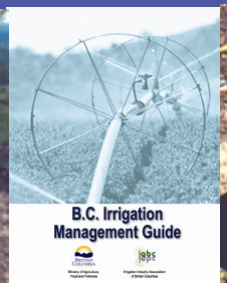




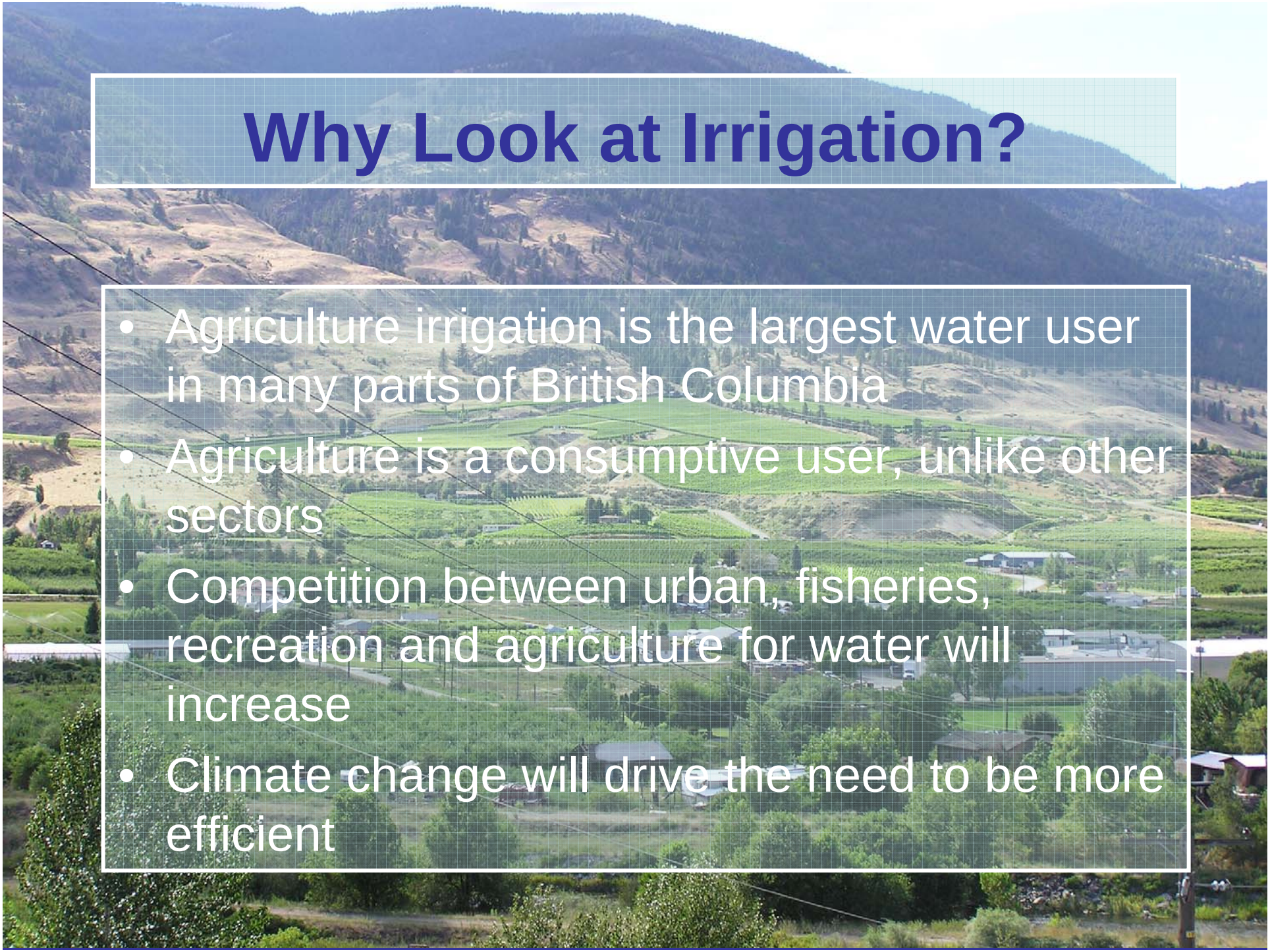
Improving Irrigation Management Using GIS in the Okanagan Basin

Ted van der Gulik, P.Eng.
Senior Engineer

B.C. Ministry of Agriculture and Lands
Resource Management Branch



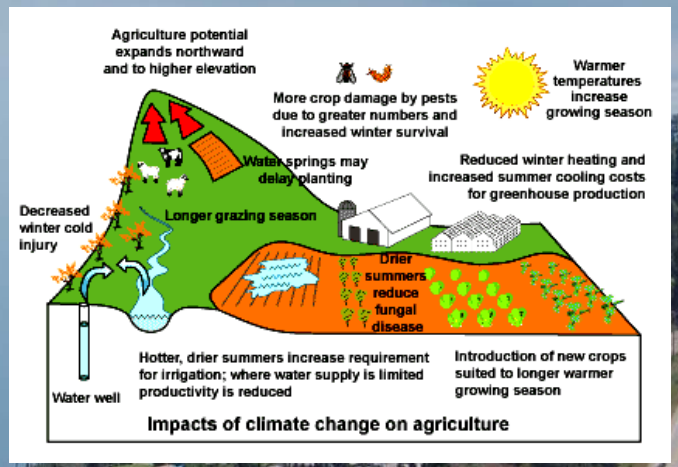
Why Look at Irrigation?

- Agriculture irrigation is the largest water user in many parts of British Columbia
- Agriculture is a consumptive user, unlike other sectors
- Competition between urban, fisheries, recreation and agriculture for water will increase
- Climate change will drive the need to be more efficient

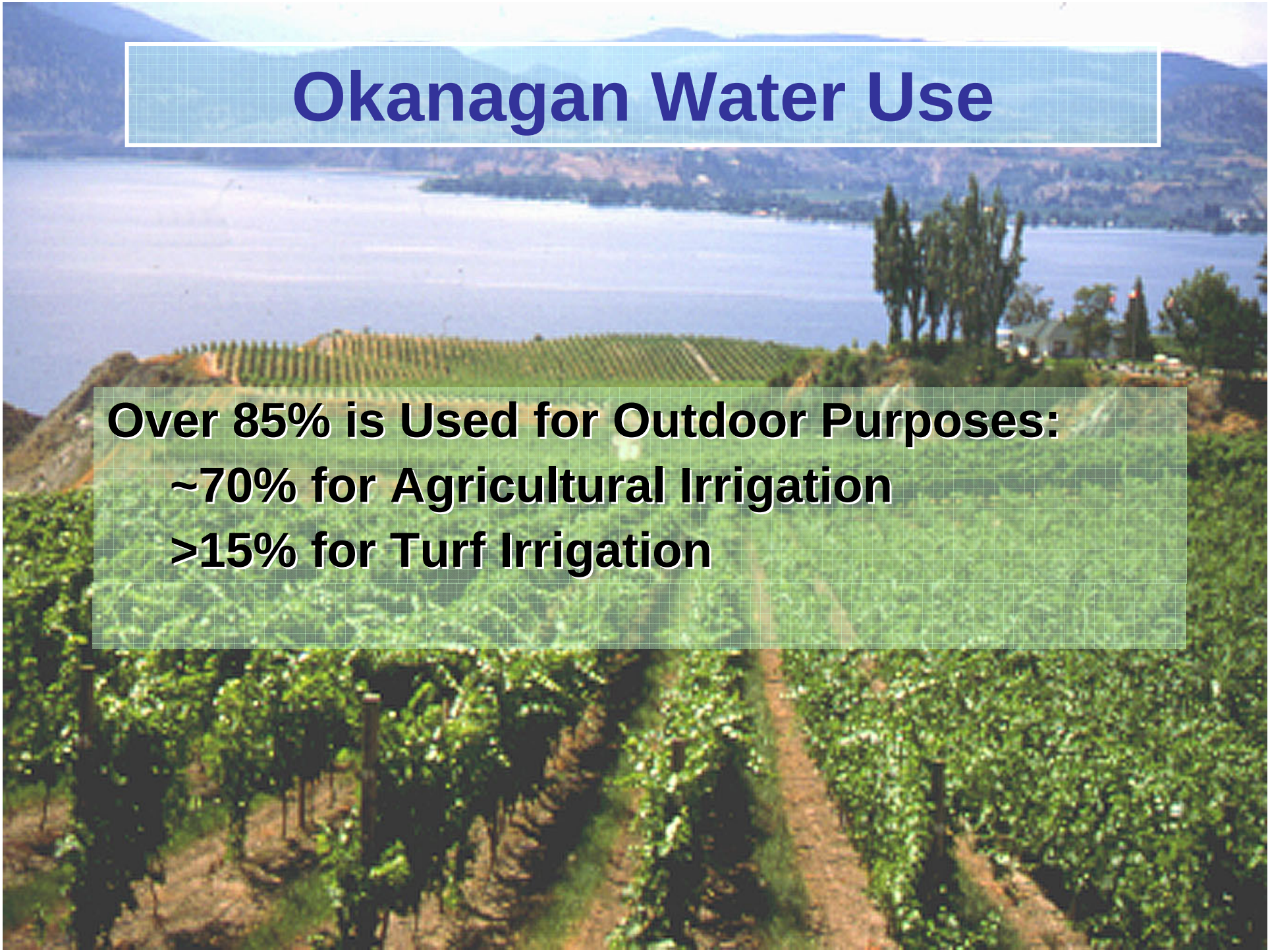
Okanagan Climate Change

Changes in water supply and demand:

