# Forage Suitability Group Description

**Forage Suitability Group Type:** Pasture
**Forage Suitability Group Name:** Very Productive Agricultural Soils
**Forage Suitability Group Number:** G004AC502WA
**Major Land Resource Area-[MLRA][LRU]:** 004AC
Sitka Spruce Belt

The following Common Resource Areas are included in this Forage Management Zone [MLRA][LRU]. (reference Pasture TN-101 Forage Zones)

| NATIONAL CRA | CRA_NAME |
|---|---|
| 4A.1 | Coastal Uplands |
| 4A.2 | Coastal Lowlands |
| 4A.3 | Coastal Volcanics |
| 4A.4 | Low Olympics |
| 4A.5 | Outwash |

For more information on MLRA's, refer to the following web site:
http://www.essc.psu.edu/soil_info/soil_lrr/
Additional information on Common Resource Areas is available on the eFOTG for NRCS-Washington: http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WA
and the following website:
http://soils.usda.gov/survey/geography/cra.html

These forage suitability groups occur in the Coastal Valleys zone of MLRA 4A on relatively level lowlands between the Pacific Ocean and the Olympic Mountains and Willapa Hills. Elevation ranges from sea level to 500 feet.
Often, a cliff 50 to 200 feet high forms most of the western edge of this zone. From the edge of the cliff, the land slopes up onto glacial drift deposits, marine terraces, or young, continental sedimentary rocks in the northern portion. In the southwest corner of Washington, the land slopes from the edge of the cliff up onto alluvial or marine terraces or flood plains and beach dunes. This zone consists primarily of glacial and alluvial sediments and some scattered areas of young Tertiary sedimentary rocks (siltstone). Glacial deposits are dominant in the northern half of the area, and alluvium and beach dune deposits are more prominent in the southern half of the zone.
The average annual precipitation is 80 to 110 inches. Most of the precipitation occurs as low-intensity, Pacific frontal storms (75%-fall and winter, 15%-spring.) Summers are cool and relatively dry. Snowfall accumulation is rare on the ocean side of this area, but some snowfall occurs on the eastern boundary. This area lies within the coastal fog belt zone, and heavy fogs are common in summer. Supplemental moisture is provided by fog condensation. See the climate tables in this document for information on temperatures and frost-free periods.
The soils have either an isomesic or isofrigid soil temperature regime with a udic or perudic soil moisture regime. The soils are very strongly acid or strongly acid throughout. The undulating to hilly marine and glacial outwash terraces are shallow or moderately deep to cemented materials or are deep or very deep. The soils are poorly drained to well drained with ferrihydritic or isotic mineralogy. The soils on the nearly level flood plains and in the estuaries are very deep and typically are very poorly drained or poorly drained with mixed mineralogy.
This area is defined by uplands dominated by a dense overstory of Sitka spruce, western hemlock, western red cedar, red alder, and Douglas-fir. The understory is dominated by salal, western swordfern, huckleberry, beargrass and oxalis. Boggy depressions often supported fire-maintained wet prairies, with camas, wild cranberry, beargrass, and sedges. Terraces often have shore pine as a dominant overstory species. The flood plains supported an herbaceous community of species such as tufted hairgrass, skunk cabbage, rushes and sedges, as well as shrubby communities dominated by willows and spirea. Estuaries often have both high and low salt marsh communities. The high salt marsh typically contains tufted hairgrass and American dunegrass. Low salt marshes support species such as saltgrass and pickleweed, During periods of low tide, large nonvegetated mudflats are exposed in the coastal bays.

## Physiographic Descriptions

| | *Minimum* | *Average* | *Maximum* |
|---|---|---|---|
| **Elevation (feet):** | 0 | | 500 |
| **Slope (percent):** | 1 | 5 | 8 |

**The soil series correlated to this Forage Suitability Group predominantly occur on these landforms.**

| terraces | uplands | till plains | utwash terrace | river valleys | flood plains | ridges |
|---|---|---|---|---|---|---|
| 28% | 15% | 9% | 9% | 9% | 6% | 6% |

## Climatic Descriptions

### Growing Season by Common Resource Area- Frost Free & Freeze Free (32, 28, & 24 degrees Fahrenheit

| Common Resource Area | | Probability | 24 degrees F or lower | | 28 degrees F or lower | | 32 degrees F or lower | |
|---|---|---|---|---|---|---|---|---|
| | | | From | To | From | To | From | To |
| 4A.2 | Last freezing temperature in spring | 5 year in 10 later than-- | 1/10 | 1/17 | 2/12 | 3/2 | 4/19 | 4/5 |
| 4A.2 | First freezing temperature in fall | 5 yr in 10 earlier than-- | 1/4 | 1/4 | 11/29 | 12/14 | 10/28 | 11/16 |

| CRA: | | From | To |
|---|---|---|---|
| 4A.1 | **Growing Degree Days (40 degrees):** | **0** | **3873** |
| | **Annual Temperature Extremes (deg. F):** | **0** | **105** |
| | **Mean annual precipitation (inches):** | **84** | **113** |
| 4A.2 | **Growing Degree Days (40 degrees):** | **3818** | **4168** |
| | **Annual Temperature Extremes (deg. F):** | **0** | **105** |
| | **Mean annual precipitation (inches):** | **69** | **84** |

