Using the Water Use Plan process as a framework for drought management planning

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OUTLINE OF PRESENTATION

- Summarize the key aspects of the Water Use Plan Process as outlined in the Water Use Plan (WUP) Guidelines
- Provide a case history of an application of the Water Use Plan approach in Summerland
- Indicate how the Water Use Plan process could be used as a framework for drought management planning in the Okanagan

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THE WATER USE PLAN PROCESS

- The Water Use Plan (WUP) Process has been demonstrated to be successful in providing an effective framework for improved management of water resources particularly where there are reservoirs in the supply system
- Detailed guidelines for preparing Water Use Plans have been prepared by an inter-agency committee including BC Hydro, the Province and DFO
- The province has made a significant investment in time and resources to develop the WUP Guidelines

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Background to the Water Use Plan process

- The Water Use Plan process was originally developed to assist the resolution of conflicts between BC Hydro water use and fish habitat needs
- Several years of costly litigation had demonstrated that a better way had to be found to manage water resources in the Province
- The goal of the WUP process is to achieve consensus on a set of operating rules that satisfies the full range of water use interests at stake
- Over the past 7 years, Water Use Plans have been prepared for 24 BC Hydro facilities

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Key principles of Water Use Planning

- **Recognition that tradeoffs (choices) have occurred and will occur.**
- **No change to existing legal and constitutional rights and responsibilities**. The purpose of the program is to clarify obligations in detailed operating plans while maintaining the regulatory powers of the federal Fisheries Act and the provincial Water Act.
- **Collaborative, cooperative and inclusive process**. The program brings together a wide variety of people to be part of decision making.

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The Water Act

- Water Use Plans are developed within the context of the Water Act. The Act governs the construction, operation and maintenance of works to ensure the beneficial use of the water resource and must consider the rights of the licensee as well as the public interest
- The outcome of the planning process may be to recommend a voluntary change to operations resulting in a diminishment of water rights
- The Guidelines state that if there are financial impacts on the licensee, from reduction in water rights, compensation for losses will be an important consideration in plan implementation

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Consultation process

- The guidelines call for consultation to be flexible to meet local circumstances and needs
- Participants in the WUP process have the responsibility to:
  - Articulate their interests in water management
  - Listen to and learn about other water use interests
  - Develop an information base for discussion
  - Explore the implications of a range of operating alternatives
  - Seek compromises across water uses
- Each process will strive for consensus
- The process should foster an atmosphere of shared resource stewardship among the interested parties
- Leads to a better understanding and support for resource management decisions

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Steps in the WUP process

- Step 1: Initiation
  - Usually a public announcement is made
- Step 2: Scope water issues
  - The licensee is responsible for plan development
- Step 3: Determine consultative process
  - The licensee in consultation with the Comptroller will define the consultative process for involving regulatory agencies and other interested parties
  - All interested parties have an opportunity to be involved in the WUP process
  - The planning process is designed to be inclusive and transparent to ensure that no one participant unduly dominates it

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Steps in the WUP Process

- Step 4: Define water use objectives
  - Consultative Committee defines water use objectives for each of the issues and interests
  - Process includes selection of measures to assess how well the objectives are achieved
- Step 5: Gather additional information
  - Carry out technical studies on impacts as required
  - Document identified information gaps
- Step 6: Create operating alternatives
  - Tradeoffs used to determine how much of a negative impact on one water use objective must be accepted to achieve a positive impact on another objective.
  - Analyse operating alternatives using watershed and reservoir operation models

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Steps in the WUP Process

- Step 7: Assess tradeoffs
  - Evaluate operating alternatives and compare
  - Tradeoffs recognize facilities as they exist and seek operational improvements
- Step 8: Determine and document areas of consensus and disagreement and prepare a consultation report
- Step 9: Prepare draft Water Use Plan
  - The licensee will draft the plan including a proposed operating regime
  - Plan will be distributed for comment to participants in the consultative process
- Step 10: Review of the draft plan by the Water Comptroller
  - Final plan is authorized by the Comptroller