- More rainfall than snow
- Annual rainfall decreases
- Water demand increases



Okanagan Water Use

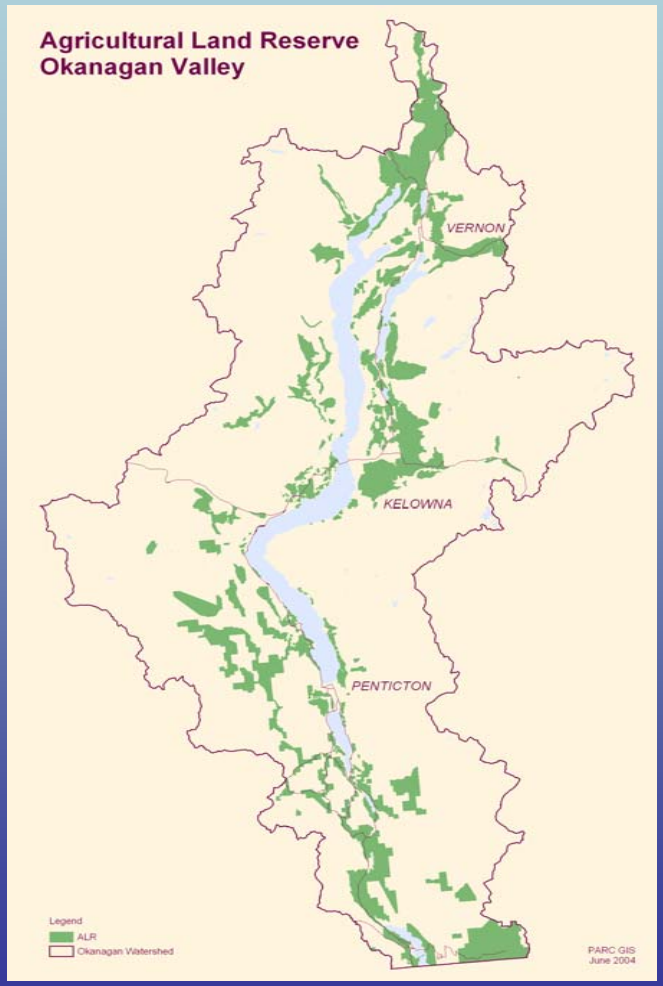


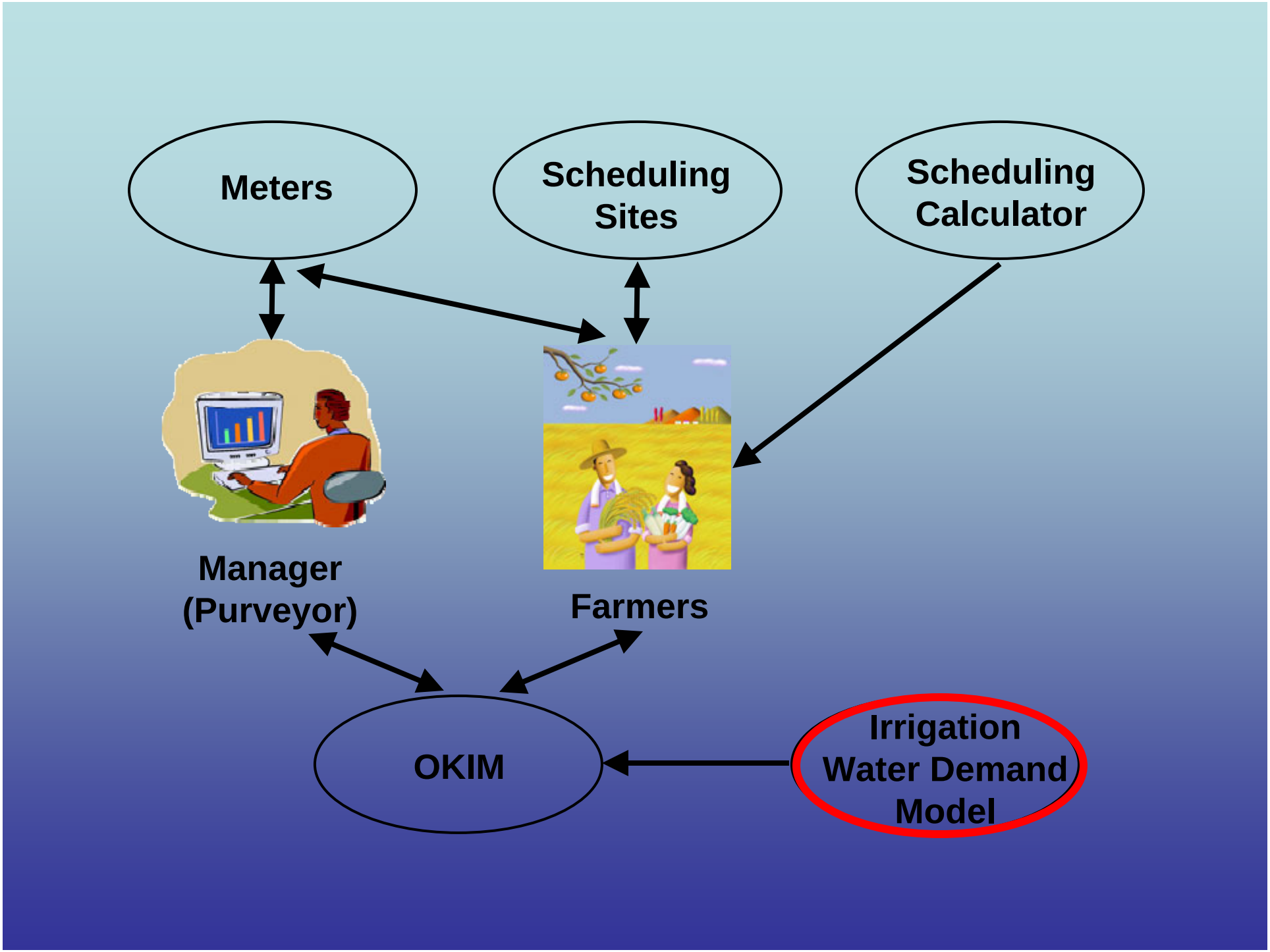
Over 85% is Used for Outdoor Purposes:

- **~70% for Agricultural Irrigation**
- **>15% for Turf Irrigation**

Okanagan Basin Irrigation Water Demand Model

- MAL and AAFC have developed a GIS-based irrigationl water demand model



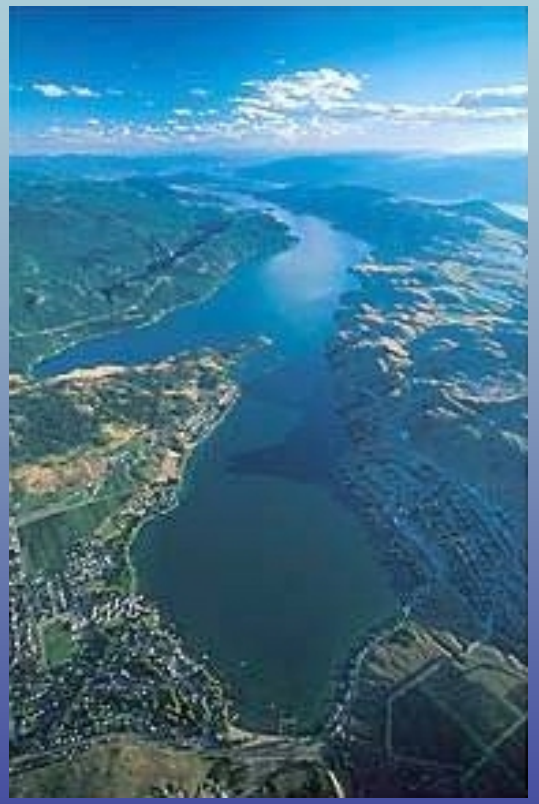

Meters
Scheduling Sites
Scheduling Calculator
Manager (Purveyor)
Farmers
OKIM
Irrigation Water Demand Model

Irrigation Water Demand Model

Objective:
Develop a model that calculates agriculture's irrigation needs by purveyor, municipality, district and sub-watershed.

Methodology:
Determine Property-by-Property water use

Result:
Planning Tools that secure water for current and future agricultural needs



Irrigation Water Demand Model

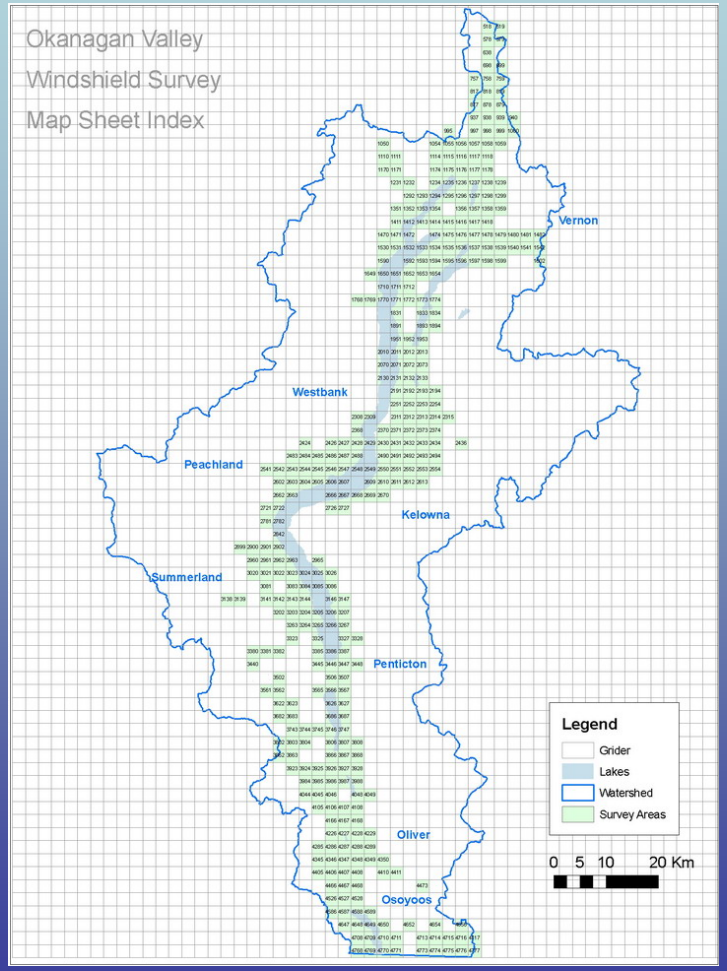
Step 1

- Develop a Unified Cadastre for the Okanagan
- Data from all regional districts is being amalgamated into one GIS data layer
- Allows for the program to determine irrigation water needs for the basin, water purveyor, watershed or municipality

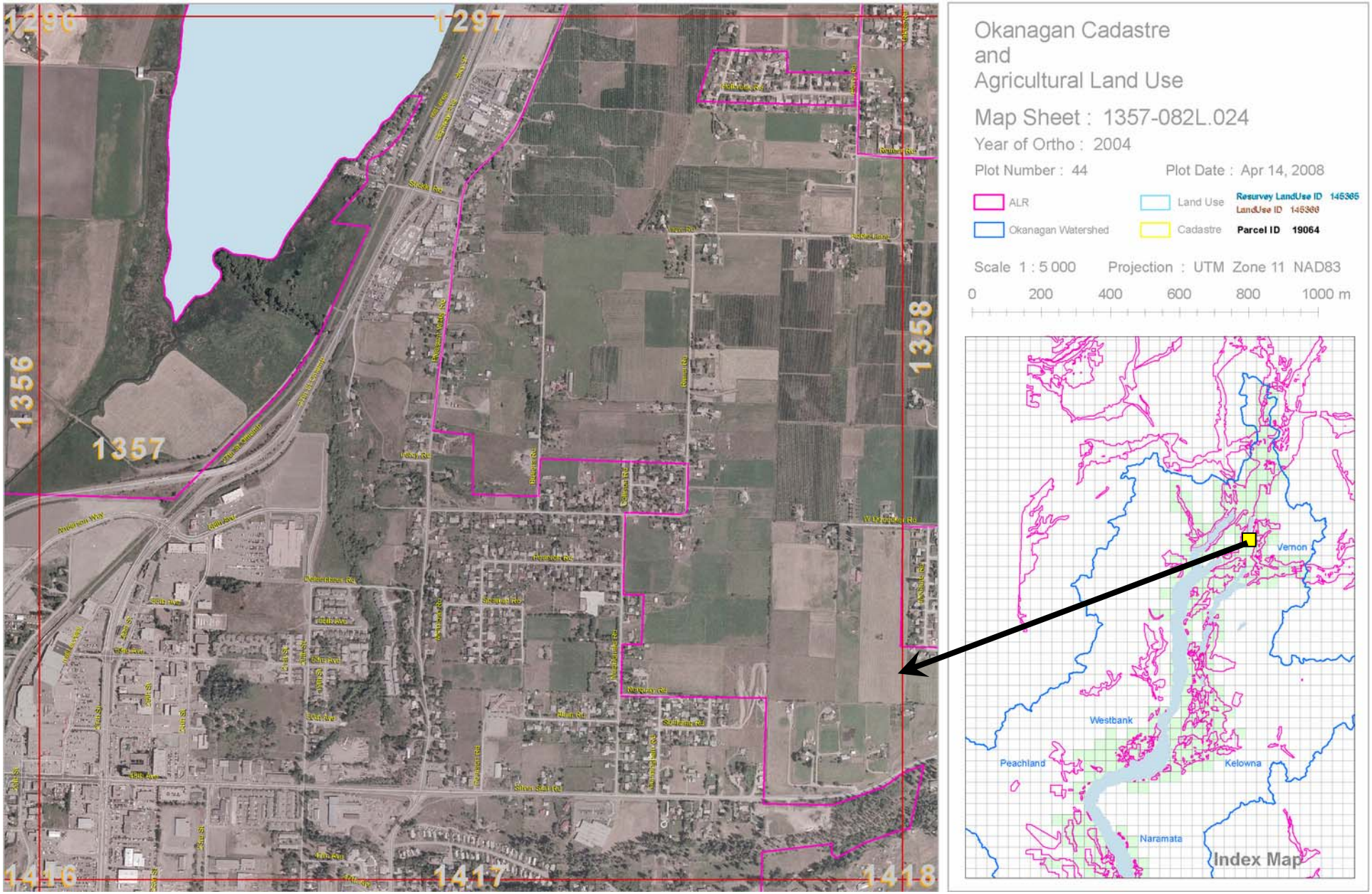
Irrigation Water Demand Model

Unified Cadastre

- The agricultural area is divided into 398 map sheets



Map Sheet


1296
1297
1356
1357
1358
1416
1417
1418
Okanagan Cadastre
and
Agricultural Land Use
Map Sheet : 1357-082L.024
Year of Ortho : 2004
Plot Number : 44
Plot Date : Apr 14, 2008
ALR
Land Use
Resurvey LandUse ID 145365
LandUse ID 145366
Okanagan Watershed
Cadastre
Parcel ID 19064
Scale 1 : 5 000
Projection : UTM Zone 11 NAD83
0 200 400 600 800 1000 m
Vernon
Westbank
Peachland
Kelowna
Naramata
Index Map

Agriculture Water Use Model

Step 2: Land Use Inventory

Crop Type:

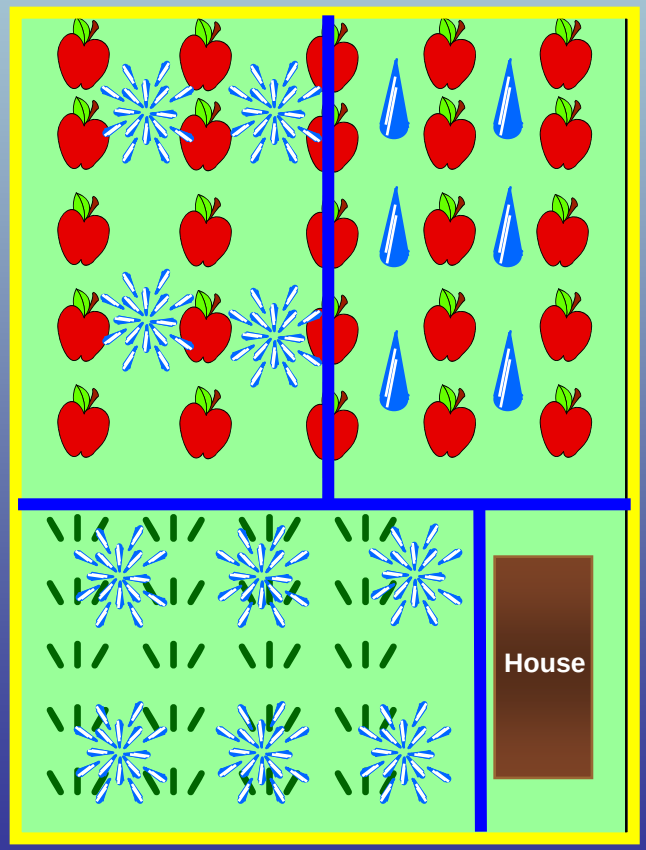
Apple

Pasture

Irrigation System Type:

Sprinkler

Drip

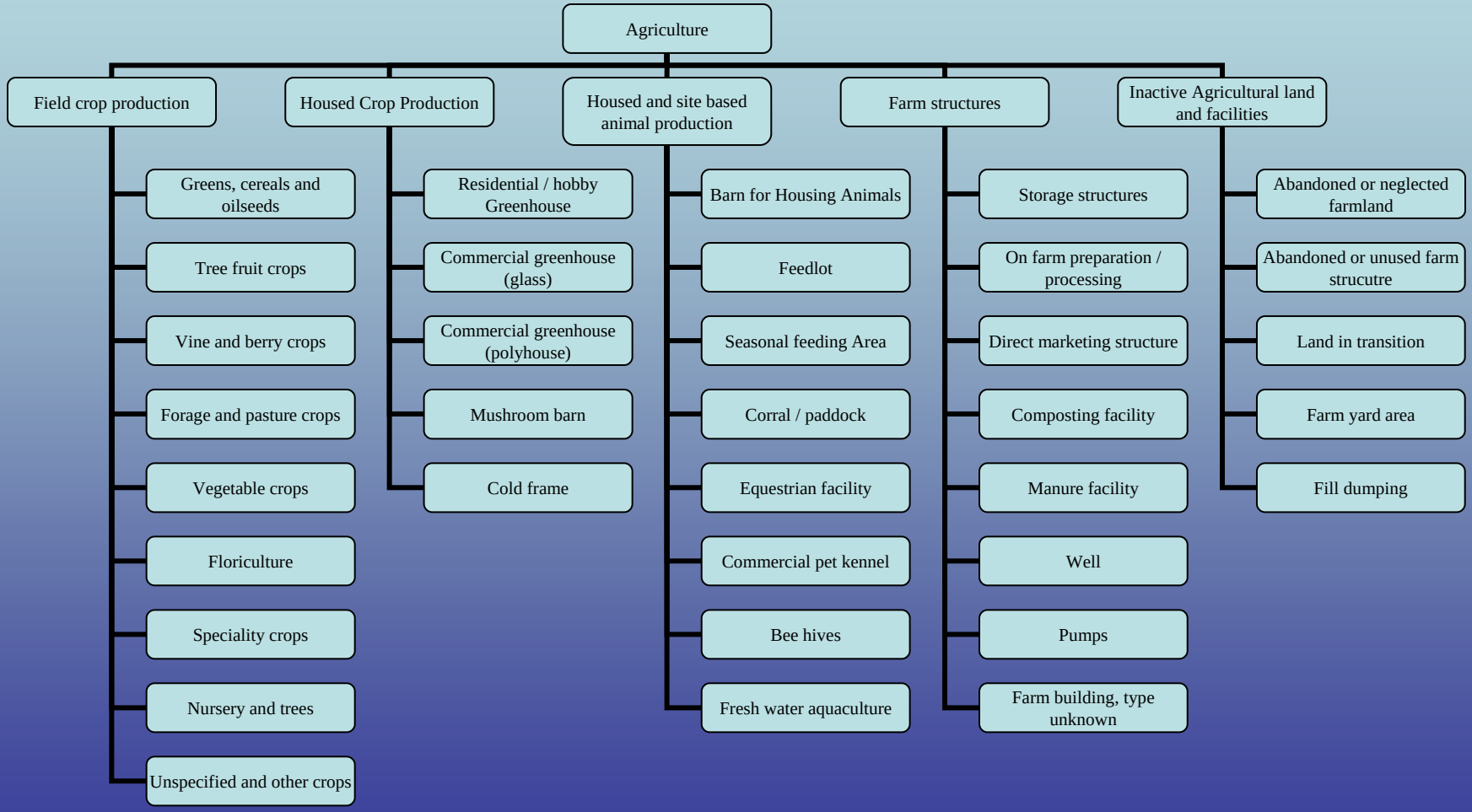


Land Use Inventory Guide

AgFocus: A Surveyor's Guide to Conducting an Agricultural Land Use Inventory

May 27, 2008

Land Use Coding



Coding Detail for Crops and Irrigation

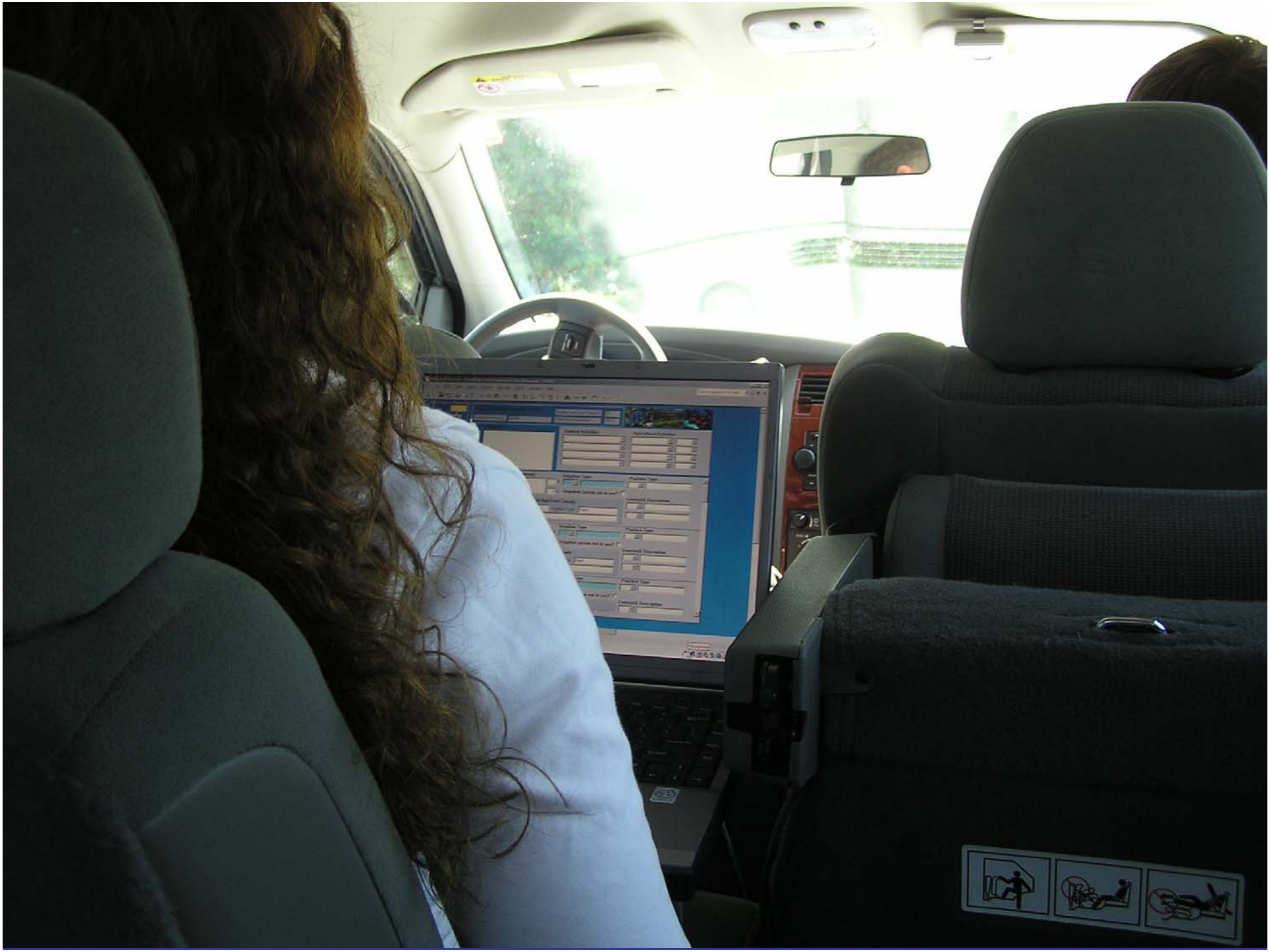
A000 AGRICULTURE

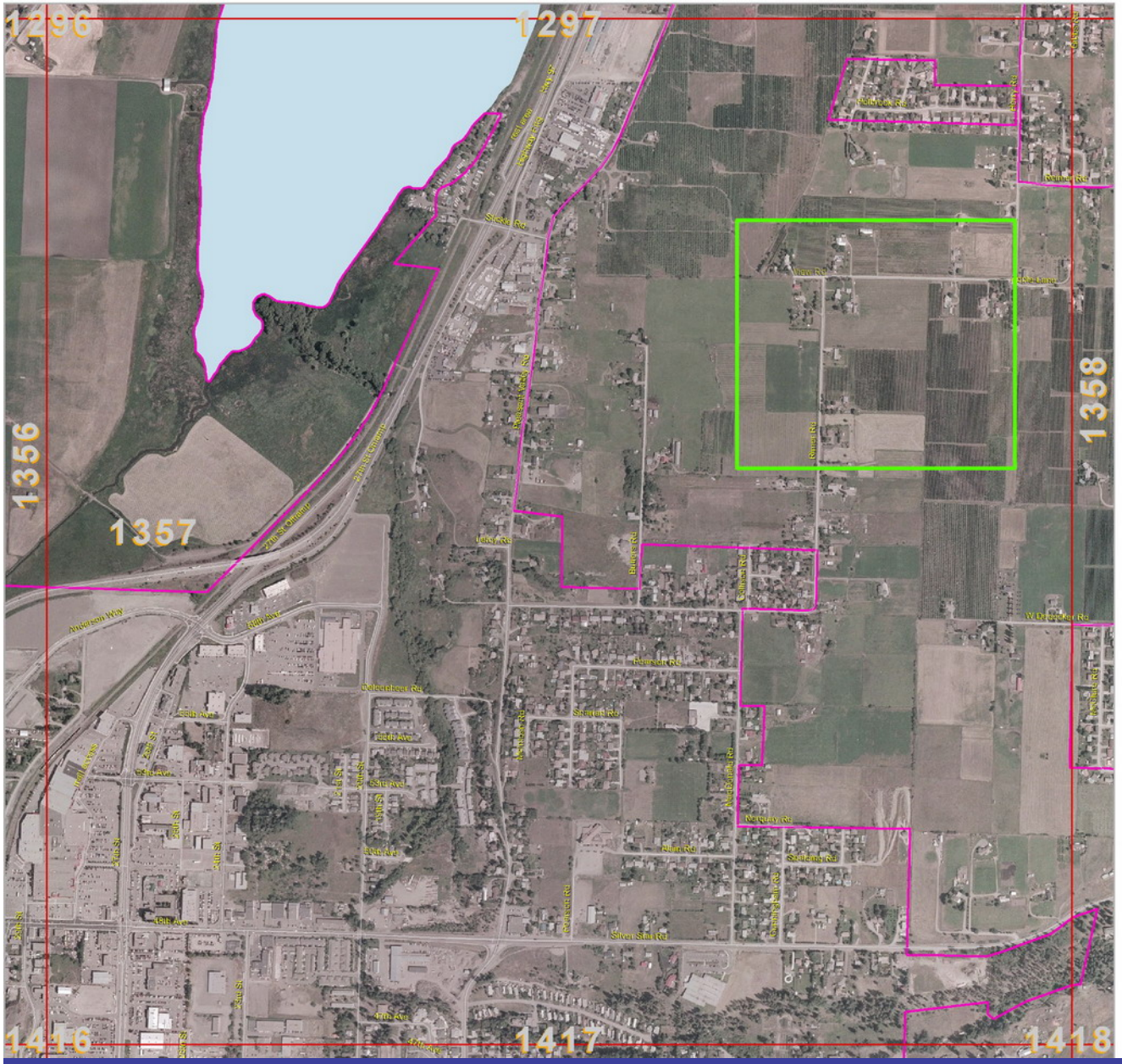
- **A100 Field crop production**
- **A110 Grains, cereals and oilseeds**
- A111 Barley
- A112 Canola
- A113 Oats
- A114 Rye
- A115 Wheat
- **A120 Tree fruit crops**
- A121 Apples
- A122 Apricots
- A123 Cherries
- A123.1 Sour cherries
- A124 Crabapples
- A125 Peaches
- A126 Pears
- A127 Plums
- A128 Nectarines
- **A130 Vine and berry crops**
- A131 Vine crops
- A131.1 Grapes
- A131.2 Kiwis
- A132 Berries