## Climate Report: Monthly Averages for MLRA-MLRU (Forage Management Zone within a MLRA)

### Monthly Precipitation (inches) and Temperature (degrees Fahrenheit):

| Month | Min. Daily Temp. | Max. Daily Temp | Avg. Daily Temp. | 2 years in 10 Precip. less than | 2 years in 10 Precip. greater than | Monthly Avg. Precip. | Avg. Snow(in.) |
|---|---|---|---|---|---|---|---|
| October | 43 | 61 | 52 | 3.1 | 11.1 | 7.2 | 0 |
| November | 39 | 52 | 46 | 7.6 | 17.7 | 12.7 | 0 |
| December | 36 | 47 | 41 | 8.0 | 17.4 | 12.8 | 0 |
| January | 36 | 48 | 42 | 7.1 | 17.3 | 12.1 | 1 |
| February | 36 | 50 | 43 | 6.1 | 14.9 | 10.5 | 0 |
| March | 38 | 53 | 46 | 6.0 | 12.6 | 9.3 | 0 |
| April | 40 | 57 | 49 | 3.9 | 8.2 | 6.2 | 0 |
| May | 45 | 61 | 53 | 2.2 | 5.8 | 4.0 | 0 |
| June | 49 | 64 | 56 | 1.6 | 3.9 | 2.9 | 0 |
| July | 52 | 68 | 60 | 0.6 | 2.4 | 1.5 | 0 |
| August | 52 | 69 | 60 | 0.5 | 2.6 | 1.6 | 0 |
| September | 48 | 68 | 58 | 0.6 | 6.0 | 3.2 | 0 |
| | | | | | **TOTALS:** | 84 | 2 |

### Number of days per year with at least 1 inch of snow on the ground:

| Least # Days | Avg. # Days | Most # Days |
|---|---|---|
| 0 | 1 | 4 |

### Climate Stations by Common Resource Area

| CRA | Station | record from | record to |
|---|---|---|---|
| 4A.1 | RAYMOND 2 S | | |
| 4A.1 | NASELLE | | |
| 4A.2 | LONG BEACH EXP STN | 1967 | 1990 |
| 4A.2 | HOQUIAM FCWOS AP | 1961 | 1990 |
| 4A.2 | GRAYLAND | 1961 | 1990 |
| 4A.2 | ABERDEEN | 1961 | 1990 |

**For local climate stations that may be more representative, refer to http://www.wcc.nrcs.usda.gov**

## Representative Soil Features

These soils typically have good available water-holding capacity and no slope, high water table, or tillage restrictions. These soils have few limitations.

| | MINIMUM | MAXIMUM |
|---|---|---|
| Depth (inches): | 36 | 66 |
| Surface Fragments 3-10" (% cover): | 0 | 3 |
| Surface Fragments > 10" (% cover): | 0 | 0 |
| Organic Matter % (surface): | 3.5 | 85 |
| Organic Matter % (0-12 inches): | 2 | 33 |
| Electrical Conductivity mmhos/cm: | - | - |
| Sodium Absorption Ratio: (0-12 inches) | - | - |
| Soil Reaction (1:1) Water (pH) (0-12 inches): | 4.2 | 6.1 |
| Cation Exchange Capacity (%) (0-12 inches): | 10.0 | 55.0 |
| Calcium Carbonate Equivalent (%) (0-12 inches): | - | - |
| Available Water Capacity (inches) (0-40 inches): | 3.1 | 13.7 |

## Characteristic Soil Series

### Dominant Series

The soil series with the dominant acres correlated to this Forage Suitability Group are listed below. The Forage Suitability Group has been correlated to soil series encompassing approximately 192000 acres.

| Calawah | Queets | Hoquiam | Willaby | Willapa | Chehalis |
|---|---|---|---|---|---|
| 30% | 11% | 7% | 5% | 5% | 5% |

### SOIL SERIES CORRELATED TO THIS FSG - SORTED ALPHABETICALLY

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Astoria | Bear Prairie | Calawah | Calawah | Calawah | Calawah | Calawah | Calawah | Calawah | Chehalis | Copalis |
| Hoquiam | Ilwaco | Ilwaco | Kalaloch | Kalaloch | Le Bar | Lebam | Newskah | O'Brien | Oyhut | Oyhut |
| Papac | Queets | Queets | Queets | Queets | Quillayute | Southshore | Vesta | Wellman | Willaby | Willapa |
| Willapa | | | | | | | | | | |

## Influencing Water Features

| | Minimum | Maximum |
|---|---|---|
| Flooding Frequency Class: | None | Occasional |
| Water Table Depth (April-June): | 30 | 41 |
| HYDRIC Rating: | No | No |
| Drainage Class: | Well drained | Moderately well drained |
| Ponding Frequency: | None | None |
| Ponding Duration: | | |
| Ponding Depth: | | |

## Adapted Species

The following species are considered adapted for the soils in this Forage Suitability Group for the uses checked.

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at http://plants.usda.gov/. NRCS-WA Plant Materials Technical Note 1 provides additional information on species adapted to western Washington conditions.

| *Soil type* | *Plant* | *Grazing only or Grazing-Hay* | *Exclusively for Hay or Silage* | *Winter-Early Spring Pasture* | *Exercise or Confinement Area* | *Temporary Cover* |
|---|---|---|---|---|---|---|
| *Well-drained all year* | | | | | | |
| | Alfalfa | ☑ | ☑ | ☐ | ☐ | ☐ |
| | Alsike Clover | ☑ | ☑ | ☐ | ☐ | ☐ |
| | Annual Ryegrass | ☑ | ☑ | ☑ | ☑ | ☑ |
| | Austrian Winter Peas | ☐ | ☐ | ☐ | ☐ | ☑ |
| | Barley | ☐ | ☐ | ☐ | ☐ | ☑ |
| | Bentgrass | ☐ | ☐ | ☐ | ☑ | ☐ |
| | Big Trefoil | ☑ | ☑ | ☐ | ☐ | ☐ |
| | Birdsfoot Trefoil | ☑ | ☑ | ☐ | ☐ | ☐ |
| | Cereal Rye | ☐ | ☐ | ☐ | ☐ | ☑ |
| | Fine Fescue | ☐ | ☐ | ☐ | ☑ | ☐ |
| | Oats | ☐ | ☐ | ☐ | ☐ | ☑ |
| | Orchardgrass | ☑ | ☑ | ☑ | ☐ | ☐ |
| | Perennial Ryegrass | ☑ | ☑ | ☑ | ☑ | ☑ |
| | Red Clover | ☑ | ☑ | ☑ | ☐ | ☐ |
| | Spring Wheat | ☐ | ☐ | ☐ | ☐ | ☑ |
| | Tall Fescue | ☑ | ☑ | ☑ | ☑ | ☐ |
| | Timothy | ☐ | ☑ | ☐ | ☐ | ☐ |
| | Triticale | ☐ | ☐ | ☐ | ☐ | ☑ |
| | White Clover | ☑ | ☑ | ☐ | ☐ | ☐ |
| | Winter Wheat | ☐ | ☐ | ☐ | ☐ | ☑ |

