Figures and Tables for the Goose Gap Viticultural Area Petition

Fig 1: Washington State AVAs

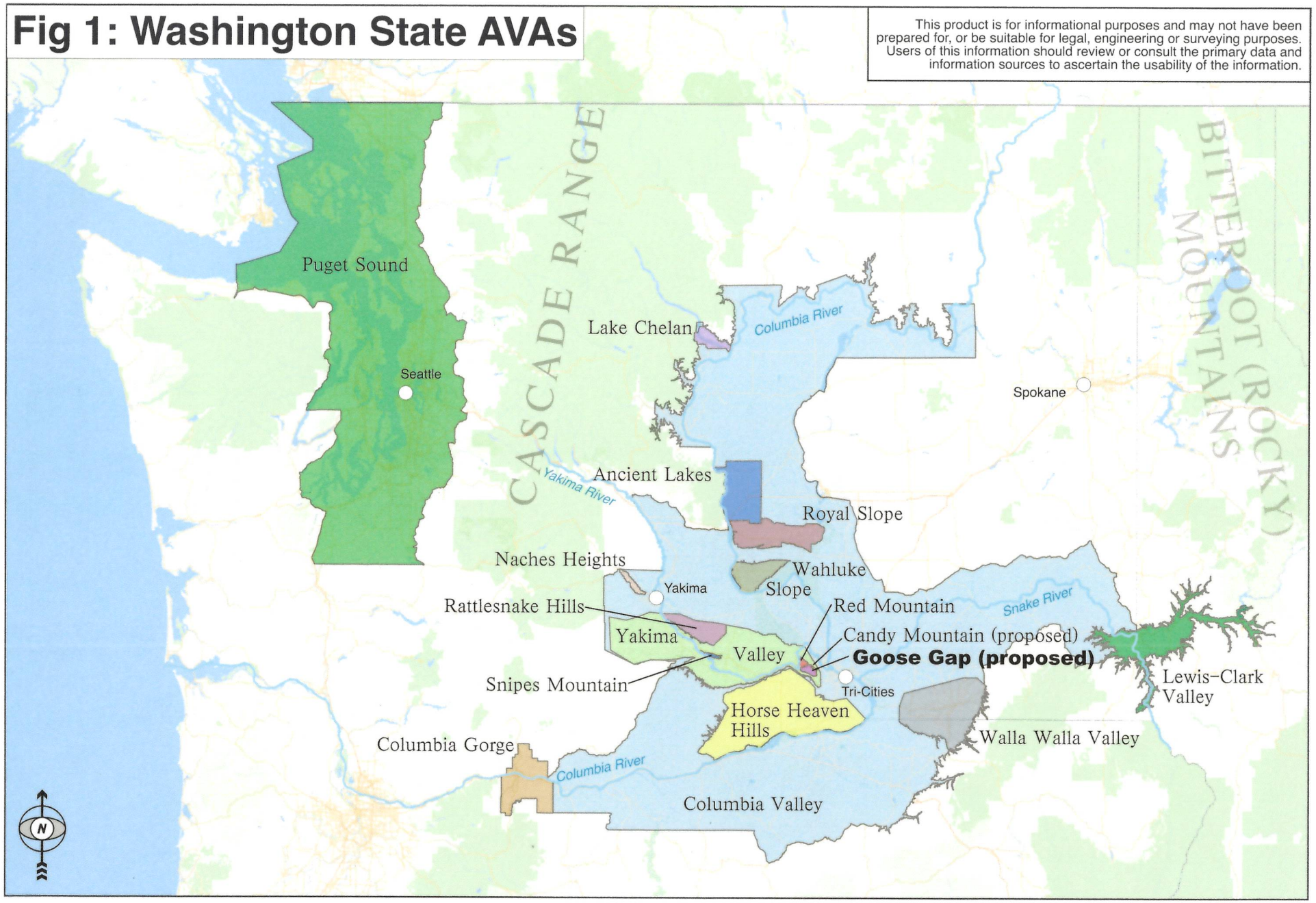


Fig 2a: Perspective View from the Southwest of Proposed Goose Gap AVA

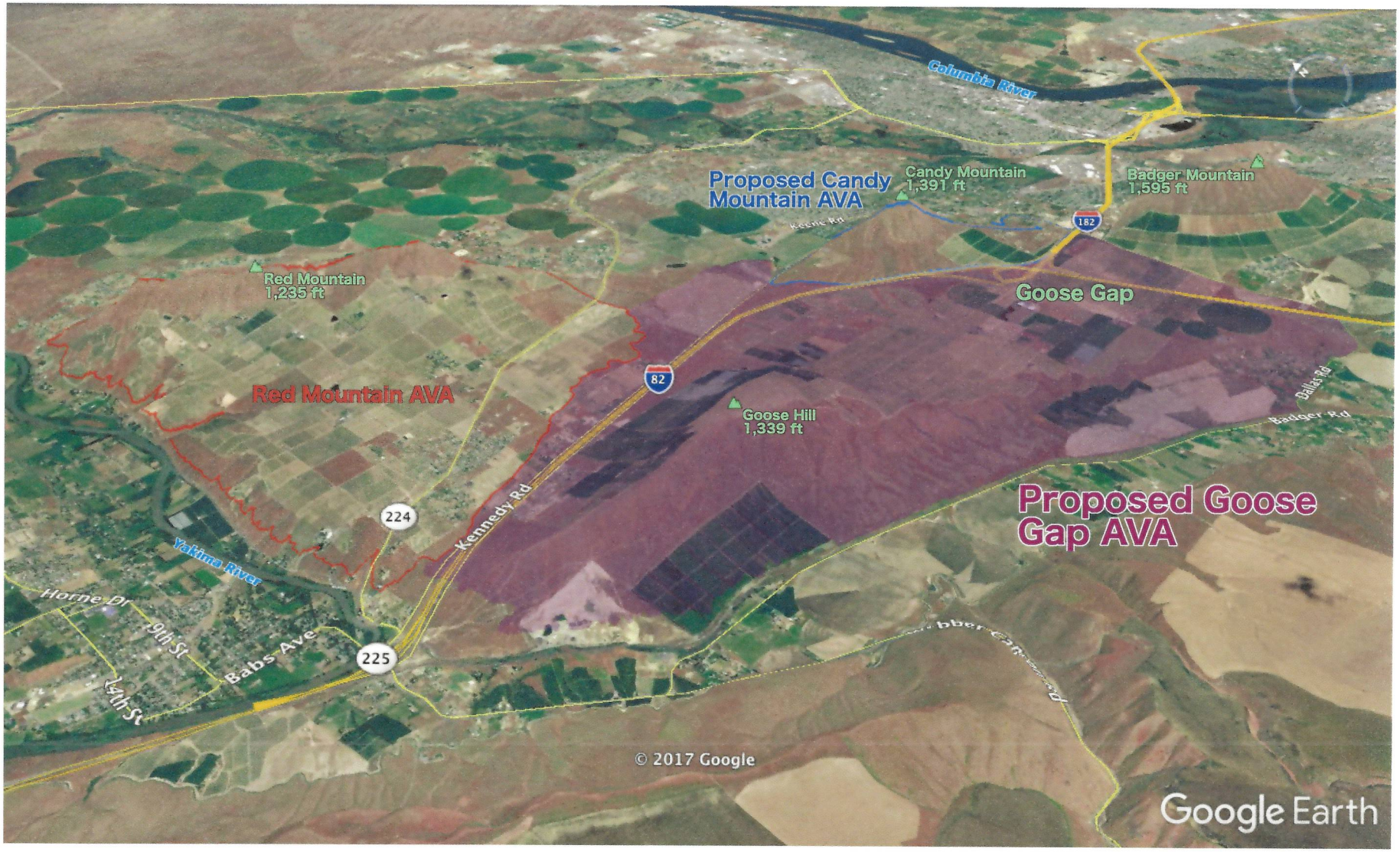
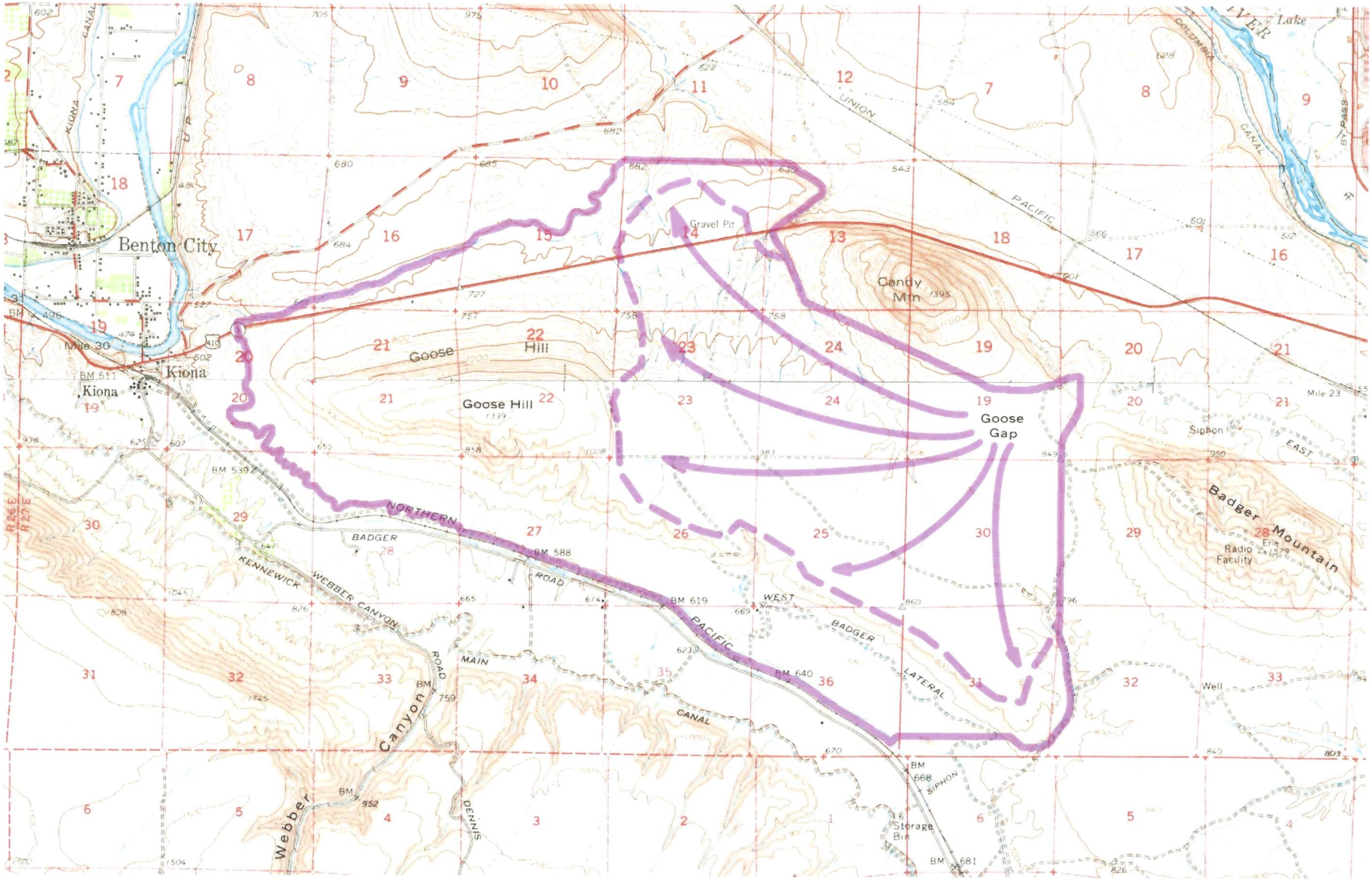


Fig 2b: Perspective View from the Southwest of the Proposed Goose Gap AVA in Relation to the Red Mountain AVA and Proposed Candy Mountain AVA

Fig 2c: Parts of the Richland and Badger Mountain 1:62,500-scale (15-minute series) topographic maps from 1965 showing Goose Gap in the center of the proposed AVA (boundary shown is approximate). Dashed area is the approximate geographic extent of the ‘gap’ or saddle of hunting lore. That is now the focus of viticulture within the proposed AVA.



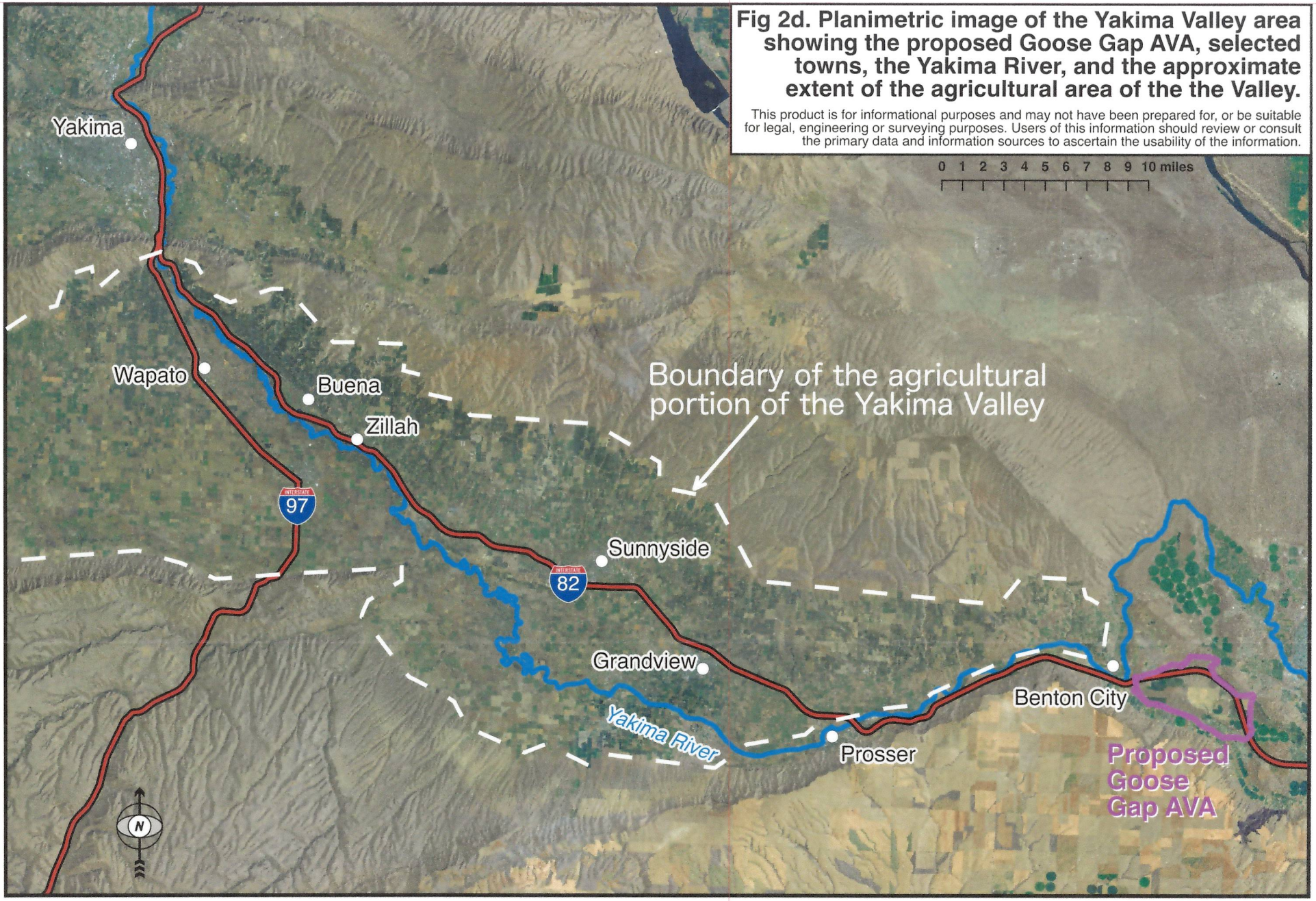


Fig 2d. Planimetric image of the Yakima Valley area showing the proposed Goose Gap AVA, selected towns, the Yakima River, and the approximate extent of the agricultural area of the the Valley.

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

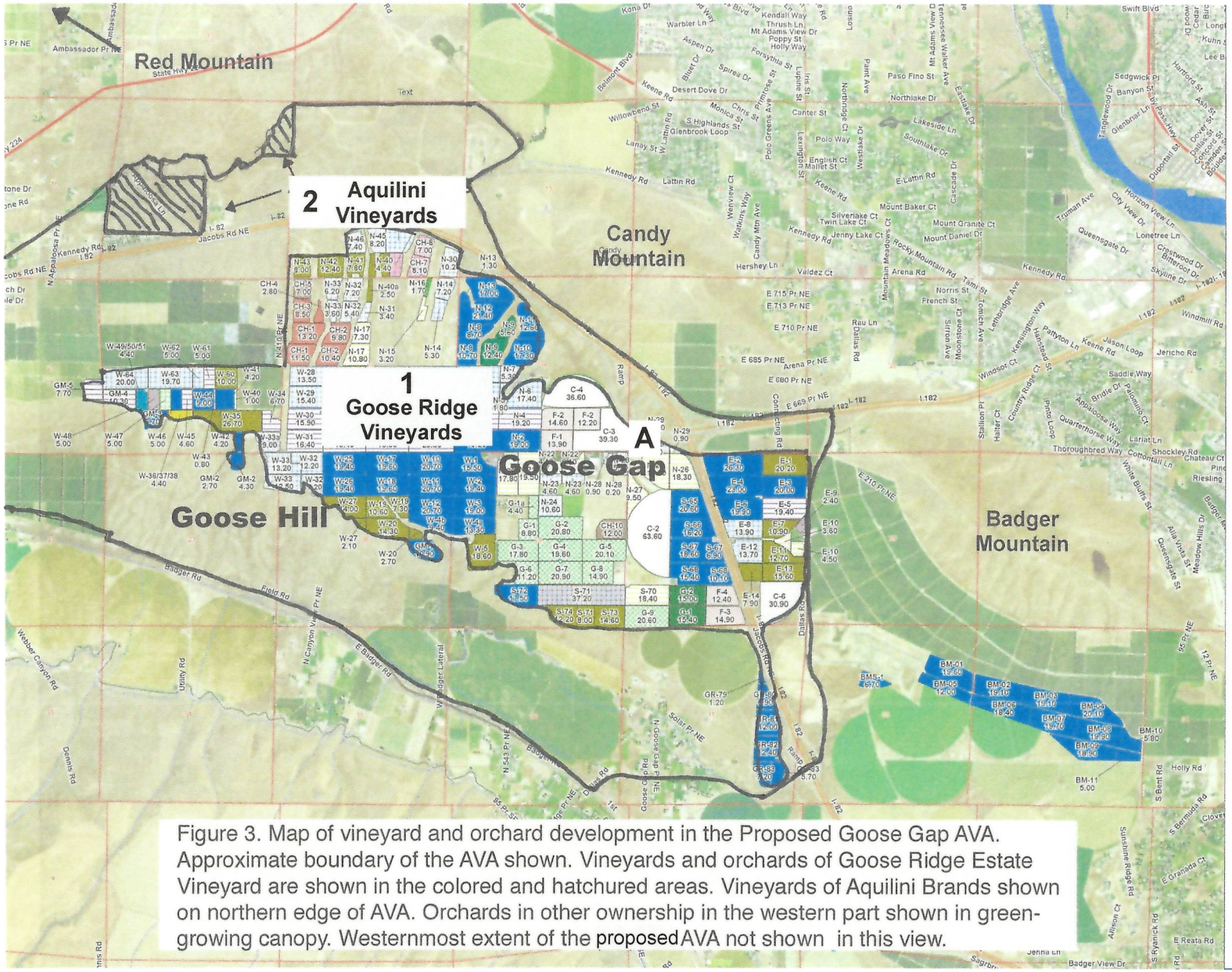


Figure 3. Map of vineyard and orchard development in the Proposed Goose Gap AVA. Approximate boundary of the AVA shown. Vineyards and orchards of Goose Ridge Estate Vineyard are shown in the colored and hatchured areas. Vineyards of Aquilini Brands shown on northern edge of AVA. Orchards in other ownership in the western part shown in green-growing canopy. Westernmost extent of the proposed AVA not shown in this view.

BENTON, WA
T9N R28E sections 30,31,32,33,19
T9N R27E sections 22,23,24,14,25,26,27,21

LEGEND

- Alfalfa
- Bentons
- Cabernet Franc
- Cabernet Sauvignon
- Chardonnay
- Chelans
- CHERRIES
- Fuji
- Gala
- Granny Smith
- Grenache Blanc-Rousanne-Sauv B
- Grenache Noir-P.Syrah-P.Verdot
- Malbec
- Merlot
- Mourvedre
- Petit Verdot
- Pinot Gris
- Syrah
- Viognier
- White Riesling

ACRES

Alfalfa	170.40
Bentons	19.00
Cabernet Franc	37.20
Cabernet Sauvignon	815.10
Chardonnay	442.80
Chelans	21.20
CHERRIES	56.20
Fuji	68.00
Gala	30.40
Granny Smith	159.10
Grenache Blanc	1.00
Grenache Noir	1.90
Malbec	7.40
Merlot	244.30
Mourvedre	5.00
Petit Syrah	0.90
Petit Verdot	2.40
Pinot Gris	1.70
Rousanne	1.90
Sauvignon Blanc	1.50
Syrah	248.40
Viognier	18.00
White Riesling	142.00
TOTAL	2493.80

Provided Courtesy of:

Figure 4a Caption. Shaded Relief Map Showing Topographic Cross-Section Lines for Figure 4b. and Weather Stations for Table 3.

Outline of the proposed Goose Gap AVA (GG) shown in purple and of the Red Mountain AVA (RM) shown in red on the main and inset maps, with Goose Hill (GH), Badger Mountain (BM), Wallula Gap (WG), and the proposed Candy Mountain (CM) AVA indicated. Also outlined are the Yakima Valley AVA in green and the Horse Heaven Hills AVA in yellow. Toppenish Creek, Yakima River, and the Columbia River are shown in blue. The approximate location of the Olympic-Wallowa Lineament (OWL) shown in transparent gray overlay. Locations of the topographic cross sections in Figure 4b are in black; that for Goose Hill-Goose Gap labeled A-A', for Red Mountain labeled B-B', that for Rattlesnake Ridge labeled C-C', and that for the Horse Heaven Hills ridge labeled D-D'. Locations of the WSU AgWeatherNet weather stations listed in Table 3 are shown with white circles; that for Benton City labeled BC, that for WSU Prosser Research Station HQ, that for Triple-S TS, that for Badger Coulee BA, that for Pasco North NP, that forCanoe Ridge CR, that for Buena BU, and an arrow and mileage mark the fdstance and direction to Walla Walla WW.

Figure 4b Caption. Topographic Cross-Section for Goose Hill-Goose Gap (A-A') Showing That the North- and Northeast-Sides have Slopes That Are Plantable to Wine Grapes With South and Southwest Slopes Too Steep to Farm. Cross-Sections for Red Mountain, Horse Heaven Hills, and Rattlesnake Ridge (B-B', C-C', D-D') show the opposite with Southwest Sides That Are Plantable to Wine Grapes With Northeast Slopes Too Steep to Farm.

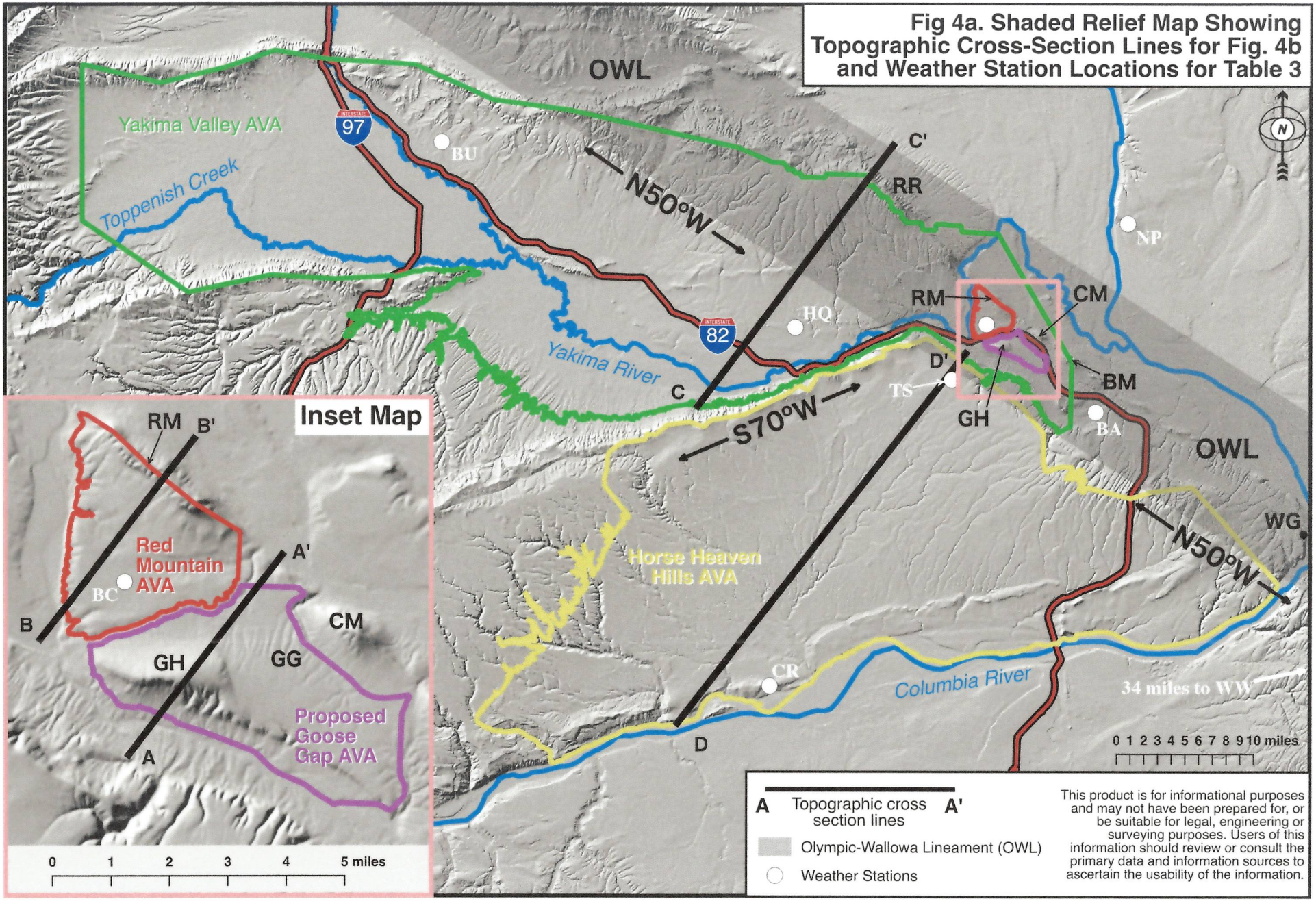


Fig 4a. Shaded Relief Map Showing Topographic Cross-Section Lines for Fig. 4b and Weather Station Locations for Table 3
OWL
Yakima Valley AVA
Toppenish Creek
Yakima River
INTERSTATE 97
INTERSTATE 82
BU
HQ
NP
RM
CM
BM
BA
GH
TS
WG
CR
C
C'
D
D'
N50°W
S70°W
N50°W
Horse Heaven Hills AVA
Columbia River
34 miles to WW
0 1 2 3 4 5 6 7 8 9 10 miles
Inset Map
RM
B'
A'
B
A
BC
Red Mountain AVA
CM
GH
GG
Proposed Goose Gap AVA
0 1 2 3 4 5 miles
A Topographic cross section lines A'
Olympic-Wallowa Lineament (OWL)
Weather Stations
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

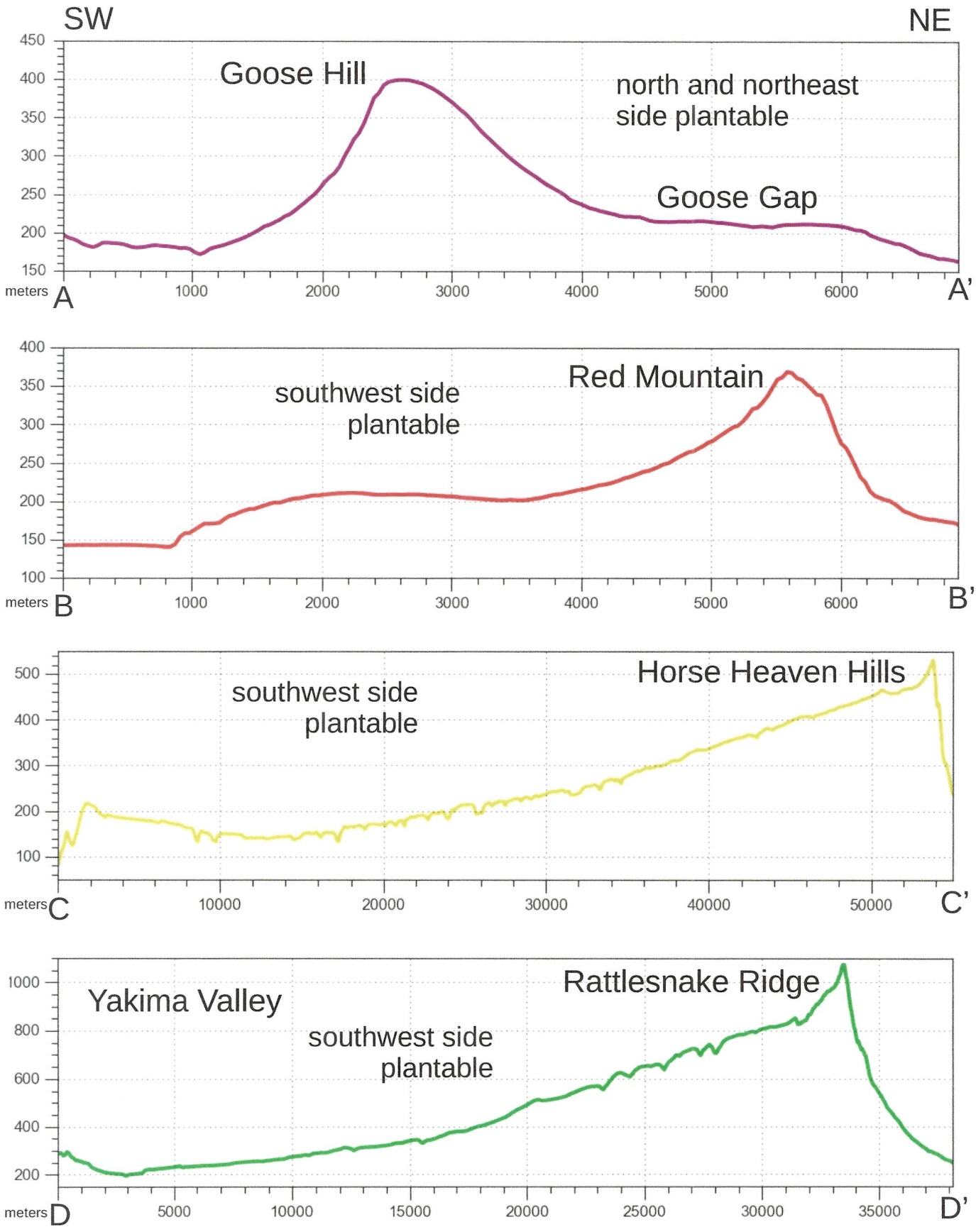


Fig 4b: Topographic Cross-Sections of Goose Gap Compared to Nearby AVAs

Figure 5a. Ridgeline of Goose Hill-Goose Gap (black line) view to the WNW (North to the right)

Showing 'reverse symmetry' compared to all other hills in the Yakima Fold Belt. That is, it has steep, unplantable SOUTH-and SOUTHWEST-FACING slopes and NORTH- and NORTHEAST-FACING slopes fully planted out to about 1700 acres of wine grapes and more than 1000 acres of tree fruit. Part of proposed Goose Gap AVA boundary shown in purple.