P200 Irrigation

- **P210 Surface irrigation**
- P211 Flood
- P212 Furrow
- **P220 Sub-surface irrigation**
- **P230 Sprinkler irrigation**
- P231 Handline sprinkler
- P232 Wheeline sprinkler
- P233 Solid set
- P233.1 Undertree
- P233.2 Overtree
- P234 Microsprinkler
- P235 Tripod sprinkler
- **P240 Centre pivot sprinkler**
- P241 Low pressure pivot
- **P250 Giant gun**
- P251 Stationary gun
- P252 Travelling gun
- P253 Solid set gun
- **P260 Trickle irrigation**
- P261 Drip emitter
- P261.1 Drip, buried
- P261.2 Drip, above ground
- P261.3 Overtree and drip
- P261.4 Overtree and microsprinkler
- P262 Spray emitter
- **P270 No irrigation**


1539
1538
1598
Scale





Okanagan Cadastre and Agricultural Land Use

Map Sheet : 1357-082L.034

Year of Ortho : 2004

Plot Number : 45 Plot Date : Aug 18, 2006

ALR

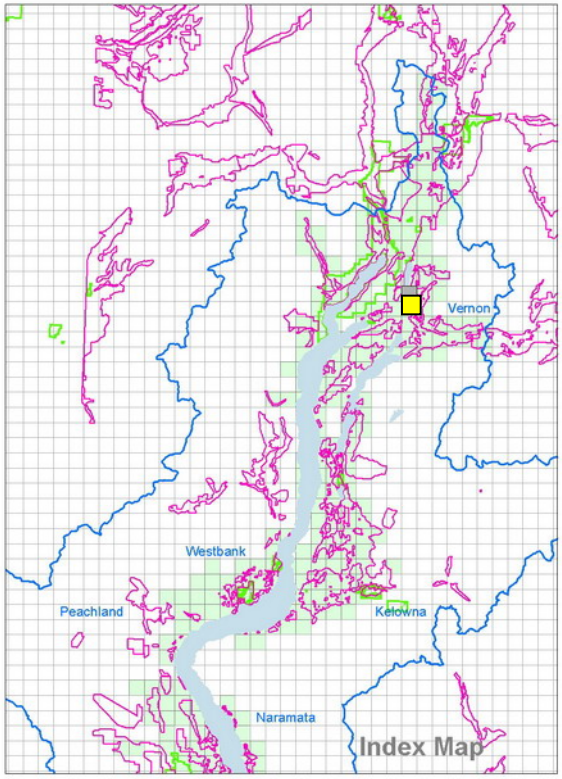
Land Use LandUse ID 145365

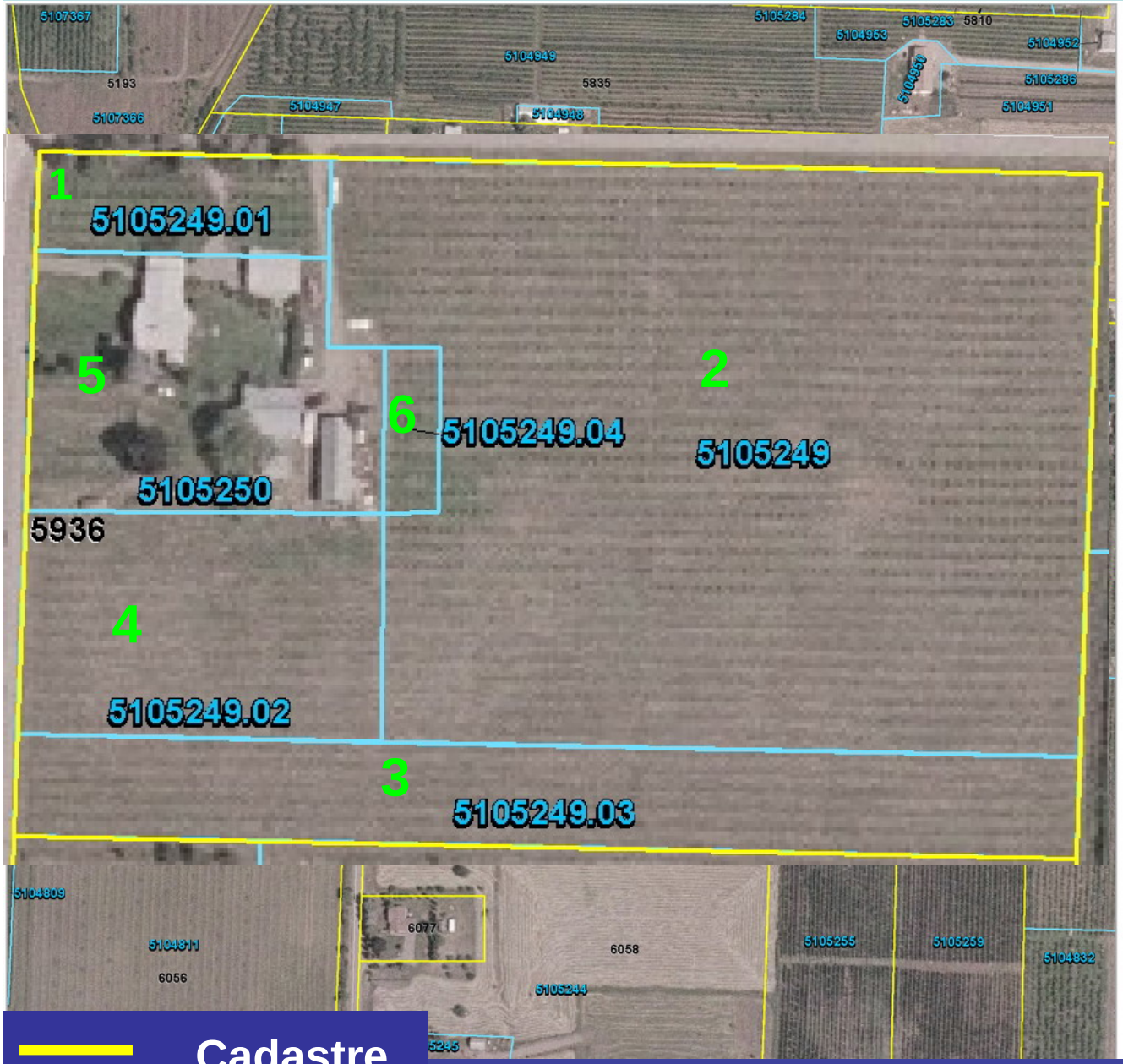
Okanagan Watershed

Cadastre Parcel ID 19064

Scale 1 : 5 000 Projection : UTM Zone 11 NAD83

0 200 400 600 800 1000 m





Okanagan Cadastre
and
Agricultural Land Use

Map Sheet : 1357-082L.024
Year of Ortho : 2004
Plot Number : 45 Plot Date : Aug 18, 2006

ALR Land Use LandUse ID 145365
Okanagan Watershed Cadastre Parcel ID 19064

Scale 1 : 5 000 Projection : UTM Zone 11 NAD83

0 50 100 150 200 250 m

LOTSL	LOCALG	MALGISTAG	MALDESC	MALIRR

1. Microsprinkler on peaches
2. Microsprinkler on cherries
3. Microsprinkler on pears
4. Drip on pears
5. Residential
6. Bee hives

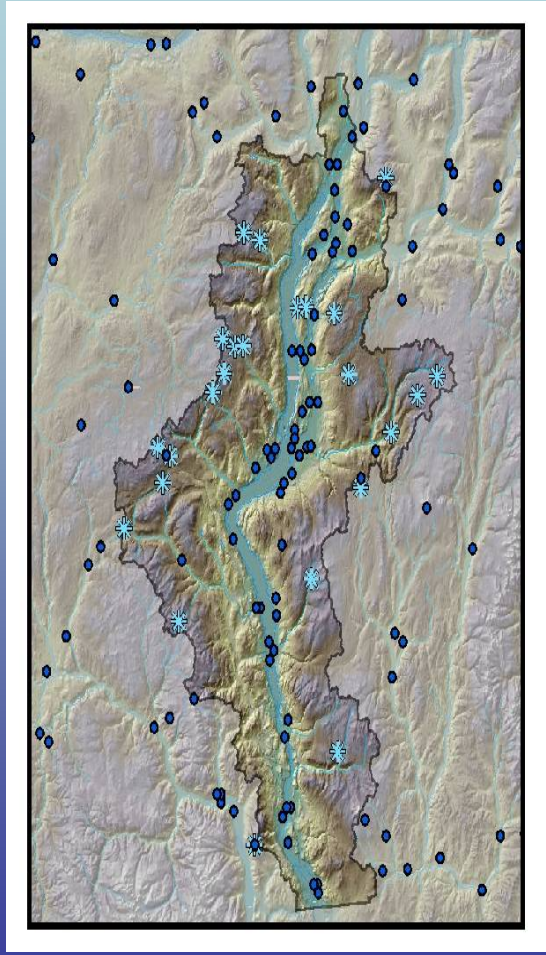
Cadastre

Polygon

Agriculture Water Use Model

Step 3: Climate data:

- A climate model has been developed on a 500 m x 500 m grid
- Provide current climate data based on historical and current information
- Climate change scenarios have been developed

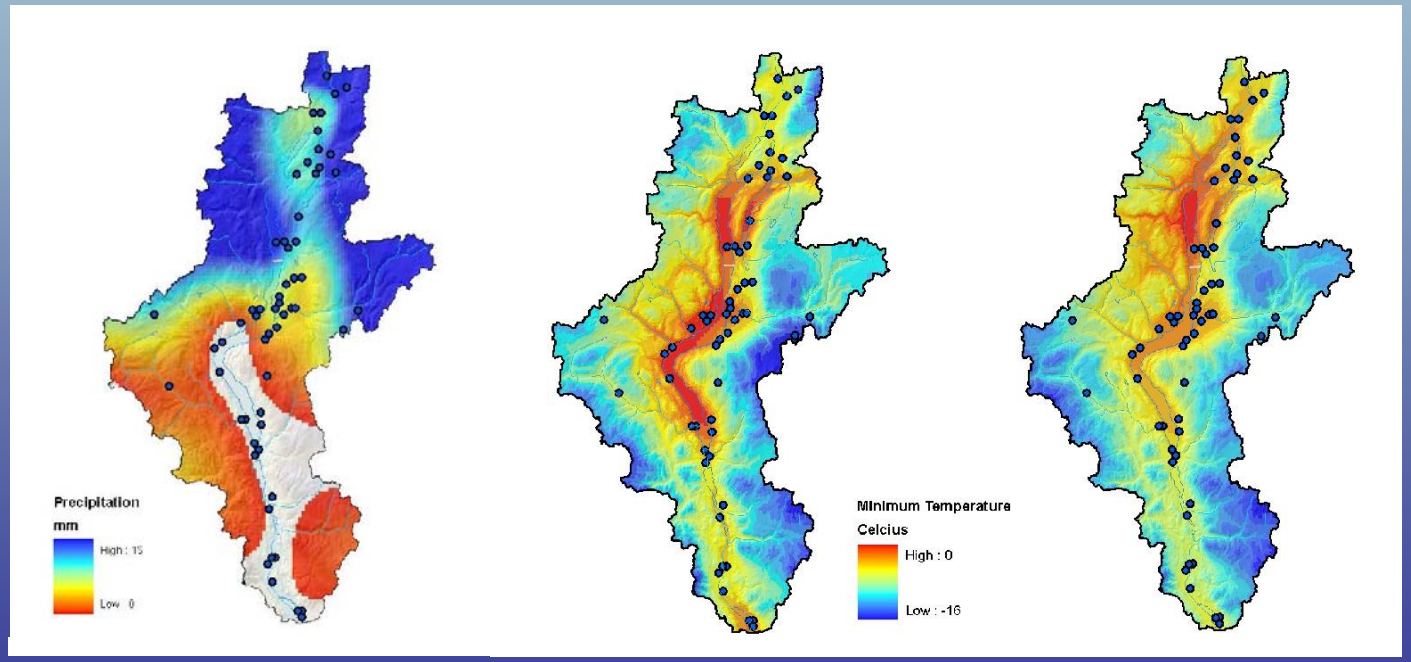


Climate Data Interpolator

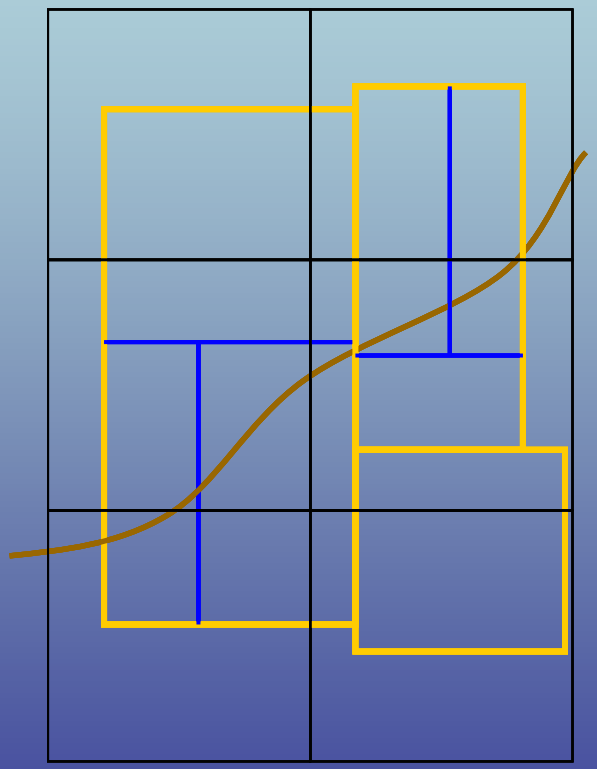
Methods:

Daily surfaces of precipitation and temperature modeled.

