10 | 10 | 0 | 95 |
| MI101 | 10-20 | N/A | N/A | 10-20 | L | 7a | iC | MC | 15 | 15 | 35 | 5 | 80 |
| DC024 | | | | | | 6 | mC | | 35 | 40 | 15 | 70 | 15 |
| DC026 | | | | | | 5 | tC | | 40 | 40 | 15 | 40 | 70 |
| MI002 | 12 | N/A | N/A | N/A | | 5 | tC | YS | 35 | 35 | 30 | 10 | 45 |
| MI102 | 15 | N/A | N/A | N/A | | 6 | mC | MC | 50 | 50 | 5 | 20 | 20 |
| MI003 | 15 | 13 | 15 | N/A | | 5 | iM | YC | 10 | 10 | 35 | 50 | 35 |
| MI001 | >20 | | | | | 3a | | | 5 | 5 | 40 | 50 | 15 |
| MI103 | >15 | | 10 | | | 6 | mC | MC | 40 | 40 | 30 | 50 | 60 |
| MI100 | >20 | | | | | 3a | | | 0 | 0 | 90 | 10 | 0 |
| DC023 | | | | <20 | L | 2a | | | 0 | 0 | 25 | 40 | 80 |
| Penn Island 01 | 15 | N/A | N/A | N/A | | 5 | tC | YC | 40 | 40 | 25 | 0.1 | 25 |
| DC001 | | | | | | 2C | | | 0 | 0 | 0 | 15 | 0 |
| DC008 | | | | 5 | L | 1b | | | 0 | 0 | 1 | 30 | 75 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC009 | | | | >20 | L | 5 | tC | | 20 | 20 | 20 | 0 | 80 |
| DC002 | | | | | | 5 | tM | | 20 | 20 | 10 | 40 | 40 |
| QI007 | | | | | | 2a | | | 0 | 0 | 0 | 30 | 0 |
| QI011 | | N/A | N/A | 5 | L | 1b | | | 0 | 0 | 0.1 | 20 | 80 |
| QI019 | >20 | N/A | 2 | | | 5 | iC | YC | 7 | 7 | 50 | 40 | 65 |
| DC006 | | | | | | 5 | tC | | 20 | 20 | 35 | 20 | 65 |
| QI004 | 14 | N/A | N/A | N/A | | 5 | tC | YS | 35 | 35 | 20 | 20 | 75 |
| QI008b | 12 | | | | | 5 | mC | YC | 35 | 35 | 20 | 10 | 75 |
| QI012 | 12 | N/A | N/A | N/A | | 6 | mC | MC | 30 | 30 | 35 | 50 | 50 |
| QI019b | >10 | N/A | N/A | N/A | | 5 | tC | YC | 40 | 40 | 5 | 10 | 15 |
| QI026 | 15 | N/A | N/A | N/A | | 6 | mC | OS | 30 | 30 | 30 | 0 | 15 |
| DC027 | | | | | | 5 | sC | | 30 | 30 | 30 | 5 | 80 |
| QI014 | 15 | N/A | N/A | 15 | | 5 | iC | MC | 10 | 10 | 25 | 15 | 80 |
| QI022 | 20 | N/A | N/A | 20 | L | 7a | mC | OC | 20 | 20 | 75 | 0.1 | 75 |
| QI018 | >15 | N/A | N/A | N/A | | 6 | mC | MC | 25 | 25 | 25 | 75 | 10 |
| QI028 | 18 | N/A | N/A | N/A | | 6 | mC | MC | 40 | 40 | 35 | 5 | 80 |
| QI010 | 15 | | | | | 6 | mC | MC | 45 | 45 | 25 | 10 | 80 |
| QI015 | >20 | | | 1 | W | 6 | iC | MC | 10 | 10 | 20 | 65 | 5 |
| QI017 | >20 | | | 2 | W | 6 | iC | MC | 15 | 15 | 40 | 65 | 20 |
| QI025 | | N/A | 15 | | | 7a | mC | OC | 15 | 15 | 75 | 10 | 35 |
| QI002 | >15 | 5 | 5 | N/A | | 5 | iM | | 15 | 15 | 20 | 40 | 5 |
| QI003 | >20 | | 5 | N/A | | 5 | tC | | 25 | 25 | 30 | 20 | 15 |
| QI009 | 0 | | 15 | | | 6 | mM | MC | 20 | 20 | 60 | 35 | 40 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC004 | | | | | | 5 | iC | | 15 | 15 | 5 | 45 | 0 |
| QI008 | | | 0 | | | 2d | | | 0 | 0 | 60 | 25 | 80 |
| QI021 | >20 | | | | | 3a | | | 0 | 0 | 80 | 40 | 75 |
| QI024 | >20 | N/A | N/A | N/A | | 3b | | | 3 | 3 | 60 | 50 | 75 |
| QI005 | 20 | | 10 | | | 3a | | | 0 | 0 | 75 | 20 | 0 |
| QI020 | >20 | | | | | 3a | | | 0 | 0 | 80 | 35 | 35 |
| QI023 | >20 | | | | | 3a | | | 0 | 0 | 80 | 30 | 0 |
| QI027 | >20 | N/A | 0 | | W | 3a | | | 0 | 0 | 40 | 40 | 0 |
| QI006 | >20 | | 2 | 2 | W | 2b | | | 0 | 0 | 0 | 65 | 10 |
| DC003 | | | | | | 2b | | | 0 | 0 | P | 70 | 5 |
| QI016 | >20 | | | | | 2b | | | 0 | 0 | 0 | 90 | 0 |
| DC005 | | | | | | 3a | | | 0 | 0 | 70 | 60 | 0 |
| QI001 | 15 | N/A | 10 | N/A | | 3a | | | 0 | 0 | 40 | 60 | 5 |
| QI013 | | | | | | 3b | | | 0 | 0.1 | 80 | 10 | 0 |
| Raza 003 | 20 | N/A | N/A | N/A | | 6 | mC | MC | 40 | 40 | 15 | 5 | 20 |
| Raza 002 | 5-10 | N/A | N/A | 5-10 | L | 5 | iC | MC | 10 | 10 | 30 | 5 | 50 |
| Raza 01 | >10 | N/A | N/A | N/A | | 6 | mC | MC | 45 | 45 | 5 | 0.1 | 15 |
| Read 22 | 2 | | | 2 | L | 2b | | | 0 | 0 | 2 | 20 | 15 |