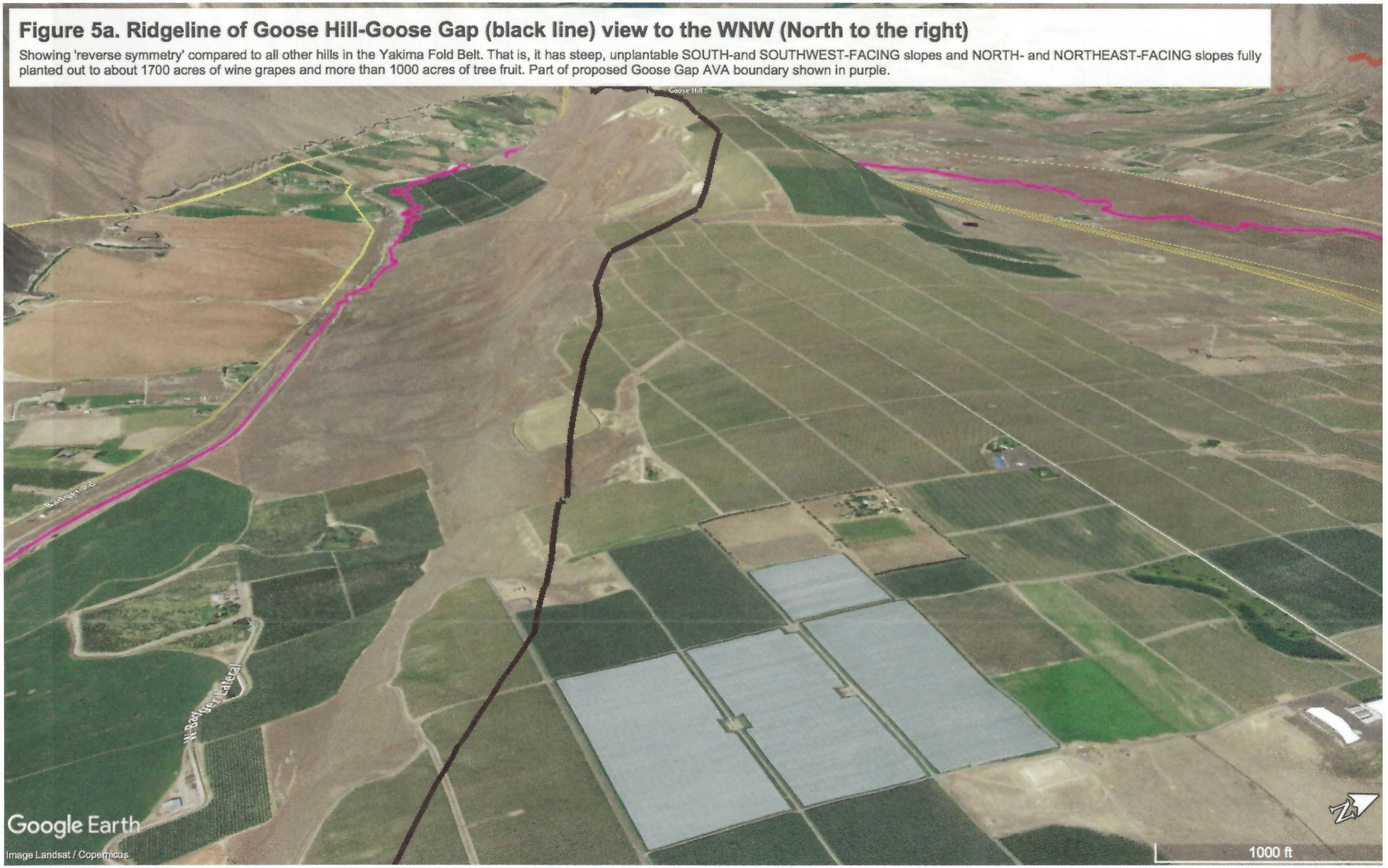
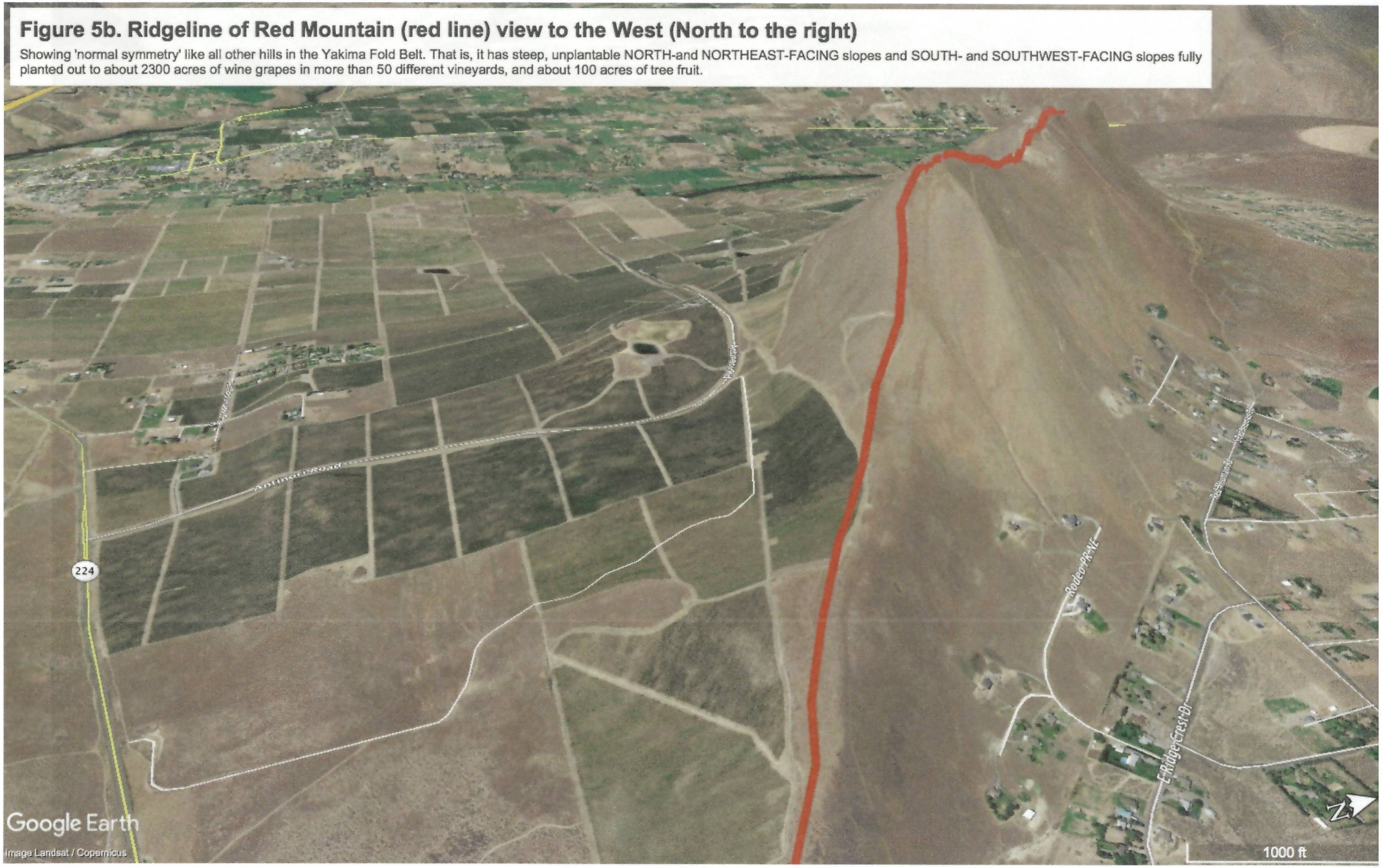


Figure 5b. Ridgeline of Red Mountain (red line) view to the West (North to the right)

Showing 'normal symmetry' like all other hills in the Yakima Fold Belt. That is, it has steep, unplantable NORTH-and NORTHEAST-FACING slopes and SOUTH- and SOUTHWEST-FACING slopes fully planted out to about 2300 acres of wine grapes in more than 50 different vineyards, and about 100 acres of tree fruit.



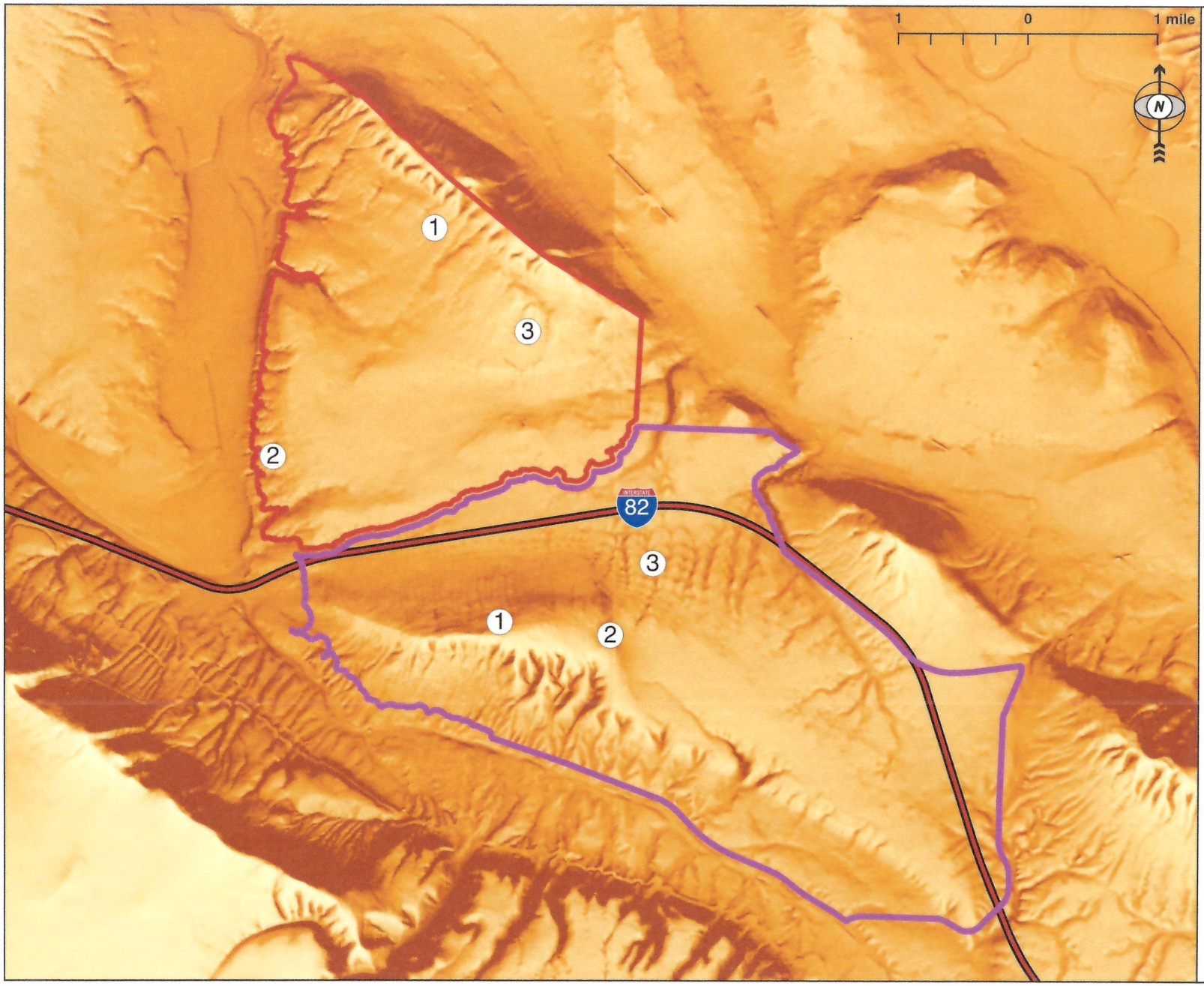
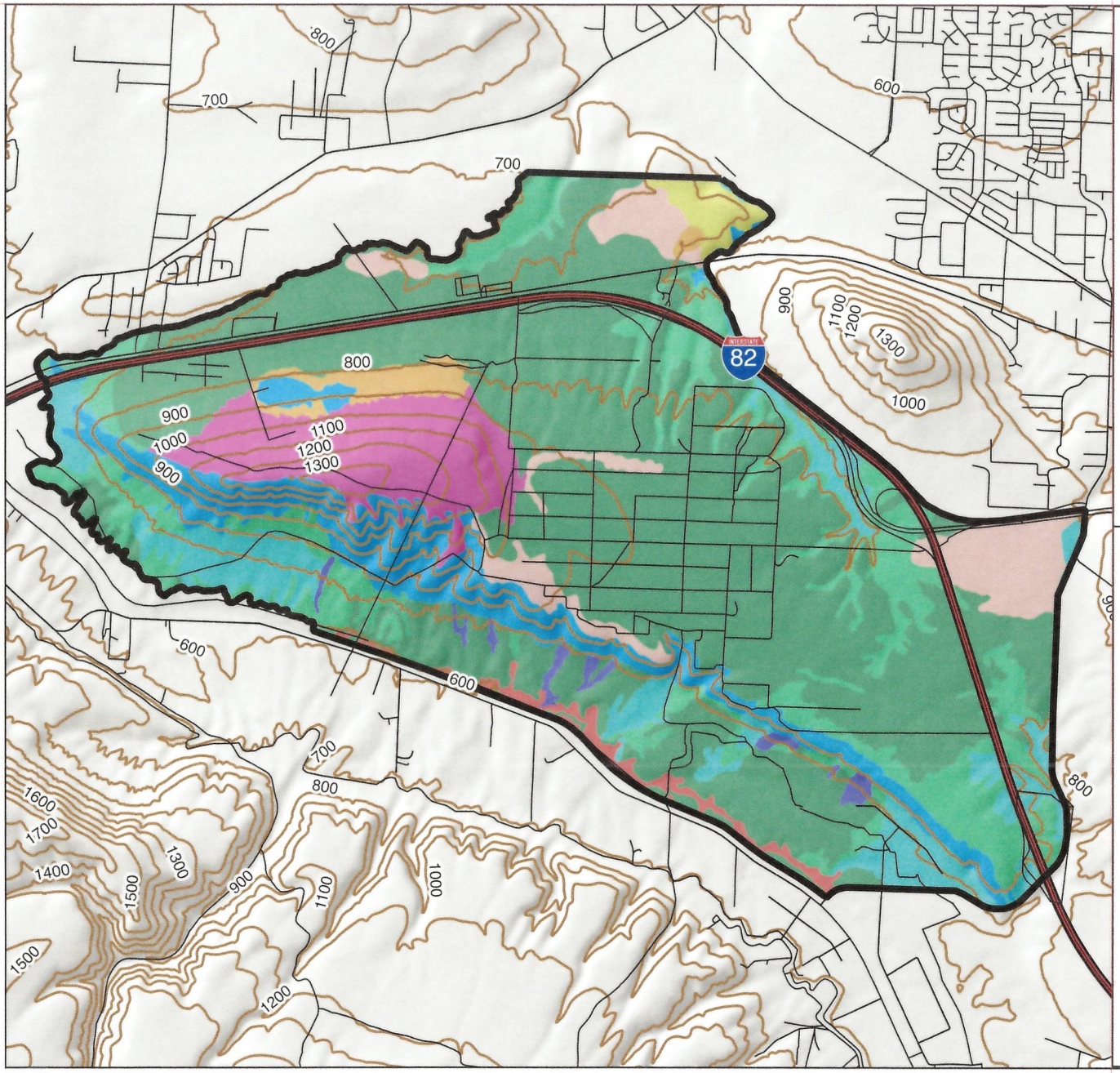


Fig 6: Color Gradient Map of Growing Season Solar Radiation

Growing Season Solar Radiation (kWh/m2)

- Low
- Mid
- High



NRCS Soil Survey Geographic Map Unit

- Burke Koehler hardpan soils
- Esquatzel loam
- Finley fine sandy loam
- Hezel & Quincy sand
- Kiona very stony silt loam
- Prosser silt loam
- Shano silt loam
- Shano very fine sandy loam
- Starbuck silt loam
- Warden silt loam
- Warden very fine sandy loam

Fig 7: Soil Map of the Proposed Goose Gap AVA

100-foot contour interval

N

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

1 0 1 miles

Table 1. List of Vineyards and Wineries Within Proposed Goose Gap AVA, With Varieties Planted, Acreages, Planting Dates, and Wine Production

Map ID Figure 3	Vineyard Name, Contact Person, Address, Contact Phone Number and Contact Email	Grape Varieties Grown	Year First Grapes Planted	Acreage of Wine Grapes Planted in 2016 and earlier	New Acreage planted 2017
1	Goose Ridge Vineyards	Cabernet Sauvigon	1998	608.0	
	Bill Monson 63615 E Jacobs Road Benton City, WA 99320 509-627-6279 billmonson@monsonranches.com	Chardonnay		451.0	
		Merlot		248.0	
		Syrah		253.0	
		Cabernet Franc		35.0	
		Viognier		18.3	
		Malbec		7.4	
		Pinot Gris		1.7	2.0
		Grenache noir		1.9	
		Petit Verdot		2.4	
		Petite Sirah		0.9	
		Sauvignon blanc		1.5	
		Roussanne		1.9	
		Grenache blanc		1.0	
		Mourvedre		5.0	
		White Riesling		68.0	
			Subtotal Acreage Goose Ridge	1705.0	
2	Aquilini Brands US Inc.	Cabernet Sauvignon	2014	105.0	0
	Barry Olivier No physical address 604-377-1863 barry.olivier@aquilini.com				
			Subtotal Acreage Aquilini	105.00	
			Total Vineyard Acreage	1810.0	2.0

Map ID Figure 3	Winery Name, Owners, Contact Person, Address, Contact Phone Number and Contact Email	Website		2017 Annual 12- bottle Case Production Goose Ridge Brands From Estate-Grown Grapes	2017 Annual 12- bottle Case Production Custom Bottling From Columbia Valley AVA Grapes
A	Goose Ridge Winery	http://www.gooseridge.com/		50,000	250,000
	Monson Family, Bill Monson 63615 E Jacobs Road Benton City, WA 99320 509-627-6279 billmonson@monsonranches.com				

Table 2. Averages of Climatic Indices for Wine Grapes from 2009-2017[1] for the 'Benton City' WSU AgWeatherNet Station Closest to the Proposed Goose Gap AVA in Blue, Compared With Stations Just Outside of the Proposed AVA to the North, East, and West in Yellow (all of these are also within the Columbia Valley AVA) and Stations in Other AVAs Within the Columbia Valley AVA in Green

Area	*Washington State University AgWeatherNet Station Name (http://weather.wsu.edu/)*	*Location*	*Distance & Direction from Proposed AVA*	*Elevation (ft)*	*Mean Annual Air Temperature (°F)*	*Mean Annual Precipitation (inches)*	*Growing Degree-Days[2] (base 50°F)*	*Cool-Climate Viticulture Suitability Index (days)*	*Days/Year > 95°F*	*Days/Year < 32°F*	*Mean Minimum Temperature Dec-Feb (°F)*	*Average Minimum Nighttime Temperature During Veraison[4] (°F)*	*Annual Mean Wind Run (mi)*
Goose Gap AVA (closest weather station, which is in the Red Mountain AVA, is used as proxy for the proposed AVA)	Benton City (BC)[5]	46.27°N, 119.45°W	0.75 mi NW	676	54.2	7	3,359	227	28	89	27.9	50.4	45,741
Outside of Proposed GGAVA to West	WSU HQ (HQ)	46.26°N, 119.74°W	13 mi W	868	52.3	8	2,789	216	12	93	27.8	48.3	70,024
Outside of Proposed GGAVA to Southwest	Triple-S (TS)	46.21°N, 119.50°W	3 mi SW	1,491	51.0	8	2,743	202	12	101	26.9	50.6	
Outside of Proposed GGAVA to Southeast	Badger Canyon (BA)	46.18°N, 119.28°W	4 mi SE	660	55.0	5	3,465	245	23	72	29.4	54.1	49,377
Outside of Proposed GGAVA to Northeast	North Pasco (NP)	46.38°N, 119.24°W	10 mi NE	850	54.2	6	3,302	256	11	66	29.6	55.0	
Yakima Valley AVA (other Columbia Valley AVA)	Buena (BU)	46.44°N, 120.29°W	42 mi WNW	884	52.6	7	2,959	220	19	105	26.8	45.8	33,145
Horse Heaven Hills AVA (other Columbia Valley AVA)	Canoe Ridge (CR)	45.88°N, 119.76°W	29 mi SW	903	53.6	7	3,232	262	16	65	30.1	54.5	
Walla Walla Valley AVA (other Columbia Valley AVA)	Walla Walla (WW)	46.08°N, 118.27°W	53 mi ESE	1,178	53.4	17	2,950	236	16	70	29.9	51.5	

Footnotes: [1] 2009-2017 was selected because several of the newer AgWeatherNet stations in the table recorded their first full year of data in 2009; [2] GDD = ∑[Daily Mean Temp (°F) - 50 °F] for all days from April 1 to Oct 31; [3] Cool-Climate Viticultural Suitability Index = No. days between last temperature <29°F in spring and first temperature <29°F in fall (http://www.nysaes.cornell.edu/hort/faculty/pool/NYSite-Soils/SiteSelection.html); [4] Veraison (beginning of coloration in red grapes until harvest) is taken to be the days from August 15 to October 15. [5] Abbreviations in parens are for AgWeatherNet weather station locations shown on Figure 4a.

Table 3. Dominant and Minor Soils of the Proposed Goose Gap AVA Compared to Soils of the Enclosing Yakima Valley AVA and the Adjoining Red Mountain and Horse Heaven Hills AVAs Highlighting Differences in Aerial Extent of Soils Among the AVAs. Soil series were extracted from the Soil Survey Geographic database using Soil Data Viewer 5.2 (NRCS, Lincoln, NE)

Soil Series	*Red Mountain AVA*	*Yakima Valley AVA*	*Horse Heaven Hills AVA*	*Proposed Goose Gap AVA*	
	Percent of Soil Series in Each Respective AVA				*Acres*
Ashue		3.7%			
Burbank		0.4%	2.9%		
Burke	0.0%	1.7%	1.2%	1.3%	108
Cheviot			1.9%		
Endicott		1.5%			
Esquatzel	0.0%	5.0%	0.2%	1.3%	106
Finley	2.5%	0.8%	1.0%	0.8%	63
Harwood-Burke-Wiehl		2.8%	0.0%		
Hezel	14.9%	2.4%	7.2%	7.3%	593
Kiona	14.6%	2.8%	1.5%	9.2%	748
Kittitas		1.8%			
Koehler	0.0%	0.2%	1.9%	0.1%	11
Lickskillet		1.5%	0.8%		
Mikkalo		0.2%	3.5%		
Mikkalo-Bakeoven			0.6%		
Moxee		1.4%			
Naches		3.3%			
Prosser	3.3%	0.6%	1.5%	5.5%	445
Quincy	0.6%	2.3%	6.9%	0.9%	73
Ritzville		3.5%	28.9%	0.0%	0
Scoon		1.7%			
Scooteney	11.0%	2.7%	0.1%	0.0%	0
Shano	0.0%	3.8%	9.6%	7.2%	584
Starbuck	6.9%	5.0%	1.3%	1.1%	90
Toppenish		3.3%			
Umapine		2.4%	0.3%		
Walla Walla		1.9%			
Warden	46.0%	25.1%	23.8%	65.3%	5307
Weirman		2.3%	0.3%		
White Swan		1.0%			
Willis		4.4%	0.5%		
Zillah		1.3%			
Other	0.0%	9.3%	4.1%	0.0%	
Total (Acres in AVA)	100% (4,538 acres)	100% (716,033 acres)	100% (576,139 acres)	100.0%	8129 acres

Table 4. Calculated Values of Annual Solar Radiation (units of watt-hours per square meter during the growing season, April 1-October 31) of Representative Points in Planted Areas of the Proposed Goose Gap AVA Versus the Red Mountain AVA. Refer to Figure 6 for Locations of Points.