Precipitation **Min. Temp** **Max. Temp**



Database Polygons



LEGEND

- **Climate Grid**
- **Cadastre Boundary**
- **Soil Boundary**
- **Crop and Irrigation Polygon**

Agriculture Water Use Model

Products developed:

Data on current and future agricultural water requirements for the whole basin

Information can be generated by:

- First Nations
- Water Purveyor
- Regional District
- Municipality
- Watershed

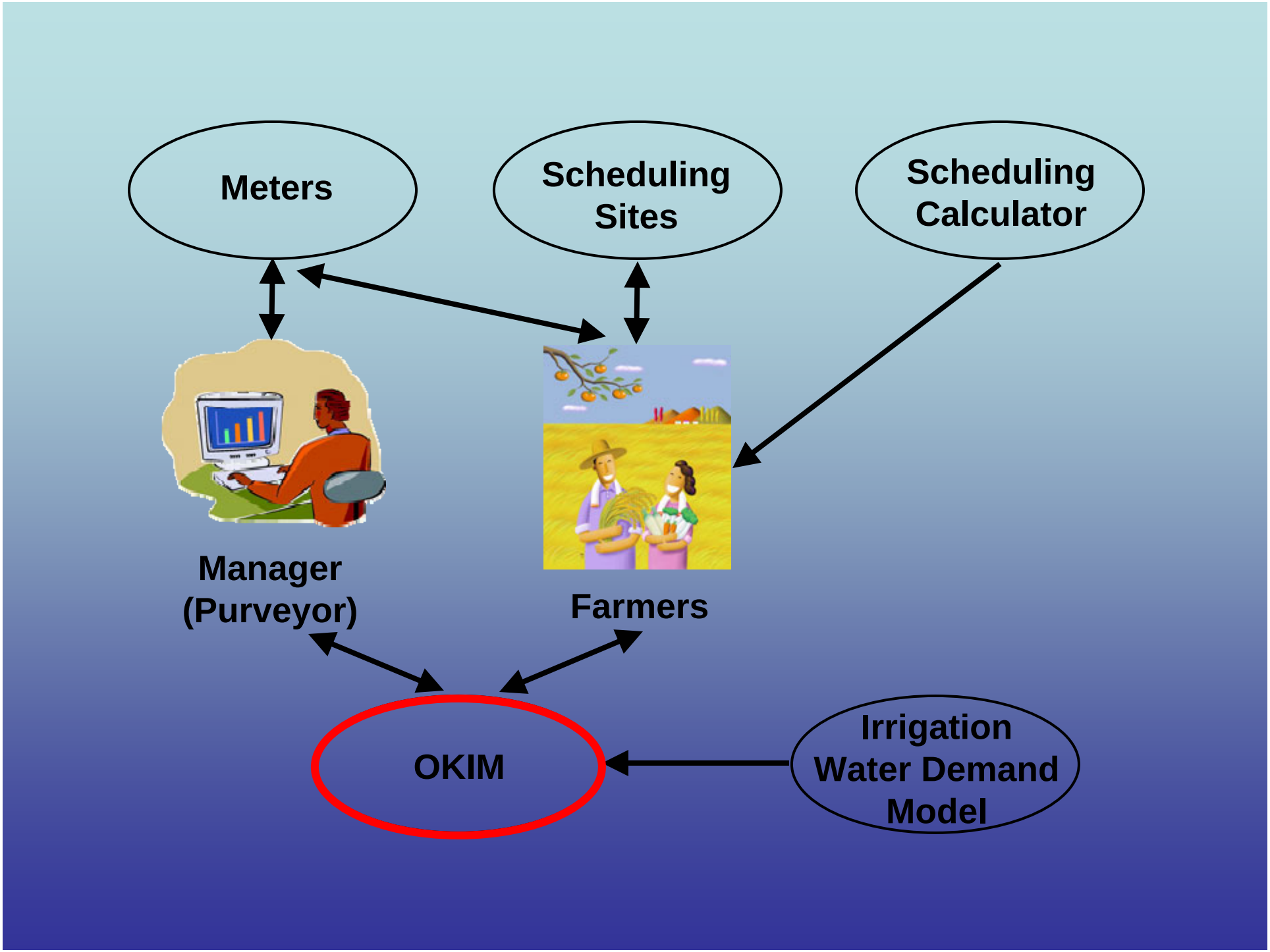
Model Results in 2006

Crop Group	Irrigated Area (ha)
Apple	4,292.7
Berry	61.8
Cherry	1,121.0
Forage	8,519.9
Fruit	897.4
Golf	1,048.1
Grape	2,734.1
Landscape Turf	126.1
Nursery	385.7
Turf Farm	120.6
Vegetables	531.1
Total =	**20,033.7**

Total Irrigation Demand in 2006:

164,120,861 m^3

Irrigation System	Irrigated Area (ha)
Drip	1,489.9
Golfsprinkler	1,045.6
Gun	308.7
Handline	1,389.4
Landscape Sprinkler	383.5
Microspray	465.8
Microsprinkler	1,548.4
Overtree Drip	219.7
Overtree-microsprinkler	16.5
Pivot	555.3
Pivot – Low Pressure	19.2
SDI	42.7
Sprinkler	3,602.7
Solid Set Gun	12.3
Solid Set Overtree	3,073.5
Solid Set Sprinkler	134.5
Solid Set Undertree	1,790.2
Sub-irrigation	194.7
Travelling gun	2,079.3
Wheelline	1,661.7
Total =	**20,033.7**


Meters
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OKIM
Irrigation Water Demand Model

OKIM

Okanagan Irrigation Management

Anonymous user

Home | My Consumption | My Account

- OKIM is a purveyor's tool to allow users (agricultural customers) access to water meter readings
- Farmers are able to:
  - read land use and current water meter reading
  - compare their actual water usage with the theoretical usage
  - compare their usage with other users with similar conditions

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Okanagan Irrigation Management

Anonymous user

Tools

Landscape Irrigation Scheduling Calculator

EVAPOTRANSPIRATION
schedule your irrigation

OKIM

This website is designed for agricultural property landowners within the Greater Vernon Services and the District of Summerland to obtain information on metered water use, calculated theoretical water demand, and land use data for their properties.

If you are a water purveyor or you reside in areas where agricultural water use is metered by a water purveyor, and would like to be part of the OKIM, please email info@Okim.ca.

Log-in
For existing users, click here to log-in.

New User
To register as a new user, you must own an agricultural property in Vernon or Summerland, and have an email address. Click here to register.

About OKIM

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Okanagan Irrigation Management

Anonymous user

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Tools

Landscape Irrigation Scheduling Calculator

EVAPOTRANSPIRATION
schedule your irrigation

User Logon

Email address: Sam.Summer@shaw.ca

Password: ●●●

Log In

Forgot your password?

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OKIM

Okanagan Irrigation Management

summerlanduser@okim.ca

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Search

Selection input

Search: Sam Summer Search Clear

Results

Local Authority	User	Owner	Address	Juroll		
Summerland	Sam Summer	GEORGE JURIS LERCHS	28411 GARNET VLY RD	32507251250	Report	More
Summerland	Sam Summer	MELVIN DIETZ	26405 GARNET VLY RD	32507105000	Report	More

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Anonymous user

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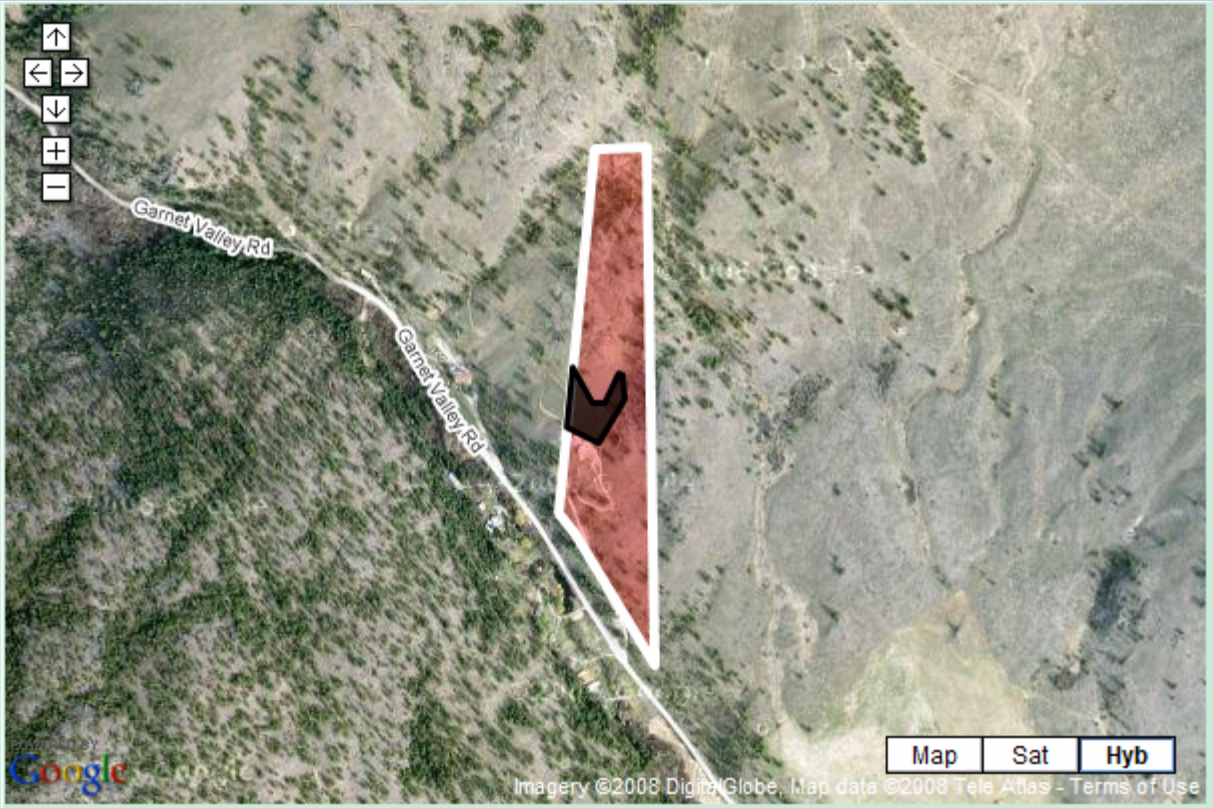
Results

Detail Results

Map	
	Open in Google Earth
Local Authority	Summerland
User	Sam Summer (summerlanduser@okim.ca)
User Address	PostalAddress1, PostalAddress2, PostalZip
Property Address	28411 GARNET VLY RD

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Okanagan Irrigation Management

Anonymous user

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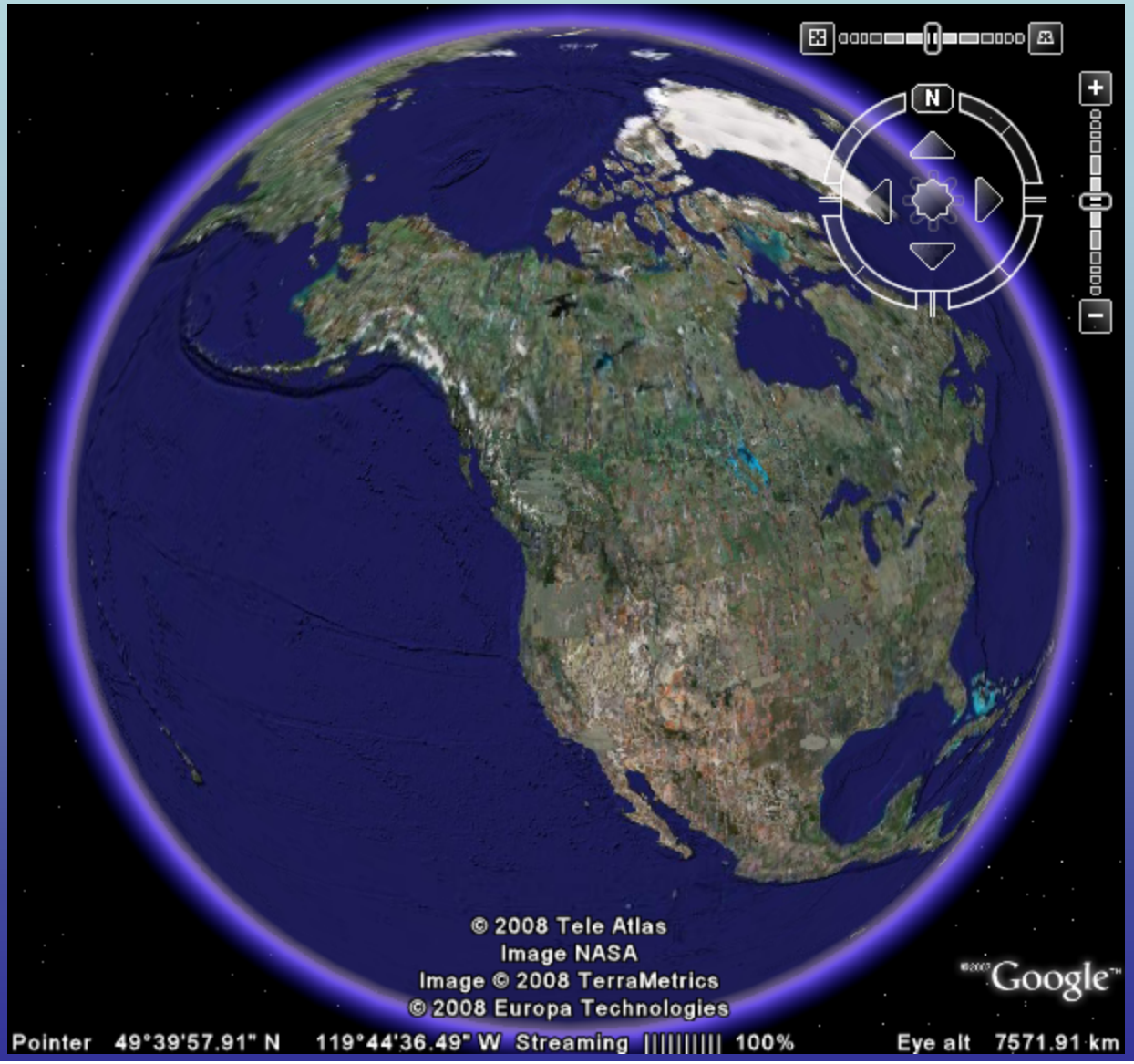