| Read 21 | 15 | | | 15 | L | 6 | iC | MC | 13 | 13 | 10 | 15 | 80 |
| Read 08 | >15 | 7 | 10 | 10 | W | 5 | mC | YC | 30 | 30 | 30 | 35 | 65 |
| DC013 | | | | | | 2b | | | 0 | 0 | 0 | 80 | 0 |
| DC020 | | | | | | 3b | | | 0 | 1 | 85 | 5 | 80 |
| Read 15 | >30 | | | | | 3a | | | 0 | 0 | 60 | 50 | 0.1 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Read 16 | >20 | | | | | 3b | | | 5 | 5 | 60 | 40 | 0 |
| DC017 | | | | | | 5 | tC | | 45 | 45 | T | 5 | 60 |
| Read 03 | >25 | N/A | N/A | N/A | | 5 | mM | YS | 35 | 35 | 5 | 20 | 15 |
| Read 06 | 21 | N/A | N/A | N/A | | 6 | mC | MS | 30 | 30 | 30 | 15 | 65 |
| DC010 | | | | | L | 5 | iC | | 10 | 0 | 0 | 1 | 50 |
| DC016 | | | | | L | 5 | iC | | 10 | 10 | 45 | 3 | 50 |
| Read 12 | 5-10 | N/A | n | | L | 7b | iC | OC | 10 | 10 | 10 | 0.1 | 80 |
| DC010b | | | | 40-80 | L | 1 | | | 0 | 0 | 0 | 1 | 65 |
| Read 07 | 15 | N/A | N/A | N/A | | 5 | tC | YC | 20 | 20 | 70 | 0.1 | 60 |
| Read 09 | 18 | N/A | N/A | 20-30 | L | 7a | mC | OC | 20 | 20 | 35 | 5 | 75 |
| Read 10 | 12 | | | 12 | L | 7a | mC | | 20 | 20 | 40 | 10 | 75 |
| Read 11 | 15 | | | 15 | W | 7a | | OC | 20 | 20 | 45 | 0.1 | 50 |
| Read 13 | 20 | N/A | N/A | N/A | | 7b | mC | OC | 40 | 40 | 30 | 0 | 40 |
| Read 04 | 20 | N/A | N/A | N/A | | 5 | mC | MC | 30 | 30 | 50 | 35 | 60 |
| Read 19 | 12 | N/A | N/A | 40-50 | L | 6 | iC | MC | 10 | 10 | 50 | 0.1 | 80 |
| DC012 | | | | | | 7 | mC | | 30 | 45 | 30 | 35 | 50 |
| Read 20 | 15 | N/A | N/A | N/A | | 6 | mC | MC | 30 | 30 | 15 | 75 | 25 |
| Read 50 | 12 | N/A | N/A | N/A | | 6 | mC | MC | 35 | 35 | 10 | 70 | 40 |
| Read 02 | 20 | N/A | N/A | N/A | | 5 | tM | YS | 50 | 50 | 7 | 25 | 15 |
| Read 17 | 18 | N/A | N/A | N/A | | 6 | mC | MC | 35 | 35 | 15 | 50 | 70 |
| DC015 | | | | | | 6 | mC | | 25 | 25 | 23 | 65 | 0 |
| Read 01 | >20 | 10 | N/A | N/A | | 5 | tM | YC | 15 | 15 | 35 | 50 | 50 |
| Read 18 | 25 | 5 | 30 | N/A | | 6 | mC | MC | 30 | 30 | 43 | 40 | 80 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC021 | | | | | | 5 | mC | | 40 | 49 | 22 | 25 | 30 |
| DC014 | | | | | | 2a | | | 0 | 0 | 0 | 75 | 0 |
| DC018 | | | | | | 3a | | | 0 | 0 | 45 | 43 | 75 |
| Read 14 | >20 | | | | | 2d | | | 1 | 1 | 15 | 60 | 50 |
| DC019 | | | | | | 2b | | | 0 | 0 | 5 | 40 | 10 |
| DC011 | | | | | | 2b | | | 0 | 0 | 0 | 6 | 0 |
| Sonora 74 | >20 | N/A | N/A | N/A | | 3a | | | 0 | 0 | 50 | 35 | 80 |
| Sonora 64 | 15 | N/A | N/A | N/A | | 5 | tC | YC | 40 | 40 | 15 | 15 | 20 |
| Sonora 69 | 12 | N/A | N/A | N/A | | 7a | tC | OC | 20 | 20 | 50 | 0.1 | 65 |
| Sonora 73 | 21 | N/A | N/A | N/A | | 7a | mC | OC | 25 | 25 | 65 | 5 | 65 |
| Sonora 63 | 15 | N/A | N/A | 15 | L | 7a | iC | OC | 20 | 20 | 65 | 5 | 50 |
| Sonora 70 | 2 | N/A | N/A | 2 | L | 6 | iC | OC | 10 | 10 | 25 | 1 | 80 |
| Sonora 72 | 18 | N/A | N/A | N/A | | 7a | | OC | 35 | 35 | 50 | 20 | 50 |
| Sonora 75 | 18 | N/A | N/A | N/A | | 7a | mC | OC | 30 | 30 | 50 | 10 | 35 |
| Sonora 71 | 14 | | | | | 7a | mC | OC | 20 | 20 | 35 | 15 | 25 |
| Sonora 58 | | | | | | 3b | | | 5 | 5 | 80 | 30 | 5 |
| Sonora 60 | 30 | | 25 | | | 3a | | | 0 | 0 | 80 | 30 | 75 |
| Sonora 61 | 22 | | | | | 3a | | | 0 | 0 | 80 | 30 | 50 |
| Sonora 02 | 20 | | | | | 6 | tC | MS | 40 | 40 | 30 | 30 | 65 |
| Sonora 04 | 20+ | | | | | 7 | mC | OC | 45 | 45 | 17 | 10 | 75 |
| Sonora 53 | >15 | N/A | N/A | N/A | | 6 | mC | MC | 25 | 25 | 15 | 30 | 35 |
| Sonora 56 | 10 | N/A | N/A | N/A | | 5 | tC | | 50 | 50 | 30 | 0.1 | 10 |
| Sonora 57 | >10 | N/A | N/A | N/A | | 6 | mC | OC | 40 | 40 | 10 | 20 | 20 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sonora 62 | 17 | | | | | 5 | tC | YS | 50 | 50 | 5 | 5 | 5 |