## Production Estimates

Yield Estimations and Yield Adjustments: This table gives guidance for estimating potential hay yields for soils with varying management factors as compared to soils under a high level of management. A high level of management typically includes factors such as: selection of the proper species and suitable high-yielding plant varieties; proper seeding rates and seedbed preparation; appropriate and timely harvest; control of weeds, plant diseases, harmful insects; and optimum levels of soil fertility. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yield estimate for fields with a high level of management is listed in the soil survey for each soil map unit. This is found in Section 2 of the electronic Field Office Technical Guide (eFOTG). Use the potential yield listed in the eFOTG as a starting point when evaluating actual estimated yield for the field through inventory tools. In this section of the Forage Suitability Group, yield interpretations have been developed for several typical types of management in the area, expressed as a percentage of the potential yield under high management listed in the EFOTG Soil Survey.

The term “organic fertility” as used in this table is mechanically applied manures or composts, rather than manure directly deposited by grazing animals. Pastured lands differ from cropland and hayland in that nutrients are recycled within their boundaries. Most of the nutrients consumed are used to maintain the animal and are excreted. Grazing cattle excrete 75 percent of the nitrogen (50 percent of N is lost due to volatilization, 37.5percent returned to the ground), 80 percent of the phosphorus and 85 percent of the potassium. The nutrients may not be distributed evenly, but the nutrients are continually returned as long as the pasture is occupied by livestock. On cropland and hayland, all nutrients in the harvested crop leave the field.

The following yield interpretations should be used only as a guide, actual field yield estimations should be developed using inventory tools.

Low Management, moderate-high fertility: Harvest regime is too early for optimal forage quantiy or too late for optimal hay quality, fertility in soil is naturally high or amended as needed.

Low fertility, moderate-good management: Harvest regime is optimal for forage quality and quantity, fertility in soil is not amended to meet forage plant needs

High organic fertility, high management: Harvest regime is optimal for forage quality and quantity, manures or compost is mechanically applied to meet crop nutrient needs

Irrigated, high fertility or organic fertility, high management: Harvest regime is optimal for forage quality and quantity, manures or compost is mechanically applied to meet crop nutrient needs, irrigation is applied to meet crop moisture needs.

Effective drainage, high organic fertility, high management: Harvest regime is optimal for forage quality and quantity, manures or compost is mechanically applied to meet crop nutrient needs, and soil drainage is installed to minimize cropping limitations.

## Production Estimates

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations. The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields, and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses. The production estimates listed below represent total annual harvested plant production (hay yields- Tons/Acre) on an air-dry-matter basis.

| | | | Irrigated | Effective Drainage |
|---|---|---|---|---|
| Low Management | Moderate-Good Management | High Management | High Management | High Management |
| Moderate-High Fertility | Low Fertility | High Organic Fertility | High Fertility or Organic Fertility | High Organic Fertility |
| 0.45 | 0.75 | 1.25 | 1.25 | N/A |

**FSG-Yield-Minimum - Average - Maximum of Soils Correlated to this Forage Suitability Group**

### Production Estimates Distribution

| 1 Tons/ Acre | 1_5 Tons/ Acre | 2 Tons/ Acre | 2_5 Tons/ Acre | 3 Tons/ Acre | 3_5 Tons/ Acre | 4 Tons/ Acre | 4_5 Tons/ Acre | 5 Tons/ Acre | 5_5 Tons/ Acre | 6 Tons/ Acre |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 6% | | 35% | 15% | 26% | 6% | 6% | 3% | 3% |

| | Pasture Yield: AUMS/Acres | | | | |
|---|---|---|---|---|---|
| Hay Yield: Tons/Acre | Harvest Efficiency: see Harvest Efficiency Table For Grazing | | | | |
| | 0.25 | 0.35 | 0.45 | 0.55 | 0.65 |
| 1 | *0.8* | *1.1* | *1.4* | *1.7* | *2.1* |
| 1.5 | *1.2* | *1.7* | *2.1* | *2.6* | *3.1* |
| 2 | *1.6* | *2.2* | *2.9* | *3.5* | *4.1* |
| 2.5 | *2.0* | *2.8* | *3.6* | *4.4* | *5.2* |
| 3 | *2.4* | *3.3* | *4.3* | *5.2* | *6.2* |
| 3.5 | *2.8* | *3.9* | *5.0* | *6.1* | *7.2* |
| 4 | *3.2* | *4.4* | *5.7* | *7.0* | *8.3* |
| 4.5 | *3.6* | *5.0* | *6.4* | *7.9* | *9.3* |
| 5 | *4.0* | *5.6* | *7.1* | *8.7* | *10.3* |
| 6 | *4.8* | *6.7* | *8.6* | *10.5* | *12.4* |
| 7 | *5.6* | *7.8* | *10.0* | *12.2* | *14.4* |
| 8 | *6.3* | *8.9* | *11.4* | *14.0* | *16.5* |
| 9 | *7.1* | *10.0* | *12.9* | *15.7* | *18.6* |
| 10 | *7.9* | *11.1* | *14.3* | *17.5* | *20.6* |
| | | | | | |
| **Instructions: Find the estimated hay yield, determine the grazing system being applied (Harvest Efficiency Table for Grazing). Use the AUMS/Acre from the appropriate Harvest Efficiency Column.** | | | | | |

| Harvest Efficiency For Grazing - Total Season Per Herd1 | | |
|---|---|---|
| **Number of Pasture Paddocks** | **Approximate Days on Each Field** | **Grazing Efficiency** |
| **Continuous** | **>14 days** | **<=30%** |
| **4 pasture** | **9 day** | **35-45%** |
| **5 pasture** | **7 day** | **45-50%** |
| **8 pasture** | **4 day** | **50-60%** |
| **24 pasture** | **1 day** | **65%+** |
| | | |