Calculations were performed using the mean latitude of Benton County, Washington and 14-day, 2-hour intervals (Yau et al., 2013)

	Solar Radiation (Wh/ $m^2 \bullet growing\ season^{-1}$)	
Map Points	***Red Mountain AVA***	***Proposed Goose Gap AVA***
Point 1	**1,025,147**	**980,405**
Point 2	**1,009,617**	**1,015,529**
Point 3	**1,042,837**	**945,618**
AVA Average	**1,025,867**	**980,517**

Exhibits for the
Goose Gap Viticultural Area Petition

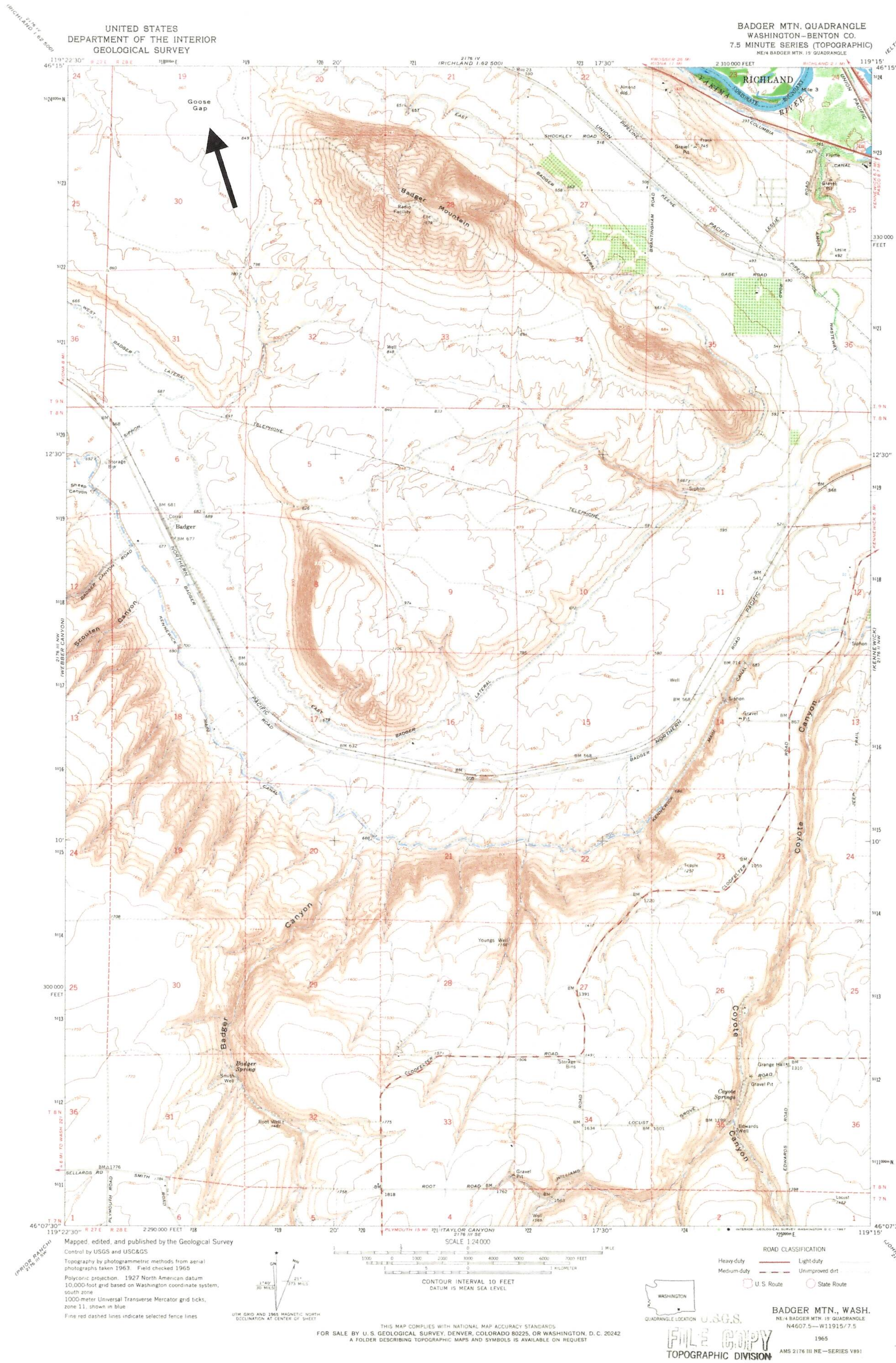

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BADGER MTN. QUADRANGLE
WASHINGTON-BENTON CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 BADGER MTN. 15' QUADRANGLE
RICHLAND
YAKIMA RIVER
Goose Gap
Badger Mountain
Radio Facility
Badger
Scouten Canyon
Badger Canyon
Coyote Canyon
Badger Spring
Coyote Springs
Youngs Well
Grange Hall
Gravel Pit
Storage Bins
NORTHERN PACIFIC
UNION PACIFIC
TELEPHONE
SHOCKLEY ROAD
BADGER LATERAL
KENNEWICK MAIN CANAL
ROOT ROAD
LOCUST GROVE ROAD
CLODFELTER ROAD
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965
Polyconic projection. 1927 North American datum
10,000-foot grid based on Washington coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue
Fine red dashed lines indicate selected fence lines
UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U.S. Route
State Route
WASHINGTON
QUADRANGLE LOCATION
BADGER MTN., WASH.
NE/4 BADGER MTN. 15' QUADRANGLE
N4607.5—W11915/7.5
1965
AMS 2176 III NE—SERIES V891
U.S.G.S.
FILE COPY
TOPOGRAPHIC DIVISION

Exhibit 1.1

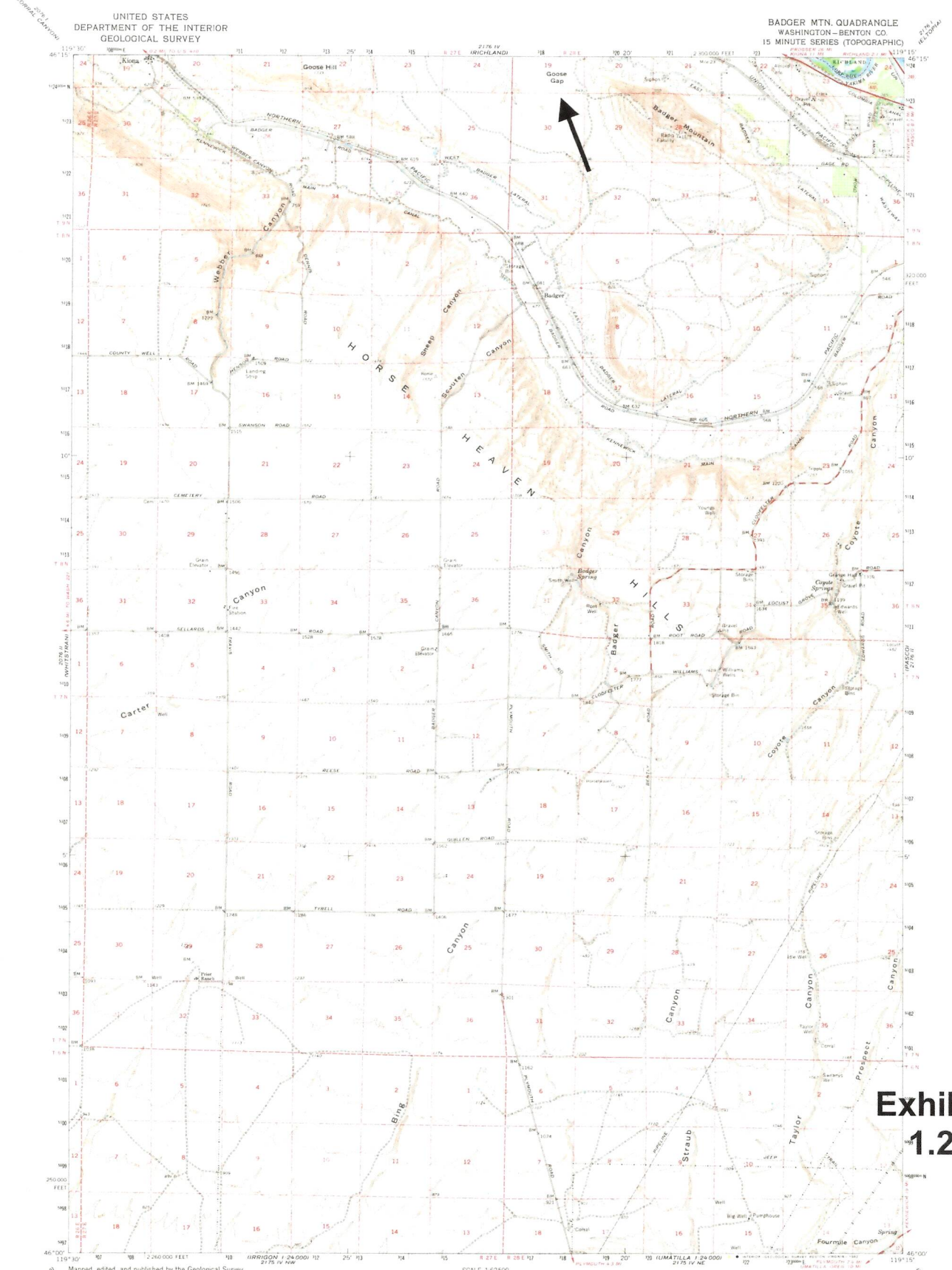


Exhibit 1.2

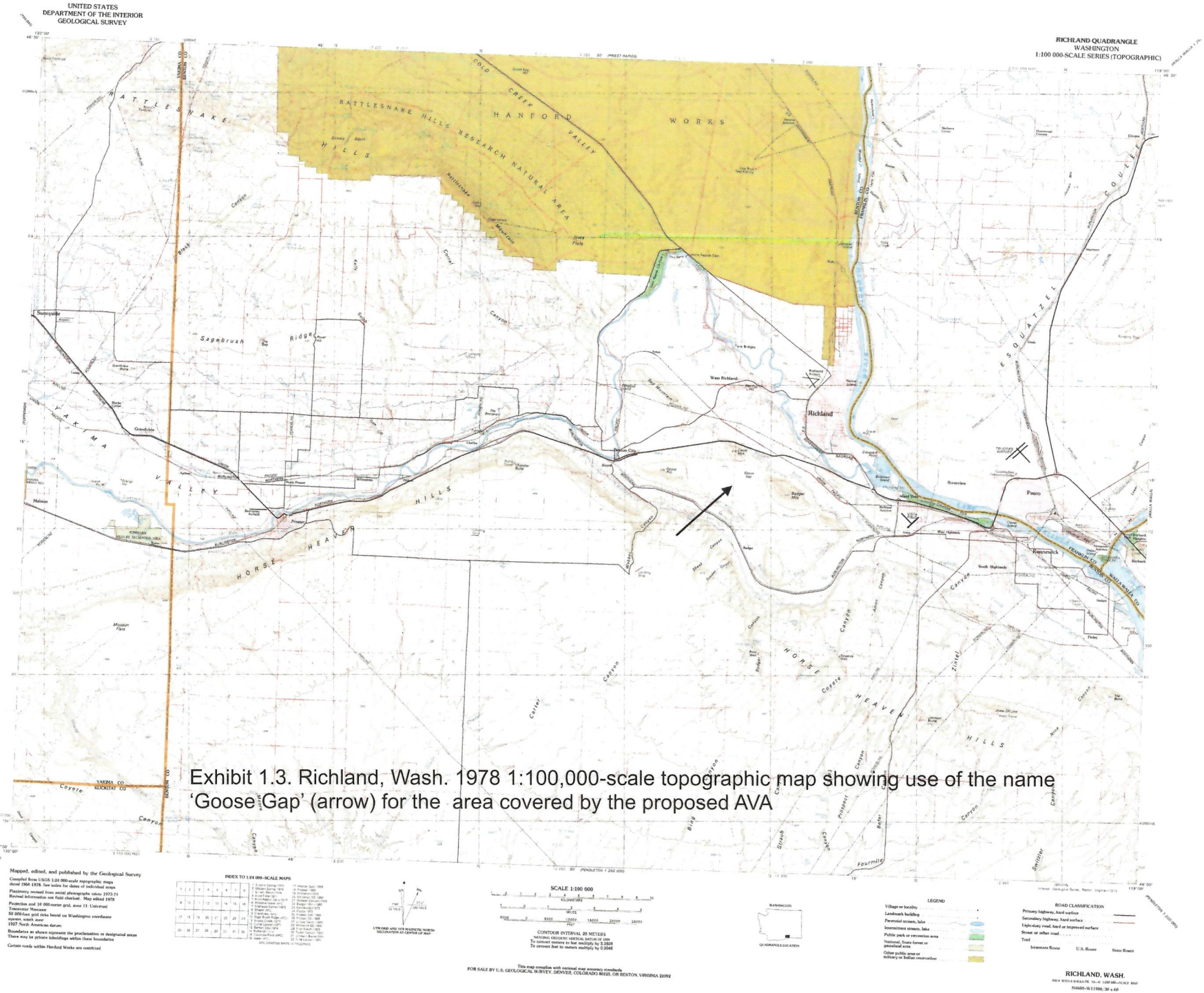


Exhibit 1.3. Richland, Wash. 1978 1:100,000-scale topographic map showing use of the name 'Goose Gap' (arrow) for the area covered by the proposed AVA

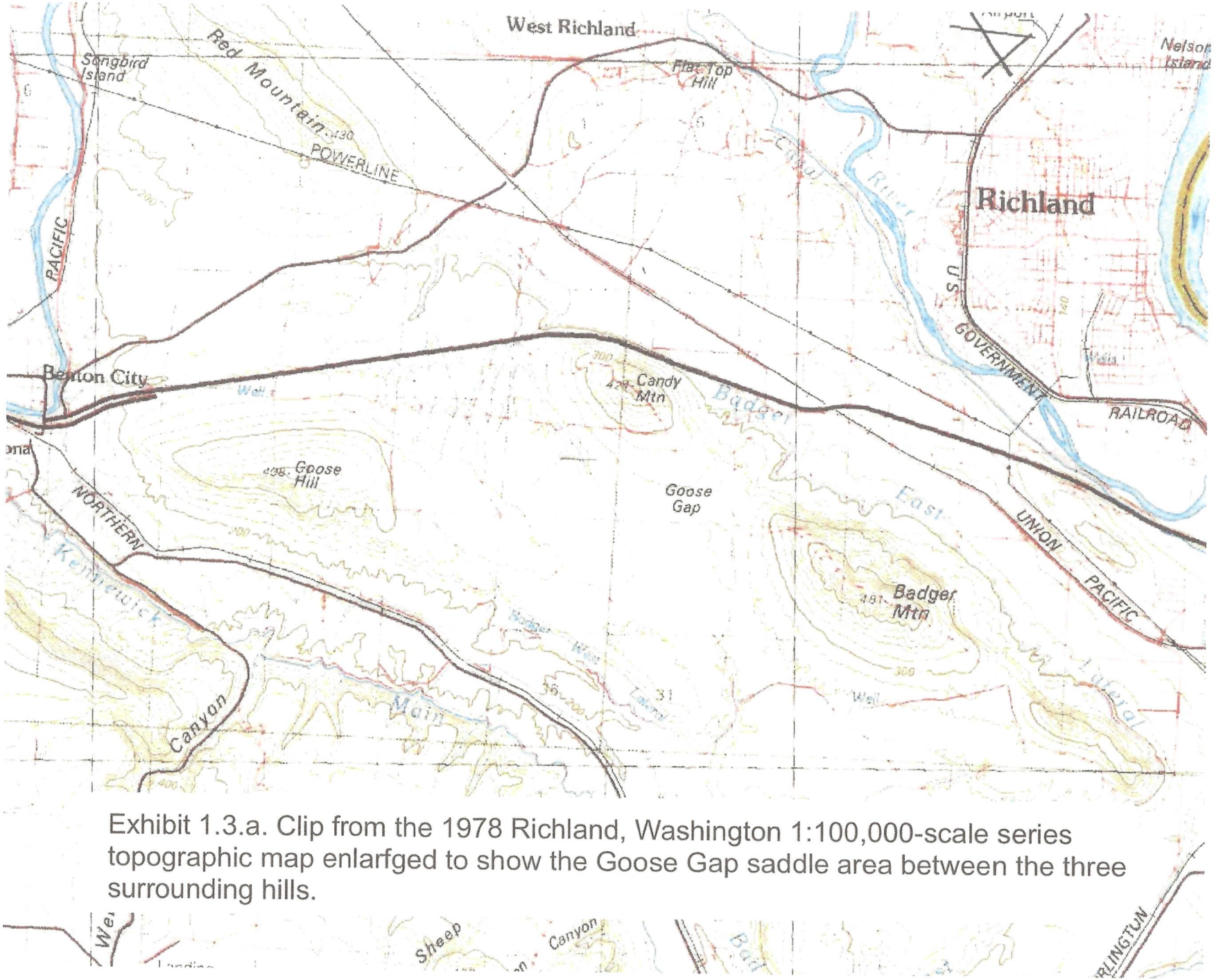


Exhibit 1.3.a. Clip from the 1978 Richland, Washington 1:100,000-scale series topographic map enlarfged to show the Goose Gap saddle area between the three surrounding hills.

Attachment 1

Determined Future Development Plan and Supporting Documentation

DNR Red Mountain Goose Gap Project

2015 Applications for Change of water right nos. CG4-23968C@2, CG4-23969C@1, CG4-23977C, G4-30827P, and G4-28833P

Exhibit 1.4 p 1

Documentation for Plan for Determined Future Development under RCW 90.14.140(2)(c) for water use on DNR's Red Mountain/Goose Gap project under G4-28833P, G4-23968C as changed by CG4-23968C@2, G4-23969C as changed by CG4-23969C@1, G4-23977C as changed by CG4-23977C, G4-30827P, G4-25449C, G4-23653C, G4-26001C, and G4-28834C

Background:

The WA State Department of Natural Resources (DNR) manages and leases out land across the state for many purposes including for agricultural production to generate revenue for the State Common School Trust. DNR's Red Mountain Goose Gap Complex and associated leases represent one of DNR's larger agriculture projects with extensive acres of vineyard and orchard production and related infrastructure. The RMGG project generates considerable revenue for Washington schools and is an important part of the local economy.

DNR established a plan for determined future development (DFD) in 1999 for its Red Mountain Goose Gap project (RMGG project) in the vicinity of T. 09 N., R. 27 E., T. 09 N, R. 28 E., and T. 10 N., R. 27 E. W. M. This property is currently served by Ground Water Right Nos. G4-28833P, CG4-23968C@2, CG4-23969C@1, CG4-23977C, G4-30827P, G4-25449C, G4-23653C, G4-26001C, and G4-28834C. DNR holds the water rights and leases out the state trust land to multiple lessees for agricultural production (mainly vineyard with some orchard and alfalfa). The DFD for the RMGG project involves converting row crops and orchard to predominantly wine grapes with some orchard mix, expanding the acres of vineyard, and acquiring additional land and water rights in the RMGG area to incorporate into the project and to consolidate DNR's holdings. DNR wishes to assert this DFD as an exemption from relinquishment under RCW 90.14.140(2)(c). The summary below and associated attachments support DNR's assertion of a DFD as outlined in Ecology's Water Resources Program Policy 1280.

The water right holder must have a firm and definitive plan.

DNR established the DFD plan to develop and lease over 3,000 acres of mainly vineyard with some orchard mix in the RMGG area. In addition to the agriculture production, the plan includes development of wineries, preservation of shrub steppe habitat, and acquiring and consolidating land and water holdings in the area. Details of the plan as well as DNR's steady progress are documented below and in the attachments. (See attachments 1-1 to 1-2 for general background on DNR's DFD)

3000 acres of mainly vineyard

The plan was established and fixed in 1999 as a result of the following actions:

Between December 1998 and early 1999, a decision was reached to convert the existing row crop (mainly center pivots and orchard blocks) to efficiently irrigated vineyard with orchard mix and to expand the vineyard on both sides of I-82 into the larger RMGG project. There were a series of concurrent actions and documents that support the fixing of this decision in 1999. These are listed below. Two of the initial actions include an agreement to assign leases from the Lessee at the time south of I-82 (Rathbun) to Monson Ranches, as documented in the attached letters between Monson Ranches and DNR (See attachments 1-3 to 1-4) and pursuing a land exchange with the Bureau of Land Management (BLM) to acquire ground across the RMGG project area. The following events and attachments provide supporting documentation for the fixing of the plan in 1999.

1-1 P 2

- On 8/27/1999 DNR assigned lease no. 12-A68285 from the existing lessee, Rathbun, to a new lessee, Monson Ranches. Shortly thereafter on 12/19/2000, DNR entered into a new lease agreement (no. 12-072612) with Monson Ranches Snake River Orchard to replace the old lease and merge it with another row crop lease (12-A71087). This new lease incorporated the new plan of development which included removal of irrigated circles and orchard, planting vineyard in place of the circles, and implementing wildlife habitat enhancements and set asides (see attachments 1-3 to 1-4; leases are also available upon request).
- On 6/14/1999, Monson Ranches sent a letter to DNR requesting changes to the Plan of Development under their lease to change crop from apples or wine grapes to grapes and natural habitat. (see attachment 1-5)
- 11/23/1999 water right change applications were filed with Ecology and processed through the Conservancy Board for CG4-23968C@1, CG4-23969C@1, CG4-23977C to spread water from row crop to wine grapes and orchard (see attachments 1-6a-c). The proposed places of use and wells for the water rights incorporate land across the RMGG area (both north and south of I-82).
- At the same time, DNR was negotiating a land exchange with BLM involving over 6,000 acres including land in the RMGG project area. On August 9, 1999, the general agreement and intent to exchange BLM and DNR lands was documented in a letter of understanding between DNR and BLM regarding the pending land exchange (BLM No. WAOR 53866/DNR#515). The exchange closed in January 2002 and included DNR acquisition of approximately 1,910 acres of land for the RMGG project in Sections 4, 10, 14, 20, 24, and 26. (see attachment 1-7)
- As documented in a 9/20/1999 internal DNR memorandum, DNR orchard vineyard manager recommended to DNR management a crop type change for the ground irrigated under G4-28833P from an apple/wine grape mix to predominantly wine grapes. This supports the intended shift across RMGG from high duty crop mix to wine grapes. (see attachment 1-8)
- On 10/25/2009 Southeast Region Orchard/Vineyard Staff finalized a summary document entitled "Goose Gap Complex: Goals, Current Conditions, Site Potential and Action Plan for Future Development." (see attachment 1-2). This summarizes the plan for future development. The document focuses on the Goose Gap portion of the RMGG project, as that portion of the project was further along in 1999, but it also describes DNR's intent to expand the vineyard on the Red Mountain side.

lease change in 1999

w.r. changes from row crops to wine grapes

crop type change to predom-inantly wine grapes

<u>Plan must be put forth by a party with vested interest in the water right.</u>

DNR in its capacity as trustee of the State's water rights and RMGG land established the DFD in 1999, and DNR is the holder of the above described water rights and associated lands as documented in the DNR's respective water right files.

<u>The plan was fixed prior to the end of the five-year period of potential non-use</u>

The DFD was established in 1999 and applies to the period of development following the decision to convert from row crop and spread water to grapes and orchard mix. The plan was fixed within a year of

removal of row crop and prior to any 5 year period of reduced use during crop transitions, water right acquisitions and/or change application development schedules.

Complexity and plan requires longer than 5 years to complete

The RMGG project is a complex project requiring well over 5 years to complete. Examples of the complexity involved and long term efforts required to implement this plan on the part of DNR and its lessees are listed below. (Refer to attachment 1-1):

- Conversion of row crop and orchard to over 3,000 acres of wine grape and orchard mix;
- Filing applications and providing processing support for a series of applications for new water rights and changes to existing rights, many of which involved multiple changes;
- Drilling, deepening and repairing wells to supply the needed irrigation water and securing the budget to fund this work;
- Funding, developing, and updating large scale agriculture infrastructure including pumps, meters, mainline, ponds, drip line, microsprays, etc;
- Acquiring and maintaining multiple easements, access agreements, roads and power both north and south of I-82;
- Pursuing capital funding in support of these efforts during periods of economic slowdown and competing funding demands for not only agriculture projects but other funding needs within DNR;
- Leasing out new and existing properties through marketing, advertising and public auctions, in addition to managing existing leases under the project;
- lease consolidations, assignments and amendments to accommodate crop and other changes;
- Pursuing and establishing contracts for wine grapes;
- Land and water right acquisitions from private parties with land adjacent to DNR's RMGG land;
- Pursuing and acquiring land through the DNR-BLM land exchange, which included exchanging over 6,000acres of timber land in Douglas, Franklin, Kittitas, Klickitat, and Lincoln counties for over 2,000acres of BLM land in the RMGG area alone and additional BLM land in other counties,
- SEPA process in support of leases; and
- Efforts to preserve shrub steppe and native habitat preservation and set asides throughout the project area.

Additional efforts and details are described in attachment 1-1 and available from DNR files if needed. A summary of progress to date is listed below and in the supporting documents.

Some affirmative steps towards realization of the fixed and definitive plan must be evident within 15 years of the last beneficial use

Considerable steps have been taken under the RMGG project since it was established in 1999. Please refer to the attached RMGG Complex History by Chad Unland (Attachment 1-1). The document and its attachments describe many of the actions and efforts taken by DNR since 1999 to implement the RMGG plan. Some of the main steps and additional supporting documentation are listed below.

- Over 3,300 acres of crops have been planted to date within the RMGG project area. This includes ~ 2,245 acres of vineyard, ~ 926 acres of orchard, and ~176 acres alfalfa and grass. Under the most recent change proposals the alfalfa will be converted and spread to additional acres of wine grapes.
- Land use and lease conversions from grazing and row crop uses to vineyard, winery and orchard uses as documented in the progression of DNR leases for RMGG property. (see attachment 1-1; lease documents available on request)
- Consolidation of multiple leases south of I-82. Refer to June 17, 2011 letter from DNR to Bill Monson regarding lease consolidation. (see attachment 1-9)
- New leases authorizing wine grape plantings and wineries were established for ground north of I-82 on the Red Mountain side of the project area. (lease documents available on request)
    - Section 4. Four new leases authorizing a total of 96.5 acres of wine grapes between 2005 and 2006.
    - Section 10. Lease authorizing 300 acres of new wine grapes issued in 2008.
    - Section 16. Lease authorizing 34 acres of wine grapes and 2 wineries issued in 2006.
    - Section 32. Lease issued in 2008 authorizing 60acres of wine grapes and later amended in 2013 to 80 acres of wine grapes and a winery.
- DNR authorizations to construct wineries and other lease improvements. Examples of supporting documents include:
    - Construction of winery in Section 30, T9N, R28E (see attachment 1-10)
    - DNR authorization for well pump test and well improvements under Lease No. 12-A69953 (see attachment 1-11a-b)
- Incremental authorizations by DNR to lessees for crop conversions and new wine grape plantings. Examples include:
    - 4/11/2000 letter from DNR to Goose Ridge LLC authorizing removal of center pivot and conversion to wine grapes (attachment 1-12)
    - 11/9/2001 Change in permitted use letter authorizing additional conversion from row crop to vineyard (see attachment 1-13)
    - 2003 Amendment to DNR Lease No. 12-A69953 authorizing conversions from irrigated agriculture row crops to wine grapes. (see attachment 1-14)
- Water right change applications were filed and supporting documents provided for the following water rights Nos. CG4-23968C@2, CG4-23969C@1, CG4-23977C to spread water from row crop to wine grapes and orchard (see attachments 1-6a-c);
- New water right applications were filed including G4-30827P, G4-28833P, and G4-28834C;
- Water rights and associated land were acquired including G4-25449C, G4-26001C, and G4-23653C (see attachment 1-1);
- Easements, power, land access and irrigation piping access (see attachment 1-1 (D-1)). Recent examples include:
    - Applied to WSDOT for access through culvert under I-82 within Section 14, T9N, R27EWM to be able to pipe water north of I-82. This is an on-going effort, but DNR entered into the Project Review Reimbursable Agreement in June 2014.

- Obtained franchise agreement with WSDOT in March 2009 to allow for piping water through culvert under I-82 between Section 24 and 13 and obtained an amendment to the franchise in August 2013 to allow pipeline installation along the WSDOT right-of-way connecting to the NE portion of Section 24, T9N, R17EWM.
- Acquired easement across KID property to allow for piping water between Section 14 and 10 as well as physical access. This allows flexibility of water use within the proposed consolidated place of use. Agreement finalized 2/2015.
- Physical access agreements. Currently in negotiations and have tentative agreement for physical road access through neighboring properties to allow for access to develop portions of DNR ground within place of use.

- Wells drilled, tested and repaired and associated infrastructure installed (pumps, mainline, meters, booster pumps etc). Well logs are provided to document work and repairs since 1999 and listed below. Additional information is available on other recent work such as pump work, if needed. A historical summary is included in Attachment 1 (G1-2); however, please note that it is an internal draft document from DNR files that has not been checked.
  - RM#1 and RM#2 wells drilling, testing, deepening (attachment 1-15 to 1-16)
  - Benton 40 well repair (attachment 1-17)
  - Goose Gap Deep (GG#3): well work and testing (attachments 1-11a-b)
- Other: The above list provides examples and is not comprehensive. Please advise if additional supporting documentation is needed.

DFD Attachments:

1-1) "Red Mountain/Goose Gap Complex History" drafted and compiled by Chad Unland in 2013.

1-2) 10/25/1999 "Goose Gap Complex: Goals, Current Conditions, Site Potential and Action Plan for Future Development" by DNR southeast region orchard/vineyard staff.

1-3) 2/26/1999 letter from WA State Department of Natural Resources to Arvid Monson. "RE: Lease 12-A68285, Conditions of Lease Assignment."

1-4) 2/16/1999 letter from Monson Ranches to DNR. "RE: Amendment/Extension of Rathbun Lease of DNR Property."

1-5) 6/14/1999 letter from Monson Ranches to DNR requesting changes to the plan of development for lease no. 12-069953. "RE: Goose Ridge, LLC – Lease No. 12-069953."

1-6) Change Applications filed proposing to spread water for additional acres of wine grapes:

a. Change application no. CG4-23977C filed with Conservancy Board on 10/18/1999 and accepted by Ecology on 11/23/1999 to spread water under G4-23977C;

b. Change application no. CG4-23968C@1 filed with Conservancy Board on 10/18/1999 to spread water under G4-23968C; and

c. Change application no. CG4-23969C@1 filed with Conservancy Board on 10/18/1999 to spread water under G4-23969C.

1-7) 8/9/1999 letter of understanding between DNR and BLM. "RE: BLM-DNR Exchange" including Attachments A and B.

1-8) 9/20/1999. DNR Memorandum from Duane Unland to Milt Johnston. "Subject: Goose Ridge Lease 12-069953 Revision"

1-9) 6/17/2011 Letter from DNR to Bill Monson. "RE: Lease Consolidation."

1-10) 5/25/2001 letter from DNR to Arvid Monson. "RE: Permitted Use and Improvement Authorization, lease no. 12-072612."