| DC022 | | | | >100 | L | 5 | iC | | 5 | 5 | 15 | 25 | 80 |
| Sonora 06 | 10 | N/A | N/A | 10-20 | L | 5 | iC | MC | 10 | 10 | 25 | 10 | 60 |
| Sonora 03 | 22 | | | | | 6 | mC | MC | 40 | 40 | 50 | 0 | 65 |
| Sonora 66 | 15 | | | | | 6 | mC | MS | 50 | 50 | 35 | 5 | 10 |
| Sonora 68 | 22 | N/A | N/A | N/A | | 6 | mC | OC | 35 | 35 | 45 | 0.1 | 65 |
| Sonora 01 | 20 | | | | | 5 | mC | YS | 30 | 30 | 15 | 5 | 35 |
| Sonora 76 | 18 | N/A | N/A | N/A | | 6 | mC | MS | 55 | 55 | 25 | 40 | 25 |
| Sonora 05 | 15 | N/A | N/A | N/A | | 6 | mC | DC | 30 | 30 | 20 | 65 | 20 |
| Sonora 51 | >20 | N/A | N/A | N/A | | 7a | mC | | 25 | 25 | 30 | 50 | 80 |
| Sonora 54 | 10 | N/A | 10 | 10 | W | 6 | mC | OC | 15 | 15 | 35 | 50 | 25 |
| Sonora 50 | 15 | | 8 | | | 7a | tC | OC | 20 | 20 | 40 | 20 | 80 |
| Sonora 65 | | | | | | 6 | iC | MC | 5 | 5 | 15 | 75 | 10 |
| Sonora 59 | | | | | | 5 | iC | | 10 | 10 | 60 | 30 | 0 |
| Sonora 67 | >15 | 10 | 15 | | | 6 | mC | MC | 30 | 30 | 50 | 40 | 25 |
| Sonora 55 | | | | | | 3b | iC | OC | 5 | 5 | 75 | 20 | 80 |
| Sonora 52 | 20 | | | 0 | W | 3a | | | 0 | 0 | 65 | 25 | 5 |
| SI001 | >20 | | 18 | 18 | W | 2b | | | 1 | 1 | 10 | 60 | 50 |
| SI005 | | | | 10 | W | 3a | | | 5 | 5 | 50 | 40 | 75 |
| SI007 | 15 | N/A | N/A | N/A | | 5 | tC | | 30 | 30 | 5 | 30 | 20 |
| SI008 | 18 | N/A | N/A | N/A | | 6 | mC | MC | 30 | 30 | 5 | 0.1 | 65 |
| SI009 | 14 | N/A | N/A | N/A | | 7a | mC | OC | 40 | 40 | 15 | 20 | 25 |
| SI003 | 12 | N/A | N/A | N/A | | 6 | mC | DC | 40 | 40 | 10 | 20 | 30 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SI004 | 10 | N/A | N/A | 10-20 | L | 5 | iC | YC | 15 | 15 | 25 | 20 | 50 |
| SI002 | 15 | N/A | N/A | N/A | | 6 | mC | DC | 40 | 40 | 10 | 60 | 20 |
| SI006 | 10-15 | N/A | 10 | | | 5 | mM | YS | 35 | 35 | 50 | 15 | 30 |
| WR007 | 10 | | | 10 | W | 3a | | | 0 | 0 | 30 | 25 | 60 |
| WR009 | | N/A | N/A | | W | 6 | | MC | 23 | 23 | 80 | 35 | 15 |
| WR018 | | | | | | 2c | | | 0 | 0 | 0 | 10 | 0 |
| WR008 | >25 | N/A | N/A | N/A | | 6 | +C | MS | 25 | 25 | 30 | 1 | 75 |
| WR021 | 20 | N/A | N/A | N/A | | 6 | mC | MC | 40 | 40 | 10 | 5 | 10 |
| WR011 | >30 | N/A | N/A | N/A | | 6 | mC | MC | 30 | 30 | 50 | 0 | 65 |
| WR006 | >20 | N/A | N/A | N/A | | 5 | mC | YC | 40 | 40 | 15 | 35 | 70 |
| WR022 | >15 | N/A | N/A | N/A | | 6 | mC | MC | 35 | 35 | 20 | 50 | 50 |
| WR010 | >30 | N/A | N/A | N/A | | 5 | mC | YC / MC | 35 | 35 | 17 | 45 | 75 |
| WR100 | 15 | N/A | N/A | N/A | | 5 | tC | YC | 50 | 50 | 10 | 0.1 | 10 |
| WR003 | >30 | | N/A | N/A | | 6 | mC | MC | 30 | 30 | 25 | 40 | 80 |
| WR101 | >20 | | 12 | N/A | | 5 | iC | YC | 15 | 15 | 50 | 10 | 10 |
| WR004 | | N/A | N/A | N/A | | 3a | | | 0 | 0 | 75 | 5 | 0 |
| WR102 | >20 | | | N/A | | 3a | | | 0 | 0.1 | 50 | 20 | 0 |
| WR002 | >42 | N/A | N/A | N/A | | 3b | | YS | 0 | 0 | 75 | 15 | 20 |
| WR017 | | | | | | 3b | | | 0 | 0 | 0 | 50 | 0 |
| WR013 | >20 | N/A | N/A | N/A | | 5 | mC | | 25 | 25 | 30 | 25 | 80 |
| WR020 | 10 | N/A | N/A | 5-10 | L | 6 | iC | MC | 10 | 10 | 15 | 7 | 80 |
| WR001 | 10 | N/A | N/A | 10 | L | 5 | tM | YC / MC | 15 | 15 | 20 | 25 | 40 |
| WR019 | >20 | N/A | N/A | 10-30 | L | 6 | mC | MC | 20 | 20 | 60 | 0 | 75 |

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| WR012 | >30 | N/A | N/A | N/A | | 6 | mC | MC | 30 | 30 | 15 | 40 | 70 |
| WR015 | 18 | N/A | N/A | N/A | | 6 | | MC | 30 | 30 | 25 | 40 | 50 |
| WR016 | >20 | 10 | 10 | 10 | W | 6 | mC | MC | 20 | 20 | 20 | 50 | 50 |
| WR014 | 20 | 8 | 20 | 25 | W | 2b | | | 0 | 0 | 0.1 | 40 | 0 |

| Plot # | Species. List |
|---|---|