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Consultative Committee for Trout Creek Water Use Plan

- Representation from each of the following
  - District of Summerland Council
  - Agricultural water users
  - Water Land and Air Protection
  - Fisheries and Oceans Canada
  - First Nations
  - Ministry of Agriculture, Food and Fisheries

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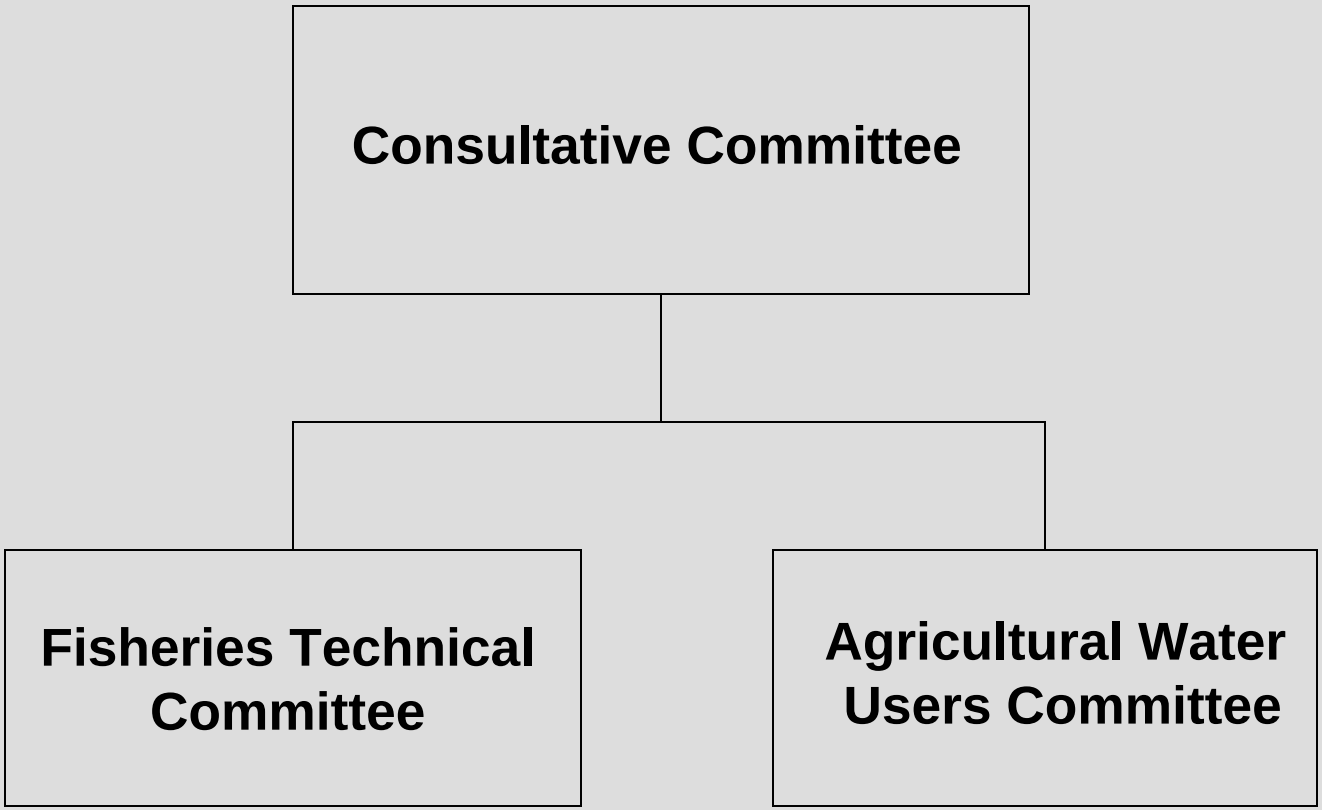
Consultative Committee Structure for Trout Creek WUP



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Trout Creek Watershed and Reservoir Operation Modelling