1-11) Goose Gap (GG#3) well testing and work

a. 9/15/2009 internal DNR memo from Mark Grassel to Milt Johnston. "Re: Improvement Reimbursement for Well Modifications, Lease No. 12-A69953."

b. 12/19/2008 letter from DNR to Bill Monson. " RE: Authorization for well pump test, lease no. 12-A69953"

1-12) 4/11/2000 letter from DNR to Arvid Monson. "RE: Improvement Authorization for Lease No. 12-069953"

1-13) 11/9/2001 letter from DNR to Arvid Monson. "RE: Change in Permitted Use, Lease no 12-072612."

1-14) 2003 "Amendment to DNR Lease No. 12-A69953." Example lease amendment which describes changes to permitted use and plan of development. Signed March 28, 2003 and April 15, 2003.

1-15) Well logs for Red Mountain well #1 located in Section 4, T9N, R27EWM.

1-16) Well logs for Red Mountain well #2 located in Section 10, T9N, R27EWM.

1-17) Well log for "Benton 40" well repair work completed in 2003. Well is located in Section 16, T9N, R27EWM.

Attachment 1-1

"Red Mountain/Goose Gap Complex History" drafted and compiled by Chad Unland in 2013.

2015 Applications for Change of water right nos. CG4-23968C@2, CG4-23969C@1, CG4-23977C, G4-30827P, and G4-28833P

Documentation Supporting Plan for Determined Future Development

Exhibit 1.5 pt

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Excellent history of development of irrigated vineyards (and orchards) at Goose Gap Attach. I-1

RED MOUNTAIN/GOOSE GAP COMPLEX HISTORY

Introduction:

The Department of Natural of Resources (DNR) has historically leased land for the irrigation of row crops and orchards, near Benton City, Washington. This area is now known as the Goose Gap and Red Mountain Complex (G.G.R.M.). Within this area, DNR developed a long term plan to convert from the row/orchards crops and into a vineyard/orchard mix. Included in this plan was a vision to acquire additional lands with water rights in the GGRM. This was largely predicated upon the fact that DNR had learned of the Red Mountain American Viticultural Area (AVA), a federally designated grape growing and wine producing region on the south facing slope of Red Mountain. This 4400 acre block of land, which was formally established in 2001, was a strategic location were DNR desired to acquire additional lands and the agency set into motion plans which would allow it to share in financail returns which could result from being a land owner in the AVA with water rights (see Attachment F for more information on the AVA).

DNR had water rights which were already perfected under water rights No.'s G4-23968C, G4-23969C, and G4-23977C on DNR properties acquired as part of an "in Lieu" lands exchange process in portions of Sections 21, 22, 23, 25, 26 and 30. These parcels of land were irrigated with pivots, in crops of alfalfa with some scattered orchards. Several other water rights were in permit status (or came later as a result of purchases) to account for all the GGRM water used today.

To initiate the plan, in 1999, DNR applied to the Benton County Water Conservancy Board to transfer portions of the water that could be saved from crop conversion and conservation, as described below. Some of the water would be transferred to the Red Mountain properties (then owned by Bureau of Land Management (BLM)). This was possible because DNR and BLM were working under an agreement to exchange lands, where DNR would acquire lands in the AVA. Water savings could also be used within an expanded "Place of Use" of the Goose Gap properties which were already owned and being expanded by DNR. The transfer and spreading of these water right savings (of G4-23968C, G4-23969C, and G4-23977C) was later approved by the Department of Ecology (DOE) in 2004. Several evolutions to the approvals have occurred since.

Shortly after initiating its plan above, DNR's lessees (with the State's consent) began conversions in crops which could be irrigated with less water. Irrigation practices began changing (in 2000) from overhead sprinkler systems, to grapes being irrigated by drip systems. The result was water savings which needed to be used elsewhere.

DNR also had two water rights in permit status (G4-28833P and G4-30827) which later became part of the spreading in 2001 and 2006, respectively.

From 1999-2004, DNR developed, refined, and implemented its vision to own large blocks of land within the AVA and Goose Gap. In 2003, DNR issued a news release to solicit interest from qualified bidders in this area (see attachment E). Within this timeframe, DNR had purchased properties, exchanged land bases with the BLM, and obtained other properties as part

I-5 p 2

of a Settlement Agreement (further described in Exhibit C) within the GGRM. These transactions brought additional certificated water rights into GGRM (water rights No.'s G4-23653C, G4-26001C, and G4-25449C). Additionally, within the GGRM, DNR has an existing lease, with separate certificated, water within Section 22, Township 9 North, Range 27 East. W.M. (G4-28834 C). To date, this water right has not been subject to any change.

This document has been prepared to define all the water rights associated with the GGRM (today), describe the historical background, outline the changes to the water rights, describe the vision of this large complex project, demonstrate the overall progress made in this development plan, and summarize the items left to be completed. The attachments listed below, describe and support DNR's efforts in this endeavor.

During the development of these lands, DNR has made major investments into property and irrigation infrastructures, by drilling/improving wells, upgrading the irrigation delivery systems/mainlines, building or investing into roads, and upgrading the electrical facilities, as part of DNR's transactions.

In this development, some challenges to DNR are unique (as contrary to other water right users) in that the agency cannot simply develop new properties with water rights and use state employees to farm and irrigate its lands. RCW 79.13 outlines the process in which DNR may lease its lands for agricultural purposes. The process typically includes marketing, advertising, and a public auction. After the public auction, if the department gets a qualified bidder, a lease for the land can be negotiated. These processes require additional periods of time, whereas, typical irrigators would not be required to hurdle such obstacles. As these properties are State Trust Lands, irrigated by lessees (which proceeds directly benefit K-12 education), DNR has moved forward in the planning and development of these lands with purpose and vision.

In addition to the obstacles identified above, another barrier in this development of these parcels was the economic slowdown in 2008. This caused delays in capital funding for DNR's lessees which slowed or halted any development projects which were planned, as banks were highly scrutinizing any investment ventures carefully.

Attachments:

~~Attachment A~~	~~Early History Water Rights~~
~~Attachment B~~	~~Early History Leases~~
Attachment C	Purchases and Settlement Agreement
~~Attachment D~~	~~Roads, Easements, and Power~~
~~Attachment E~~	~~2003 Press Release~~
~~Attachment F~~	~~AVA Information~~
~~Attachment G~~	~~Wells~~
Attachment H	~~Goose Gap Leases 2013 to Current~~
Attachment I	~~Red Mountain Lease History~~
Attachment J	~~Annual Reporting to DOE~~ beginning in 2003

→ see 'Goose Gap parcels' map' Attachment C-2 p. 6 of 32.

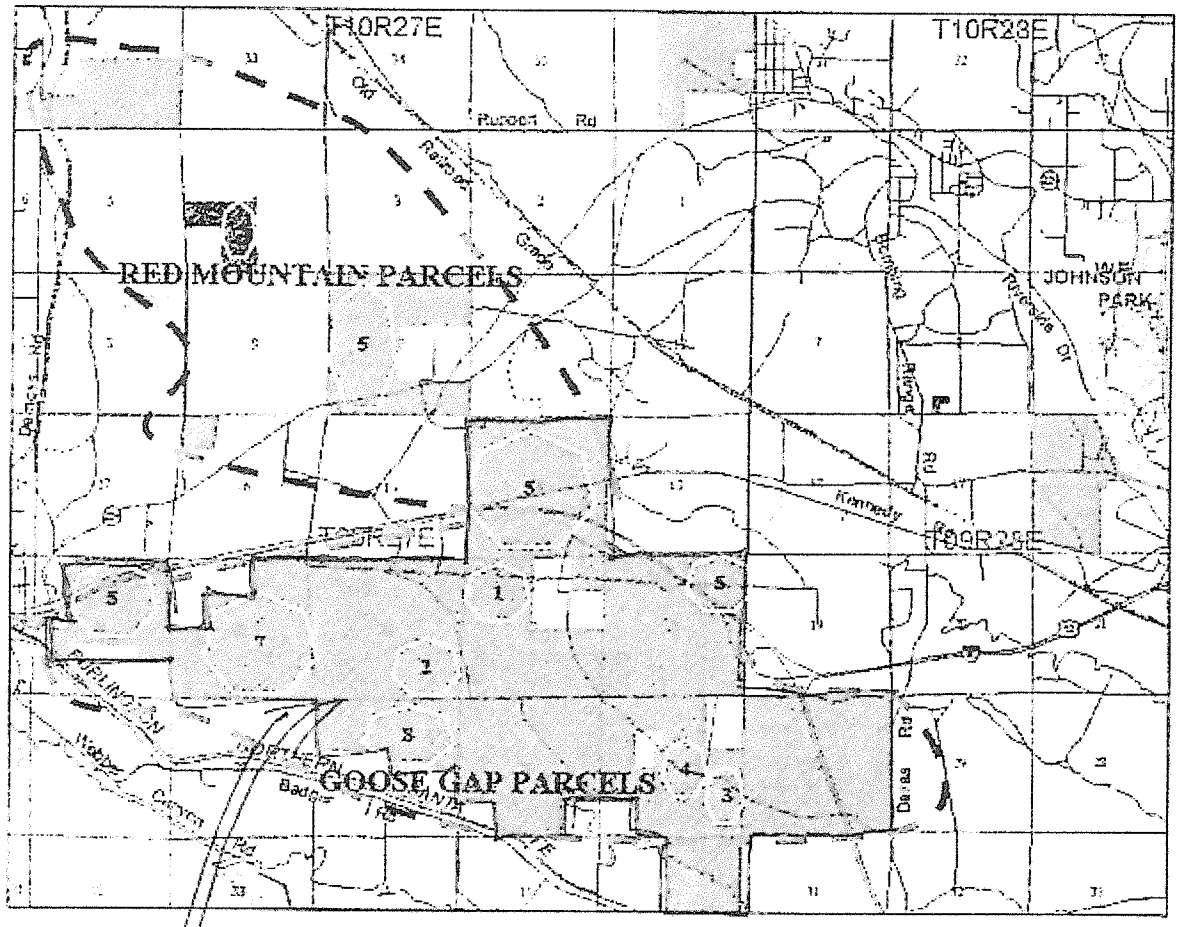
Qualification statement: This historical document was prepared using information from various sources including DNR's financial management systems (SAP and APS), DNR maintained water right and leasing files, project files from employees (both physical and electronic), and other sources as available. The content is written to show the complexity of the project, in total, and represents an accurate depiction of the GGRM transition as it progressed throughout time. Certain facts may be missing or incomplete, however, the information is accurate and true to the best of the DNR's knowledge.

15 P 3

Attachment C-2
Purchases, Map, and Settlement

GGRM MAP

*Numbers below correspond to the purchase exchange number above.



Boundary between the Goose Gap and Red Mt Parcels are separate by I-82
Map not to scale

Note that the shaded area titled 'Goose Gap Parcels' encompasses almost the entire proposed AVA area

Attachment D-1
Infrastructure, Road, and Power

Investments: Roads, Easements, and Power:

ROADS

Red Mtn. Access Exchange: In 2005, DNR exchanged multiple easements with private landowners across Sections 3, 4, 9 & 10, T9N, R27E, with the intent of developing an access loop between SR224 and Sunset Road.

Antinori Road: In 2006, DNR, Benton County and Col Solare entered into a cost share for the construction of Antinori Road from SR224, across Section 10 and into Sections 3, 4 & 9, T9N, R27E, with the plan to later extend over to Sunset Road, as was the original plan for the exchange of easements in 2005. DNR contributed $525,000.00 toward this road construction.

In 2008, DNR was actively engaged in the proposed Red Mountain Interchange off of I-82 and its impact to DNR planned developments in the vicinity, especially in Section 14, T9N, R27E.

In 2009, DNR and Monson Snake River Orchards exchanged easements in Sections 24 & 25 to improve State access and allow Monson to improve the road into their planned winery facility in Section 25, T9N, R27E.

Candy Mtn. Access: In 2005, DNR attempted unsuccessfully to exchange easements to acquire across S13, T9N, R27E, to access portions of DNR Section 24 north of I-82. DNR is currently in active negotiations to acquire access from the east across Section 19, T19N, R28E.

DNR is currently negotiating with Benton County concerning the proposed extension of Antinori Road between Sections 4 & 9, T9N, R27E, to reach Sunset Road.

UTILITIES

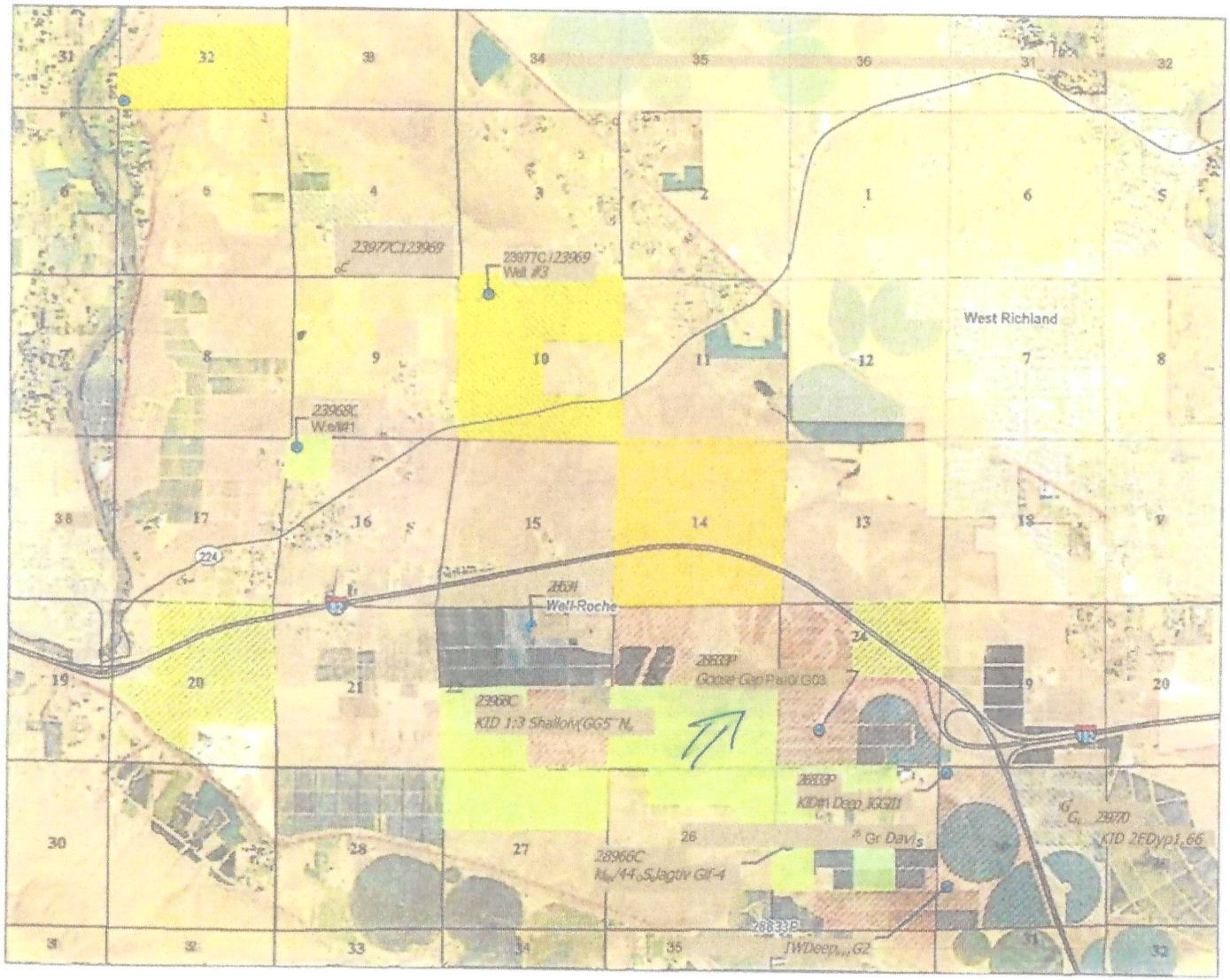
In 2005, as part of the road easement exchange on Red Mtn., DNR acquired easement for irrigation pipeline necessary to extend between DNR wells in Sections 4 & 10, T9N, R27E.

In 2006, DNR shared the costs of overhead power installation with Col Solare to bring power across Section 10 to Col Solare in Section 9, T9N, R27E and tie into the existing PUD line between Sections 4 & 9. DNR contributed ($150,000.00?).

In 2006, as part of the Antinori Road project, DNR granted Benton PUD easement to extend power for intersection lighting at Antinori Road and SR224.

In 2007, DNR granted easement for overhead power to Benton REA over Section 14, T9N, R27E, in anticipation of DNR development needs.

In 2009, DNR acquired easements and installed irrigation pipeline from the DNR well in Section 4, T9N, R27E, to DNR in Section 32, T10N, R27E. DNR granted easement to Benton PUD for power to be provided to lease irrigation facilities in this parcel in 2012.



Red Mountain - Goose Gap

WATER PERMIT STATUS & COMMENTS

0G4-23966C ©2 /78-000676
-3800 GPM • Grapes only
– 1230 ac-ft •Water Duty 1 62 ac-ft
– Proof 2013 ©5g prn/ac

CG4-23969C I [78-000675
1550 GPM
-535 ac-ft • Water Duty 1.72 ac-ft
-Proof 2013 ©5gprn1ac
-317 Authorized - 150 Used - 167 Available

CG4-23977C [78-000677
-2400 GPM
– 1326 ac-ft • Water Duty 3 ac-ft
-Proof 2073
-457 Authorized - 405.5 Used -51.5 Available

G4-28833P©3 /78-000800
-6720 GPM
-2707 ac-ft • Water Duty 2 39 ac-ft -Const Notice 7|112075
• 1,134.3 Authorized -1054 Used - 80 3

456.5b Acres Available

• Irrigation Wells

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January 2013

Exhibit 1.6


2016 STATE OF Ag
Tri-City He
tricityhe
VOICE OF THE MID-Co
A LOOK AT WASHINGTON'S MOS
IMPORTANT AG COMMODITIES
APPLES • GRAPES • WHEAT • HOPS

Wine grapes continue to

BY KEVIN COLE
For the Tri-City Herald

Washington's wine grapes brought in $262 million in 2015, and early indications are that 2016's wine grape harvest may be one of the biggest ever. The quality is harder to call, but even that could be among the best in years.

Tom Thorsen manages Conner Lee Vineyards, suppliers of premium wine grapes to a number of well-respected wineries. He says that last year's heat drove the brix (sugar level) higher than normal, quicker than usual. Thus, they were "sugar ripe" before they were "flavor ripe." A cooler late summer this year has flavor and sugar levels ripening together. His clients are liking what they see of the bigger fruit (grapes) and bigger clusters.

Caleb Foster made wine in New Zealand, South Africa and California before settling at John Bookwalter Wines – an iconic Tri-Cities winery. He's one of Thorsen's happy clients: "You can make wine a lot of different ways, depending on what harvest gives you to work with," he said. "This year, a wide variety of flavors are developing beautifully, offering great opportunities to do interesting things. The quality is exceptionally high, as expressed in both color and intensity of flavor – not just sugar."

Foster is a Washington fan. "We (Eastern Washington) offer the very best quality fruit in the world. In time we can and will double the amount of wine we produce from grapes that we grow. It's up to us as growers and producers to keep it exciting for consumers," he said.

Most of Washington's wine grapes are grown on contract for Washington wineries, according to Vicky Scharlau of the Washington Association of Wine Grape Growers (WAWGG). Not coincidentally, most of Washington's 900-plus wineries don't grow their own grapes; they buy from Eastern Washington vineyards.

A healthy wine industry merger and acquisition market has resulted in Washington vineyards and wineries more frequently being owned by big companies from elsewhere. Washington state's biggest vineyard owner/operator is Ste. Michelle Wine Estates, owned by Virginia-based Altria. Other big Washington growers are Precept, Constellation and Gallo. Of those, only Precept is Northwest-owned.

Photo by Sara Nelson

More than 4,000 acres of grapes grow in the vineyards of the Red Mountain AVA, or American Viticulture Area.

The Tri-Cities' biggest vineyard does happen to be locally-owned. The Monson family started out in cattle and fruit before developing Goose Ridge Vineyards, and has turned a unique property in Goose Gap into 2,200 acres of wine grapes. Goose Gap is a saddle-shaped piece of land between Red Mountain, Candy Mountain and the Horse Heaven Hills, southwest of West Richland.

It's a wide open area with great sun and "interesting" slopes that winemaker Andrew Wilson says provide a variety of opportunities for vineyard manager Glen Ward. "It's a warm site where we can ripen a lot of different varietals," Wilson said. "Even better, there are slopes to almost every direction, which give it a tremendous variability and versatility."

Washington's largest wine grape nursery is just west of Red Mountain, near Benton City. Inland Desert Nursery sells vines around the country but is particularly familiar with local vineyards. General Manager Kevin Judkins says red wines are the big dogs: "Our top five sold into Washington are all reds: cabernet sauvignon, syrah, cabernet franc, merlot, malbec. Very few places in the world can you grow a really super-premium red wine grape... but we have a number of them."

The Mid-Columbia is perfectly capable of growing excellent white wine grapes as well, but it comes down to return. "Generally speaking, if a piece of land will grow a premium red wine grape, it will yield a bigger return than would most white wine grapes. So the vineyards tend to lean toward reds."

Decades ago, Washington's post-prohibition wine grape growers made an

intentional choice to focus on premium wine grapes rather than compete for the high-quantity, low-price market segment. That's paying off now, as California growers – under pressure from cheap imported wine – tear out thousands of acres that produced wine priced at less than $8 a bottle. At the same time, demand for premium grapes for more expensive wines continues to grow.

The future of Washington's wine grape crop isn't easy to call, despite consistent, predictable growth in recent years. It takes a big investment and several years for vineyards to start to produce. Thus wine grape growers have to think years ahead. Even with an enviable position at the premium end of the spectrum, generational changes impact everything – including the future of wine.

Silicon Valley Bank pays close attention to the wine industry – especially in California, Washington and Oregon. Their 2016 state of the wine industry report identifies four consumer groups by age: Boomers (50 – 67 years old) drink most of the wine, Gen X (38 – 49 years old) are in second place. Millennials (21 – 37 years old) and Matures (68+ years old) are much farther back.

Why does that matter? Five years from now, Gen X will take over the top spot. Just five years after that, Millennials will be the dominant wine drinkers, although they are showing interest in alternatives such as craft ciders and spirits.

Rob McMillan is the executive vice president of Silicon Valley Bank's Wine Division. He says Washington growers are in a good situation. "A lot of California wineries looking for premium quality grapes find them in Washington and Oregon. That works out well for the Northwest, with its high quality and relatively low cost."

Things are looking good in the foreseeable future for eastern Washington's wine grape growers, thanks to the foresight of the generations of vineyard owners and managers who maintained a focus on quality and put in the work to develop what has become Washington's Wine Country.

Barnard Griffin 2016 Rosé of Sangiovese, Columbia Valley, $14: Rob Griffin, the dean of Washington winemakers, ranks among the country's most talented rosé producers, evidenced by his string of gold medals at the San Francisco Chronicle Wine Competition. He focuses on the Italian grape Sangiovese to create classic aromas of strawberry, watermelon and orange zest, which are repeated on the palate with a crisp and lingering finish. (12.9 percent alcohol)

Mercer Estates 2016 Spice Cabinet Vineyard Rosé, Horse Heaven Hills, $13: One of the state's top sites for Malbec is the source for the Mercer family's Grenache rosé. A 24-hour soaking on the grape skins leads to delicate and dusty aromas and flavors of white strawberry, cranberry and red currant that finish with finesse and almost no perceived residual sugar. (12.5 percent alcohol)

Goose Ridge Vineyards 2016 Estate Rosé, Columbia Valley, $20: Goose Gap winemaker Andrew Wilson pulled hand-harvested Grenache and Mourvèdre from the Monson estate near Richland, fermented the juice to dryness then spent three months on the lees in neutral French oak barrels. The process made for sandalwood and spice aromas with pomegranate. Raspberry and cranberry flavors are joined by plum skin in the finish. (13.8 percent alcohol)

Eye of the Needle Winery 2016 Moments Rosé, Columbia Valley, $15: Woodinville winemaker Bob Bullock, proud member of the 12th Man at CenturyLink, quarterbacks this blush-style pink made with Chenin Blanc and Sangiovese, which will tackle a summertime thirst with its tasty mix of strawberry, Fuji apple and raspberry. It finishes nicely dry at just 0.5% residual sugar, and it merited a gold medal at the 2017 Cascadia Wine Competition. (13.9 percent alcohol)

Underwood 2016 Rosé, Oregon, $14: JP Caldcleugh is responsible for one of the Northwest's largest productions of rosé, and a sizable amount of the release by the prolific Union Wine Co., will be coming out in 375-milliliter cans. It's more of a pink wine than rosé because the base blend is Riesling, Pinot Gris and Muscat. The early whiff of caramel corn transitions into lemonade with a twist of lime, making for a tasty and surprisingly dry drink. (12.5 percent alcohol)

Acrobat Winery 2016 Rosé of Pinot Noir, Oregon, $14: King Estate continues to expand its Acrobat program. Created in the saignée method, it then spent two months on the lees in stainless steel to build mouth feel. Its strawberry-rhubarb color leads to aromas and flavors of strawberry-rhubarb compote with boysenberry acidity and Rainier cherry skin tannins. Enjoy with grilled lamb or chicken rubbed with herbs or barbecue. (14 percent alcohol)

accessed on 12 Dec. 2017

Exhibit 1.8

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Goose Gap Topo Map in Benton County WA

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Exhibit 1.9

accessed 12 Dec 2017

FOREST AND STREAM.

A Weekly Journal of the Rod and Gun.

ANGLING, SHOOTING, THE KENNEL, PRACTICAL NATURAL HISTORY, FISHCULTURE, YACHTING AND CANOEING,

AND THE

INCULCATION IN MEN AND WOMEN OF A HEALTHY INTEREST IN OUTDOOR RECREATION AND STUDY.

VOLUME LXII.

FOREST AND STREAM PUBLISHING COMPANY,
NEW YORK.

Exhibit 110 P.I.

Washington Geese.

SEATTLE, Wash., Dec. 25.—Johnny Wheeler, formerly known as John F. Wheeler, came staggering up the street one day last week with eighteen geese. The load was so heavy Johnny did not have a chance to appreciate the sensation his attractive appearance caused. Men, women and even the all-absorbed messenger boys, stopped and took a mental inventory of the magnificent birds. Meanwhile Johnny struggled on, his back humping more and more as the load grew heavier. About every ten paces the lucky hunter was stopped by inquisitive friends.

"Great bag," was the almost universal expression of greeting, followed by the natural question: "Where did you get 'em?"

"Horse Heaven country, over in eastern Washington," replied Johnny. Before he finally took the car for home Johnny thought in a rather bewildered way that he had more friends than ever before. "I guess I must be the most popular man in Seattle," said Johnny to himself." Three geese finally reached the Wheeler house, but Johnny consoled himself with the fact that many a good dinner would be eaten in Seattle as a result of his clever manipulation of the shotgun on the breaks of the Horse Heaven shooting grounds.

County Commissioner Lou Smith, John Wooding, Walt Lund, Charles Potsky and Walter Mess, all of whom are well known in King county, were in the Horse Heaven country at the same time as Wheeler. They shot at Goose Gap, through which the geese fly in reaching the Horse Heaven feeding grounds, after they leave the sand bars in the Columbia River. Their bag was sixty-five, which included both common geese and the big honkers. Wheeler shot alone on the breaks at Long Cañon, getting practically all of his birds last Sunday between 7:30 o'clock in the morning and 2 in the afternoon. He made a mistake in leaving so soon, as the birds flew all day. The day following, Monday, there was not enough wind to keep the geese low down, consequently few birds fell to the guns.

Wheeler left Seattle Thursday evening, Dec. 17, and on the way to eastern Washington was joined unexpectedly by Smith, Wooding, Lund, Potsky and Mess. All of them left the train at Kiona, where they were met by teams and driven nine miles to the hunting grounds. Friday and Saturday there was a dense fog, which made it impossible to do any shooting. Big bands of geese were in the air, and their querulous calling and swishing wings sent shivers up and down the spines of the unlucky hunters. How they did pray for a wind to sweep away the enshrouding veil, but all in vain. Two days had passed, and it looked as if the trip was to be a failure; then came the storm, which made things sing all along the Oregon and Washington coast. It was a sou'wester, starting at Astoria and sweeping up the big Columbia River with a fury that kept the geese on the sandbars until they were so hungry that they smashed into its face in their determination to reach the feeding places in the Horse Heaven grain fields.