# Forage Growth Curves

These curves represent the average percent of total production that grows during that month.

| Growth Curve Number | Growth Curve Name | Growth Curve Description |
|---|---|---|
| WA1423 | Coastal Lowlands-MLRA 4A-High Available Water/Sub-Irrigated | High Available water-holding capacity & slopes < 8%, or some summer sub-irrigation |

| OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 3 | 1 | 2 | 4 | 9 | 14 | 17 | 15 | 12 | 6 | 9 |

| Growth Curve Number | Growth Curve Name | Growth Curve Description |
|---|---|---|
| WA1424 | Coastal Lowlands-MLRA 4A-Irrigated/Sub-Irrigated | Irrigated fully to meet crop needs, or fully sub-irrigated in summer |

| OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 3 | 1 | 2 | 4 | 9 | 11 | 15 | 14 | 14 | 10 | 10 |

# Pasture Calendar for Western Washington

| Month | Portion of Month | Vancouver/Cowlitz Basin | | Puget Lowland | | Foothills | Coastal Valleys |
|---|---|---|---|---|---|---|---|
| Soil Moisture Status during growing season: | | Droughty to adequate | Optimal | Droughty to adequate | Optimal | all | all |
| MLRA or Common Resource Area: | | 2.3, 2.4 | 2.1, 2.2, 2.3, 2.9 | 2.6 - 2.8, 2.10 - 2.13 | | 1.1, 1.2, 1.3, 1.5, 2.5, 4a.3, 4a.5, 3.1 | 4a.1, 4a.2 |
| Ecozone Map region: | | 3d | 2i, 3a, 3b, 3c | 2c, 2d, 2e, 2f, 2g | 2a, 2b | 1c, 1d, 1e, 4a, 1g, 1h | 1a, 1b, 1c, 1e, 1f |
| September ** | 1st 1/2 | 1 | 1 | 1 | 2a | 2a | 2a |
| September ** | 2nd 1/2 | 1 | 1 | 1/2a | 2b | 2a | 2a |
| October | 1st 1/2 | 2a | 2a | 2a | 2b | 2b | 2a |
| October | 2nd 1/2 | 2b | 2b | 2b | 2b | 2b | 2b |
| November | 1st 1/2 | 2b | 2b | 2b | 2b | 3 | 2b |
| November | 2nd 1/2 | 3 | 3 | 3 | 3 | 3 | 2b |
| December | 1st 1/2 | 3 | 3 | 3 | 3 | 4 | 2b |
| December | 2nd 1/2 | 4 | 4 | 4 | 4 | 4 | 3 |
| January | 1st 1/2 | 4 | 4 | 4 | 4 | 4 | 4 |
| January | 2nd 1/2 | 5 | 4 | 4 | 4 | 4 | 5 |
| February | 1st 1/2 | 5 | 5 | 5 | 4 | 4 | 5 |
| February | 2nd 1/2 | 6a | 5 | 5 | 5 | 4 | 6a |
| March | 1st 1/2 | 6a | 6a | 6a | 5 | 5 | 6a |
| March | 2nd 1/2 | 6b | 6a | 6a | 6a | 5 | 6a |
| April | 1st 1/2 | 6b | 6b | 6b | 6a | 6a | 6b |
| April | 2nd 1/2 | 6b | 6b | 6b | 6b | 6b | 6b |
| May | 1st 1/2 | 6b | 6b | 6b | 6b | 6b | 6b |
| May | 2nd 1/2 | 6b | 6b | 6b | 6b | 6b | 6b |
| June | 1st 1/2 | 7 | 7 | 7 | 6b | 6b | 6b |
| June | 2nd 1/2 | 7/8 | 7/8 | 7 | 7 | 6b | 6b |
| July | 1st 1/2 | 9 | 9 | 8 | 8 | 7 | 7 |
| July ** | 2nd 1/2 | 10 | 9 | 9 | 8 | 7 | 7 |
| August ** | 1st 1/2 | 10 | 10 | 10 | 9 | 8 | 8 |
| August ** | 2nd 1/2 | 10 | 10 | 10 | 9 | 9 | 8 |

** Dependent on soil moisture and precipitation. Water will maintain growth or break dormancy.

**Description of Grassland Growth Period**

| Period | Title | Brief Description |
|---|---|---|
| 1 | ***Semi-dormancy*** | Recovering from summer dormancy, root growth |
| 2a | ***Steady regrowth*** | New green sprigs with much brown, root growth |
| 2b | ***Steady regrowth*** | Looks mostly green with little brown, root growth |
| 3 | ***Declining regrowth*** | Slowing plant top & root growth, tops may yellow |
| 4 | ***Very slow growth*** | Plants semi-dormant, maintenance growth |
| 5 | ***Increasing growth*** | Plant uses reserves to increase growth of shoots & roots |
| 6a | ***Rapid growth - cool soils*** | Plant uses reserves as in 5, above, but at a faster rate |
| 6b | ***Rapid growth - warming so*** | Tops show rapid growth, quality declines w/o harvest |
| 7 | ***Slowing growth*** | Top growth slows, managed harvest maintains quality |
| 8 | ***Steady growth*** | Less top growth, root shedding begins |
| 9 | ***Slow growth*** | Rapid root shedding, drought/heat may start dormancy |
| 10 | ***Dormancy*** | Dormancy w/o irrigation, stubble mgmt critical for regrow |