- System modelling is a key component of Water Use Planning
- Model was calibrated to 38 years of data from unregulated Camp Creek
- Model then extended to the entire Trout Creek watershed
- Reservoir operation model developed for simulating water supply using 66 years of generated inflow data
- Both models calibrated against recorded reservoir operations

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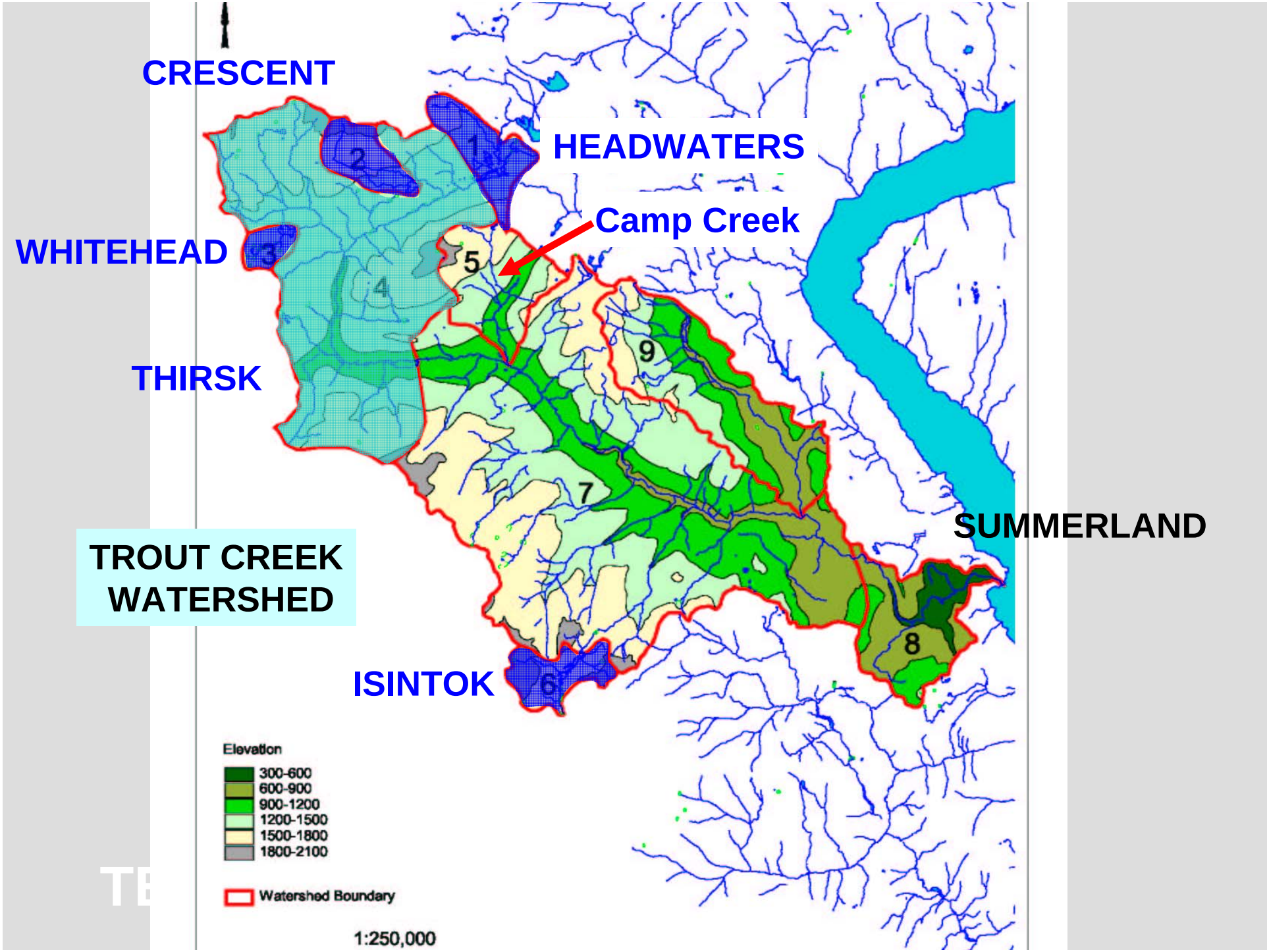