To reach the fields, which are approximately 1,400 feet above the level of the sea, the geese must pass through what is known as Goose Gap, and here it was that Smith, Wooding, Lund, Potsky, and Mess caught them coming. Magnificent is the word that describes the sport they had with the long-necked, keen-eyed and ever-suspicious monarchs of the web-footers. Wheeler was having his sport on what are called the breaks. To those who have never been in that particular goose hunting country this term may require explanation. The Columbia River makes a bend, and in that bend is the Horse Heaven district. A storm working up the river passes over the hunting ground instead of following the river in its bending course. The best hunting is always had when the wind comes from the southwest, because the birds have to fly against it and fly low. Between the sandbars of the river and the level fields are high ridges or hills with depressions or valleys between. Now, the geese do not like to face the wind any more than a human being does. They naturally seek for some method to make their trip to the feeding grounds as easy as possible, and this explains why a flock will, after crossing a ridge, drop down. When they come to the next ridge, they rise just enough to pass over it, and immediately drop into the comparatively quiet air again. If the wind is light they will go high up in the air when they cross a ridge; instinct, combined with experience, has taught them that there is danger in the little tufts of sage brush which dot the otherwise barren hills.

Man has figured out all these little peculiarities of the flight of the geese, and he takes advantage of the situation. In a little hole, the dirt from which has been removed to a far distance—it is no use to dig a hole and throw the dirt around—the hunter conceals himself and waits for the flight. If he can get a sage brush screen he does so gladly, but as a rule the cover is not sufficient to protect him from the ever watchful eye of the leader of the band.

An old goose hunter has no difficulty judging the range, but the novice, and even the old-time duck hunters get fooled badly. A goose is so much larger than a duck that the eye gets all mixed up with itself in trying to figure out where the bird is.

"You think," said Wheeler, "that the old goose is right on top of you, up you jump and give him both barrels, only to find that he is 100 yards up in the air."

How easy it is to get fooled may be judged from the following dimensions of a goose that weighed four pounds. Length from bill to tail feathers, 28 inches; spread of wings, 53 inches; around breast, 19 inches. Wings that spread out 53 inches loom up big in the air when there is no background. Another thing one must remember in this connection, and that is, when you look up at a goose you have no other object to help you out in making comparisons of size and distance. The average hunter does not turn his gun loose on geese more than two or three times a season, consequently he has to use all his faculties to keep from being pulled off center. I have had a flock of sprigtail ducks circle and circle around just out of range until they had me going.

C. B. Yandell was hunting quail on Whidby Island; his dog had just come to a point, and Yandell was approaching to shoot when he suddenly heard wings in the air and observed that a band of geese were circling over him. Quick as thought he dropped to the ground and remained motionless. Apparently the birds did not notice him, for they kept circling and coming closer to the ground. It was an exciting time for the quail hunter. There stood his dog, rigid and wondering why there was nothing doing. In the air the big birds were cutting circles and gradually approaching. "I thought I'd bust," said Yandell; "the tension was something awful. Finally it seemed to me that if I did not shoot my gun barrel would stick up into the air beyond the old king goose. Up I jumped and whanged away. Then I saw what I had done. The birds were still high up in the air."

Yandell's eye had the gauge for quail, but when a quick transition was made to geese, he lost his sense of proportion and distance.

One of the honkers that Wheeler brought home with him weighed 14½ pounds. When he was over on the same ground earlier in the season he brought down two which weighed 15 pounds each. "At this time of the year," continued Wheeler, "it is almost necessary to have a strong sou'west wind in order to get any shooting. Earlier in the season, before the birds get wise and look with suspicion on everything, one can shoot them in the grain fields, but as the season advances, the bands fly higher and higher, and move at the slightest sign of danger. Under such conditions, a strong wind is required to keep them down close to the points of land from which the shooting is done. And in shooting from the ridges, when the geese are flying from the sandbars to the fields, that is called brake shooting."

Judge Arthur E. Griffin and Fred Mess have probably made the best kills in the Horse Heaven country this year. On one trip lasting several days they got ninety-five birds.

Mayor Humes is another hunter who has had good luck in the same fields. He has usually been early on the ground and shot from holes in the grain fields. Profile decoys are used. There is no chance for motion among the decoys, such as there is in duck shooting. The decoys are nothing but thin sheets of metal cut out to resemble a goose and painted to conform as nearly as possible to its colors. Skill is required in placing the decoys because of their flat surface.

Western Washington does not compare well with the eastern part of the State in this particular sport, although it is recorded that a goose was killed on the Seattle golf links a few weeks ago. At least that is the story told without any effort to have it appear in print.

PORTUS BAXTER.

Days at Grindstone.

"There comes a month in the weary year,
A month of leisure and peaceful rest,
When the ripe leaves fall and the air is clear—
October, the brown, the crisp, the best.
My lot has little enough of bliss;
I drag the days of the odd eleven—
Counting the time that shall lead to this,
The month that opens the hunter's heaven."

THAT grand old man of the woods, Nessmuk, has gone where all good hunters go, but his sweet and simple songs of the forest have found a resting place in many a heart.

October was upon us with its gorgeous display of woodland tints. The morning air was crisp and redolent of earthly fragrance wafted from unseen groves, and life indeed was good. We wanted to fly; but realizing the danger of trying it, we decided to go to Maine.

But there was that pestiferous tax staring at us, we could not escape it by going around it, arbitration would not avail; for Mr. Carleton said so.

We magnanimously decided to forgive the commissioners for giving our pockets such a jolt, and with the "call of the wild" in our hearts we decided to visit again our old hunting grounds by the tranquil Penobscot.

Frank came from New York. Schofield and his wife were on hand also, as were Ed and Allie. Harvey of the "big market" appeared two days later. He had to walk six miles to reach us, but that is only a trifle to a man who has climbed to the sumit of Katahdin. The East Branch was in sight most of the time, and its music made his heart glad. The snow-crowned peaks of Katahdin also lent inspiration, and he arrived in camp in a jubilant mood, and struggling with a most eloquent appetite.

Our little band of capitalists contributed $105 toward game protection, but up to the time of going to press we had not received a vote of thanks from any of the game commissioners.

G. J. Braun, of Revere, is the "Nessmuk" of our little company of sure-shots, having preceded us by a few seasons into the woods. He has hunted the caribou on Katahdin's dangerous slopes and has secured many fine heads. He is a native of the Pine Tree State and owns property there, but he refuses to be imposed upon by a tax, and will hunt this season in Canada.

The B. & A. Railroad managers afforded us a most agreeable surprise this season by doing away with the tiresome hold-up at Bangor, and dropping us at our backwoods station of Grindstone fully three hours earlier than in previous seasons.

The woods were white with snow when we stepped from the train, and considering the date, Oct. 26, it agreeably surprised us. It did not last long enough to make good tracking, but served to dampen the leaves.

Al and Seth were at the station with buckboard and wagon, and after hearty greetings were exchanged, trunks and bags made fast, we piled in for the six-mile drive through the woods. The roads in Maine are not macadamized; the drive, though a short one, gave us appetites as sharp as tacks, and we surprised Aunt Augustie by the manner in which we dispatched the leg of venison and other good things she had prepared for us.

At 4 next morning Frank aroused the entire party by executing a double shuffle, accompanied by a song. Seth and Al not taking kindly to such a rude method of awakening people, protested most vigorously, but Frank said he was in Maine for business and did not intend to waste any time in sleeping.

After breakfast each one was ready to take his separate trail over the ridges or through the swamps. Frank struck out for Salmon stream, where he found bear signs in the snow, and followed the tracks until they led into a swamp. Darkness sets in very quickly in the woods, so he gave up until next day.

This is the second year that the beechnuts have been a failure, and in consequence we were unable to find any deer working on the ridges. Hard frosts all through the early summer months nipped the buds and deprived the deer of many fattening morsels. Persistent hunting for the past seven or eight years has greatly diminished the deer in our territory, and it certainly has taken away most of the big ones.

Only two big deer were seen by us during our stay. On Nov. 7 we had about 10 inches of snow, and over a road five miles long we found many tracks, but only one or two large ones among them. The traveling of human beings over a given space frequently will cause deer to forsake that immediate locality and find new ground.

About the only time any of us could catch a glimpse of a deer was in the early morning, in some sunny bit of second growth. Nothing but young fawns ventured to stroll about during the day, and even those little fellows had a big advantage over the mad man trying to tiptoe up to them.

With their mule-like ears constantly listening, they are well fortified against an enemy. Owing to the bad habit that deer possess of going about chiefly in the night time, it was difficult for our very new members to catch a glimpse of more than a white tail. In fact, one of the party looked up in time to see what he thought was a white owl about to fly into a tree, while in reality it was the white flag of a deer as it was bounding away through a thicket. Things look very queer to a new man during his first trip to Maine.

One of the hunters was waiting on the edge of a swamp near the ridge one evening, hoping to catch a deer working out. He had been waiting for about an hour, while his teeth were chattering and his knees knocking each other. Suddenly he heard a commotion in the thickly piled leaves on the ridge behind him. A cold sweat began to break out on his forehead, his heart tried to get out of his mouth, and gripping his rifle tightly he got ready to kill something, when the terrible strain was broken by the chattering of two red squirrels chasing each other. And from experience I also know that the nimble little red brother makes enough noise to warrant one in thinking that a whole flock of deer are about to rush at him. The solemn silence of the forest intensifies the slightest sound.

Frank was the first one to bring in game. He fired at a doe as she whistled and broke into a run. He followed on her tracks for over an hour, the blood spots finally failing to show on the leaves. He dislikes to wound a deer and not secure it, for it means a lingering death for the graceful animal. Crossing over to Hinch's camp, he found Al and Young eating lunch, and after hearing his story, Al said he could find the doe. They returned to Wadley brook and took up the track again, when Al succeeded in finding the doe, where she had dropped, right near the brook. Those backwoods fellows know their book thoroughly. Wadley brook is three miles from the camp, but Frank carried the deer without assistance, stopping twice to breathe straight. It is no child's play to tote a deer over a rough road.

Ed, the youngster, by the aid of a field glass, located a small bunch of deer way down river feeding in the old field. He dropped into the canoe with Allie in the stern, and they drifted down quite handy to the deer. By carefully working along to the shelter of some alders, they were able to get within shooting distance. The boys fired together, dropping two of the deer, the fawn did not run, when one more well placed shot ended its career. A small spikehorn and his doe, with the fawn, made a good load for the trip up river. The does luck run at times.

Schofield has been accompanied by his wife on h[is] trips for some years, and she has become skillful wi[th] the rifle, always killing her own game. She does n[ot] go very deep into the woods, confining her trips to t[he] river banks and edges of the swamps, but she rar[ely] returns home without her complement of deer. S[he] shot a fine spikehorn handy to the camp, and also o[ne] of the best does taken out this season. She is [an] enthusiast when talking of life in the woods, for [she] has built up her constitution wonderfully since she f[irst] began to accompany her husband on his hunting tri[ps]. The air of the Maine woods has done more for [her] than the skill of the practitioner.

Young was the luckiest of the party. He started early on the new snow Nov. 7, and following a go[od] sized track, soon had in the snow a buck that weig[hed] 155 pounds dressed. Not very big as bucks go, but [we] were all envious just the same. We noticed, whe[n on] the train for Boston, that Young occasionally emitt[ed a] low, amused chuckle, as though he was tickled [at] something.

We all had a jolly good time and were loat[h to] leave. We had lots of partridge stews and roasts [and] heaps of fun climbing trees for spruce gum. [M]pleasant hours were spent in exploring old lo[g] roads and visiting deserted camps; or finding fox t[racks] in the snow and following them for hours, finally [com]ing back near where we started in. It is remar[kable] what the snow shows to an observer in the li[ne of] tracks. Here, right ahead of us, a hedge hog [took] the straight road over the ridge. His is the [most] curious track of all. There are two distinct fu[rrows] reaching out on both sides, one plowing into the [other] far beyond the line of the other. He must hav[e had] a hard time forging through the drifts before he reached his old tree. We failed to bring camer[a this] year, and thus lost a fund of much future pl

Exhibit 1.10 p. 2

Excerpt from 'Forest and Stream' magazine dated January 9, 1904 that describes Goose Gap near the town of Kiona where hunters regularly 'bagged' (shot) huge numbers of geese flying through the Goose Gap.

Goose Hunting.

Geese and ducks are now plentiful in this vicinity, the former in Horse Heaven and the latter along the river below town. Hunters are daily coming in from the sound, North Yakima and eastern Washington to go after the big birds in the Horse Heaven grain fields. Time was when the geese flew back and forth over the valley from their roosting places on the river. They flew low on windy mornings and came over "Goose Hill" just east of town, like a regiment, and the hunters lay in wait for them on the lee side of the hill, bowling them over by the wholesale. They no longer occupy their old nesting places, having been frightened away by hunters who unfairly slaughtered them there—and to secure any geese one must now lie in wait for them on the feeding grounds.—Kiona Enterprise.

Exhibit 11

Yakima Herald 12/4/1907 page 4

News from the 'Kiona Enterprise' newspaper in the town of Kiona just 1 mile west of the Goose Gap AVA boundary

Clipped By:

alwilson000
Wed, Jul 20, 2016

Mr. and Mrs. C. E. Millard entertained at cards Saturday evening in honor of Mrs. Millard's birthday. Refreshments were served at a late hour.

RICHLAND ITEMS

John Brandt and B. W. Fruhling left Friday for Douglas, Wash., making the trip overland. Mrs. Brandt and children will remain here with relatives for about ten days, after which she will join her husband and they will make their home on a farm near Douglas.

A missionary and Thanksgiving combination sermon was given Sunday evening by Rev. S. C. Foster at the Evangelical church. The ladies of the missionary society brought in their thanksoffering boxes, besides the other collection, all of which goes for missionary purposes.

Mrs. J. Roehl has been quite ill for the past week, but is better at this writing.

A pleasant entertainment was given Friday night at the Methodist church for the King's Daughters Sunday school

have been visiting for the past week at the homes of their daughter, Mrs. Taylor and neice, Mrs. Bliss, left Tuesday for their home in southern California.

Mr. and Mrs. Shirley, of Spokane, were visitors at the Craver home for the week-end. Mr. Shirley joined Messrs. Hess, Craver, White, Kenyon, Ward, E. O. and L. M. Keene in a goose hunt at "Goose Gap" last Sunday.

Messrs. Cook, Taylor and Bliss went up the river for a hunt last week and report lots of sport and some game bagged.

I. N. Boynton spent the first of the week in Seattle.

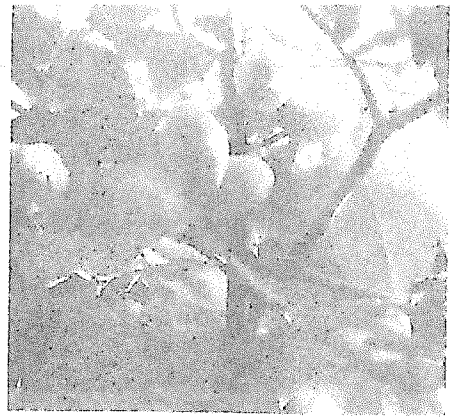
A social dance was enjoyed by several of our young people Tuesday evening at the club house.

Freddie Krug is absent from school this week; while engaged in a wrestling match at school the little fellow slipped and sprained his ankle.

W. Kenyon is rebuilding the road to Shady Hill which was so badly cut down during the dry weather. Gravel which was excavated from the Rudkin basement, is being hauled to make the fill.

11/28/1913

Exhibit 1.12



Pawpaws growing in clusters.

The Forgotten Fruit – America's native fruit, the pawpaw, *asimina triloba*,

- Largest edible fruit indigenous to 26 states in the U.S. from northern Florida to southern Ontario and as far west as eastern Nebraska.
- Delicious, nutritious food for Native Americans, European explorers, settlers, and wild animals.
  - The Shawnee had a "pawpaw month" dedicated in their calendar.
  - First mentioned in Hernanado de Soto's 1540 Mississippi expedition, where a traveler noted the fruit being cultivated by American Indians.
  - Lewis and Clark ate pawpaws during their westward expedition.
  - George Washington enjoyed the pawpaw fruit.
- Interest waned after World War II with the introduction of other fruit.
- Unique flavor of the fruit resembles a blend of various tropical flavors, including banana, pineapple, and mango.

Just try one; we think you'll like it. You'll be back for more!

John and Barbara Kerr began growing their pawpaw orchard in Badger Canyon in June 2002. A research orchard in Prosser was closed concluding that pawpaws could not be cultivated in this area.

"Since pawpaws' worst enemy is dry, hot wind, we planted a windbreak of spruce trees to deflect the prevailing winds and maintained solid set irrigation. Thus, we created a more humid (and natural) environment for the trees."

Pawpaws are available mid to late September at Goose Gap Pawpaws. Contact us at:

Phone: 509.628.1812

Email: Kerrcountrygardener@yahoo.com

Resources:

1. "Foods Indigenous to the Western Hemisphere - Pawpaw," by Scott Sheu.
2. "Pawpaw Description and Nutritional Information," Kentucky State University Cooperative Extension Program, Pawpaw Research Project, Community Research Service, Atwood Research Facility, Frankfort, KY 40601-2355, from The KYSU Extension Bulletin, "Cooking with Pawpaws," by Snake C. Jones and Desmond R. Layne.

For more information on pawpaws, visit the Kentucky State University website at www.pawpaw.kysu.edu

Exhibit 1.13

Introducing Goose Gap Pawpaws

Grown in Badger Canyon in the shadow of the Benton County's wine country

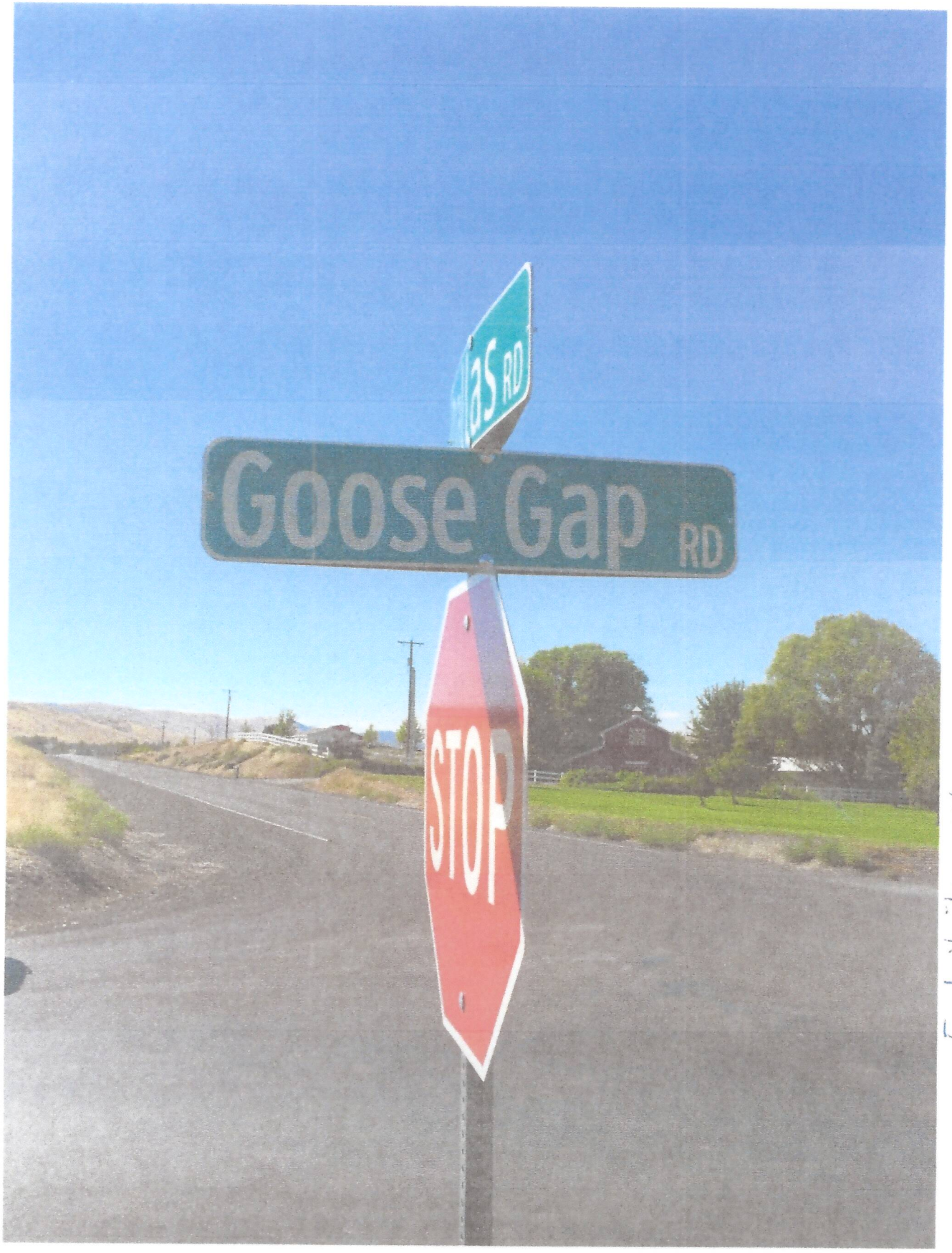


Exhibit 1.14.a.

Exhibit 1.14-b.

History

of

BENTON CITY

Washington

1853 - 1959

Exhibit 115

the Columbia and on to empty in the Pacific Ocean . . . he will keep his promise to care for the Indians."

Up on the north slope of the Rattlesnake Range it is rumored there is a big ring where sometime or another there has been a large Indian encampment. The sagebrush has been trampled into dust by the passage of many feet and must have been where many tribes met to talk over their affairs. Possibly a good spring nearby made this a good spot for the Indians to sojourn.

Along the Yakima River as well as the Columbia are special signs made by the red men showing the direction to the closest water hole. There was some years ago two fine Indian Arrowhead collections at Kiona and Mrs. Auggie Frye's at Benton City. In looking at Mrs. Frye's collection she had a number of frames with choice arrowheads under glass hanging on the walls of the room. They were mounted on white cotton for a background. Then in boxes were collections of stones to be laid out for inspection. She had arrowheads of all shapes, sizes and descriptions. Colors too vied with each other in indescribable beauty. Some were of onyx, others of obsidian and lovely agate. There were long ones, short ones and a good many narrow. The most perfect were of basalt and carnelian with many kinds unknown. There was a string of wampum (Indian money). These white disks, not as large as a quarter, were carved and round with holes of about the same size in the center. They had a cold clammy feel and were made either of bones or shells. Another exhibit was of long, smooth rubbed stones—worn down to serve as scrapers. The squaws used these to clean the hides of wild animals. There were bone needles and thimbles used to sew the buckskins into garments. At the bottom of one box was a blood-thirsty looking tomahawk.

And where did all these remarkable arrowheads come from?

In fingering the stone-tipped missiles, some of them whetted as sharp as knife blades one found they were for the most part exquisitely carved, those death dealing chips of stone. Some had very slender points which bespoke the bloody intent of the person who had made them.

These stones were found at points along the Columbia River to way down the Klickitat county banks of the great river. By sifting the soil in a screened box one may be rewarded by finding a fine arrowhead. Some of the arrows more than likely have been washed into the sand bars from eastern Washington and Idaho. And then over the Klickitat country and the Yakima Valley there are numerous burying grounds where undoubtedly battles have been fought. No one knows how long these have been buried under the sand since they were in constant use. Around the lower valley at Goose Gap up the canyon . . . the wild geese come in to feed in great flocks at certain seasons of the year. One can wager a guess nothing would live long that one of these arrows hit. The tribesmen who once inhabited the reaches of the Columbia as well as the Yakima left many symbols behind them for the coming white men to read and decipher. Painted pictures on rocks and also signs remain through the most devasting weather of numerous decades.

After the dam was put in on the east side of the "Horn" and a salmon run was on fishermen used to come from all over to catch the toothsome fish some weighing up to thirty pounds or more and it was sure a sight to see the Indians and whitemen alike fishing by the hour. This delicate meat has more flavor and tastes far better than any fish commercially canned. Here too the Indians had their drying sheds and Mrs. Gwin vouches for the fact that these dried salmon when cooked were really worth eating. It took a good deal of joy out of the lives of many Nimrods when this sport was finally curtailed owing to state regulations. And about 1914 one of the most stirring sights ever witnessed was of the Yakima River when a huge salmon run was on. The banks of the river were chuck full of leaping silver-coated bodies charging up the stream to their spawning grounds along the upper reaches of the Yakima. This sight was one in a million to behold. In later years since the building of dams in the Columbia River it is feared the salmon runs in the big river are about a thing of the past.

In the early days Dan McAlpin was farming a large acreage in hops now known as the old Pryor place. He always had a lot of Indians working for him in hop picking time. An interested observer talked to an old man who doubtless had no idea of how old he was. He camped by the Kiona bridge

Exhibit 1-15 cont. p 2

The Yakima River looking north from 410 highway

Kiona

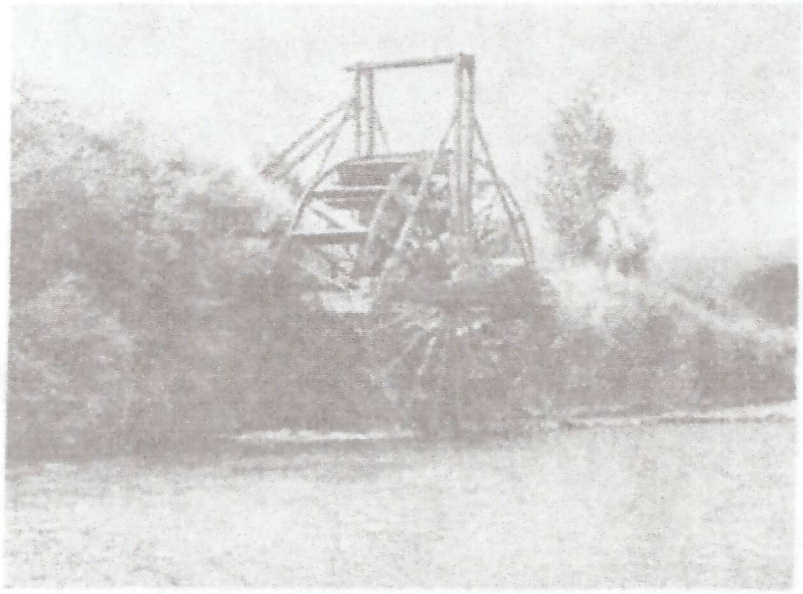
There were three families living in Kiona before construction was started on the Kiona Irrigation Canal. They were the Neils, Samuel Lightles and Soloman Browning. Mr. Neil was the first section foreman on the Northern Pacific Railway and he purchased the land between the river and the railroad. He also claimed some Government land across the river under the Kiona canal. The Samuel Lightle family came to Kiona in 1887, drawn by advertising of the Railroad concerning the Kiona Canal. Mr. Lightle claimed an eighty acre tract of Government land on the North side of the river, (S½ of the SE¼ Sec. 18). This would lie north of Hedger Avenue and East of A Street. There were five children in the family, Harry, William, Roll, Ernest and a daughter, Nellie. Roll is the authority for much of Kiona history. Samuel Lightle was the first teacher in Kiona and also the first Justice of the Peace. He taught in a little building located near the present Shill Tavern. The school was started for the benefit of the children of the construction workers on the Northern Pacific. Later there were only nine students, three Lightles, 2 Brownings, three Neils and Bob Travis who rode down from Horse Heaven. Sol Browning was a brother of Mrs. Lightle. He took up 160 acres of Government land, running from the present intersection of Main and East A street to the river and north for one mile. In later years he succeeded in raising both cotton and peanuts in the sandy soil on the lower river road and had a large colony of bees.

C. S. Prowell was the roadmaster on the Northern Pacific. He bought the land south of Hedger Avenue to the river. He also owned land on the east side of the river where the Louis Rowley family now lives. He had plans for constructing a canal along the north side of his property and siphoning water across the river to irrigate his land on the East side. Part of the canal was dug and can still be seen below the Donald Kerr place and on past the Masonic Hall. He later sold his land east of the river to a Mr. Coatney who sold to Lou Armacost, stepfather of C. E. Rowley, whose son Louis Rowley is now farming the land and raises some of the best alfalfa, corn, grapes and asparagus grown in the community.

Exhibit 1.15 cont. p 3

Mr. Prowell in 1895 induced his brother-in-law, Dr. F. S. Hedger, to come to Kiona from Missoula, Montana. The family lived on the Ely place just north of the school until they built their home, now owned by L. S. Carnahan. This was the center of early day hospitality, surrounded by a beautiful lawn and roses. Dr. Hedgers practice extended from Prosser to Kennewick and his bay trotters and light buggy were familiar to the entire area. He was a real horticulturist, always experimenting with new varieties. He developed a grape which was named Hedgers Keepers and was palatable till long after the holidays.

Residents of Kiona were surprised one day in August 1941 when without any warning a cloudburst hit on the hills just south of town. The water came down a small canyon just above the railroad viaduct and washed out the 410 highway. The Standard Oil Delivery truck was unloading gasoline at Cobbs Corners when Don Elliott looked up from his work and saw the water come roaring through the viaduct. His loud yell of fear was heard by Mr. and Mrs. Cobb. "Run fast. The whole Yakima River is coming down the road." Needless to say they ran but Don was too late getting to safety. The rush of water rolled him against a pole where it took all his strength to cling till he was safe. The basement, lawn and goldfish pond were filled with mud.