| DC007 | Fd, Hw, Cw, Blecspi, Viola spp., UNID Grasses, Hylospl, Mahoaqu, UNID mosses |
| ER002 | Hw, Rubuspe, Vaccpar, Vaccova, Polymun, Blecspi Dryoexp, Hylospl, Plag sp., Rhytlor, Kindore, Kindpra, Rhizgla |
| ER001 | Alnurub, Rubuspe, Caresit, Lysiame, Equiarv, Athyfil, Gali spp. |
| WR005 | Spirdou, Rosanut, Seduore, Planmar, Pleccon, Collpar, Planmac, UNID Grasses, Trigmar, Raco spp., Dich spp., Bryumin |
| DC025 | Pl, Fd, Cw, Vaccpar, Dicr spp., Raco spp., Cladran, Cladina spp., Cladonia spp., Pleusch |
| MI101 | Fd, Cw, Pl, Gaulsha, Vaccpar, Festocc, Hyporad, Crypt spp., Luzupar, Pleusch, Polyjun, Cladina spp., Dicr spp., Raco spp., Kindore |
| DC024 | Fd, Cw, Hw, Polymun, Kindore, Hylospl |
| DC026 | Hw, Cw, Alnurub, Sambrac, Vaccpar, Polymun, Blecspi, Tiartri, Hylospl, Rhytlor, Kindore, Plag spp., Rhizgla |
| MI002 | Hw, Vaccpar, Vaccova?, Rubuspe, Dryoexp, Polymun, Plagund, Rhyttri, Hylospl, Plagins, Rhiz sp., Kindore, Dicr spp. |
| MI102 | Fd, Cw, Hw, Acermac, Polymun, Kindore, Rhyttri |
| MI003 | Hw, Cw, Rubuspe, Oplohor, Polymun, Lysiame, Dryoexp, Streros, Ranuunc, Equiarv, Athyfil, Galitri, Careobt, Ranu spp., Viola spp., Plagins, Rhizgla, Rhiz sp., Rhizmag, Kindore |
| MI001 | Pl, Cw, Ledugla, Gaulsha, Oplohor, Spirgra?, Rubuspe, Loniinv, Lysiame, Careobt, Phegcon, Athyfil, Rhyttri |
| MI103 | Cw, Hw, Ss, Vaccpar, Gaulsha, Lysiame, Blecspi, Athyfil, Tiartri, Hylospl, Rhiz spp., Plag spp., Kindore |
| MI100 | Gale spp, spir spp., careobt |
| DC023 | Malufus, Spirdou, Amelaln, Gaulsha, Rosagym, Allicer, Zigaven, Hier spp., Fritlan, Achimil, Pleccon, Collpar, Fragchi, Spiranthes spp., Ceraarv, Raco spp., Poly spp., Pleusch, Cladina spp., Dicr spp., UNID grasses and mosses |

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| Penn Island 01 | Fd, Cw, Hw, Vaccpar, Gaulsha, Polymun, Hylospl, Kindore |
| DC001 | Typhlat, Carex spp., Nuphpol, Careaqu, Alnurub |
| DC008 | Pl, Fd, Amelaln, Hier spp., Achimil, Zigaven, Luzupar, Ceraarv, Collpar, Rumeace, UNID Grasses, Raco spp., Poly spp., Dicr spp., UNID mosses, Cladina spp., Cladonia spp., UNID Lichens |
| DC009 | Pl, Fd, Holodis, Vaccpar, Mahoaqu, Gaultheria spp., Rosagym, Hylospl, Rhytlor, Poly spp. |
| DC002 | Hw, Fd, Alnus spp, Picea x, Ribelac, Rubuspe, Vaccpar, Equiarv, Athyfil, Ptilcri |
| Ql007 | Menytri, Brassch, Careobt |
| Ql011 | Fd, Hyporad, Achimil, Mimuals, Fest spp., Elym spp., Pteraqu, Polyjun, Poly spp., Racolan, Raco spp., Schiapo |
| Ql019 | Cw, Pl, Hw, Alnurub, Ledu spp., Drosrot, Carelas, Careobt, Carex spp., Equiarv, Viola, Lysiame, Spha spp., Sphasqu, Hylospl, Pleusch, Aulapal |
| DC006 | Fd, Hw, Mahoaqu, Vaccpar, Rosanut, Pteraqu, Galitri, Adenbic, Ranu spp., Luzula spp., Viola spp., Hylospl, Pleusch |
| Ql004 | Hw, Fd, Vaccpar, Mahoaqu, Gaulsha, Polymun, Plagund, Kindore, Hylospl, Rhytlor |
| Ql008b | Fd, Cw, Hw, Gaulsha, Vaccpar, Polymun, Belc sp., Kindore, Plagund, Hylospl |
| Ql012 | Fd, Cw, Hw, Bg, Alnurub, Rubuspe, Vaccpar, Mahoaqu, Gaulsha, Polymun, Corncan, Pteraqu, Luzupar, Fest spp., Galitri, Tiartri, Ranu spp., Hylospl, Kindore |
| Ql019b | Hw, Cw, Vaccpar, Gaulsha, Polymun, Plagund, Kindore |
| Ql026 | Fd, Hw, Gaulsha, Hylospl, Rhytlor, Kindore |
| DC027 | Fd, Hw, Vaccpar, Gaulsha, Mahober, Ribelac, Polymun, Pteraqu, Linnbor, Trielat, Kindore, Hylospl, Rhytlor |
| Ql014 | Fd, Gaulsha, Vaccpar, Holodis, Rosanut, Pteraqu, Luzu spp, Luzucam, Fest spp., Polyjun, Raco spp., Dicr spp., Poly spp., Pleusch, Hylospl |
| Ql022 | Hw, Cw, Fd, Gaulsha, Vaccpar, Listcor, Hylospl, Rhytlor, Plagund, Kindore |