## Pasture Calendar Summary

### *Pasture Calendar Summary*

| | Growth Activity | Environment | Management Action | Avoid these Actions |
|---|---|---|---|---|
| **1 Semi-dormancy** | Limited growth unless irrigated; root growth starts; growing points developing; protein increasing; carbohydrates being stored in stem bases; winter weeds sprout | Rains return; temperatures cooler, esp. at night; days shorter; soils warm | Fall soil test, lime or fertilize; use confinement area. | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. Over-fertilization |
| **2a Steady regrowth** | New green growth with much brown; roots and growing points establishing and growing; carbohydrates stored in stem bases; high protein and carbohydrate levels, highest digestibility of the year. | Day length decreasing (fall equinox), regular rains; soil and air temperatures cool; soil nitrogen mineralization increasing if moisture available. | Fall soil test, lime or fertilize; use confinement area | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. Over-fertilization |
| **2b Steady regrowth** | Mostly green with little brown, root growth continues; high protein and carbohydrate levels, highest digestibility of the year. | Soil nitrogen mineralization rapid, steady rainfall; soils cool further. | Fall soil test, lime; monitor soils for saturation and remove livestock to avoid compaction; use confinement area. | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. Over-fertilization |
| **3 Declining regrowth** | Slowing forage and root growth; root shedding; tops yellow; protein levels drop, carbohydrate levels remain high | Short day length slows forage growth; heavy rains; soil nutrients less available; flooding possible on low-lying fields. | Use confinement area. | Grazing or equipment use on saturated soils. Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. Over-fertilization |
| **4 Very slow growth** | Semi-dormant; maintenance growth; root shedding; protein levels drop, carbohydrate levels stay high | Short days; cold air temperatures; heavy rains; soil nutrients less available; soil temperatures cool; flooding possible on low-lying fields. | Use confinement area. Start tracking T-Sum. | Grazing or equipment use on saturated soils. Over fertilization. Grazing below increased residual heights: 4 inches-bunchgrasses, 3 inches-sodformers. |
| **5 Increasing growth** | Stem base reserves used for shoot and root growth; production increasing; protein and carbohydrate levels low. | Day length increasing; air temperatures warming; soil nutrients increasingly available after T-Sum 200 but mineral deficiency symptoms may occur due to cool soils; soils warming and drying | Monitor T-Sum. First application of nutrients and lime. Check for weed problems. Use confinement area. | Grazing or equipment use on saturated soils. Over fertilization. Grazing below increased residual heights: 4 inches-bunchgrasses, 3 inches-sodformers. |
| **6a Rapid growth - cool soils** | Stem base reserves used for shoot and root growth at a faster rate; seedhead developing; protein and carbohydrate levels low; digestibility high, fiber low. | Day length increasing (spring equinox); air temperatures increasing, nights cool; soils cool; soil nutrients increasingly available. | Apply nutrients and lime if not previously done; use confinement area; overseed confinement areas; reseed scheduled pastures; control weeds. | Grazing or equipment use on saturated soils. Over fertilization. Grazing below increased residual heights: 4 inches-bunchgrasses, 3 inches-sodformers. |
| **6b Rapid growth - warming soils** | Rapid growth; quality declines w/o harvest; seedheads emerging; regrowth rapid; root growth slowing, carbohydrate levels increasing in lower leaves and stem; digestibility high, fiber low. | Day length significantly longer; air temperatures increasing; nights cool, but not frosting; soils warming; soils nutrients more available, but may not meet plant needs. | 1st/2nd application of nutrients and lime; reseed scheduled pastures; over-seed confinement areas; control weeds. | Grazing or equipment use on saturated soils. Over fertilization. Grazing below increased residual heights: 4 inches-bunchgrasses, 3 inches-sodformers. |
| **7 Slowing growth** | Slowing growth, mostly from vegetative tillers; digestibility lower but still high quality; seedheads emerge on late species such as timothy; regrowth time increasing; root growth slowing, carbohydrate levels declining. | Longest days of the year (summer solstice); soil moisture adequate but less available; air temperatures warming day and night; soil temperatures warming; soil nutrients very available. | Monitor growth rates; control weeds; monitor irrigation needs; 2nd/3rd application of nutrients. Cut hay before mature seed-setting phase. | Grazing below increased residual heights: 4 inches-bunchgrasses, 3 inches-sodformers. |
| **8 Steady growth** | Less forage growth, root shedding begins; protein levels adequate; carbohydrate levels decline; digestibility lower and fiber higher; lack of moisture and high temperatures slows growth, may start dormancy. | Air temperatures (day and night) and soil temperatures are warm; little rainfall; evaporation increases. | Monitor growth rates. Use confinement area if stubble height can't be maintained. Cut hay before mature seed-setting phase. | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. |
| **9 Slow growth** | Rapid root shedding; forage growth slowing; drought/heat result in very little growth or start dormancy; protein levels adequate, low carbohydrate levels, digestibility improving | Air temperatures usually higher than optimum for forage growth; little rainfall; soil temperatures warm, day length decreasing. | Use confinement area to maintain stubble height. Cut hay before mature seed-setting phase. | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. |
| **10 Dormancy** | Dormancy w/o soil moisture or irrigation; protein levels adequate, carbohydrate levels low and static because no growth is occurring. | Day length decreasing; air temperatures peak; little or no rainfall; soil temperatures peak | Use confinement area to maintain stubble height.. | Grazing below minimum residual heights: 3 inches-bunchgrasses, 2 inches-sodformers. |