Water wheel for irrigation on Yakima, supplanted by ditches and canals

The worst flood in the memory of Indians or of the white race was in 1894. Other floods came along in 1917, 1922, 1933 and again in 1948. After every flood there is crop and property damage. Floods are caused by a heavy snowfall in the mountains, then the warm Chinook Winds come to melt the snow so fast that the river bed is unable to carry the water. In 1917 the flood caused the old bridge timbers at the side of what is now the old bridge across the Yakima to take off for parts unknown down the river. The flood in 1922 was a humdinger. One could see from a vantage point at Corrall Creek the many men with poles feeling out the N.P. Railway tracks ahead of the slow moving trains. Argus Hughes lifted groceries from his store floor up on top of the counters as the flood waters lapped the railroad tracks south of the depot. The flood in 1933 was plenty high and caused considerable damage. The N.P. trains could only go as far as Union Gap where the passengers

Exhibit 1.15 cont. p 4

Grapes from this vineyard at Benton took first prize at Washington State Fair in 1910, and won first prize at Spokane same year

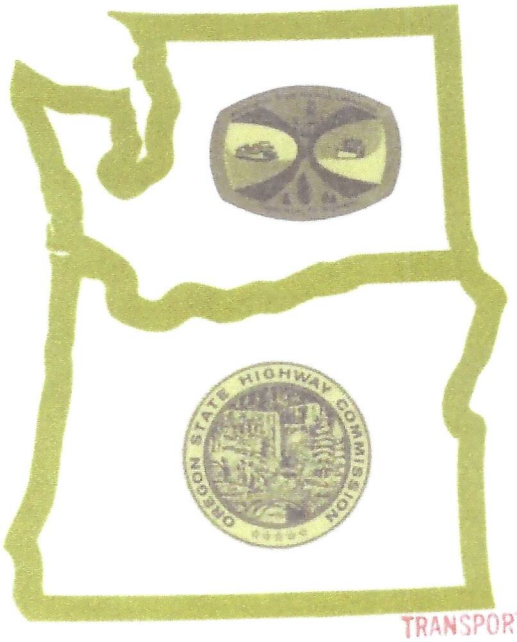
were transferred to another coast train. In 1948 deliverymen from Kennewick had to go up over the Horse Heaven Hills to Prosser then cross the river there and down to Benton City on the north side of the river. It was with a breath of relief all over the Valley people were joyous when the threat-

Viaduct at Kiona during the cloudburst

Exhibit 1.15 cont. p 5

Draft Environmental Statement

INTERSTATE 82/182
PROSSER, WASHINGTON
TO INTERSTATE 80N IN OREGON



Oregon State Highway Division • Washington State Department of Highways

FHWA-WN-EIS-73-01-D
FHWA-OR-EIS-73-01-D

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

Prepared by
Washington State Department of Highways
and
Oregon State Highway Division

DRAFT

ENVIRONMENTAL STATEMENT

Administrative Action

for

INTERSTATE 82/182--PROSSER, WASHINGTON,

TO INTERSTATE 80N IN OREGON

This highway improvement is proposed for funding under Title 32, U.S.C. This statement for the improvement was developed in consultation with the Federal Highway Administration and is submitted pursuant to:

42 U.S.C. 4332(2)(C)
and
RCW 43.21C, RCW 47.04

12-22-72
Date

[redacted]
Signature of Assistant Director for Planning, Research & State Aid
Washington State Department of Highways

12-22-72
Date

[redacted]
Signature of Administrator of Highways
Oregon State Highway Division

APPROVED AND ADOPTED BY FHWA

12-28-72
Date

[redacted]
Signature of FHWA Reviewing Official

Exhibit 1.16 cont. p2

Park area. It then swings to an easterly course across the Columbia River (Lake Wallula) to an area just south of the Boise-Cascade paper plant at Attalia. Although Lake Wallula is wide in the area of the crossing, it is also shallow, and a crossing here would not be as costly as it might appear. An earth and rock fill causeway could be used for a great portion of this crossing with a bridge over the main channel. The corridor continues east across SR 12, then curves to the south, parallel to SR 12 immediately east of the community of Wallula. Crossing the Walla Walla River, this corridor displaces a Washington State Highway Department rest area picnic site and traverses a wildlife refuge area managed by the Washington State Game Department. The corridor then turns easterly across SR 12, makes a steep ascent of the north face of the ridge toward Vansycle Canyon, then again swings southerly through the rugged mountains to the Oregon State Line.

This corridor would anticipate similar interchange locations to those indicated for Corridor 3 with the addition of one near Attalia and also the SR 12/SR 395 Wallula Junction. Frontage roads, highway grade separations, and railroad grade separations would be provided as necessary for safety and continuity of existing road systems.

This corridor would provide direct access to Prosser, Benton City, and South Kennewick. The length between Badger Canyon and Wallula Lake forms a cordon around much of the South Kennewick area but does leave it intact. This area will see intense development by 1990 and, if this corridor were used, the development would accelerate rapidly. An indirect improvement in long-haul access to Pasco and Richland would be developed, but would be dependent upon implementation of specific related improvements to the network of existing roadways in the region. The Port of Walla Walla County district would probably experience an increased growth due to the proximity of an alignment in this corridor.

There are three involvements with Public Recreational Lands within Corridor 4. They are at Hover Park, Washington State Highway Department's Wallula Jct. picnic site, and the wildlife refuge in the Walla Walla River delta area. Map I-2 shows their location.

Hover Park is located on the west bank of Lake Wallula. It is an undeveloped facility under lease to Benton County by the Corps of Engineers.

The Washington State Highway Department owns and maintains a picnic area type rest stop in the Wallula Junction vicinity near the SR 12/SR 395 intersection.

The Washington State Game Department manages and operates a wildlife refuge on land leased from the Corps of Engineers in the Walla Walla River delta area. The refuge extends approximately three miles upstream from the present SR 12/395 crossing of the Walla Walla River.

These involvements with publicly owned recreational land will constitute a 4(f) involvement.

Design characteristics of the corridor are summarized and compared with other corridors in Table I-A.

CORRIDOR 4a, 5a, 6a, 7a, 8a

This corridor is an alternate to Corridors 4, 5, 6, 7, and 8. Immediately south of the Walla Walla River, the corridor turns to the southwest toward Wallula Gap, generally paralleling SR 395 and the Columbia River to the Oregon state line. This corridor is quite wide and would accommodate an alignment atop the rock bluffs, or at the approximate level of SR 395 near the river's edge, or within Lake Wallula on an earth and rock fill.

Frontage roads, highway grade separations, and railroad grade separations would be provided as necessary for safety and continuity of existing access and road systems. An alignment using this corridor would probably have an interchange at the SR 12/SR 395 junction in the Walla Walla River delta area.

There is one public recreational land area involved with this corridor. It is the Washington State Game Department's wildlife refuge in the Walla Walla River delta area. Involvement with this publicly owned recreational land will constitute a 4(f) involvement. Also within this corridor, local interest groups indicate there is an area, not yet officially dedicated as a public recreational or historical land, that has considerable geological and biological significance. This site is known as the "Twin Sisters" or "Twin Captains" area and is characterized by its peculiar twin rock formation situated high on the bluffs overlooking Lake Wallula to the west. This formation is located about 1-1/2 miles north of Port Kelly.

Basically, this corridor would serve the same long-haul traffic as routes using the southern end of Corridor 4. One exception would be a more direct local route for the Umatilla, Oregon, to Tri-Cities oriented traffic. Industrial transportation benefits would result for the Port District of Walla Walla near Wallula Junction and for Port Kelly. Enhanced access to an interstate highway would aid economic development in these industrial areas.

Design characteristics of this corridor are summarized and compared with other corridors in Table I-A.

CORRIDOR 5

Between Prosser and the SR 12/SR 395 interchange at East Pasco, Corridor 5 is identical in location and impacts to the previously studied and approved I-182 spur route (herein called I-182(A)). The I-182(A) portion of Corridor 5 is being reevaluated, however, as an integral part of the new I-182 corridor analysis now being conducted.

Corridor 5 begins at East Prosser and follows a passage identical to Corridors 2, 3, and 4 to Goose Gap at the northwest end of Badger Mountain. At Goose Gap the corridor swings northeasterly through the gap where deep cuts are expected.

Throughout the first 20 miles of its length, the corridor traverses almost entirely nonirrigated arid land that is mostly unused except for grazing.

Continuing on an easterly bearing, the corridor descends the northeasterly dip slope of the Badger Mountain anticline, and extends onto a low upland bench overlooking the Yakima River. At this point it crosses irrigated farmland served by the Kennewick Irrigation canal. Here also the corridor crosses Keene Road, the Union Pacific Railroad, and existing SR 12. Continuing easterly through the northern edge of Murray Plat and toward the Yakima River, the corridor descends the

Exhibit 1-16 cont. p 3

Feature Query Results

Click the feature name for details and to access map services
Click any column name to sort the list ascending ▲ or descending ▼

Feature Name	ID	Class	County	State	Latitude	Longitude	Ele(ft)*	Map**	BGN Date	Entry Date
Goose Gap	224323	Gap	Shasta	CA	405442N	1220425W	2467	Goose Gap	-	19-JAN-1981
Goose House Gap	314700	Gap	Ware	GA	304027N	0821323W	121	Chesser Island	-	25-SEP-1979
Goose Gap Hollow	718592	Valley	Pike	MO	393138N	0911001W	531	Ashburn	-	24-OCT-1980
Goose Gap	1285675	Gap	Sevier	TN	354828N	0833649W	1201	Pigeon Forge	-	19-MAY-1980
Goose Gap	1505186	Gap	Benton	WA	461442N	1192126W	860	Badger Mountain	-	10-SEP-1979
Goose Gap	1513373	Gap	Benton	WA	460529N	1185856W	597	Wallula	-	10-SEP-1979

California
Georgia
Missouri
Tennessee
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View & Print all

Note: If data are returned and the column headings display but no data appear, click any column heading.
***Elevations are from the National Elevation Dataset**
****The map name is not necessarily the name of the community containing the feature. See FAQs for details.**

Exhibit 1.17

Exhibit 1.19

Goose Gap in a rural, mountainous area of Tennessee with dense forest and horse pastures.

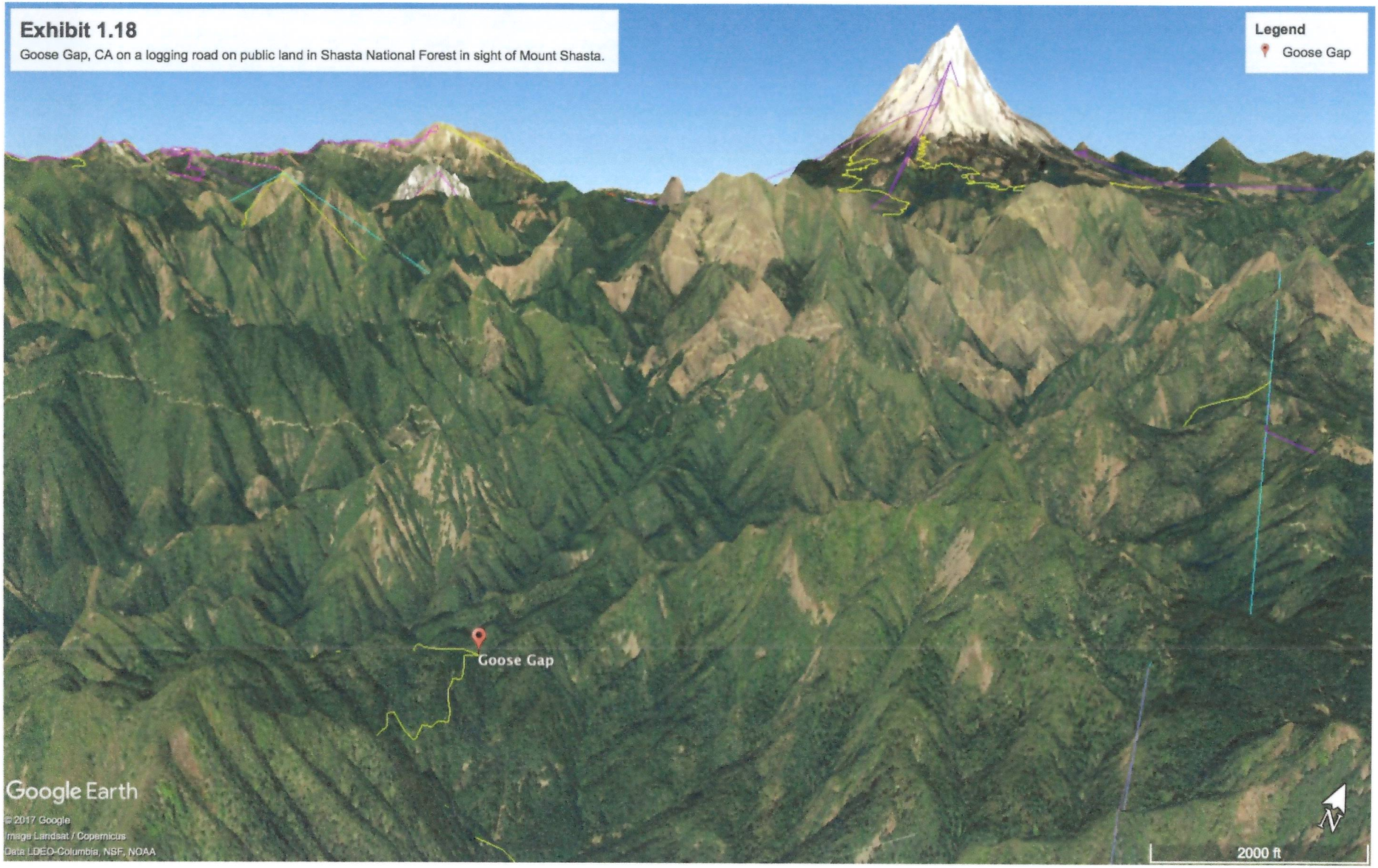
Exhibit 1.18
Goose Gap, CA on a logging road on public land in Shasta National Forest in sight of Mount Shasta.
Legend
Goose Gap
Goose Gap
Google Earth
© 2017 Google
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
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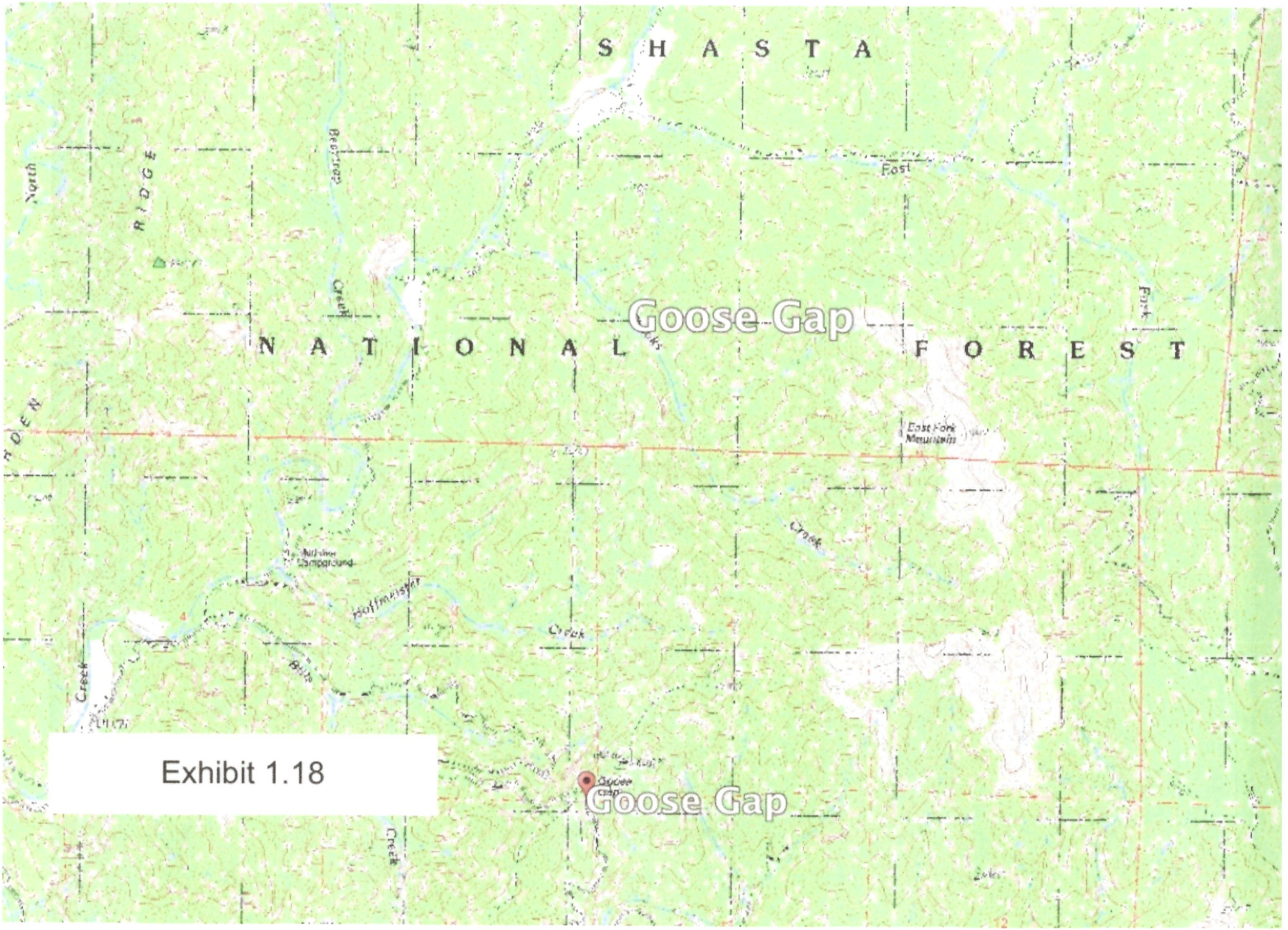
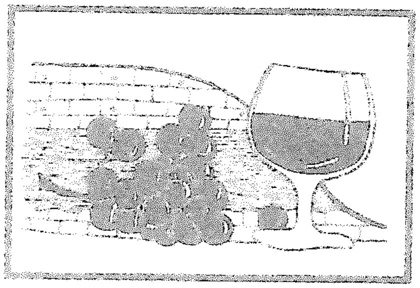
2000 ft


S H A S T A
N A T I O N A L F O R E S T
Goose Gap
Goose Gap
Exhibit 1.18

Series



Geology and Wine 6. Terroir of the Red Mountain Appellation, Central Washington State, U.S.A.

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SUMMARY
Red Mountain is the newest of five appellations in Washington State and like the majority of Washington vineyards its terroir is influenced by 1) the rain shadow effect and volcanic episodes of the Cascade Mountain Range; 2) soils derived from Quaternary glacial sediments and wind-blown loess overlying Miocene basalt; and 3) a warm, dry climate with abundant sunshine and cool nights due to high latitude (N 46°) and topography. Variations of rooting depth, texture, calcium carbonate content, and other properties of vineyard soils are directly influenced by Quaternary glacial flood backwater on the back side of Red Mountain and by the variable nature of the loess and dune cover on the flood deposits. This is the first demonstration of the effect of paleohydrology on vineyard site characteristics. In the past two years, wines made from Red Mountain grapes have received nine scores of ≥ 94 out of 100 in independent blind tastings and merlot wine made from Red Mountain grapes has been ranked as the best in the United States for each of the past two years by two different national wine magazines.

Red Mountain is one of the warmest and driest viticultural sites in Washington State having heat summation (growing degree days) and total sunshine similar to Napa Valley, California which is 1000 km farther south. Other wine regions that have been influenced by the worldwide glacial processes that were so important in the development of Washington vineyards include the gravel mounds that underlie most of the first growth vineyards of Graves-Médoc, Bordeaux, France and some of the outwash gravel plains of New Zealand.

RÉSUMÉ
L'appellation Red Mountain est la plus récente des cinq appellations de l'État de Washington et, comme c'est le cas pour la plupart des vignobles de l'État de Washington, son terroir dépend 1) de l'effet orographique de la chaîne des monts Cascade et de ses centres volcaniques; 2) des sols dérivés des sédiments glaciaires quaternaires et des loess éoliens recouvrant le basalte miocène et; 3) d'un climat chaud et sec avec un fort ensoleillement, avec des nuits fraîches dues à la latitude (N 46°) et à la topographie. Les variations de la profondeur d'enracinement, de texture, de contenu en carbonate de calcium et d'autres propriétés pédologiques des vignobles varient selon le patron de dépôt des alluvions glaciaires quaternaires par écoulement tourbillonnaire de Red Mountain et de la variation de composition du loess et de la couverture des dunes des dépôts alluvionnaires. Cela constitue la première démonstration des effets paléohydrologiques sur les propriétés des sites viticoles. Au cours des deux dernières années, les vins des raisins de Red Mountain ont reçu neuf cotes de plus de 94% lors de dégustation anonyme, et les vins merlots provenant de raisins de Red Mountain ont été jugés les meilleurs aux USA pour chacune des deux dernières années, par deux revues spécialisées d'envergure nationale.

La région de Red Mountain constitue l'un des sites viticoles les plus chauds et les plus secs de l'État de Washington, possédant un bilan thermique (degré-jour de croissance) et un ensoleillement comparable à ceux de la vallée de Napa en Californie, laquelle est située à 1 000 km plus au sud. Parmi d'autres régions ayant subi l'influence de processus glaciaires mondiaux et qui se sont avérés déterminants dans le développement des vignobles de l'État de Washington, on retrouve celle des collines graveleuses constituant le lieu de croissance de la plupart des vignobles de première génération de Graves-Médoc de la région de Bordeaux en France, et d'autres sur des plaines d'épandage en Nouvelle-Zélande.

INTRODUCTION
As described in other articles in this Geoscience Canada series (e.g., Wilson, 2001), *terroir* involves the complex interplay of climate, soils, geology, and culture that influences the character and quality of wine. These factors are in addition to, or perhaps underlie, the substantial contribution of good viticultural practice and expert winemaking. One common illustration of the importance of terroir is the occurrence of adjacent or nearby vineyards that produce strikingly different wines even when many of the measurable aspects of climate, viticulture, and winemaking technique are very similar. It is also common, although usually incorrect, to point to a single factor as the explanation. "It's the soil." "It's the water." "It's the limestone." Terroir is the integration of individual factors that contribute to wine quality, and to make matters even more complicated there is the variable of time. What may be good terroir in one year may be less so in another. For

Exhibit 2.1 page 1

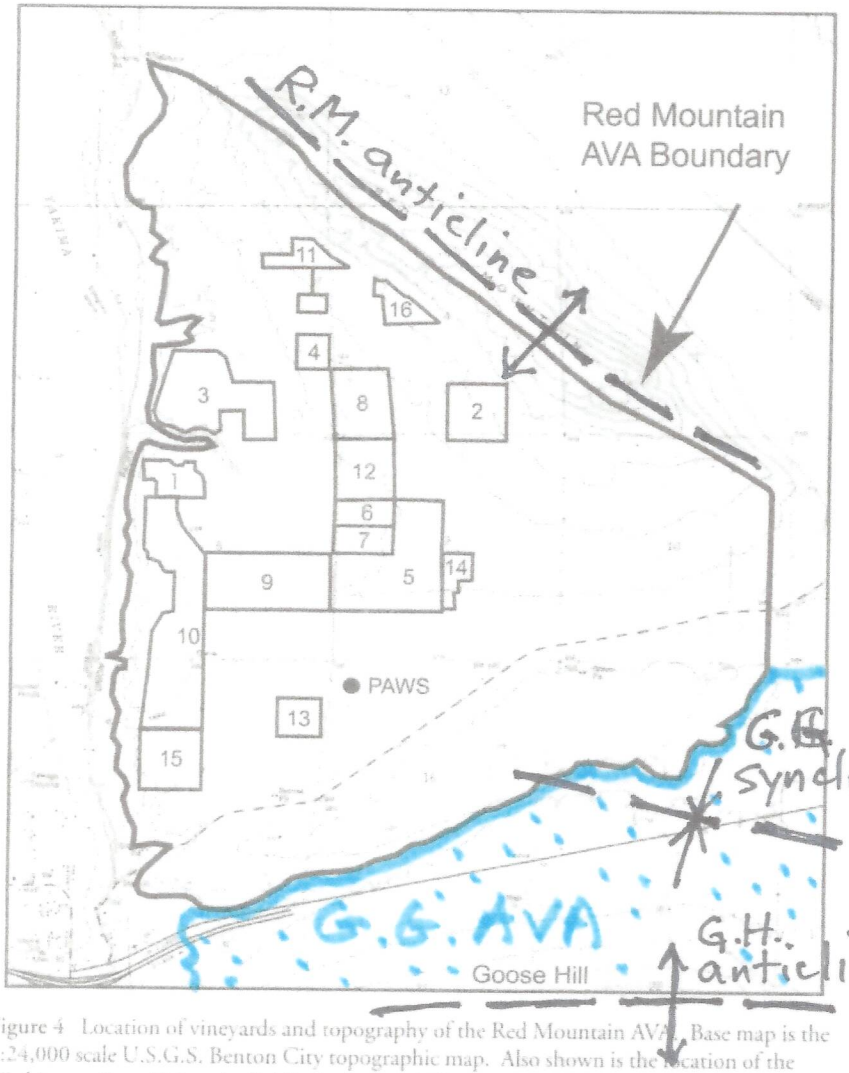

Figure 4 Location of vineyards and topography of the Red Mountain AVA. Base map is the 1:24,000 scale U.S.G.S. Benton City topographic map. Also shown is the location of the Washington State University Public Agricultural Weather System (PAWS) station that collected the data in Table 5. Information about numbered vineyards is presented in Table 2.

topographic features such as the Olympic-Wallowa lineament whereas the synclines generally form basins that are covered by younger sediments (Fig. 7). The Red Mountain and Goose Hill anticlines form the northern and southern geological boundaries of the Red Mountain AVA. Most of the vineyards are underlain by the intervening syncline, which has been called both the Goose Gap syncline and the Benton City syncline (Reidel and Fecht, 1994). According to Reidel and Fecht (1994) the northern limb of the Red Mountain anticline is steeper than the southern limb and like many such structures in the Yakima Fold Belt, may have local reverse faults (West *et al.*, 1996). Such faulting, as illustrated in the upper part of Figure 7, may explain the great differences in yield between otherwise similar water wells in the Red Mountain area.

Glacial Sediments

Except on ridgetops above about 400 m in elevation and where incised by modern drainage, the basalt in the Red Mountain area is everywhere overlain by unconsolidated sediments (labeled as Qht in Fig. 5) that were deposited by the series of glacial outburst floods related to the drainage of glacial Lake Missoula, described above. As the peak of Red Mountain is 430 m and the mean slackwater elevation of Lake Lewis, which temporarily filled the Pasco Basin (Fig. 2), is estimated at about 390 m, it is likely that the floodwater torrent surrounded Red Mountain, forming a very strong back-eddy behind (to the south of) Red Mountain as illustrated in Figure 8. The paleohydrology of this back-eddy resulted in extreme heterogeneity of the sediments that were deposited to the south of Red Mountain and that make up the deeper soil levels of the vineyards within the Red Mountain AVA.

Perhaps the most noticeable sedimentary features are the glacial erratics, large boulders that were carried by icebergs from the broken ice dam. These icebergs must have ranged up to 10s and perhaps 100s of metres in size, as the boulders that were dropped when these icebergs grounded, melted and deposited their entrained load, range up to several metres in size (Fig. 9A, B). Erratics are particularly prevalent along the high water strand of the slackwaters (Fig. 9A), but also are distributed throughout the Red Mountain AVA as illustrated in Figure 8D and evidenced by the rows, walls, and boxes of boulders (Fig. 9C) removed from the vineyards during initial planting and subsequent ploughing. Most of the boulders are granitic and metamorphic rock types that are not found within several hundred kilometres of Red Mountain, but which are abundant in the Rocky Mountain source region of the flood waters and the encompassing glaciers. Figure 9B shows one such boulder that is about 3 m in diameter and consists of gleaming white marble with layers of brown garnet skarn, rock types that do not occur in outcrop anywhere in Central Washington.

Although the largest boulders could not have been carried directly by the flood waters, the peak velocity and discharge of the floods, estimated at 200 m/sec and 2 x 10^7 m^3/sec, respectively, (O'Connor and Baker, 1992) were sufficient to carry large amounts of relatively coarse sediment that was subsequently deposited when the water slowed near obstructions, as would be the case in the eddies behind Red Mountain (illustrated in Fig. 8D). This resulted in lenses of coarse gravels (Fig. 9D, F) in the generally finer grained silt and sand deposited by the ponded slackwater of Lake Lewis (Fig. 2).