| Ql018 | Fd, Cw, Hw, Ss, Bg, Alnurub, Vaccpar, Rubuspe, Polymun, Hylospl, Kindore |
| Ql028 | Cw, Fd, Hw, Gaulsha, Vaccpar, Polymun, Blecspi, Pteraqu, Listcor, Moneuni, Linnbor, Rhytlor, Hylospl, Kindore, Plagins, Rhiz, UNID Liverworts |
| Ql010 | Fd, Cw, Hw, Vaccpar, Vaccova, Mahoaqu, Gaulsha, Linnbor, Pteraqu, Polymun, Viola sp., Kindore, Hylospl |
| Ql015 | Cw, Hw, Ss, Sambrac, Alnurub, Rubuspe, Lysiame, Careobt, Carelas, Athyfil, Oenasar, V, Rumax spp., Dichpel |
| Ql017 | Ss, Cw, Hw, Oplohor, Rubuspe, Vaccpar, Lysiame, Careobt, Athyfil, Scrimic, Ranu spp., Oenasar, Pteraqu, Plagins, Rhiz spp., Kindore |
| Ql025 | Ss, Cw, Hw, Pw, Gaulsha, Lysiame, Careobt, Athyfil, Pteraqu, Blecspi, Hylospl, Rhytlor, Spha spp., UNID Liverworts, Plagins |

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| Ql002 | Cw, Hw, Ss, Alnurub, Rubuspe, Vaccpar, Oplohor, Lysiame, Polymun, Equiarv, Athyfil, Oenasar, Cardoli, Careobt, Kindore |
| Ql003 | Fd, Cw, Hw, Ss, Alnurub, Rubuspe, Gaulsha, Vaccpar, Lysiame, Equiarv, Blecspi, Athyfil, Polymun, Plagins, Rhiz sp., Kindore, Spha spp. |
| Ql009 | Fd, Cw, Hw, Alnurub, Rubuspe, Rosagym, Oplohor, Lystame, Dryoexp, Polymun, Galitri, Ranu sp., Smilrac, Arulnud, Stach sp., Athylfil, Equiarv, Rhytlor, Rhyttri, Kinfore, Plagins, Rhiz sp. |
| DC004 | Hw, Cw, Alnus spp., Careaqu, Lysiame, Athyfil |
| Ql008 | Myrigal, Ledugra, Kalmmic, Cw, Oxycoxy, Lystame, Carelas, Drosang, Drosrot, Spha sps., Sphasqu |
| Ql021 | Hw, Cw, Pw, Ledum spp., Kalimic, Gaulsha, Oxycoxy, Drosrot, Pleusch, Spha spp., Sphacom |
| Ql024 | Pl, Pw, Hw, Ledum spp., Kalimic, Oxycoxy, Empenig, Drosrot, Eriocha, Carelas, Sphacom, Spha spp., Pleusch, Aulapal, Cladina spp. |
| Ql005 | Spirdou, Myrigal, Careobt, Potepal |
| Ql020 | Cw, Myrigal, Spirdou, Ledum spp., Kalimic, Carelas, Sphacom |
| Ql023 | Myrigal, Spirdou, Carelas, Carex spp. |
| Ql027 | Myrigal, Spirdou, Carelas, Caresit |
| Ql006 | Careobt, Carelas, Carex spp, Equivar, Lysiame, Menytri, Siumsua, Aulapal |
| DC003 | Careaqu, Carex spp., Lysiame, Potepal, Ranu spp. |
| Ql016 | Careobt, Lysiame, Oenasar, Scrimic, Galitri, Equiarv |
| DC005 | Spirdou, Careaqu, Nuphvar, Scirpus spp. |
| Ql001 | Spirdou, Careobt, Carex spp., Lysiame, Potepal, Aulapal |
| Ql013 | Spirdou, Alnurub, Careobt, Phalaru |
| Raza 003 | Fd, Cw, Hw, Acermac, Mahoaqu, Gaulsha, Vaccpar, Polymun, Rhytlor, Kindore, Hylospl |
| Raza 002 | Fd, Pl, Arbumen, Arctcol, Gaulsha, Rosagym, Rubufru, Elymus spp., UNID Grasses, Polyjun, Poly spp., Cladina spp., Raco spp., Tort spp., Dicr spp. |
| Raza 01 | Fd, Cw, Hw, Polymun, Gaulsha, Kindore, Polyjun, Rhyttri |
| Read 22 | Rosanuk, Amilaln, Fd, Galitri, Fragchi, Festocc, Plantago sp., Callsta, Mimugut, Carelym, Allacu, Heucgla, Fritcam, Sagimax, Ceraarv, Luzumul, Clad sps., Raco sp., Tort sp. |
| Read 21 | Pl, Fd, Arbumen, Elymus sp., Hyporad, Polyjun, Disc sp., Clad sp., Raco sp., Tort., Poly sp., Pleusch. |
| Read 08 | Cw, Hw, Ss, Gaulsha, Vaccpar, Lysiame, Careobt, Athyfil, Blecspi, Polymun, Kindore, Plagins, Rhiz spp., Hylospl |

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| DC013 | Potepen, Juncus spp., UNID Grasses, Carex spp., Equistum spp. |
| DC020 | Pl, Hw, Ledugla, Spirdou, Kalmmic, Carex spp., UNID Grasses, Pleusch, Sphagnum spp., Hylospl |
| Read 15 | Spirdou, Alnurub, Malufus, Rosanut, Phalaru, Careobt, Carex spp., Equihye |
| Read 16 | Cw, Ss, Alnurub, Saliluc, Salix spp., Malufus, Gaulsha, Loniinv, Spirdou, Rubuspe, Careobt, Lysiame, Equihye |
| DC017 | Fd, Cw, Hw, Vaccpar, Rhytlor, Hylospl |
| Read 03 | Fd, Hw, Acermac, Alnurub, Vaccpar, Polymun, Plagund, Hylospl, Kindore |