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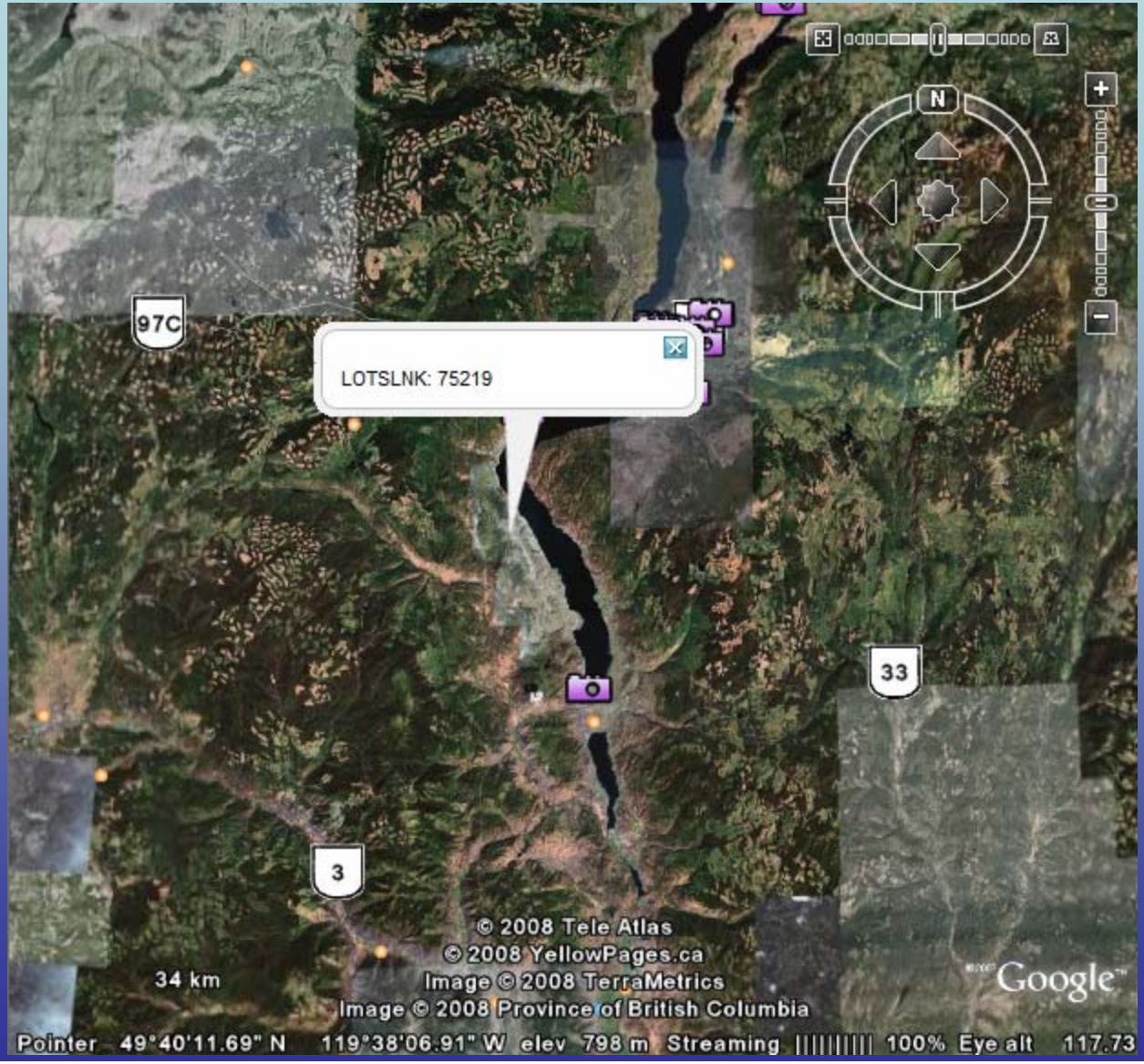

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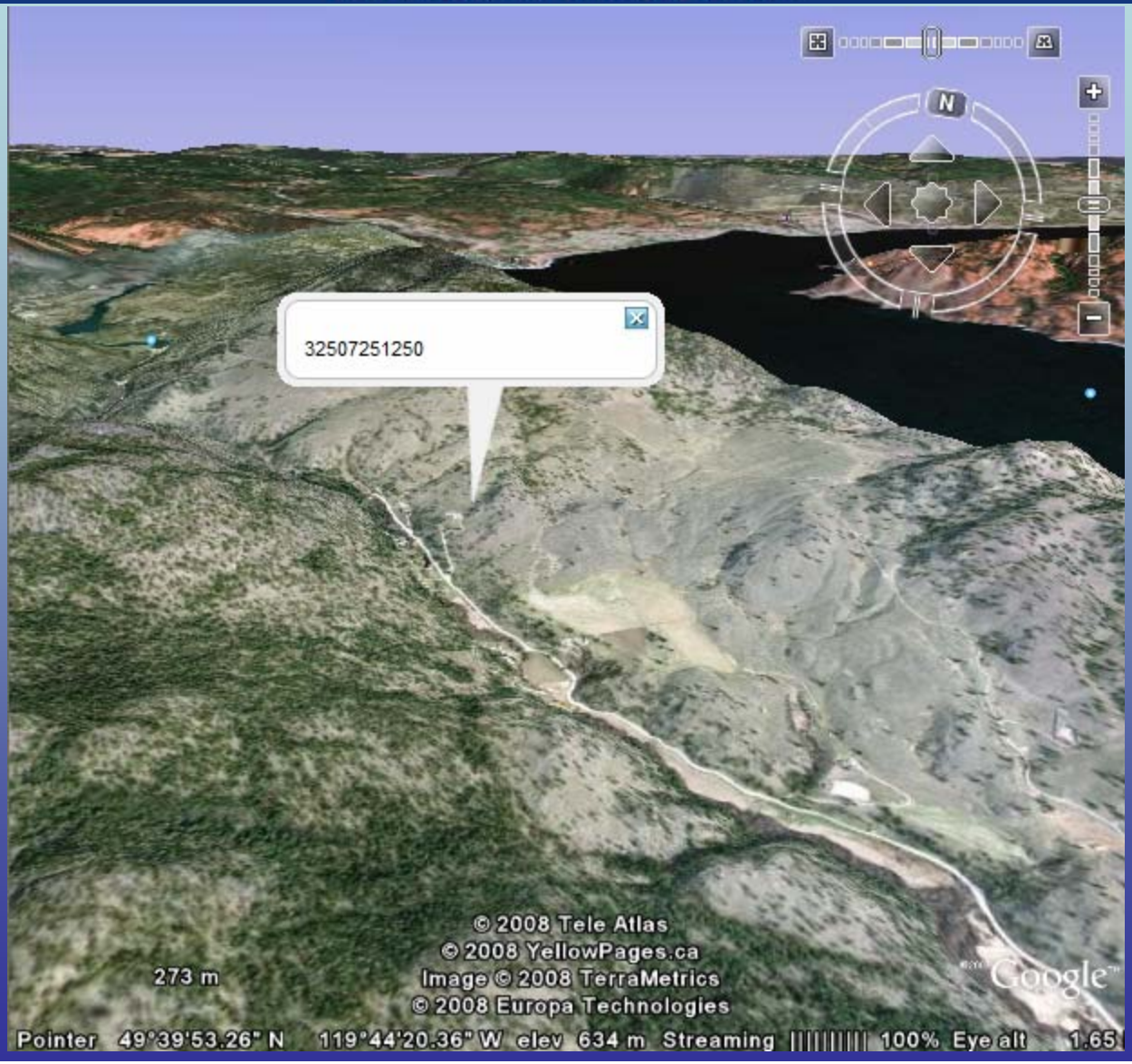

OKIM

Okanagan Irrigation Management

Anonymous user

District Of Summerland

Irrigation Monitoring Program Water Use Report

Sam Summer Wednesday, March 26, 2008

PostalAddress1

PostalAddress2

PostalZip

Water use report for the period: 4/1/2007 to 11/1/2007

Property Owner: Sam Summer

Property Address: 28411 GARNET VLY RD

Legal Description: 32507251250

Irrigated Area: 7.990 (ha)

Water Allocation: xxx (ha)

A. Agricultural Units Information :

Land Use	Soil Type	Irrigation Type	ET	Area (ha)
Grape	default	Sprinkler	834.3072 mm / 32.85 inch	0.520
Blank	default	Blank	834.3072 mm / 32.85 inch	7.190
Blank	default	Blank	834.3072 mm / 32.85 inch	0.280

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B. Current Growing Season Water Consumption:

	Your Water Use (volume)		Calculated water Requirement	
Period	**cubic meters**	**US Gallons**	**cubic meters**	**US Gallons**
April (4/1/2007 - 5/1/2007)	100.320	26504.624	0.000	0.000
May (5/1/2007 - 6/1/2007)	103.550	27357.992	0.000	0.000
June (6/1/2007 - 7/1/2007)	116.820	30863.937	279.572	73863.144
July (7/1/2007 - 8/1/2007)	309.360	81733.157	358.748	94781.506
August (8/1/2007 - 9/1/2007)	274.010	72393.659	642.969	169872.919
September (9/1/2007 - 10/1/2007)	0.000	0.000	445.974	117826.684
October (10/1/2007 - 11/1/2007)	0.000	0.000	150.407	39737.649
Season (4/1/2007 - 11/1/2007)	877.230	231764.861	1825.240	482229.855

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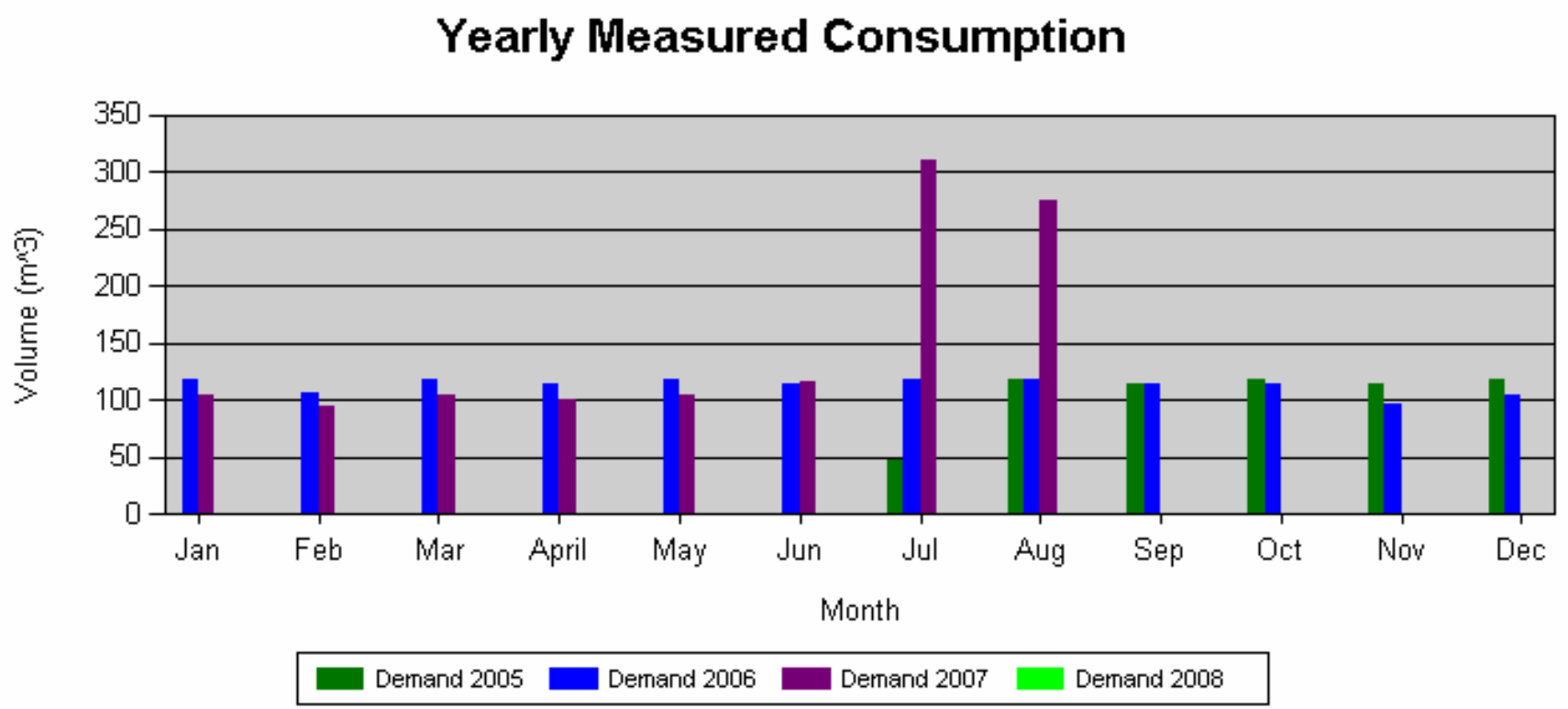
Okanagan Irrigation Management