In addition to the multiple pulses of floodwater that resulted in complex interbeds of gravel, sand, and silt, periodic eruption of Cascade volcanoes to the West

Exhibit 2.1 page 2

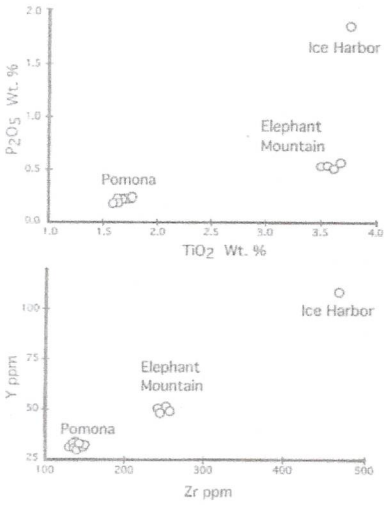

Figure 6 Compositional discrimination diagrams for Columbia River basalts using a) P_2O_5 versus TiO_2 and b) Y versus Zr. Data from Table 3 and Hooper (2000).

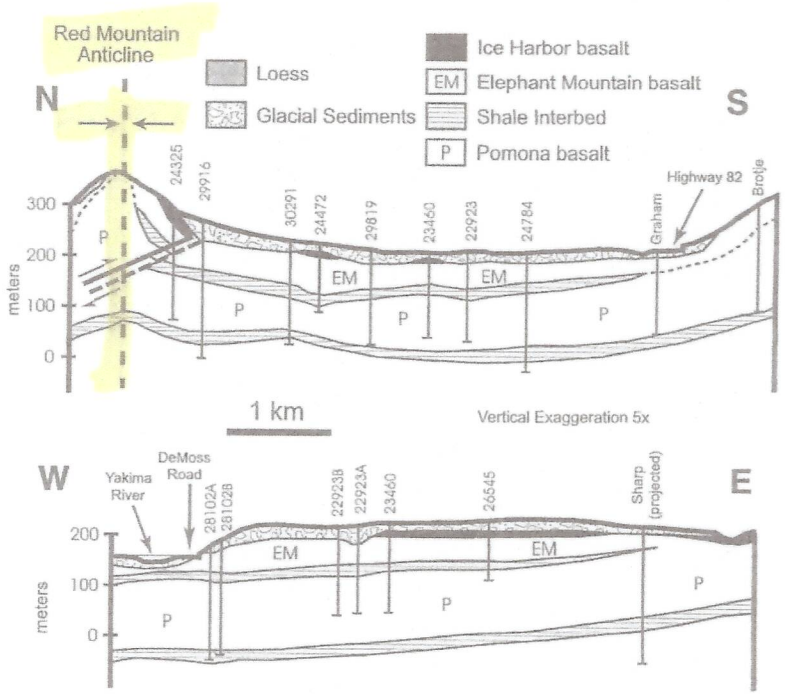

Figure 7 Geological cross-sections through the Red Mountain area (vertical exaggeration 5:1). Well log data courtesy of Lorne Jacobsen, written communication, 2001. Location of cross-sections is illustrated in Figure 5.

as evapotranspiration, the coarse gravel lenses intercept and channel the infiltration of precipitation descending through overlying loess and dune materials. Thus, shallow gravel lenses can contain significant calcium carbonate. An analysis of one such petrocalcic horizon (RM-10, Table 3) shows that it contains up to 50% CaO, an order of magnitude more calcium than average soil and rock values (Tables 3, 4). Although limestone is absent in the Red Mountain AVA, other than as erratic boulders, the calcite-cemented gravel lenses form significant reservoirs of calcium carbonate that can affect vineyard performance. For example, calcium is known to inhibit vine uptake of such essential nutrients as nitrogen and potassium (Winkler *et al.*, 1974; Ribéreau-Gayon *et al.*, 2000). Also, Fe is particularly affected if water pools on calcic layers in the root zone (Sara Spayd, written communication, 2002). Some Red Mountain wineries such as Terra Blanca, Spanish for white earth, point to these calcic layers as an important and sometimes negative part of the local terroir.

RED MOUNTAIN SOILS

The layered stratigraphy of bedrock basalt and overlying glacial floodwater and eolian sediments forms the substrate for soil development in the Red Mountain AVA. Given the heterogeneity of these sediments, it is not surprising that there are a number of different soils in the Red Mountain AVA (Fig. 10), and that these soils perform very differently under grape production.

A common theme to the soils of the benched area of Red Mountain is that they formed in eolian materials (loess or dune) over slackwater sediments from giant glacial outburst floods (Meinert and Busacca, 2000). Yet within this landscape, no fewer than eight different soil series have been mapped, and these can have very different textures (Table 4) and profile morphology (Fig. 11): Hezel (Xeric Torriorthents), Quincy (Xeric Torripsamments), and Finley, Scooteney, Prosser, Starbuck, Kiona, and Warden (all Xeric Haplocambids; Soil Survey Staff, 1999). Vineyards are planted on most of these, with development planned for the remainder.

All but two of the principal soils are classified as Aridisols in soil taxonomy (formative word Arid; Soil Survey Staff, 1999) based primarily on an aridic soil moisture regime. The two soils that formed in dune materials (Hezel and Quincy) are Entisols (formative word Recent) because the shifting sands lack most soil profile features. In sharp contrast to the Aridisols and Entisols of the appellation, soils on the floodplain of the Yakima River less than one kilometre outside the appellation and planted to *Vinifera* are Mollisols of the Pasco series (Fig. 11; Cumulic Endoaquolls), which are wet soils with very dark, thick, humus-enriched topsoils. These soils have a permanent water table whose height in the soil profile fluctuates seasonally with stages of the Yakima River. The generally high water table results in carbonates to the surface and uncontrolled access to water during the growing season.

Large areas of the benchlands of the Red Mountain appellation are underlain by the Warden series soils, formed in about 50 cm of loess or mixed loess and eolian sand over stratified flood sediments (Fig. 11), whereas adjacent areas, even within the same vineyard, are underlain by the Hezel series soils (Fig. 14b), which formed in a cover of about 50 cm of dune sand over sandy stratified flood sediments. In contrast, areas of Scooteney soils grade downward from an eolian sandy loam or loam at the surface to a fluvial unit of very cobbly sandy loam at

Exhibit 2.1. Page 3

---------- Message ----------
Subject: RE: Hola Steve: It's Alan B with a question
From: "Steve Reidel" <sreidel@tricity.wsu.edu>
Date: Fri, September 9, 2016 11:12 am
To: "Alan Busacca" <alan@vinitas.net>

HI Alan

Yes, it's been a long time since we've seen each other. I'm still plugging away on the basalts and their structure. Nice photos of your vineyard. My wife and I really like Zin so I'm looking forward to your wines. We make annual trips to the CA Dry Creek area and Paso Robles.

Goose Hill is an odd ridge. To be perfectly honest we don't know exactly why it is oriented as it is but we have a guess, as I explain below. It's odd because even though its in the center of the OWL (Olympic-Wallowa Lineament) including the crests of Rattlesnake Ridge, Red Mountain, Candy Mountain, and Badger Mountain, which all trend N50°W, *Goose Hill is an anomaly because it's the only one that trends East-West* in the face of everything else regionally trending N50°W. I have attached our GSA Special Paper 497 chapter from 2013 describing the tectonics of the area as we now see it.

You'll notice that the N50°W trend of the ridge of the Horse Heaven Hills (HHH) and OWL, which parallel each other from the Blue Mountains 65 miles to the ESE, past Wallula Gap and to the Goose Hill area, diverge abruptly there (the OWL continuing N50°W through the Cascade Mountains and into western Washington) whereas the crest of the HHH turns to the WSW at Goose Hill and trends all the way into the Portland basin. We think that is basement control. The OWL is probably a deep seated fault that was here probably when a lot of the basement rock were accreted onto N America in the Mesozoic. The OWL is some kind of fundamental crustal boundary in the Pacific Northwest (PNW).

Now as far as Goose Hill, the E-W trend of the ridge line is in line with North-South compression under the present stress regime we see from earthquake focal mechanisms. There are a few other structures that are E-W, like some smaller ridges along the crest of the HHH. Next time you drive up highway SR221 to Prosser, notice the north flank of the HHH has a series of small E-W ridges that popup right at the crest. Those are small anticlines on the main anticline but they are oriented E-W and are superimposed on the NW trending HHH.

We think that they and Goose Hill are controlled by the current stress field and thus are detached from the main structures of the HHH. That would make them 'rootless' meaning that the faults on the don't go very deep and may just die out close to the surface.

So Goose Hill is a rootless structure: it's faults die out not too far below the surface. And that in turn explains the 'reverse symmetry' of Goose Hill relative to the Horse Heaven Hills, Red Mountain, Rattlesnake Mountain, and nearly every other ridge in the Yakima

Fold Belt (YFB. see figure, next page; the YFB is circled in blue dashes). That is, that the typical topographic profile of all of these hills in the YFB is gentle on the south limb and step on the north limb; however, Goose Hill certainly is the reverse.

One hitch on the current stress regime as told by earthquake focal mechanisms, the GPS studies suggest that the crust is moving to the NE, contrary to the earthquake data. No one seems to know why. I have attached a diagram showing what the GPS says.

Hope this helps. Any of the figures in the paper that might be useful I'll be happy to send along. I have them as Adobe Ill or as JEPGs.

Stephen Reidel PhD
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School of The Environment - Geology
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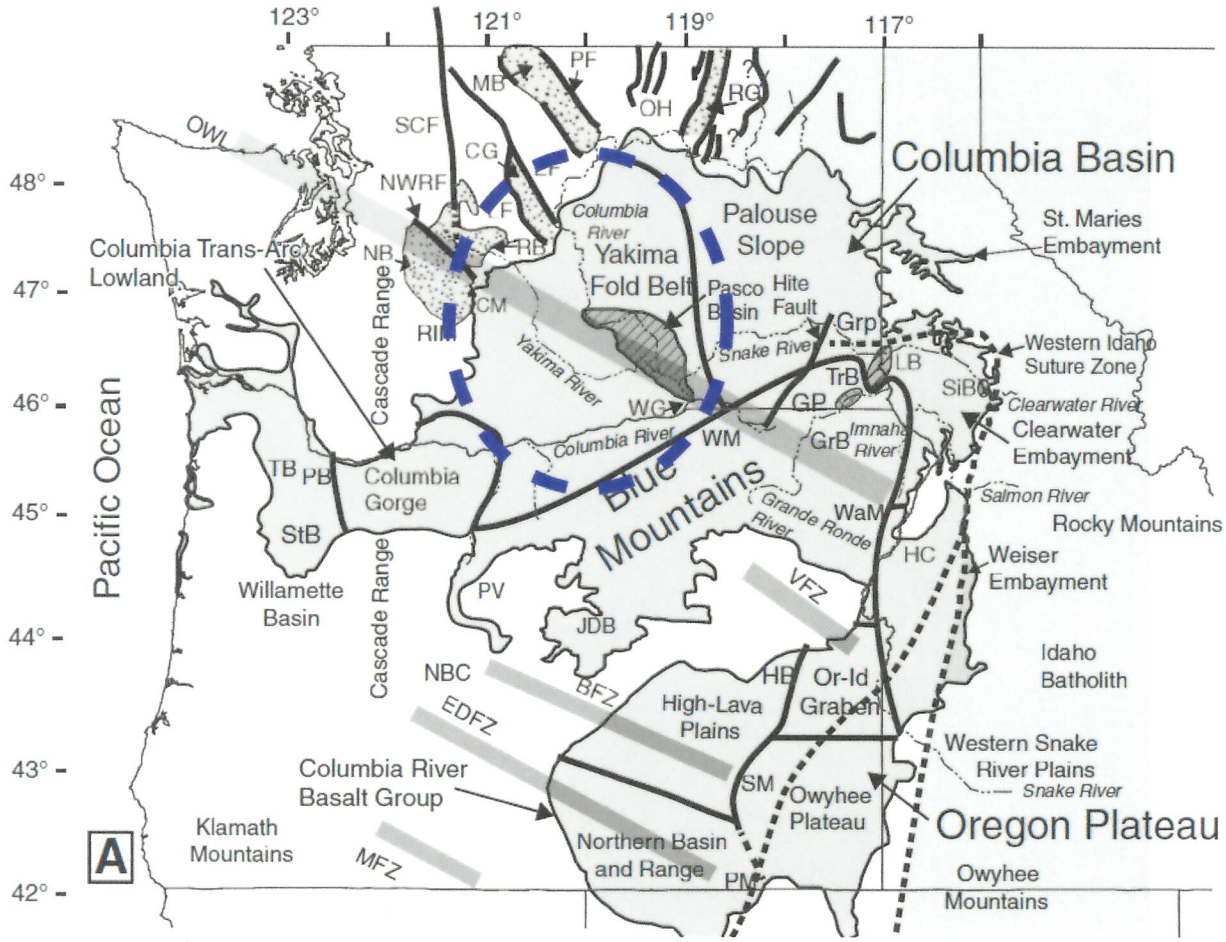
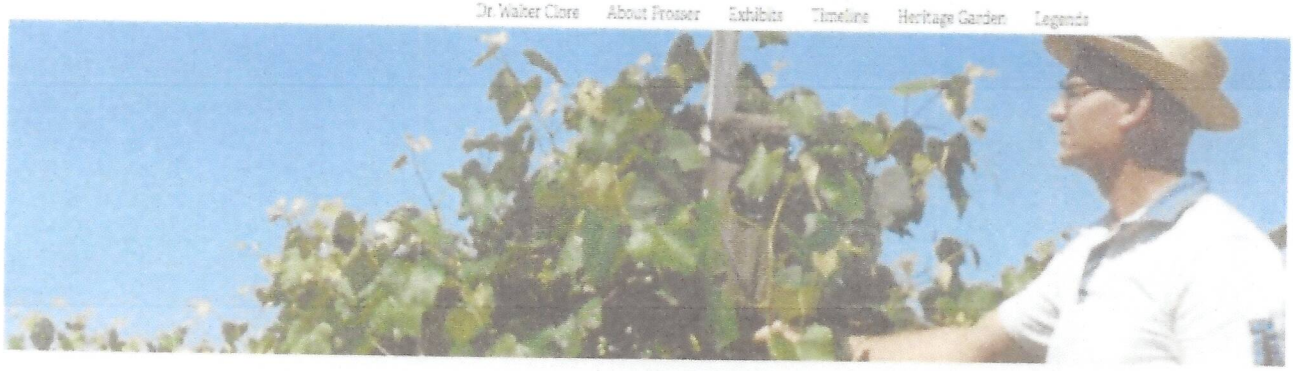
sreidel@wsu.edu





https://www.theclorecenter.org/dr-walter-clore

DR. WALTER CLORE THE FATHER OF WASHINGTON WINE

Dr. Walter J. Clore was a man with a passion and vision for Washington viticulture that extended far beyond his years.

The son of teetotalers, he was born July 1, 1911 in the small town of Tecumseh, Oklahoma. He grew up in Tulsa, Oklahoma and after high school, received his bachelor's degree in horticulture from Oklahoma A&M, now known as Oklahoma State University. With a hardworking spirit and college degree under his belt, he managed through the Great Depression sweeping floors at an oil refinery for 25 cents an hour. This experience and an article he read on the Grand Coulee Dam irrigation project were the turning points that inspired Dr. Clore to seek out opportunities and a better life in Washington State.

In 1934, he landed a scholarship with Washington State College, now known as Washington State University (WSU) for $500 to study horticulture. He and his wife Irene, arrived in Pullman with only $5 in their pockets. In 1937, he was hired as the fourth faculty member to staff the WSU Irrigated Agriculture Research Extension Center in Prosser, WA and began work with small fruits and vegetables, including grapes. It was there he would work for the next forty years, pursuing his interest in horticulture and cultivating a passion for growing fine wine grape varietals.

Dr. Clore began trials of grape varieties in Prosser and tested more than 250 American, European and hybrid varietals. In 1960, he partnered with WSU microbiologist and former Napa Valley resident Charles Nagel, to test the vines and determine what would grow where and under what conditions. Dr. Clore's meticulous research was instrumental in assuring Washington farmers that they could grow vinifera grapes and produce fine wine.

Dr. Clore retired from WSU in 1976 and published his studies and feasibility of growing vinifera in Washington, ""Ten Years of Grape Variety Responses and Wine Making Trials in Central Washington". He also co-authored "The Wine Project: Washington State's Winemaking History" with Ron Irvine. He received many awards in his lifetime. In 2003, the Washington State Legislature officially recognized Dr. Clore as the Father of the Washington State Wine Industry for his research contribution to Washington viticulture.

His viticultural research, especially on the challenges of growing European wine grapes, played an indispensable role in the expansion of Washington viniculture. After retirement from WSU, Dr. Clore worked as a consultant to the wine industry, most notably for Ste. Michelle Vineyards. Today, Washington state is the second largest premium wine producer in the country and it's wine industry contributes in excess of $14.9 billion to the national economy and supports more than 27,000 jobs.

Dr. Clore passed on February 3, 2003 at the age of 91 and will forever be remembered as ""The Father of Washington Wine". The Walter Clore Wine & Culinary Center will be dedicated in his honor to showcase the quality of Washington's modern day viticulture, enology and culinary practices through education, experience and entertainment.

Exhibit 2.3

Mr. Arvid Monson [redacted] 9-18-02

Outlook, WA 98930

Dear Mr. Monson:

Enclosed is my estimated acreages and comments summary concerning the Poteet and Eagle Peak properties for possible premium wine grape plantings. The movement of soil and leveling, where feasible, could increase the acreage and efficiency of future vineyard operations.

Additional information enclosed: Topographical maps of the Poteet Sec. 27 and Eagle Peak Sec 8; soil identifcation maps, soil types and descriptions for these two sections of land, and extensive weather data and analysis for May and June (1995-2002) from the PAWS Badger Canyon (Sleater), 4.0 MI SW of Kennewick, WA. Data for every day and month are available from the Sleater location since July 1995.

Because of the inclination of the land Sec.27 should be the warmest site-- being most favorable for the production of red premium wine grapes. Jon Hayter shows a total of 149 acres for Sec. 27. My total for this section is 165 acres. If Jon used a planimeter for irregular areas his readings would be more accurate.

For further information and details concerning these sites please contact me.

Sincerely,

[redacted]

WAlter J. Clore, Horticulturist,
[redacted]
Prosser, WA 9935

Exhibit 24 page 1

POTEET PROPERTY Section 27: (South of Goose Ridge)

600' to 1000' elv. Lowest temperature since 1995, -15.9 F at 599', 4 mi SW of Kennewick in February 1996.

UPPER 80 ACRES '

Two N-S ridges estimated to provide 40 ac.@ 11% slope.

Second 80 ac. (adjacent @ to the S).
70 acres with 15 to 20% slopes.

Lowest 80 ac.(adjacent @ to the S).
If extensively leveled, could provide 77 acres of Warden soil at 600' elev. which would be more subject to frosts and below zero temperatures.
Soils: predominatetly Kiona, Warden, Shano.
Rooting depth of all soils 60".

Eagle Peak: Section 8, (elevation 1,000 to 1317').

For weather parameters; See PAWS "Sleater" Satielite location, 4 miles SW of Kennewick at 599' elv.
Upper section of approximately 9 acres short because of directional change in section line.
NW corner of 15 acres has a 17% slope to the N.
The upper NE corner has 60 acres with a 15% NE slope.
The remainder of this acreage to the south consists of 125 acres with an 10% E slope.
Soils are predominantly Kiona, Warden, Shano, all with 60" rooting depth.
Air drainage favorable from, "Section 8", to the east and at an elevation of 1,000'.

The attached topography maps scale 1 inch = 2000 ft.

Exhibit 2.4 page 2

Mr. Arvid Monson [redacted]
Outlook, WA 98930

October 2, 2002

Dear Mr. Monson:

Concerning grape acreage in the Candy Mountain area: adjoining the east section line of Sec. 13 and the N. side of I-82 of Sec.24 there is a triangular area of approximately 100 acres with 2.5 to 15% slopes. This area is made up of Warden, Kiona and Scotney soils with a rooting depth of 60".
The elevations vary from 850' to 1100'.

Adjacent to Koenig and Wilkens properties I-82 crosses the south end of Sec 14 at 725 elev. at a 1% slope of Warden soil. This area may tend to be frosty as it air drains to the east about 6 miles to the Columbia River where the elevation is 341'.

The A.K. Sadri property borders I-82 and crosses the lower portion of Sec.15 at 780' elev. The soil is Warden. This area may tend to be frosty as the Wilkens property.

The best grape sites in this area would be on the SW slope of Candy Mtn. and cofined to the nearby areas adjacent to the North side of I-82.

Air drains two ways from this area--by the Yakima River channel and straight east around the north side of Candy Mtn. By the river channel to the Columbia River from Benton City it is 28 miles. From Benton City to the Columbia River around Candy Mtn. it is 11 miles.

Sincerely,

[redacted]
Walter J. Clore, Horticulturist

Exhibit 2.5

http://www.gooseridge.com/About-Us

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Our Vineyards

Winemaking

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Goose Ridge Estate Vineyard & Winery is an honest reflection of the Monson family's shared family vision, stewardship of the land, and commitment to artisan winemaking.

The Monson family has been farming the Columbia Valley for over four decades. It started in the early 1900's when M.L. "Van" Monson left North Dakota for the Yakima Valley with a love for farming and a dream of starting a family business he could pass on to the next generation. Cattle and orchards occupied the Monson family in eastern Washington's Columbia Valley until 1998, when they planted their first vines.

Van's son, Arvid, and his wife Suzanne saw viticulture on the rise in Washington, and little by little began adding acreage to their vineyard. Known for their meticulous commitment to quality farming, the Monsons plotted, planned and planted their Estate Vineyard a vine at a time, ever-mindful of the old adage, "*great wines are grown, not made.*" In 1999, Goose Ridge Estate Vineyard & Winery was launched to be dedicated to handcrafting exquisite wines from grapes grown on their 2,200 acre vineyard. The family produced its first wine in 2000.

Today, the grandchildren Valerie, Bill and Molly remain true to Van and Arvid's vision of growing a vineyard and forging a winery built to last. More than a decade later, Goose Ridge Estate is the largest contiguous vineyard property in Washington state. It is the family's dedication to this unique spot of land that sets the Goose Ridge wines apart. Their pride and dedication to these highly regarded vineyards and their respect for the land's past, present, and future is evident in the farming practices they maintain and the stunning quality of the wines they craft.

"My sisters and I grew up with the understanding you don't farm for this generation, you farm for the next one."

Bill Monson, President

Exhibit 2.6

GOOD FRUIT GROWER

Arvid V. Monson 1941 – 2014

Melissa Hansen // Dec 9, 2014 // Apples // Grapes // Obituaries // Updates

Diversified grower, rancher, and founder of Goose Ridge Winery Arvid Monson, 73, died December 1. The long time Yakima Valley, Washington, cattleman will be remembered for his handshake business dealings and innovations in tree fruit and wine grapes.

Arvid V. Monson

Monson grew up in Yakima and graduated from Selah High School in 1959. He attended Yakima Valley Community College, where he met his future wife, Suzanne Villaume-Monson. They were married in 1961.

After working with his father in a feedlot in Selah, Monson got into the cattle feeding business on his own when he purchased a 25,000-head feedlot operation in 1975 in Sunnyside, Washington. Monson and his partners then purchased a meat packing company in 1977 and formed Washington Beef, which they owned and operated until 1988. In 2004, the family moved their feeding operation from Sunnyside to the Midwest.

His involvement in Washington's tree fruit industry began in 1979 when he planted a Red Delicious orchard in Outlook. In 1993, Monson and his family purchased property on the Snake River and were early adopters of high-density apple orchard systems.

Four years later, he led the development of Goose Ridge Estate Vineyards, under the guidance of the late Dr. Walter Clore. Today, Goose Ridge has 2,200 acres of wine grapes. Through the years, Monson and family developed and planted more than 2,800 acres of wine grapes, apples, and cherries.

Monson is survived by his wife, Suzanne, daughter Valerie of Richland, Washington, son Bill and his wife, Darci, of Kennewick, and daughter Molly Stutesman and her husband, Rob, of Richland.

By Melissa Hansen | December 9th, 2014 | Apples, Grapes, Melissa Hansen, Obituaries, Updates

Exhibit 2.7

ABOUT THE AUTHOR: MELISSA HANSEN

Melissa Hansen is the research program manager for the Washington Wine Commission. Hansen previously was an Good Fruit Grower associate editor from 1996 through 2015. **Read her stories:** Author Index

HEZEL SERIES

The Hezel series consists of very deep, somewhat excessively drained soils formed in glaciofluvial sediments with a mantle of eolian sand. Hezel soils are on dissected terraces and terrace escarpments. Slopes are 0 to 60 percent. The average annual precipitation is about 8 inches and average annual temperature is about 53 degrees F.

TAXONOMIC CLASS: Sandy over loamy, mixed, superactive, nonacid, mesic Xeric Torriorthents

TYPICAL PEDON: Hezel loamy fine sand - grassland. (Colors are for dry soil unless otherwise stated. All textures are apparent field textures).

A--0 to 7 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many very fine and fine irregular pores;moderately alkaline (pH 8.0); clear smooth boundary. (5 to 10 inches thick)

C--7 to 18 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; many very fine and fine irregular pores; moderately alkaline (pH 8.2); clear smooth boundary. (10 to 30 inches thick)

2Ckl--18 to 27 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, friable, nonsticky and nonplastic; common fine roots; many very fine and fine irregular pores; secondary carbonates on faces of peds; calcareous; strongly alkaline (pH 8.6); abrupt smooth boundary. (0 to 2 inches thick)

2Ck2--27 to 60 inches; light gray (2.5Y 7/2) stratified silt loam to fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; common very fine and fine irregular pores; secondary carbonates in seams and lenses; calcareous; strongly alkaline (pH 8.6).

TYPE LOCATION: Franklin County, Washington; about one mile east of Glade; 700 feet east and 500 feet north of the southwest corner of sec. 24, T.10N., R.29E., W.M.

GEOGRAPHIC SETTING: Hezel soils are on dissected terraces and terrace escarpments at elevations of 400 to 2,500 feet. Slopes are 0 to 60 percent. These soils formed in lake sediments or glaciofluvial deposits with a mantle of eolian sand. They are in an arid climate with an annual precipitation of 6 to 10 inches; average January temperature is about 36 degrees F.; average July temperature is about 76 degrees F.; average annual temperature is 50 to 54 degrees F. Frost-free season is 150 to 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Koehler, Quincy, Sagehill, Sagemoor and Warden soils. Koehler soils are on terraces and have duripans at 20 to 40 inches. Quincy soils are on dunes and terraces and are sandy in all parts of the particle-size control section.

Sagehill, Sagemoor and Warden soils are on terraces and lack sandy textures in the upper part of the particle-size control section.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained; slow to rapid runoff; rapid over moderately slow permeability.

USE AND VEGETATION: Irrigated crop production or pasture and livestock grazing. Native vegetation is thickspike wheatgrass, needleandthread, Indian ricegrass, Wyoming big sagebrush, and antelope bitterbrush.

DISTRIBUTION AND EXTENT: Southeastern Washington and northeastern Oregon. Series is of moderate extent.

KIONA SERIES

The Kiona series consists of very deep, well drained soils formed in mixed colluvium from basalt and loess. Kiona soils are on hillslopes and canyon side slopes. Slopes are 0 to 120 percent. The mean annual precipitation is about 8 inches and mean annual temperature is about 51 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, mixed, superactive, mesic Xeric Haplocambids

TYPICAL PEDON: Kiona cobbly silt loam-grassland. (Colors are for dry soil unless otherwise noted. All textures are apparent field textures).

A--0 to 4 inches; grayish brown (10YR 5/2) cobbly silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine roots; many very fine and fine irregular pores; 10 percent angular basalt gravel and 10 percent cobbles; slightly alkaline (pH 7.4); abrupt wavy boundary. (2 to 7 inches thick)

Bw--4 to 20 inches; brown (10YR 5/3) cobbly silt loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and slightly plastic; common fine roots; common fine irregular pores; 10 percent angular basalt gravel, 15 percent cobbles, and 5 percent stones; slightly alkaline (pH 7.6); abrupt irregular boundary. (8 to 29 inches thick)

Bk--20 to 60 inches; light brownish gray (10YR 6/2) extremely cobbly loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; common very fine and fine irregular pores; 35 percent angular basalt gravel, 30 percent cobbles, and 5 percent stones; violently effervescent; moderately alkaline (pH 8.2).

TYPE LOCATION: Benton County, Washington; one mile southeast of Gibbon in SE1/4 NW1/4 section 25, T.9N., R.25E., W.M.

GEOGRAPHIC SETTING: Kiona soils are on hillslopes and canyon side slopes. Elevation is 400 to 2,500 feet. Slopes are 0 to 120 percent. The soils formed in mixed colluvium from basalt and loess. The rock fragments are dominantly angular basalt. The soils are in an arid climate with hot dry summers and cool moist winters. The mean annual precipitation is 6 to 9 inches and ranges to 12 inches on north-facing slopes. The average January temperature is 28 degrees F. and the average July temperature is 72 degrees F. The mean annual temperature is 49 to 53 degrees F. The frost-free season is 135 to 210 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bakeoven, Finley, Ritzville, Shano, Starbuck, Taunton, and Warden soils. Bakeoven and Starbuck soils are on uplands and have a lithic contact at a depth of less than 20 inches. Finley soils are on alluvial fans and are sandy-skeletal in the lower particle-size control section. Ritzville and Shano soils are on hills and Warden soils are on terraces. Ritzville, Shano and Warden soils are coarse-silty and lack rock fragments. Taunton soils are on terraces and have a duripan.