| Read 06 | Cw, Hw, Fd, Vaccpar, Gaulsha, Polymun, Hylospl, Kindore, Rhyttri, Plagund |
| DC010 | Pl, Fd, Hw, Vaccpar, Hylospl, Raco spp, Dicr, Cladina spp |
| DC016 | Fd, Pl, Cw, Arbumen, Ribelac, Gaulsha, Vaccpar, Rosagym, Hier spp., Lilicol, UNID Grasses, Dicr spp., Raco spp., Cladina spp. |
| Read 12 | Fd, Pl, Gaulsha, Holodis, Vaccpar, Rosanut, Prunema, Rubuurs, Chimumb, UNID Grasses, Polygly, Polymun, Tortrua, Raco spp., Pleusch, Cladina spp., Hylospl |
| DC010b | Hw, Cw, Hylospl |
| Read 07 | Cw, Hw, Fd, Pl, Vaccpar, Gaulsha, Polymun, Hylospl, Kindore, Rhyttri, Plagund |
| Read 09 | Fd, Cw, Hw, Acermac, Gaulsha, Mahoner, Vaccpar, Polygly, Chimumb, Linnbor, Polymun, Pleusch, Hylospl, Kindore, Rhyttri, Dicrfus |
| Read 10 | Fd, Cw, Hw, Gaulsha, Vaccpar, Holodis, Linnbor, Polymun, Hylospl, Rhyttri, Kindore, Pleusch |
| Read 11 | Fd, Cw, Hw, Gaulsha, Rosanut, Holodis, Vaccpar, UNID Grasses, Hylospl, Polyjun, Pleusch, Dicr. Sp., Rhyttri |
| Read 13 | Fd, Cw, Hw, Gaulsha, Vaccpar, Plagund, Kindore, Pleusch, Hylospl |
| Read 04 | Cw, Fd, Hw, Acermac, Gaulsha, Mahoner, Vaccpar, Polymun, Linnbor, Chimumb, Listcor, Goodobl, Hylospl, Kindore |
| Read 19 | Pl, Fd, Gaulsha, Holodis, Vaccpar, Luzupar, Dicr sp., Polyjun, Poly spp., Cladina sp., Hylospl, Pleusch, Rhyttri, Rhytlor, Kindore |
| DC012 | Fd, Cw, Hw, Vaccpar, Acermac, Hylospl, Rhytlor, Plag spp. |
| Read 20 | Fd, Hw, Cw, Bg, Ba, Acermac, Vaccpar, Polymun, Kindore, Hylospl |
| Read 50 | Fd, Cw, Hw, Acermac, Vaccova?, Vaccpar, Polymun, Kindore, Rhyttri, Hylospl |
| Read 02 | Hw, Ss, Alnurub, Rubuspe, Vaccpar, Polymun, Dryoexp, Blecspi, Hylospl, Kindore |
| Read 17 | Fd, Cw, Hw, Vaccpar, Mahoaqu, Rubuspe, Gaulsha, Polymun, Pteraqu, Dryoexp, Blecspi, Corncan, Violcan, Kindore, Plagund, Hylospl, Rhiz. Spp., Rhyttri |

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| DC015 | Hw, Cw, Sambrac, Rubuspe, Rubuspe |
| Read 01 | Cw, Hw, Alnurub, Rubuspe, Lysiame, Galitri, Ranu spp., Stacmex, UNID Grasses, Verobec, Athyfil, Careobt, Blecspi, Oenasar, Circalp, Plagins, Kindore, Rhytlor, Mylitay, Polymun, Rhiz spp. |
| Read 18 | Cw, Hw, Ss, Bg, Vaccpar, Gaulsha, Rubuspe, Lysiame, Equiarv, Polymun, Athyfil, Blecspi, Galitri, Careobt, Tiartri, Hylospl, Rhytlor, Kindore, Plagund, Plagins, Leafy Mosses |
| DC021 | Cw, Hw, Picesit, Alnurub, Rubufru, Vaccpar, Carex spp., Lysiame, Hylospl, Rhytlor, Kindore |
| DC014 | Salivir, Glamav |
| DC018 | Kalmmic, Gaulsha, Hw, Oxytropis spp., Lysiame, Carex spp., Drosrot, Platdil, Sphagnum spp., Pleusch |
| Read 14 | Pl, Cw, Ledugro, Gaulsha, Empenig, Kalmmic, Saxi spp., Corncan, Drosrot, Oxycoxy, Carex spp., Careaqu, Spha spp., Pleusch |
| DC019 | Spirdou, Careaqu, Careros, Sphagnum spp. |
| DC011 | Cw, Hw, Carex spp., Athyfil, Lysiame |
| Sonora 74 | Pl, Ledum spp., Gaulsha, Vaccmem, Hw, Oxycoxy, Erioand, Carelim, Drosrot, Menytri, Sphacom, Spha spp., Pleusch |
| Sonora 64 | Hw, Fd, Vaccpar, Alnurub, Polymun, Tiartri, Viola spp., Galitri, Dryoexp, Rhyttri, Kindore, Rhiz. Spp., Plagund |
| Sonora 69 | Cw, Hw, Fd, Abies spp., Abieama, Vaccala, Vaccpar, Gaulsha, Listcor, Hylospl, Rhytlor, Plagund, UNID Liverworts |
| Sonora 73 | Fd, Hw, Cy, Bl, Vaccpar, Vaccova, Vaccala, Gaulsha, Corncan, Goodobl, Listcor, List spp., Hylospl, Rhytlor, Rhytrob |
| Sonora 63 | Fd, Pl, Cw, Arctcol, Gaulsha, Vaccpar, Pteraqu, Fest spp., Dicr spp., Pleusch, Polyjun, Cladran, Cladina spp. |
| Sonora 70 | Pl, Fd, Cw, Pw, Gaulsha, Vaccpar, Pens spp., Fest spp., Cladina spp., Racocan, Cladonia spp. |