## Forage Suitability Group Interpretations

### Grazing Management Interpretations

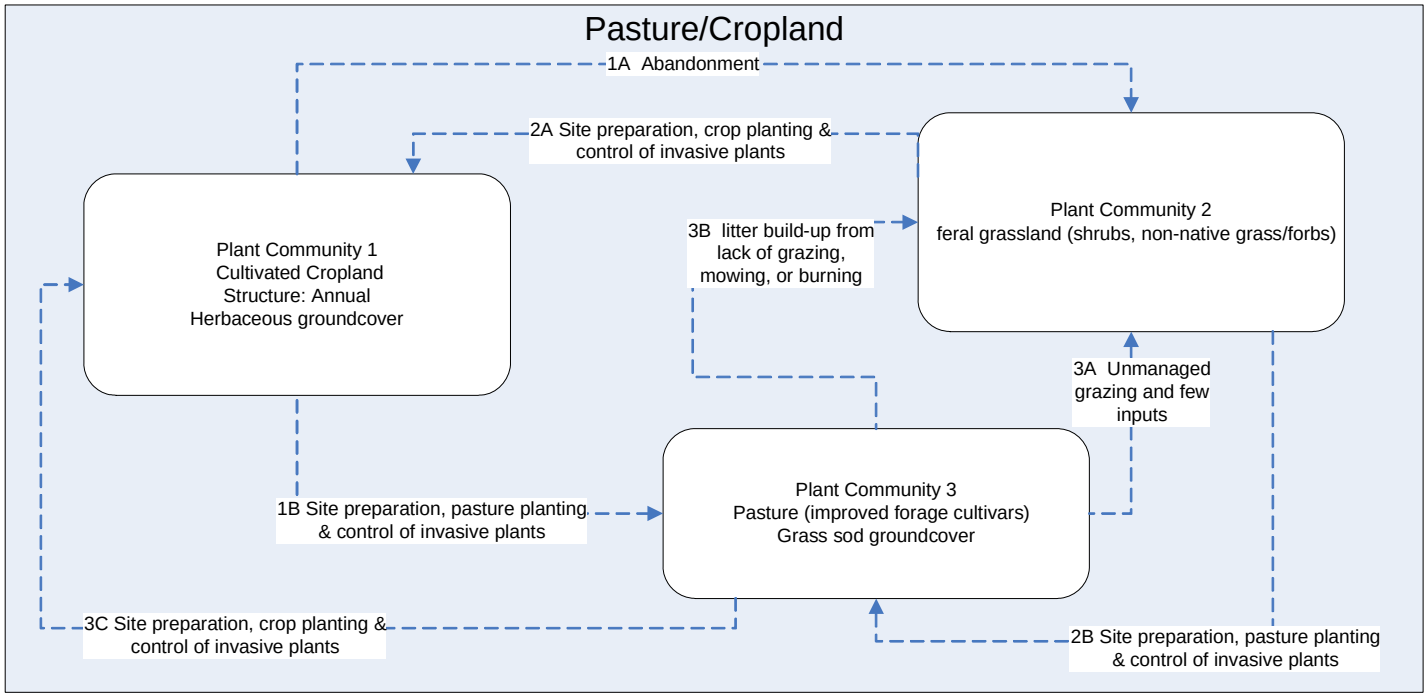
Management Limitations: Some of these soils have a high water table in the winter, but it can be controlled with drainage, minimizing its effects on forage production and use.
Management Advantages: Because of good water holding capacity, the growing season extends through most of the summer drought period. Natural soil fertility is high. This combination of water and fertility leads to high yields. Because these soils are flat to gently sloping, there are almost no physical restrictions on use of equipment or problems with achieving uniform livestock distribution. This soil makes excellent summer pasture. Better-drained or sandier soils have an extended use period into early spring and late fall, and livestock can graze early and late forage growth with minimal soil compaction.

### Wildlife Interpretations

Management of Improved Grassland for Wildlife Habitat

Grasslands in western Washington are important habitats for many wildlife species. They provide feed, cover and nesting habitat. Improved grasslands are especially important for grazing animals, because this habitat provides palatable, highly nutritious feed during critical seasons of the year. Elk and wintering waterfowl use this habitat extensively when it is available, as do several native butterfly species. Management to produce high quality livestock forage will also produce nutritious forage for wildlife. These management activities include designing grazing systems, haying or mowing scheduling, and timing of fertilizer applications to produce leafy green stems during the target feeding period.

## Cropland Pastureland Plant Community



# Agroecology of the Cropland-Pastureland Plant Communities

An agronomic ecosystem is constrained by the climate and the soil resource, including soil biota. The soil and vegetative components are inseparably connected through interacting ecological processes of (1) hydrology (the capture, storage, and redistribution of precipitation); (2) energy capture (conversion of sunlight to plant and animal matter); and (3) nutrient cycling (the cycle of nutrients through the physical and biotic components of the environment). The functioning of the management unit ecosystem is evalutated using the Pasture Condition Scoresheet. All management actions must be accomplished within the constraints imposed by the management unit ecosystem. On pastured lands, the system is driven by the grazing management regime that is applied. On cropped (machine harvested) lands, the system is driven by planting and harvesting regimes. Cropped and pastured agronomic ecosystems in western Washington typically consist of three general plant communities depending on planting and harvesting regimes (by grazing animal or machine). A complete lack of management inputs or intentional tree planting will result in a return to dominance by coniferous or coniferous and deciduous species.

**Plant Community Number: 1** **Common Name:** Cultivated

**Structure:** Cropland

Plant Community 1 consists of a range of crops, including: annually planted species such as cereal grains, corn, vegetable crops and flowers; short-lived perennials such as strawberries; and more permanent shrubby crops such as caneberries, blueberries, grapes and woody herbs.

**Pathway**

**A** Gradual- In the absence of agronomic activities seeds from surrounding disturbed communities will be transported to the site through factors such as wind, flood water, animals or vehicle traffic.

**B** Abrupt - Agronomic activities such as tillage, addition of significant fertility or other soil amendments such as lime, mowing, burning, harvest or chemical control of vegetation, planting the site to grassland

**Plant Community Number: 2** **Common Name:** Feral Grassland & Shrubland

**Structure:** Grasses, forbs and/or shrubs

Plant Community 2 is characterized by a low level of agronomic inputs such as added fertility, intensive grazing management, clipping or weed control. This plant community is dominated by introduced species, such as velvetgrass (Holcus lanatus), bentgrass (Agrostis spp.), sweet vernalgrass (Anthoxanthum odoratum), tall oatgrass (Arrhenatherum elatius), red fescue (Festuca rubra), Canada bluegrass (Poa compressa), and various introduced weedy forbs. Sites with extremely low fertility or heavy grazing pressure will have a higher proportion of annual species such as medics (Medicago spp.), annual bluegrass (Poa annua), soft chess (Bromus mollis), and annual fescues (Vulpia spp.). Wetland areas are often dominated by reed canarygrass (Phalaris arundinaceae) and meadow foxtail (Alopecurus pratensis). This plant community can include remnants of commonly seeded introduced pasture species such as orchardgrass (Dactylis glomerata), tall fescue (Schedonorus arundinacea), timothy (Phleum pratense), big trefoil (Lotus uliginosis), red clover (Trifolium pratense) and white clover (Trifolium repens).