Anonymous user

C. Historic Water Consumption Data:



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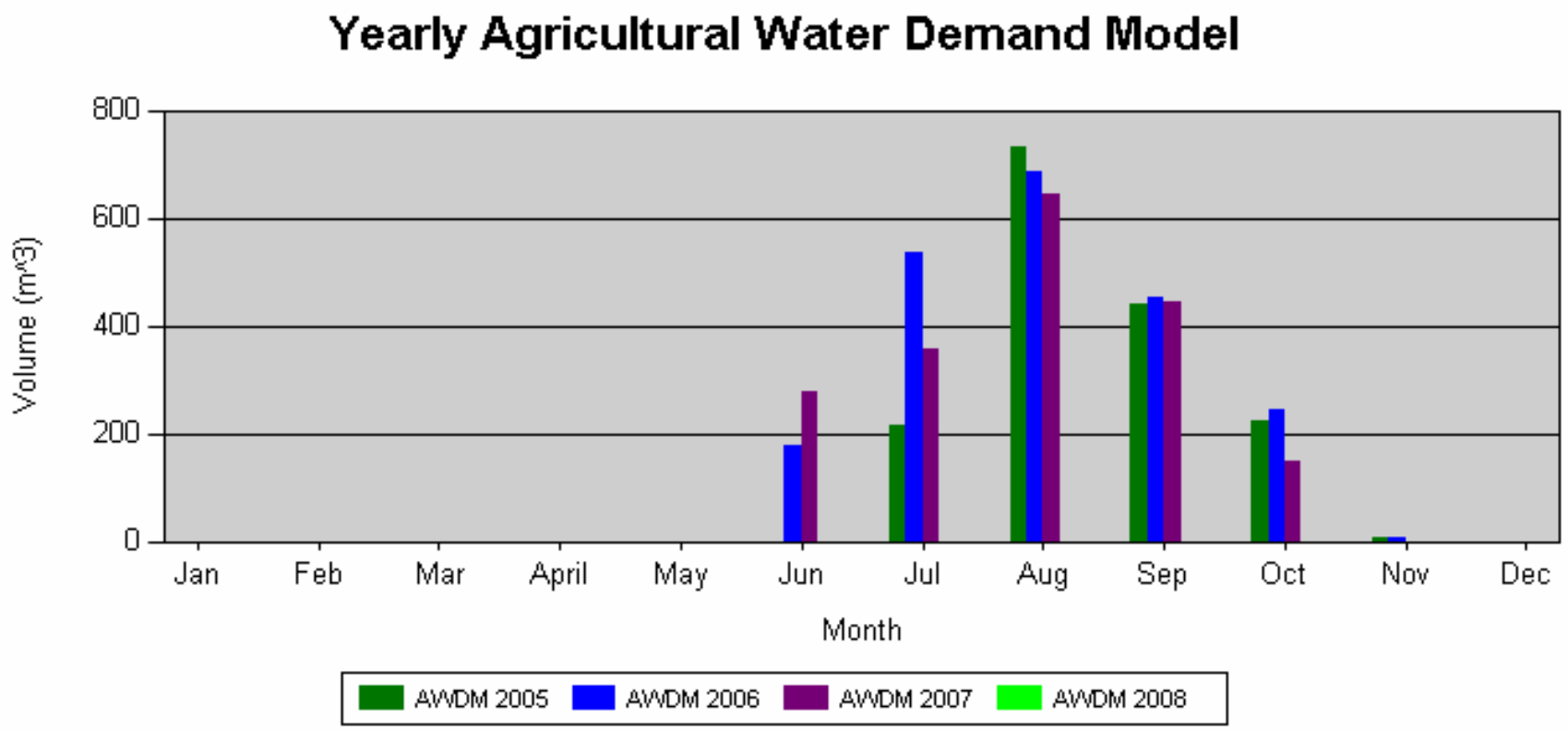
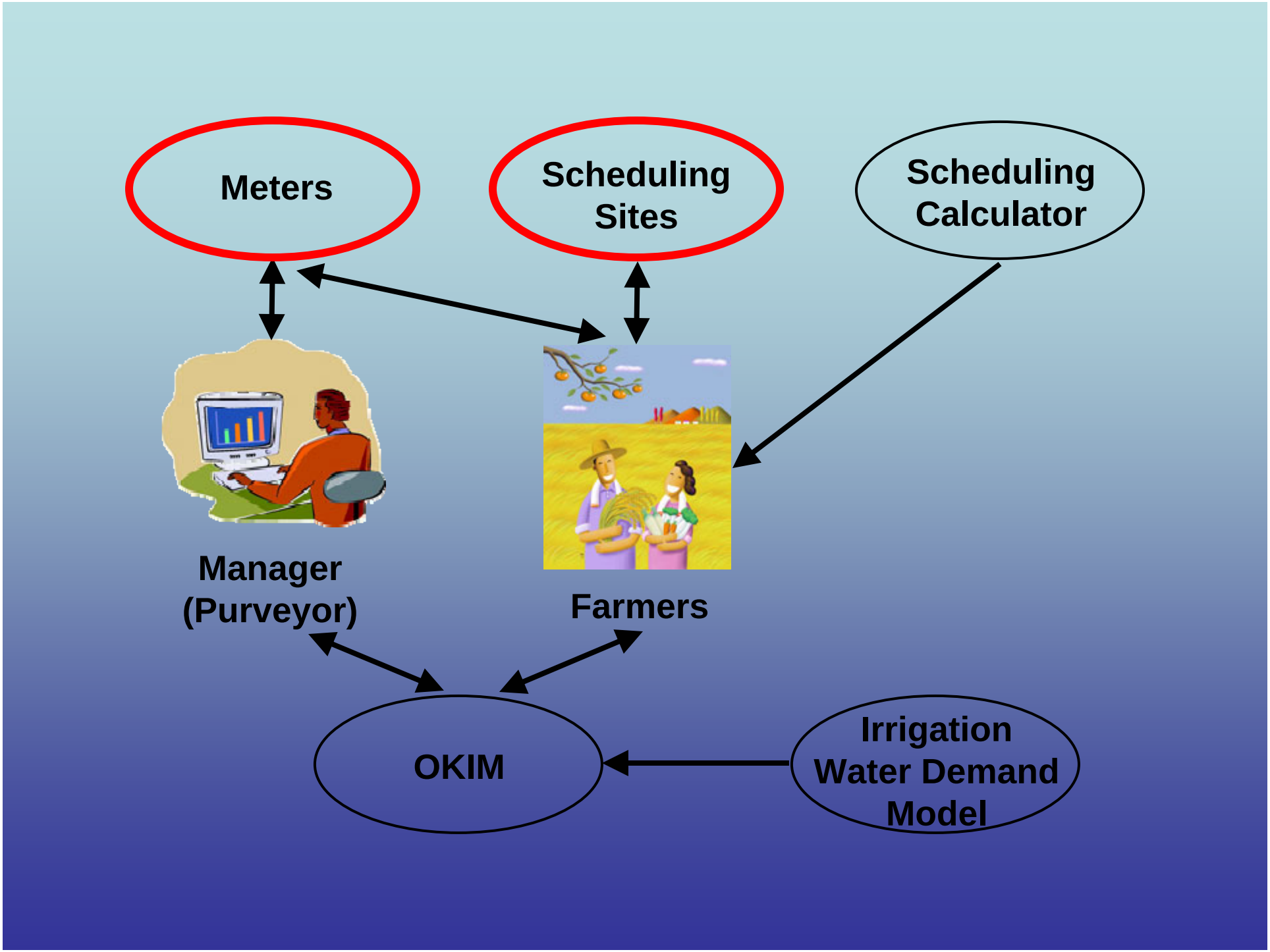
D. Estimated Water Consumption based on Agricultural Water Demand Model (AWDM):




Meters
Scheduling Sites
Scheduling Calculator
Manager (Purveyor)
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OKIM
Irrigation Water Demand Model

Okanagan Metering Project

The water purveyors obtained funding from CBCWSEP for metering their agricultural connections.

1. Vernon
2. Glenmore-Ellison
3. Westbank
4. Summerland
5. Black Mountain
6. Lakeview

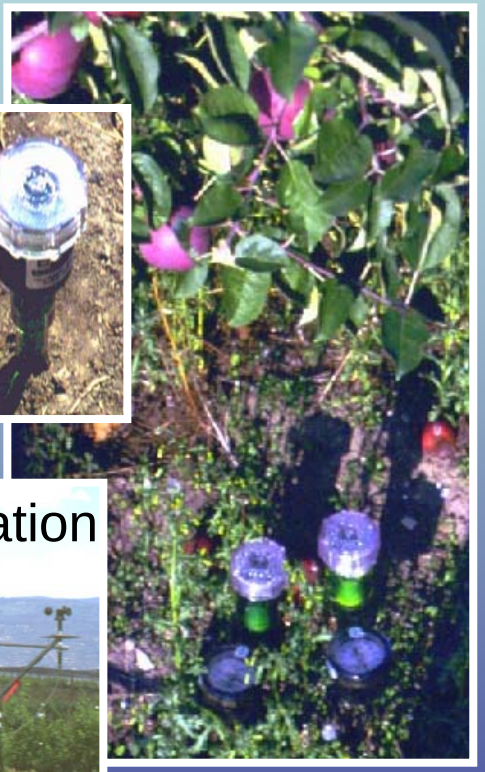
Okanagan Metering Project

The meter is a tool to:

- Ensure a fair distribution of water
- Ensure agricultural water requirements are met
- Assist the districts to manage water and provide a useful tool in times of drought