| Sonora 72 | Ba, Cw, Hw, Cy, Hm, Vaccova, Vaccpar, Vaccala, Gaulsha, Menzfer, Blecspi, Lycocla, Lysiame, Listcor, List spp., Corncan, Sphasqu, UNID Liverworts, Plag spp., Hylospl, Rhiz, Plagins Rhytlor |
| Sonora 75 | Cw, Hw, Ba, Gaulsha, Vaccala, Vaccpar, Corncan, Tiartri, Blecspi, Stre ros, Listcor, Rubuped, Hylospl, Rhytlor, UNID Liverworts, Rhiz spp. |
| Sonora 71 | Cw, Hw, Fd, Vaccala, Vaccpar, Gaulsha, Blec sp., List sp., Tiartri, Athyfil, Kindore, Plag sp., Rhis spp. |
| Sonora 58 | Cw, Hw, Spir spp., Loniinv, Vaccpar, Lysiame, Careobt, Carex spp., Galitri, Oenasar, Athyfil, Gymndry, Junc spp., Typhlat, Rhyttri |
| Sonora 60 | Pl, Ledugra, Myrigal, Spirdou, Loniinv, Oxycoxy, Lystame, Careobt, Sphatri, Sphacom, Spha sps., Hylospl |
| Sonora 61 | Pl, Cw, Alnurub, Spirdou, Myrigal, Lonninv, Ledugla, Gaulsha, Salisco, Hw, Lystame, Careobt, Blecspi, Corncan, Hylospl, Shpaspp., Sphatri |
| Sonora 02 | Cw, Hw, Fd, Gaulsha, Vaccpar, Vaccova, Polymun, Blec sp., Plagund, Hylospl, Kindore, Rhytlor |
| Sonora 04 | Fd, Cw, Hw, Ss, Vaccova, Vaccpar, Polymun, Listcor, Blec Sp., Kindore, Plagund, Rhyttri, Rhytlor, Barb sp., Hylospl, leafy mosses |

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| Sonora 53 | Fd, Cw, Hw, Ss, Alnurub, Vaccpar, Polymun, Kindore, Hylospl |
| Sonora 56 | Hw, Fd, Cw, Vaccpar, Vaccova, UNID Liverworts, Plagund, Kindore |
| Sonora 57 | Cw, Fd, Hw, Ss, Alnurub, Acergla, Polymun, Kindore, Hylospl |
| Sonora 62 | Fd, Hw, Vaccpar, Polymun, Kingore, Rhyttri |
| DC022 | Fd, Pl, Holodis, Vaccpar, Arctcol, Rubufru, Hier spp., Achimil, Zigaven, Luzupar, Artemisia spp., Racocan, Racolan, Cladina spp., Poly spp. |
| Sonora 06 | Pl, Fd, Arctcol, Gaulsha, Festocc, Hyporad, Achimil, Hier spp., Camas, Rubufru, Cladina spp., Tort spp., Raco spp., Polyjun, UNID Lichens and Mosses |
| Sonora 03 | Fd, Cw, Hw, Vaccpar, Gaulsha, Listcor, Hylospl, Rhyttri, Kindore, Plagund |
| Sonora 66 | Fd, Cw, Hw, Gaulsha, Mahoaqu, Vaccpar, Polymun, Kindore |
| Sonora 68 | Cw, Fd, Hw, Gaulsha, Vaccpar, Listcor, Hylospl, Rhytlor, Kindore |
| Sonora 01 | Fd, Cw, Hw, Ss, Alnurub, Vaccova, Vaccpar, Blec sp., Rhyttri, Kindore, Barb sp., Hylospl, Plagund |
| Sonora 76 | Fd, Cw, Hw, Vaccpar, Mahoaqu, Polymun, Dryoexp, Blecspi, Kindore, Hylospl |
| Sonora 05 | Cw, Hw, Fd, Rubuspe, Sambrac, Acergla, Vaccpar, Ribelac, Polymun, Dryoexp, Kindore, Hylospl, Rhytlor |
| Sonora 51 | Cw, Hw, Ss, Acermac, Rubuspe, Oplohor, Vaccpar, Polymun, Blecspi, Athyfil, Tiartri, Dryoexp, Maiadil, Streros, Gymndry, Thelphe, Lysiame, Achltri, Hylospl, Rhyttri, Rhytlor, Kindore |
| Sonora 54 | Cw, Hw, Oplohor, Rubuspe, Vaccpar, Menzfer, Lysiame, Tiartri, Gymndry, Thelphe, Streros, Blecspi, Caremer, Carex spp., Arundio, Athyfil, Pteraqu, List spp., Rhyttri, Plagins, Rhiz spp. |
| Sonora 50 | Cw, Hw, Ss, Vaccova, Gaulsha, Vaccpar, Menzfer, Lysiame, Sphasqu, Rhyttri, Kindore, Plagins, Rhiz spp. |
| Sonora 65 | Cw, Hw, Alnurub, Vaccpar, Gaulsha, Rubuspe, Careobt, Carelas, Oenasar, Galitri, Epil spp., Scirmic, Athyfil, Spha spp., Plag spp.,UNID Liverworts |
| Sonora 59 | Cw, Hw, Ss, Spirdou, Gaulsha, Loniinv, Lysiame, Careobt, Carex spp., Menytri |
| Sonora 67 | Cw, Hw, Ss, Alnurub, Rubuspe, Vaccpar, Polymun, Lysiame, Athyfil, Tiartri, Phegcon, Rhytlor, Rhyttri, Plagins, Rhiz. Spp. |
| Sonora 55 | Pl, Hw, Ledu spp., Empenig, Kalimic, Gaulsha, Eriocha, Drosrot, Oxycoxy, Pteraqu, Sphasqu, Sphacom, Spha spp., Cladina spp., Cladran |
| Sonora 52 | S. gale?, Spirdou, Loniinv, Careobt, Lysiame, Sphacap, Sphasqu |
| SI001 | Cw, Hw, Ss, Alnurub, Rubuspe, Vaccpar, Ledugla, Careobt, Carex spp., Lysiame, Menytri, Typhlat, Spha spp., Aulapal |