**Pathway**

**A** Abrupt-Agronomic activities such as tillage, addition of significant fertility or other soil amendments such as lime, chemical control of vegetation and planting the site to cultivated crop.

**B** Abrupt-Agronomic activities such as tillage, addition of significant fertility or other soil amendments such as lime, chemical control of vegetation and planting the site planting the site to improved forage species.

**Plant Community Number: 3** **Common Name:** Improved Grassland

**Structure:** Grasses and forbs

Plant Community 3 receives regular agronomic inputs such as added fertility or other soil amendments such as lime, intensive grazing management or clipping and weed control. This plant community includes commonly seeded introduced pasture species such as orchardgrass (Dactylis glomerata), perennial ryegrass (Lolium perenne), tall fescue (Schedonorus arundinacea), timothy (Phleum pratense), big trefoil (Lotus uliginosis), red clover (Trifolium pratense), white clover (Trifolium repens) and alsike clover (Trifolium hybridum). Wetland areas often also support reed canarygrass (Phalaris arundinaceae) and meadow foxtail (Alopecurus pratensis). Additional introduced species that commonly occur in Feral Grassland and Shrub Communities (see Community 2, above) will also occur in this community, although in minor amounts.

**Pathway**

**A** Gradual-Overgrazing and a lack of agronomic activities, such as added fertility, clipping or weed control causes a shift in species composition away from desirable forage species.

**B** Gradual-Lack of grazing and clipping results in excessive litter buildup favoring those species better suited to low fertility and excessive litter conditions. These species may include velvetgrass (Holcus lanatus), bentgrass (Agrostis spp.), sweet vernalgrass (Anthoxanthum odoratum), tall oatgrass (Arrhenatherum elatius), red fescue (Festuca rubra), Canada bluegrass (Poa compressa), and various introduced weedy forbs.

**C** Abrupt-Agronomic activities such as tillage or chemical control of vegetation, addition of significant fertility or other soil amendments such as lime and planting the site to cultivated crop

**Supporting Information**

**Associated Sites:**

There are seven Forage Suitability Groups (FSG) developed for each MLRA-LRU:

| Series | FSG Name | FSG Description |
|---|---|---|
| 100 | Wet Soils | Soils with a high water table (less than 6” below soil surface) for a significant portion of the year |
| 200 | Seasonally Wet Soils | Soils with a seasonal high water table within 12” of the soil surface |
| 300 | Limited Depth Soils | Soils with a dense layer or bedrock generally less than 36 inches below the soil surface |
| 400 | Droughty Soils | Soils with low available water-holding capacity and without modifying factors such as a high water table or summer moisture |
| 500 | Very Productive Agricultural Soils | Soils with good available water-holding capacity, & no slope, high water table, or tillage restrictions. |
| 600 | Moderately Productive Agricultural Soils | Soils with moderate available water-holding capacity, moderate slope or tillage restrictions, but generally without a high water table. |
| 700 | Sloping to Steep Soils | Soils with moderate available water-holding capacity, no high water table restrictions, but slope > 8% causes management restrictions. |

**State Correlation:**

**Inventory Data References**

**Type Locality**

**Relationship to Other Established Classifications:**

Level IV Ecoregions of the Conterminous United States

**Other References:**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## Forage Suitability Group Description Approval