Irrigation Scheduling

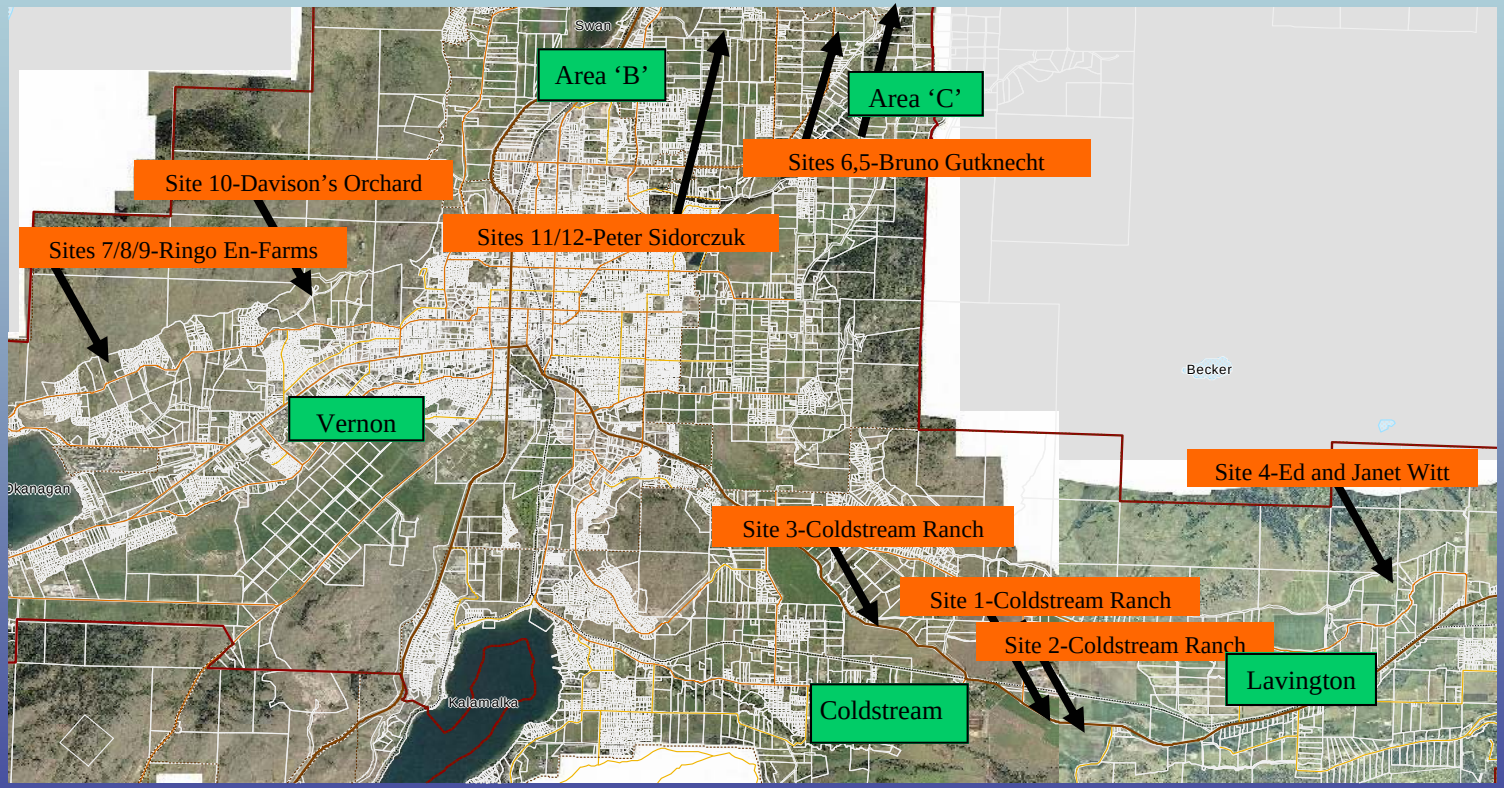
Soil Moisture Sensors



Climate Station

- Determine amount of water farmers need in their fields
- Determine baseline based on irrigation system type, crop type and soil type
- Calibrate Agriculture Water Demand Model

12 Monitoring Sites in NORD



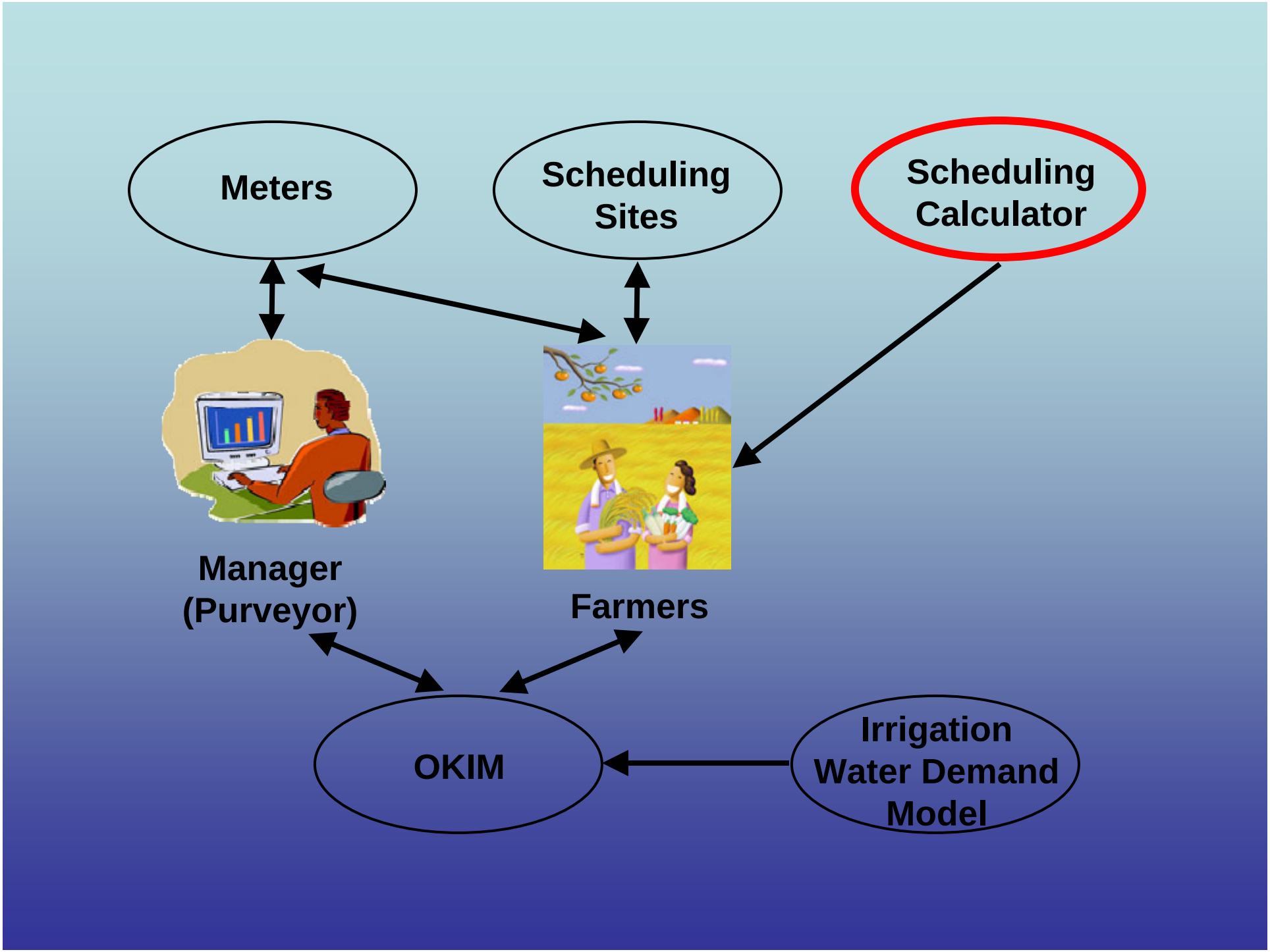
Site Summary

Site	Crop Type	System Type	Soil Type
1	Grass	Wheelmove	Loam
2	Alfalfa	Centre Pivot	Loam
3	Corn	Travelling Gun	Loam
4	Alfalfa	Handmove	Loam
5	Apples	Drip	Sandy Loam
6	Apples	Overhead	Sandy Loam
7	Apples	Drip with Overhead	Loam
8	Apples	Drip	Clay Loam
9	Tomatoes	Drip	Clay
10	Squash	Drip	Clay
11	Pears	Microsprinklers	Sandy Loam
12	Cherries	Microsprinklers	Sandy Loam








Meters
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Irrigation Water Demand Model

Irrigation Scheduling Calculator

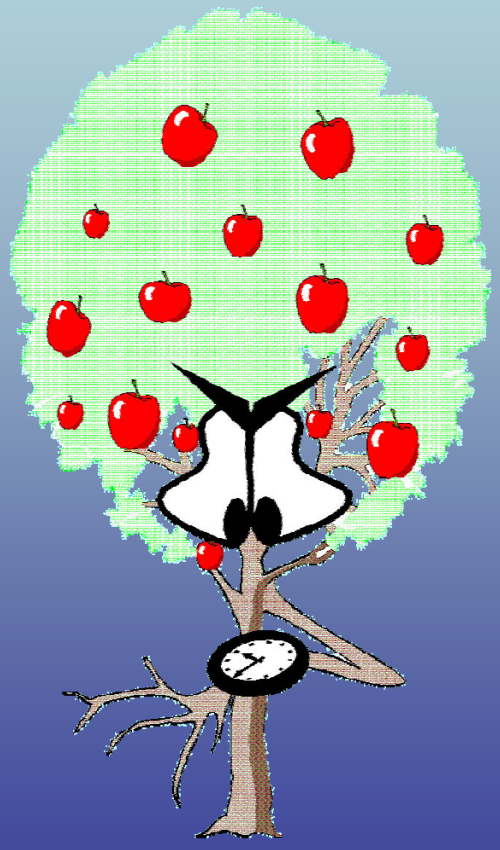
Host:

IIABC website

www.irrigationbc.com

Result:

Irrigation scheduling calculator works for landscape and agricultural irrigation systems



Agricultural Calculator | Landscape Calculator

Returning Users

Username

Password

Log In!

Forgotten Your Password? Help

Is this your first visit to the calculator?

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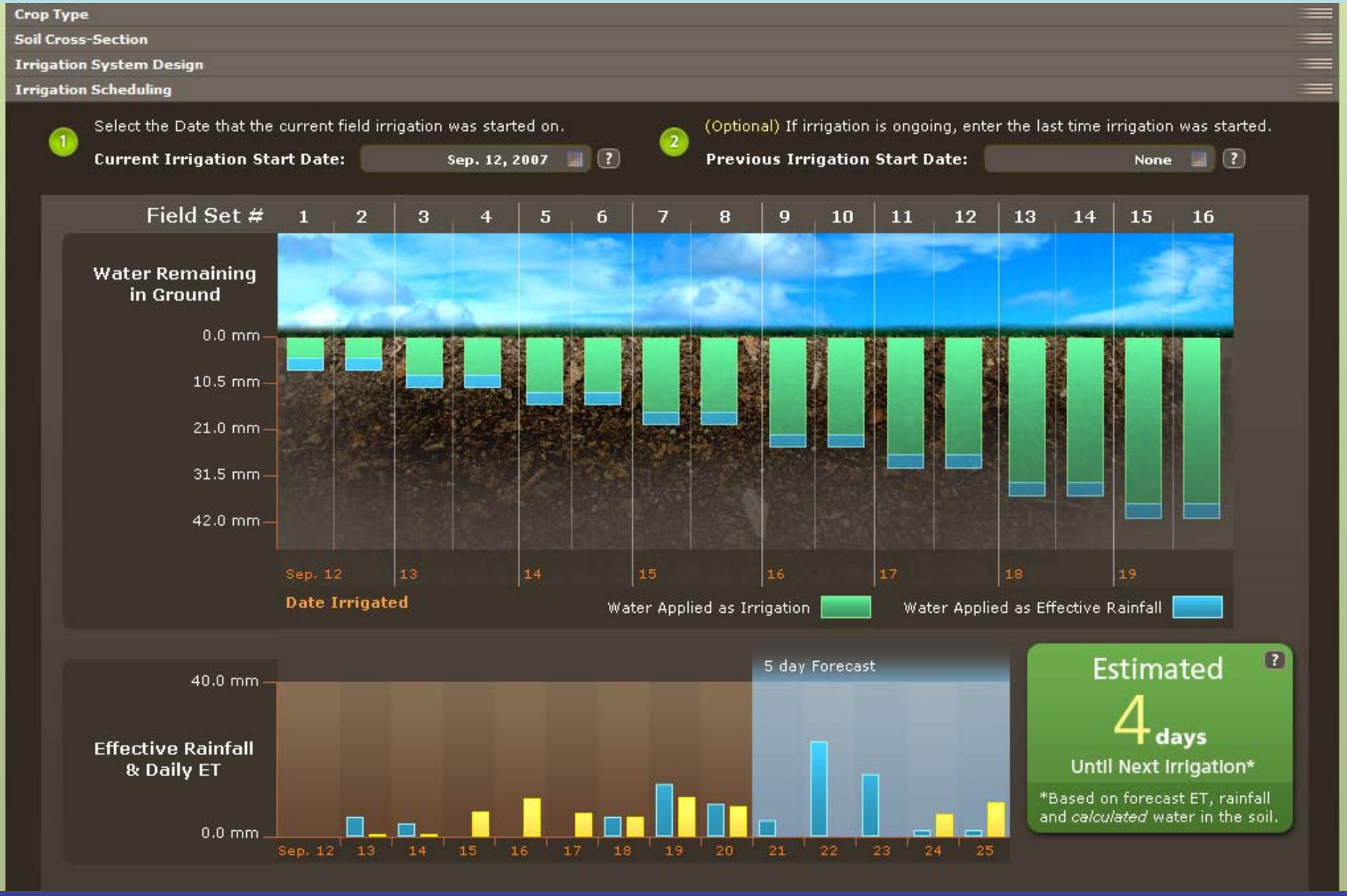
Create a New Account


Crop Type
Soil Cross-Section
Irrigation System Design
Irrigation Scheduling
1
Select the Date that the current field irrigation was started on.
Current Irrigation Start Date:
Sep. 12, 2007
2
(Optional) If irrigation is ongoing, enter the last time irrigation was started.
Previous Irrigation Start Date:
None
Field Set #
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Water Remaining in Ground
0.0 mm
10.5 mm
21.0 mm
31.5 mm
42.0 mm
Sep. 12 13 14 15 16 17 18 19
Date Irrigated
Water Applied as Irrigation
Water Applied as Effective Rainfall
40.0 mm
Effective Rainfall & Daily ET
0.0 mm
5 day Forecast
Sep. 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Estimated
4 days
Until Next Irrigation*
*Based on forecast ET, rainfall and calculated water in the soil.

Agriculture Water Use Model

Database is linked to cadastre:

- Land use / irrigation system
- Climate
- Soil type

Water use is determined by an algorithm that calculates water requirement for each property