| SI005 | Cw, Hw, Ledugla, Myrigal, Kalmmic, Gaulsha, Alnurub, Lysiame, Drosrot, Carex spp., Oxycoxy, Spha spp., Pleusch, Cladina spp., Rhyttri |
| SI007 | Hw, Cw, Vaccpar, Alnurub, Polymun, Rhyttri, Plagund, Kindore |

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| SI008 | Fd, Cw, Hw, Vaccpar, Vaccova, Listcor, Hylospl, Kindore, Rhyttri |
| SI009 | Cw, Fd, Hw, Vaccova, Polymun, Rhyttri, Hylospl, Kindore |
| SI003 | Cw, Fd, Hw, Acermac, Alnurub, Polymun, Hylospl, Rhyttri, Kindore, Plagins, Rhytlor |
| SI004 | Fd, Holodis, Gaulsha, Vaccpar, Festocc, Camas, Mimugut, Myos spp., Hyporad, Cladina spp., Raco spp., Tort spp., Pleusch, Dicr spp., UNID Lichens |
| SI002 | Fd, Cw, Hw, Ss, Acermac, Vaccpar, Polymun, Dryoexp, Hylospl, Kindore, Rhytlor |
| SI006 | Cw, Hw, Ss, Alnurub, Vaccpar, Vaccova?, Rubuspe, Acergla, Sambrac, Lysiame, Equiarv, Dryoexp, Gymndry, Achltri, Kindore, Plag spp., Rhiz sp., Plagins, Hylospl, Rhytlor |
| WR007 | Ledum spp., Kali, Spirdou, Nuphvar, Drop, Oxycoxy, Spha spp. |
| WR009 | Cw, Hw, Gaulsha, Lysiame, Blecspi, Careobt, Junc spp., Spirdou, Carex spp., Leafy Mosses, Spha spp. |
| WR018 | Nuphar, Polygonum spp., Menytri, Typhlat |
| WR008 | Cw, Fd, Hw, Alnurub, Abiemon?, Gaulsha, Vaccpar, Pteraqu, List spp., Hylospl, Kindore, Plag spp. |
| WR021 | Fd, Cw, Hw, Gaulsha, Mahoaqu, Vaccpar, Polymun, Hylospl, Rhyt spp., Kindore |
| WR011 | Cw, Hw Fd, Pw, Gaulsha, Vaccpar, Pteraqu, Goodpbl, Hylospl, Kindore, Rhytlor |
| WR006 | Cw, Hw, Acermac, Gaulsha, Polymun, Hylospl, Kindsch?, Plag sp., Rhyttri |
| WR022 | Fd, Cw, Hw, Vaccpar, Gaulsha, Polymun, Hylospl, Rhyttri, Kindore |
| WR010 | Cw, Hw, Fd, Gaulsha, Vaccpar, Acercir, Rubuspe, Polymun, List spp., Dryoexp, Blecspi, Hylospl, Kindore, Rhyt spp. |
| WR100 | Cw, Fd, Hw, Bg, Alnurub, Vaccpar, Vaccova?, Dryoexp, Polymun, Rhiz sp., Plagins, Kindore, Plagund |
| WR003 | Cw, Hw, Fd, Gaulsha, Polymun, Galitri, Rubuped, Hylospl, Rhyt spp., Dicr. spp., Kind spp. |
| WR101 | Cw, Hw, Fd, Ss, Gaulsha, Ledugla, Rubufru, Rubuspe, Lysiame, Blecspi, Hylospl, Kindore, Plagins, Rhiz spp. |
| WR004 | Spirdou, Typhlat, Junc spp., Careobt, Careaqu, Equiarv |
| WR102 | Cw, Spirdou, Myrigal, Ledugla, Gaulsha, Careobt, Carex spp., Drosrot |
| WR002 | Hw, Cw, Fd, Ss, Pl, Alnurub, Rubuspe, Gaulsha, Ledu spp., Saliluc, Salix spp., Lysiame, Junc spp., Junccom, Careobt, Carex spp., Equihye, UNID Grasses, Leafy Mosses |
| WR017 | Careobn, Junceff, Equiarv, Polygonum spp., Phraaus, Lysiame |
| WR013 | Cw, Hw, Ss, Fd, Vaccpar, Gaulsha, Pteraqu, Polymun, Blecspi, Hylospl, Kindore |

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| WR020 | Pl, Fd, Arbumen, Arctcol, Junisco, Pachmyr, Gaulsha, Amelaln, Rubuurs, Pleccon, Penspro, Saxi spp., Hyporad, Listcau, Hieralb, Collpar, Bromvul, Polygly, Death-Camas, Boschoo, Listcor, Aquifor, Fragchi, Cladran, Polyjun, Poly spp., Pleusch |
| WR001 | Fd, Arbumen, Junisco, Holodis, Mahoner, Achimil, Mimuals, UNID Grasses, Zigaven, Allicer, Crypcri, Polymun, Polygly, Aspl spp., Collpar, Mimugut, Galiapa. Seduore, Tortula spp., Dicr. Sp., Amph sp., Schi sp., Cladina sp. |
| WR019 | Fd, Cw, Gaulsha, Vaccpar, Hylospl, Pleusch, Kindore, Polytrichum spp., Polyjun, Cladina spp., Barb spp. |
| WR012 | Cw, Hw, Fd, Alnurub, Polymun, Blecspi, Hylospl, Kindore, Rhyt spp. |
| WR015 | Cw, Fd, Hw, Ss, Alnurub, Vaccpar, Mahoner, Gaulsha, Polymun, Blecspi, Hylospl, Kindore, Rhyt spp. |
| WR016 | Cw, Ss, Hw, Alnurub, Gaulsha, Vaccpar, Rubufru, Lysiame, Blecspi, Careobn, Equiflu, Hylospl, Kindore, Rhyt spp., Plag spp. |
| WR014 | Rubu spp., Careobn, Poteans, Hierodo, Ranu spp., Lath spp., Galitri, Distspi |