**Author**

// Marty Chaney

**Date**

9/18/2008

**Approval by:**

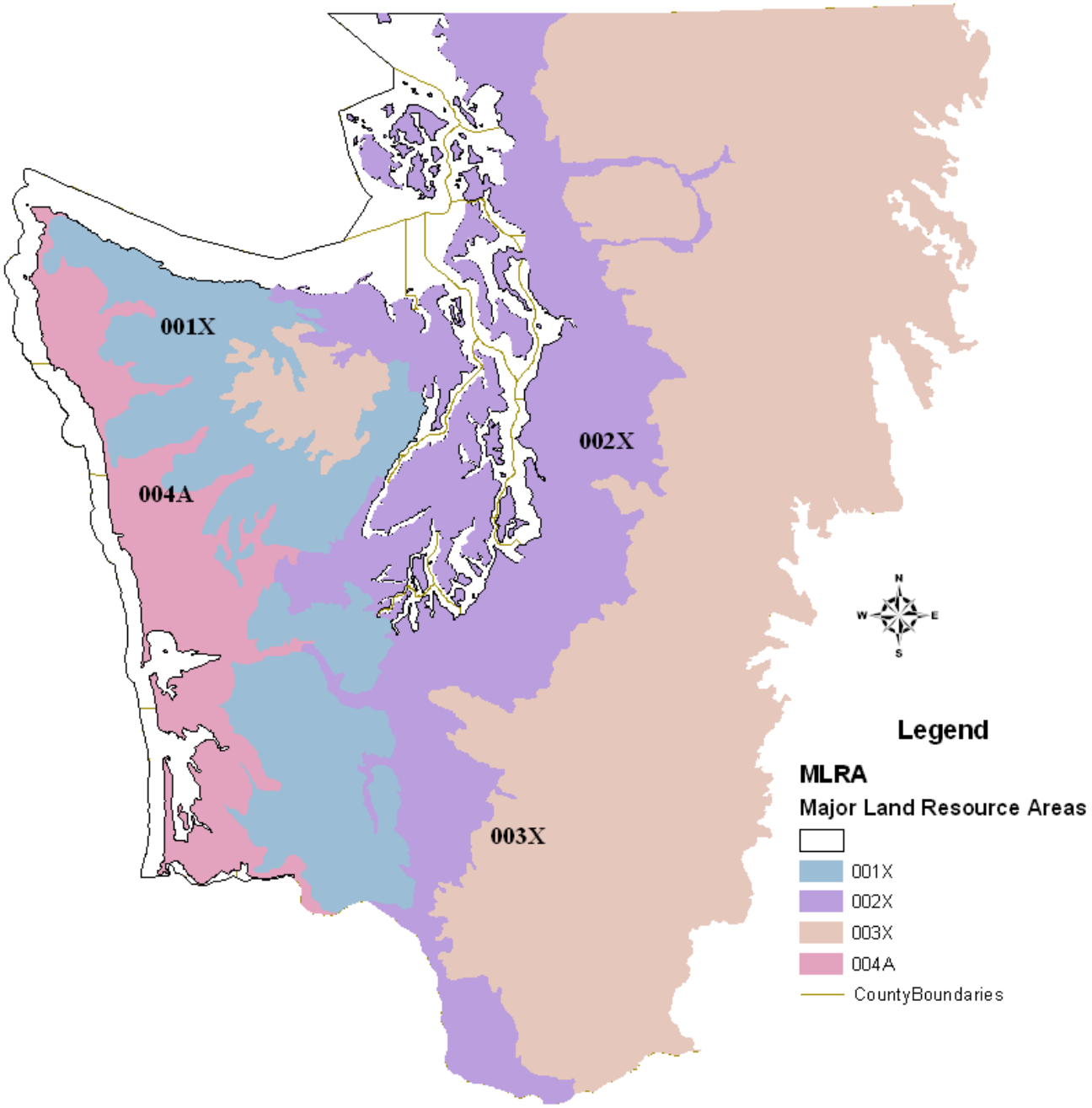
// Gerald Rouse

**State Range Management Specialist**

**Approval Date::**

9/18/2008

MLRA Map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Major Land Resource Areas
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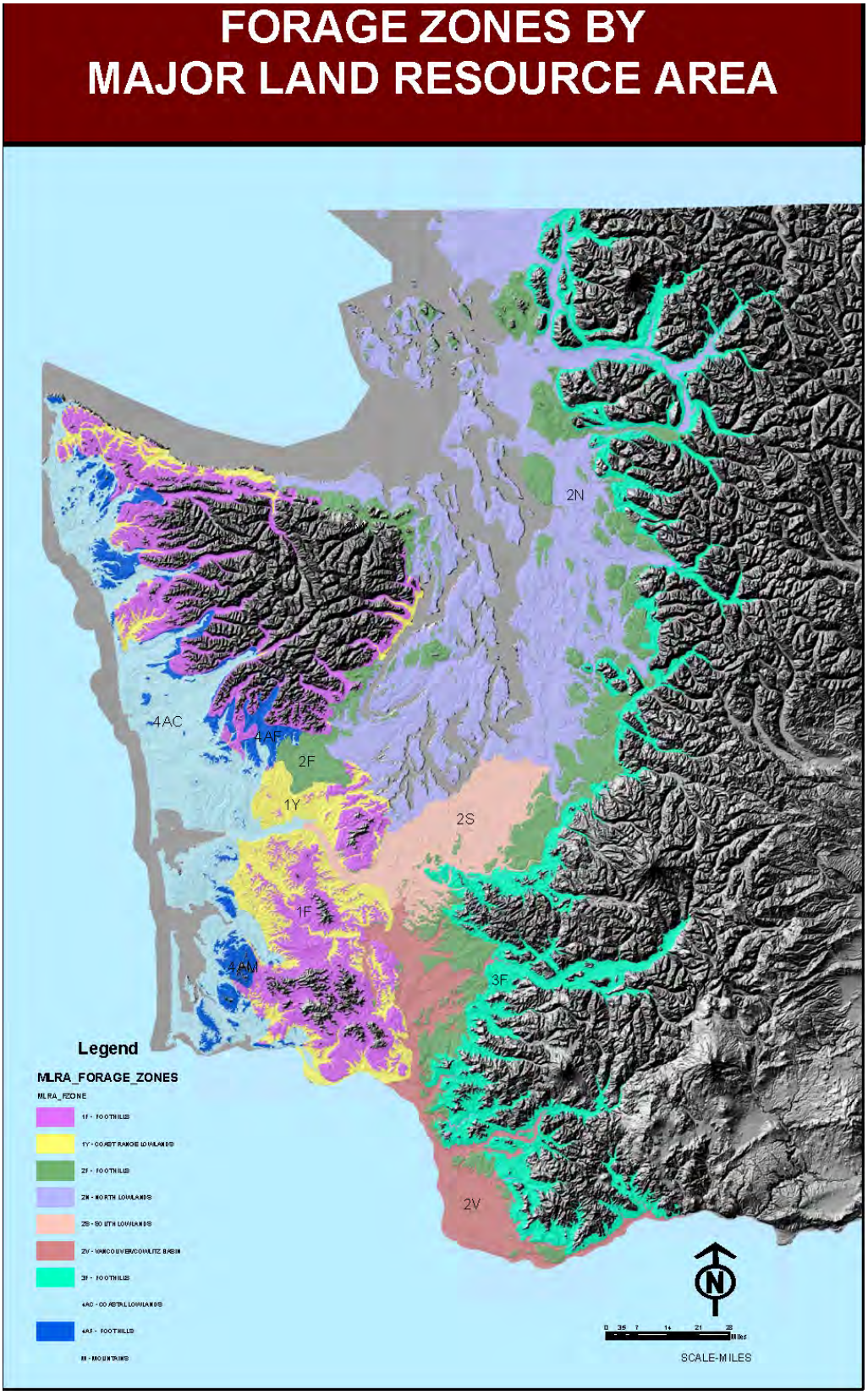
**Forage Management Zones Map**