DRAINAGE AND PERMEABILITY: Well drained; slow to very rapid runoff; moderate permeability.

USE AND VEGETATION: These soils are used mainly for domestic livestock grazing. Vegetation is Wyoming big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, mustard, needleandthread, and Thurber needlegrass.

DISTRIBUTION AND EXTENT: Central Washington. MLRA 7, 8. Series of moderate extent.

SERIES ESTABLISHED: Benton County, Washington, 1971.

PROSSER SERIES

The Prosser series consists of moderately deep, well drained soils that formed mainly in loess and glaciofluvial sediments over basalt. Prosser soils are on hillslopes, benches, and plateaus. Slopes are 0 to 60 percent. The mean annual precipitation is about 8 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, mesic Xeric Haplocambids

TYPICAL PEDON: Prosser very fine sandy loam - grassland. (Colors are for dry soil unless otherwise noted.)

A--0 to 4 inches; grayish brown (10YR 5/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; nonsticky and nonplastic; many roots; neutral (pH 7.2); abrupt smooth boundary. (3 to 6 inches thick)

Bw1--4 to 15 inches; brown (10YR 5/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable; nonsticky and nonplastic; many roots; common very fine tubular pores; slightly alkaline (pH 7.6); clear wavy boundary.

Bw2--15 to 24 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; nonsticky and nonplastic; many roots; common very fine tubular pores; moderately alkaline (pH 8.0); clear wavy boundary. (Combined thickness of the Bw horizon is 7 to 26 inches)

Bk--24 to 30 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; nonsticky and nonplastic; many roots; many very fine tubular pores; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary. (0 to 10 inches thick)

2R--30 inches; basalt; discontinuous lime-silica coatings.

TYPE LOCATION: Adams County, Washington; about 2 miles northwest of Othello; 500 feet south and 100 feet east of the northwest corner of section 28, T. 16 N., R. 29 E., W.M.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 50 to 56 degrees F. These soils are usually dry in all parts between depths of 4 and 12 inches following summer solstice and are moist during the winter and spring. Depth to the Bk horizon, when present, is 10 to 30 inches. Depth to a lithic contact ranges from 20 to 40 inches. The soil has 5 to 12 percent clay and is 15 to 30 percent sand coarser than very fine sand including gravel in the particle-size control section.

The A horizon has value of 5 or 6 dry, 3 or 4 moist and chroma of 2 to 4 moist and dry. Reaction is neutral or slightly alkaline.

The Bw horizon has value of 5 or 6 dry, 3 or 4 moist and chroma of 2 to 4 moist. Texture is silt loam or very fine sandy loam. Reaction is slightly alkaline or moderately alkaline.

The Bk horizon (when present) has value of 5 to 7 dry, 3 to 5 moist, and chroma of 2 to 4 moist or dry. It is silt loam or very fine sandy loam. In some pedons, this horizon contains a few pebbles or cobbles. The only zone of lime accumulation in some pedons, is a thin cap on the top of the bedrock.

COMPETING SERIES: These are the Bijorja, Chedehap, Clems, Drewsey, Haybourne, Heist, Irrigon, McClenden, Rebel, Royal, Scooteney, Sohappy, Vining, and Wiehl series. Chedehap, Clems, Drewsey, Haybourne, Heist, McClenden, Rebel, Royal, Scooteney, Sohappy, and Wiehl soils are more than 40 inches to bedrock. Bijorja, Irrigon and Wiehl soils have a paralithic contact at a depth of 20 to 40 inches. Vining soils are fine sandy loam or sandy loam in the particle-size control section.

GEOGRAPHIC SETTING: Prosser soils formed mainly in loess and in glaciofluvial sediments with a minor component of volcanic ash. These soils are on hillslopes, benches, and plateaus at elevations of 300 to 2,400 feet. Slopes range from 0 to 60 percent. Summers are hot and dry, and winters are cool and moist. The mean annual precipitation is 6 to 9 inches. The average January temperature is 28 degrees F. and the average July temperature is 72 degrees F. The mean annual temperature is 49 to 51 degrees F. The frost-free season is 135 to 210 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burke, Ephrata, Koehler, Quincy, Shano, Starbuck, and Warden soils. Burke soils are on uplands and have a duripan. Ephrata soils are on terraces and are coarse-loamy over sandy or sandy-skeletal. Koehler soils are on terraces, sandy and have a duripan. Quincy soils are on dunes and terraces and are sandy and deep. Shano soils on uplands and Warden soils on terraces and both are more than 40 inches deep. Starbuck soils are on benches and have a lithic contact at a depth of 12 to 20 inches.

DRAINAGE AND PERMEABILITY: Well drained; very slow to rapid runoff; moderate permeability.

USE AND VEGETATION: Prosser soils are used mainly for grazing and for growing irrigated crops. The native vegetation is bluebunch wheatgrass, Sandberg bluegrass, and big sagebrush.

DISTRIBUTION AND EXTENT: Southeastern and south-central Washington and north-central

QUINCY SERIES

The Quincy series consists of very deep, excessively drained soils formed in sands on dunes and terraces. Slopes are 0 to 65 percent. The mean annual precipitation is about 10 inches and the mean annual temperature is about 52 degrees F.

TAXONOMIC CLASS: Mixed, mesic Xeric Torripsamments

TYPICAL PEDON: Quincy fine sand-grassland. (Colors are for dry soil unless otherwise noted.)

A--0 to 15 inches; grayish brown (10YR 5/2) fine sand, dark brown (10YR 3/3) moist; single grain; loose; many fine roots; porous; moderately alkaline (pH 8.0); clear wavy boundary. (5 to 20 inches thick)

C--15 to 60 inches; grayish brown (10YR 5/2) fine sand, dark brown (10YR 3/3) moist; single grain; loose; common fine and very fine roots; porous; slightly effervescent; moderately alkaline (pH 8.2).

TYPE LOCATION: Adams County, Washington; 10 feet north and 2,l110 feet east of the southwest corner section 28, T. 15 N., R. 29 E.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 50 to 57 degrees F, and the mean summer temperature is 66 to 78 degrees F. These soils are moist in the winter and spring but are dry more than one half of the time the soil temperature exceeds 40 degrees F., about 105 to 130 consecutive days. These soils are dry in all parts between depths of 7 and 20 inches. Hue is 10YR or 2.5Y. Value is 4 to 7 dry, 3 to 5 moist and chroma is 1 to 4 moist or dry. Organic matter in the surface horizon when mixed is less than 1 percent. The 10 to 40 inch particle-size control section ranges from sand to loamy fine sand. Less than 75 percent of the sand is very coarse, coarse, and medium if the clay content is less than 5 percent. If the clay content exceeds 5 percent, more than 75 percent of the sand fraction can be in the very coarse, coarse and medium size classes. The upper 15 inches of these soils is free of lime, except for small particles brought up by insects and animals. The matrix below 15 inches is noncalcareous in some pedons. Reaction in the upper 20 inches is slightly acid to moderately alkaline, and below 20 inches it is neutral to moderately alkaline. Some pedons have unconforming materials, including coarse sand, fine sandy loam, very fine sandy loam, silt loam, very gravelly sand, very gravelly loamy fine sand, at depths below 40 inches.

COMPETING SERIES: These are the Berent, Fernley, Goldrun, Hotsprings, Incy, Lachim (T), Painter (T), Quinton, Rinquin, Toll, Walco, Winchester, and Zorravista series. Berent soils contain rock fragments that increase in volume with increasing. Fernley soils have redoximorphic features at a depth of 20 to 36 inches. Painter soils have a lithic contact at a depth of 24 to 40 inches and a paralithic contact at a depth of 20 to 30 inches. Quinton and Walco soils have a lithic contact at a depth of 20 to 40 inches. Goldrun soils are dry for more than 130 consecutive days. Hotsprings soils are gravelly loamy coarse sand or gravelly loamy sand with 20 to 35 percent pebbles in the particle-size control section. Incy soils are neutral and noncalcareous to a depth of more than 60 inches and formed in sand dominantly from granite. Lachim and Rinquin soils have a paralithic contact at a depth of 20 to 40 inches. Toll soils are slightly acid or neutral, and are noncalcareous to more than 60 inches. Winchester soils have more than 75 percent of the sand fraction in the very coarse, coarse, and medium size classes and have less than 5 percent clay. Zorravista soils are calcareous in the surface.

GEOGRAPHIC SETTING: Quincy soils are on uplands, fan piedmonts and terraces, some having a ridged, hummocky, or dune microrelief. Slopes range from 0 to 65 percent. Many of the low rounded

ridges are narrow and long. These soils formed in sands from mixed sources, but contains significant amounts of dark colored basaltic sand. Elevations are 200 to 2,800 feet in Washington and north-central Oregon, and 2,500 to 4,500 feet elsewhere. The climate is arid or semiarid and summers are dry. The mean annual precipitation is 6 to 12 inches. The mean annual air temperature is 47 to 53 degrees F. The frost-free season is 130 to 200 days in Washington and north-central Oregon, and 100 to 150 days elsewhere.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Quinton soils and the Burbank, Cencove, Esquatzel, Feltham, Hezel, Taunton, and Warden soils. Burbank soils are sandy-skeletal and are on terraces and terrace escarpments. Cencove soils are coarse-loamy in the upper part and are on alluvial fans and terraces. Esquatzel and Warden soils are coarse-silty. Esquatzel soils are on bottomlands. Warden soils are on terraces and terrace escarpments. Feltham soils are finer than sandy in some part and are on terraces and alluvial fans. Hezel soils are sandy over loamy and are on dissected terraces and terrace escarpments. Taunton soils have a duripan, are coarse-loamy and are on terraces, basalt plains, and fan terraces. Quinton soils are on hillslopes, benches, and terraces.

DRAINAGE AND PERMEABILITY: Excessively drained; very slow to moderate runoff; very rapid or rapid permeability. Substratum phases range from moderate to slow permeability.

USE AND VEGETATION: These soils are used for livestock grazing and irrigated cropland. Irrigated areas are in potatoes, hay, pasture, small grains, grapes, and tree fruits. The natural vegetation is needleandthread, thickspike wheatgrass, Indian ricegrass, rabbitbrush, horsebrush, fourwing saltbush, Antelope bitterbrush, and big sagebrush.

DISTRIBUTION AND EXTENT: Washington MLRA 7, Oregon MLRA 7 and 11, Idaho MLRA 11, and California. The soil is extensive.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Grant County, Washington, 1911.

REMARKS: Diagnostic horizons or features recognized in this pedon are:
Ochric epipedon
Particle-size control section - from 10 to 40 inches that is sandy throughout
Those pedons with bedrock or duripans between 40 and 60 inches previously included within the Quincy series concept, will no longer be considered with the series concept
Aridic soil moisture regime bordering xeric

ADDITIONAL DATA: Laboratory Data, Riverside, California S61 Wash. 11-1, S61 Wash. 11-2.

National Cooperative Soil Survey
U.S.A.

RITZVILLE SERIES

The Ritzville series consists of very deep and deep to duripan, well drained soils formed in loess. Ritzville soils are on uplands and have slopes of 0 to 70 percent. The mean annual precipitation is about 10 inches and the mean annual temperature is about 49 degrees F.

TAXONOMIC CLASS: Coarse-silty, mixed, superactive, mesic Calcidic Haploxerolls

TYPICAL PEDON: Ritzville silt loam - cultivated. (Colors are for dry soil unless otherwise stated. All textures are apparent field textures).

Ap--0 to 9 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common roots; many very fine and fine irregular pores; neutral (pH 6.8); abrupt smooth boundary. (6 to 13 inches thick)

AB--9 to 18 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium and coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common roots; many fine tubular pores; slightly alkaline (pH 7.8); clear wavy boundary. (0 to 12 inches thick)

Bw--18 to 36 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak medium and coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common roots; many fine tubular pores; slightly alkaline (pH 7.8); abrupt wavy boundary. (13 to 34 inches thick)

Bk--36 to 43 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common roots; many very fine tubular pores; segregated lime in pores and root channels; violently effervescent; moderately alkaline (pH 8.2); gradual wavy boundary. (6 to 19 inches thick)

C1--43 to 54 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few roots; common very fine tubular pores; strongly effervescent; strongly alkaline (pH 8.5); abrupt irregular boundary. (8 to 20 inches thick)

C2--54 to 65 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3 moist; massive, hard, very friable, slightly sticky and slightly plastic; few roots; common very fine tubular pores; strongly effervescent; strongly alkaline (pH 8.5); abrupt irregular boundary. (8 to 20 inches thick)

TYPE LOCATION: Adams County, Washington; 190 feet east and 770 feet north of southwest corner sec. 35, R. 20 N., R. 35 E. W.M.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 49 to 54 degrees F. The soil is usually dry in all parts between depths of 4 and 12 inches for one-half to three-fourths of the time when the soil temperature is above 41 degrees F. Depth to the Bk horizon and soft powdery secondary carbonates is 19 to 44 inches. The mollic epipedon is 10 to 20 inches thick. The particle-size control section contains less than 15 percent fine sand or coarser including rock fragments. Clay content is 5 to 10 percent. Some pedons are stratified at depths of 40 to 60 inches, and a duripan may occur at depths of over 40 inches.

The Ap and AB horizons have value of 4 or 5 dry, and chroma of 2 or 3 dry or moist. The Ap horizon has granular or subangular blocky structure.

The Bw horizon has value of 4, 5, or 6 dry, 3 or 4 moist and chroma of 3 or 4 dry and moist. It has weak prismatic or subangular blocky structure, and is neutral to moderately alkaline.

The Bk and C horizons have value of 4 to 7 dry, 4 or 5 moist and chroma of 2 to 4 dry and moist. It is silt loam, fine sandy loam, or very fine sandy loam. It is moderately or strongly alkaline.

COMPETING SERIES: These are the Ellisforde, Mikkalo, and Neeley series. Ellisforde soils have laminated lake silts at depths of 20 to 40 inches. Mikkalo soils have a lithic contact at 20 to 40 inches. Neeley soils have a calcic horizon at a depth of about 11 inches.

GEOGRAPHIC SETTING: Ritzville soils are on uplands including plateaus, benches, and canyon side slopes. Elevations are 800 to 3,000 feet. Slopes range from 0 to 70 percent. These soils formed in loess. They have a small amount, less than 20 percent, of volcanic ash in the surface layer. These soils are in a semiarid climate with cool, moist winters and warm, dry summers. The average annual precipitation is 9 to 12 inches. Average January temperature is 28 degrees F., average July temperature is 71 degrees F., and average annual temperature is 48 to 52 degrees F. Frost-free season is about 130 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Esquatzel, Gravden, Mikkalo, Ritzcal, and Willis soils. Esquatzel soils are on bottomlands and have irregular distribution of organic matter. Gravden soils are on terraces and are loamy-skeletal and have a duripan. Mikkalo soils are on uplands and are 20 to 40 inches deep to bedrock. Ritzcal soils are on uplands and are calcareous throughout. Willis soils are on terraces and have a lime-silica duripan at a depth of 20 to 40 inches.

DRAINAGE AND PERMEABILITY: Well drained; very slow to rapid runoff; moderate permeability.

USE AND VEGETATION: Dryland wheat production and some livestock grazing. Native vegetation is bluebunch wheatgrass, Sandberg bluegrass, Wyoming big sagebrush, and yarrow.

DISTRIBUTION AND EXTENT: Eastern Washington and eastern Oregon. Series is extensive.

SCOOTENEY SERIES

The Scooteney series consists of very deep, well drained soils formed in alluvium. Scooteney soils are on alluvial fans and terraces. Slopes are 0 to 30 percent. The mean annual precipitation is about 8 inches and the mean annual temperature is about 51 degrees F.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, mesic Xeric Haplocambids

TYPICAL PEDON: Scooteney loam, grassland. (Colors are for dry soil unless otherwise noted.)

A--0 to 4 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak thick platy structure; soft, very friable, nonsticky and nonplastic; many fine roots; neutral (pH 7.2); abrupt wavy boundary. (3 to 6 inches thick)

Bw--4 to 18 inches; brown (10YR 5/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; few very fine tubular pores; slightly alkaline (pH 7.4); clear wavy boundary. (8 to 20 inches thick)

Bk1--18 to 29 inches; light brownish gray (10YR 6/2) gravelly very fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; many fine tubular pores; 20 percent gravel; violently effervescent; moderately alkaline (pH 8.0); clear wavy boundary. (6 to 15 inches thick)

Bk2--29 to 60 inches; light brownish gray (10YR 6/2) very cobbly and sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; 55 percent gravel and cobbles; strongly effervescent; moderately alkaline (pH 8.2).

TYPE LOCATION: Adams County, Washington; 30 feet north and 400 feet east of south quarter corner of section 11, T.15N., R.28E., WM.

RANGE IN CHARACTERISTICS: Solum thickness and depth to carbonates is 12 to 24 inches. These soils are usually dry in all parts between 8 and 24 inches. The mean annual temperature at 20 inches is 52 to 55 degrees F. The mean summer temperature is 70 to 76 degrees F. The particle-size control section averages 20 to 35 percent rock fragments and 5 to 10 percent clay.

The A horizon has chroma of 2 or 3 dry or moist. Texture is loam, silt loam, or very fine sandy loam.

The Bw horizon has value of 5 or 6 dry and chroma of 2 to 4 dry or moist. Texture is loam, silt loam, or very fine sandy loam. It has 5 to 10 percent clay. Reaction is neutral or slightly alkaline.

COMPETING SERIES: These are the Clemen, Prosser, Rebel, Royal, Sohappy, and Wiehl series. Bijorja soils have a paralithic contact (granodiorite) at 20 to 40 inches. Chedehap soils are 25 to 40 inches to loose sand and gravel and have less than 15 percent gravel in the particle-size control section. Clems soils are 45 to 60 inches to a calcareous 2Ck horizon. Drewsey soils have a mean annual soil temperature of 47 to 50 degrees F., 0 to 10 percent rock fragments in the particle-size control section, and are more than 60 inches to the base of the Bk horizon. Haybourne soils are 18 to 35 inches to stratified gravelly coarse sand and fine sandy loam C horizons with an EC of 0 to 2mmhos/cm. Heist soils have a mean annual soil temperature of 48 to 52 degrees F. and have 0 to 15 percent rock fragments in the particle-size control

section. Irrigon soils are 20 to 40 inches to a paralithic contact (tuff sandstone). McClenden soils have a mean annual soil temperature of 47 to 50 degrees F. and have 10 to 18 percent clay in the particle-size control section. Prosser soils are 20 to 40 inches to a lithic contact (basalt). Rebel soils have 10 to 18 percent clay, 2 to 15 percent rock fragments and 5 to 15 percent mica in the particle-size control section. Royal soils have stratified nongravelly moderately coarse and coarse textures in the control section. Sohappy soils are 43 to 60 inches to an indurated duripan and 24 to 44 inches to carbonates. Vining soils are 20 to 40 inches to a lithic contact (basalt). Wiehl soils have a paralithic contact at 20 to 40 inches.

GEOGRAPHIC SETTING: Scooteney soils are on nearly level to steep alluvial fans and terraces at elevations of 400 to 1,300 feet. These soils formed in alluvium. They are in an arid climate with hot, dry summers and cool, moist winters. The mean annual precipitation is 6 to 9 inches. The mean January temperature is 28 degrees F. and the mean July temperature is 72 degrees F. The mean annual temperature is 50 to 53 degrees F. The frost-free season is 135 to 170 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Finley, Kennewick, and Shano soils and the competing Ephrata soils. Finley soils have more than 35 percent coarse fragments in the control section and are on outwash terraces and alluvial fans. Kennewick soils are calcareous throughout, lack coarse fragments and are on terraces. Shano soils have a coarse-silty control section, lack coarse fragments in the control section and are on terraces and hills.

DRAINAGE AND PERMEABILITY: Well drained; slow to medium runoff; moderate permeability.

USE AND VEGETATION: These soils are used for livestock grazing and irrigated cropland. Native vegetation is bluebunch wheatgrass, Sandberg bluegrass, and big sagebrush.

DISTRIBUTION AND EXTENT: Central Washington. MLRA 8. Series is of moderate extent.

SHANO SERIES

The Shano series consists of very deep well drained soils that formed in loess. Shano soils are on terraces, uplands, plateaus, and hills. Slopes are 0 to 65 percent. The mean annual precipitation is about 8 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Coarse-silty, mixed, superactive, mesic Xeric Haplocambids

TYPICAL PEDON: Shano silt loam - cultivated. (Colors are for dry soil unless otherwise stated. All textures are apparent field textures).

Ap--0 to 8 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many very fine and fine irregular pores; slightly alkaline (pH 7.6); abrupt smooth boundary. (4 to 8 inches thick)

Bw1--8 to 19 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse and medium prismatic structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; slightly alkaline (pH 7.6); gradual wavy boundary.

Bw2--19 to 33 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; moderately alkaline (pH 8.0); clear wavy boundary. (Combined thickness of the Bw horizon is 16 to 36 inches)

Bk1--33 to 42 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few roots; common very fine tubular pores; violent effervescence; moderately alkaline (pH 8.2); common concentric hard (cicada) nodules; gradual wavy boundary.

Bk2--42 to 57 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few roots; common very fine tubular pores; few concentric hard (cicada) nodules; strong effervescence; strongly alkaline (pH 8.6); gradual wavy boundary. (Combined thickness of Bk1 and Bk2 horizons is 17 to 35 inches.)

Bk3--57 to 67 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few roots; few very fine tubular pores; strong effervescence; intermixed with pockets of soft, very friable material; strongly alkaline (pH 9.0).

TYPE LOCATION: Grant county, Washington; 150 feet south and 1,000 feet east of northwest corner sec. 19, T. 19 N., R. 30 E.

GEOGRAPHIC SETTING: Shano soils are on terraces, uplands, plateaus, and hills at elevations of 500 to 2,300 feet (2,900 to 4,200 feet in Idaho). Slopes range from 0 to 65 percent. These soils formed in loess. Shano soils are in a semiarid climate with warm, dry summers and cool, moist winters. The mean annual precipitation is 6 to 10 inches. The average January temperature is 28 degrees F. and the average July temperature is 72 degrees F. The mean annual temperature is 47 to 53 degrees F. The frost-free season is 120 to 200 days.

EXHIBIT 3.7

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burke, Esquatzel, Prosser, and Scooteney soils. Burke soils are on uplands and have a duripan at 20 to 40 inches. Esquatzel soils are on bottomlands and have a mollic epipedon. Prosser soils are on plateaus and have a lithic contact at 20 to 40 inches. Scooteney soils are on alluvial fans and are coarse-loamy.

DRAINAGE AND PERMEABILITY: Well drained; very slow to medium runoff; moderate permeability.

USE AND VEGETATION: These soils are used for dryland wheat production, livestock grazing, and irrigated crop production. Native vegetation is bluebunch wheatgrass, beardless wheatgrass, Sandberg bluegrass, Idaho fescue, Cusick bluegrass and Wyoming big sagebrush.

DISTRIBUTION AND EXTENT: Central Washington, eastern Oregon, and southern Idaho. MLRA 7, 8. Series is extensive.

SERIES ESTABLISHED: Adams County, Washington, 1966.

STARBUCK SERIES

The Starbuck series consists of shallow, well drained soils formed in loess, colluvium, residuum and alluvium over basalt on benches, hillsides, and ridgetops. Slopes are 0 to 65 percent. The mean annual precipitation is about 9 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Loamy, mixed, superactive, mesic Lithic Xeric Haplocambids

TYPICAL PEDON: Starbuck silt loam- grassland. (Colors are for dry soil unless otherwise stated. All textures are apparent field textures).

A1--0 to 3 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium platy and weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many roots; many fine and very fine tubular pores; 5 percent angular basalt gravel; neutral (pH 6.6); abrupt smooth boundary.

A2--3 to 9 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common roots; many fine tubular pores; 5 percent angular basalt gravel; neutral (pH 6.8); clear smooth boundary. (Combined thickness of the A horizon is 3 to 12 inches)

Bw--9 to 16 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common roots; many fine tubular pores; 10 percent basalt gravel; neutral (pH 7.0); abrupt wavy boundary. (6 to 13 inches thick)

2R--16 inches; unweathered basalt.

TYPE LOCATION: Adams County, Washington; 1,050 feet south and 1,300 feet west of the northeast corner of sec. 4, T. 17 N., R. 34 E.

GEOGRAPHIC SETTING: Starbuck soils are on benches, hillsides, terraces, and ridgetops at elevations of 400 to 2,700 feet in Washington and Oregon, and 3,500 to 4,700 feet in Idaho. Starbuck soils formed in loess, colluvium and alluvium over basalt. They are in a semiarid climate with hot, dry summers and cool, moist winters. The mean annual precipitation is 6 to 12 inches. The average January temperature is about 28 degrees F. and the average July temperature is about 73 degrees F. The mean annual temperature is 48 to 53 degrees F. The frost-free period is 120 to 210 days in Washington and Oregon and 130 to 140 days in Idaho.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Barrymore, Farrell, Magallon, McPan, Mikkalo, Prosser, Ritzville, Roloff, and Stratford soils. Farrell, Magallon and Stratford soils are on terraces. Mikkalo soils are on uplands. Prosser, Ritzville and Roloff soils are on hills. All of these soils are deeper than 20 inches to a lithic contact.

DRAINAGE AND PERMEABILITY: Well drained; slow to very rapid runoff; moderate permeability.

USE AND VEGETATION: These soils are used for domestic livestock grazing. Native vegetation is bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue, Thurber needleandthread, rabbitbrush, and sagebrush.

DISTRIBUTION AND EXTENT: Central Washington, north-central Oregon, and southern Idaho. MLRA 8. Series is of moderate extent.

SERIES ESTABLISHED: Walla Walla County, Washington, 1960.

WARDEN SERIES

The Warden series consists of very deep and deep, well drained soils formed in a thin mantle of loess over lacustrine sediments. Warden soils are on terraces and terrace escarpments. Slopes are 0 to 65 percent. The mean annual precipitation is about 7 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Coarse-silty, mixed, superactive, mesic Xeric Haplocambids

TYPICAL PEDON: Warden very fine sandy loam, cultivated. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 6 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly alkaline (pH 7.8); abrupt smooth boundary. (3 to 10 inches thick)

Bw--6 to 19 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; common very fine tubular pores; slightly alkaline (pH 7.8); abrupt smooth boundary. (9 to 28 inches thick)

2Bk--19 to 40 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few thinly laminated lenses; common fine roots; many very fine tubular pores; few secondary lime aggregates; violently effervescent; moderately alkaline (pH 8.4); clear wavy boundary. (8 to 40 inches thick)

2C1--40 to 54 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; common fine roots; common very fine tubular pores; violently effervescent; strongly alkaline (pH 8.6); clear wavy boundary. (0 to 20 inches thick)

2C2--54 to 60 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few roots; few very fine tubular pores; violently effervescent; strongly alkaline (pH 8.6).

TYPE LOCATION: Adams County, Washington; 100 feet south and 500 feet east of northwest corner, section 19, T. 16 N., R. 30 E., WM.

GEOGRAPHIC SETTING: Warden soils are on terraces and terrace escarpments at elevations of 500 to 1,300 feet. Slopes are 0 to 65 percent. The climate is characterized by warm, dry summers and cool, moist winters. The mean annual precipitation is 6 to 9 inches. The average January temperature is 27 degrees F. and the average July temperature is 71 degrees F.The mean annual temperature is 49 to 53 degrees F. The frost-free season is 135 to 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Gravden, Kennewick, Royal, Sagehill, Taunton, and Wahluke soils and the competing Sagemoor and Shano soils. Kennewick soils are calcareous in all parts and are on terraces. Royal, Sagehill, and Taunton soils are coarse-loamy and are on terraces. Taunton soils also have a duripan. Gravden soils are loamy-skeletal, have a duripan, and are on terraces. Wahluke soils are weakly cemented, have no cambic horizon, and are on lake beds and terraces.

DRAINAGE AND PERMEABILITY: Well drained; very slow to rapid runoff; moderate permeability.

EXHIBIT 3.9

USE AND VEGETATION: These soils are used for irrigated cropland, livestock grazing, and some dryland cropland. Dryland crops are wheat and rye in a summer fallow system. Irrigated crops include wheat, grass legume hay, potatoes, dry beans, dry peas, tree fruit, hops, mint, and vegetables. Native vegetation is bluebunch wheatgrass, Sandberg bluegrass, needleandthread, and big sagebrush.

DISTRIBUTION AND EXTENT: Central Washington and north-central Oregon. MLRA 7, 8. Series is of moderate extent.

SERIES ESTABLISHED: Columbia Basin area Reconnaissance, Washington, 1929.