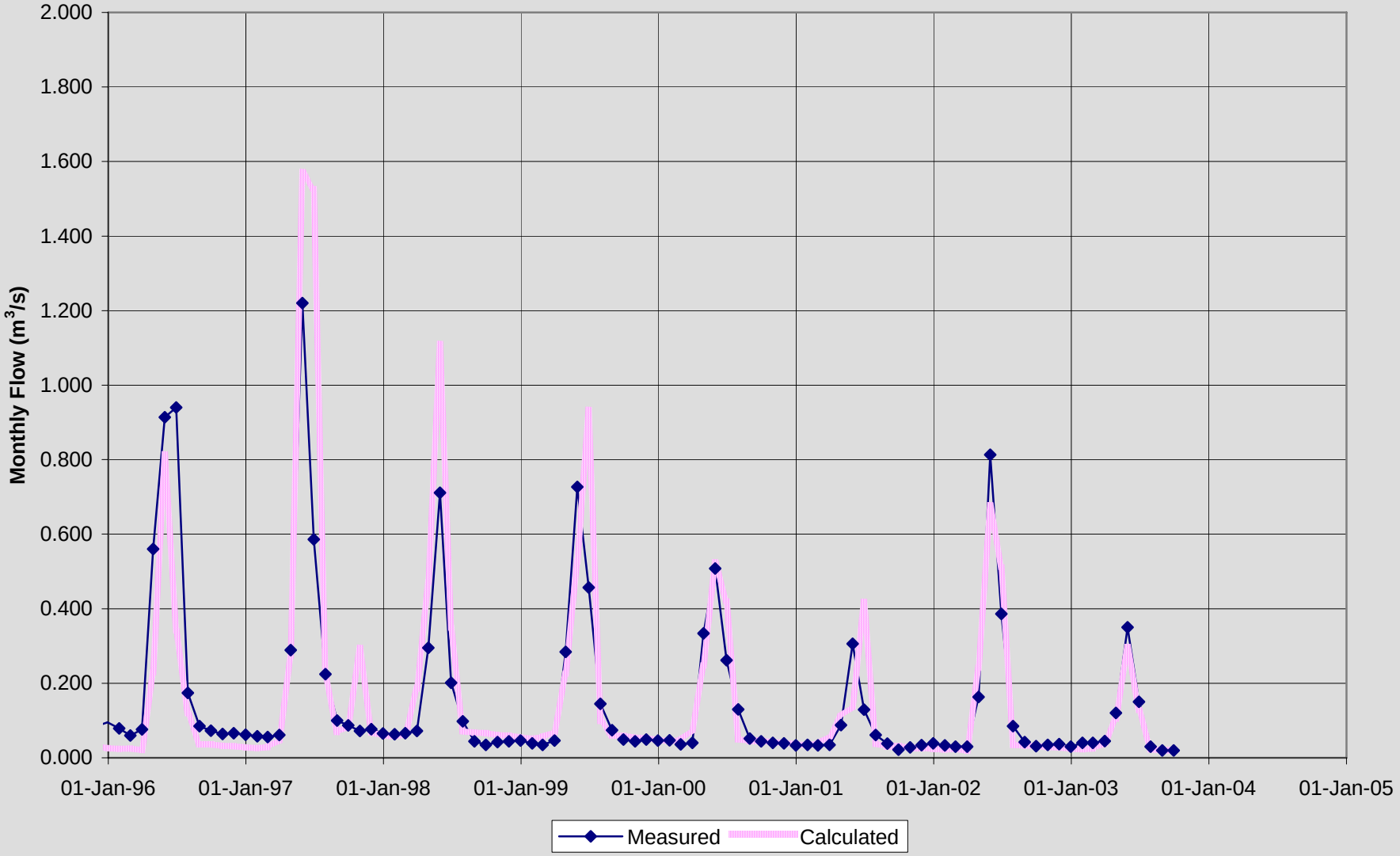
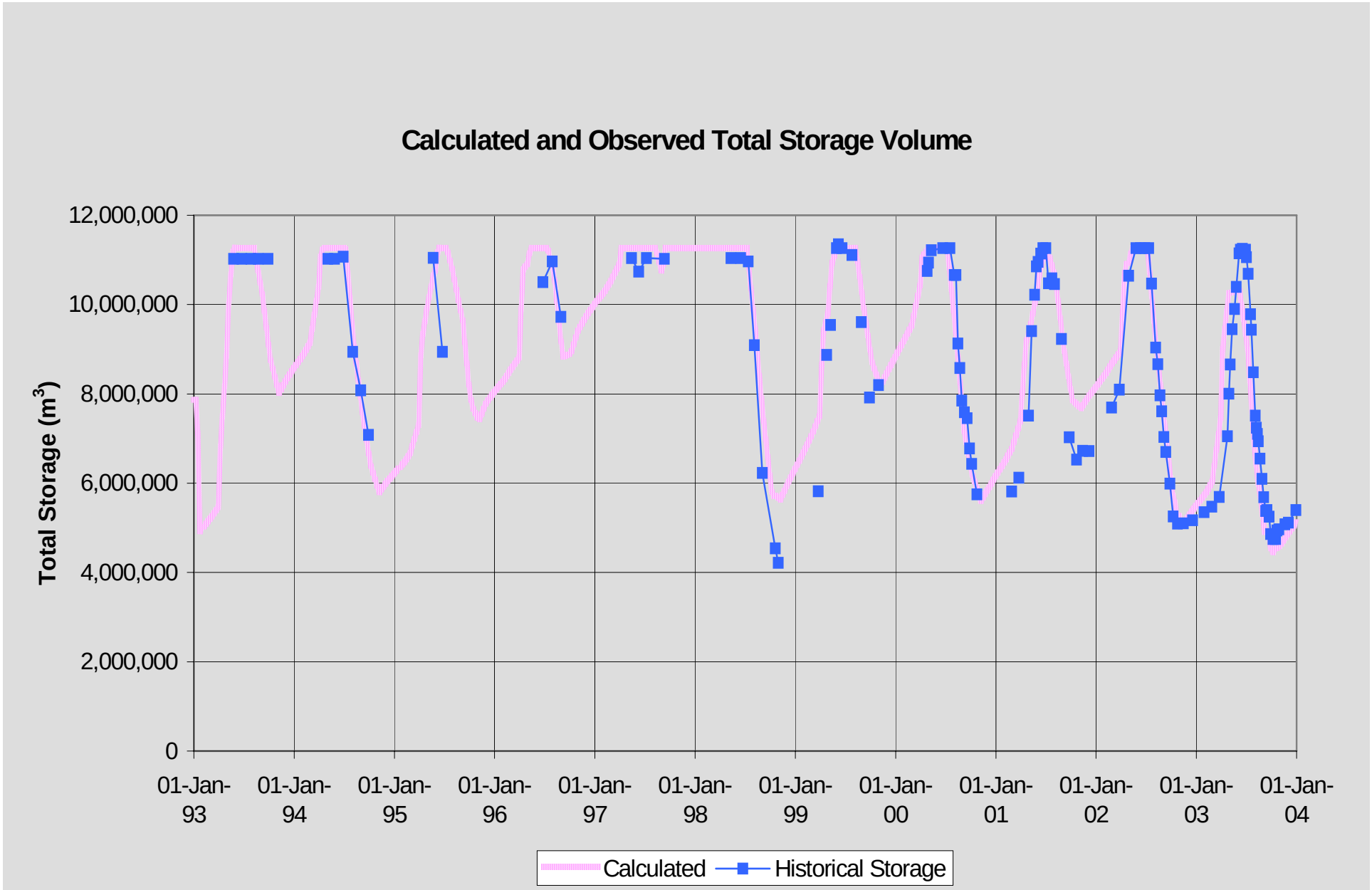
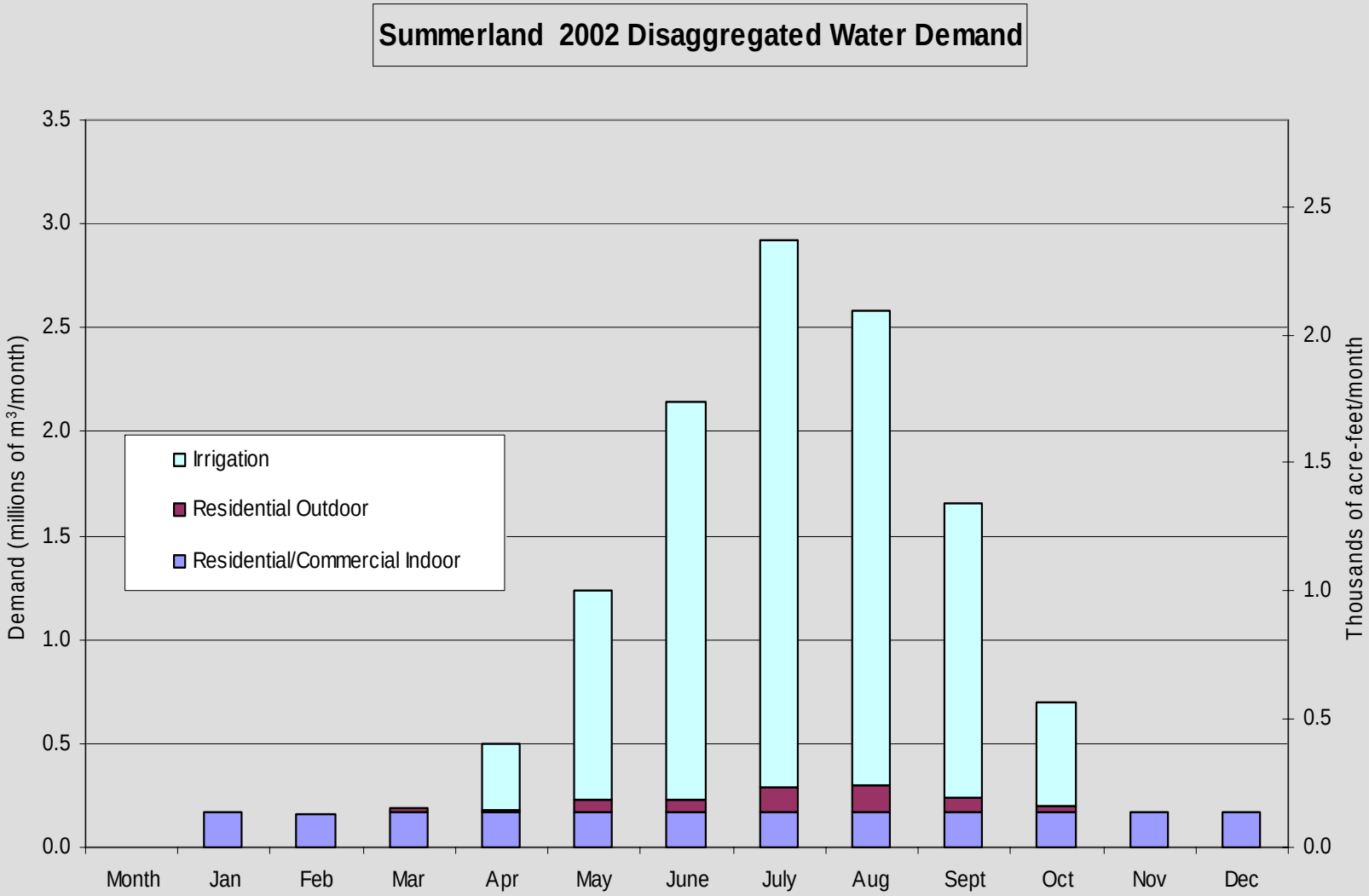
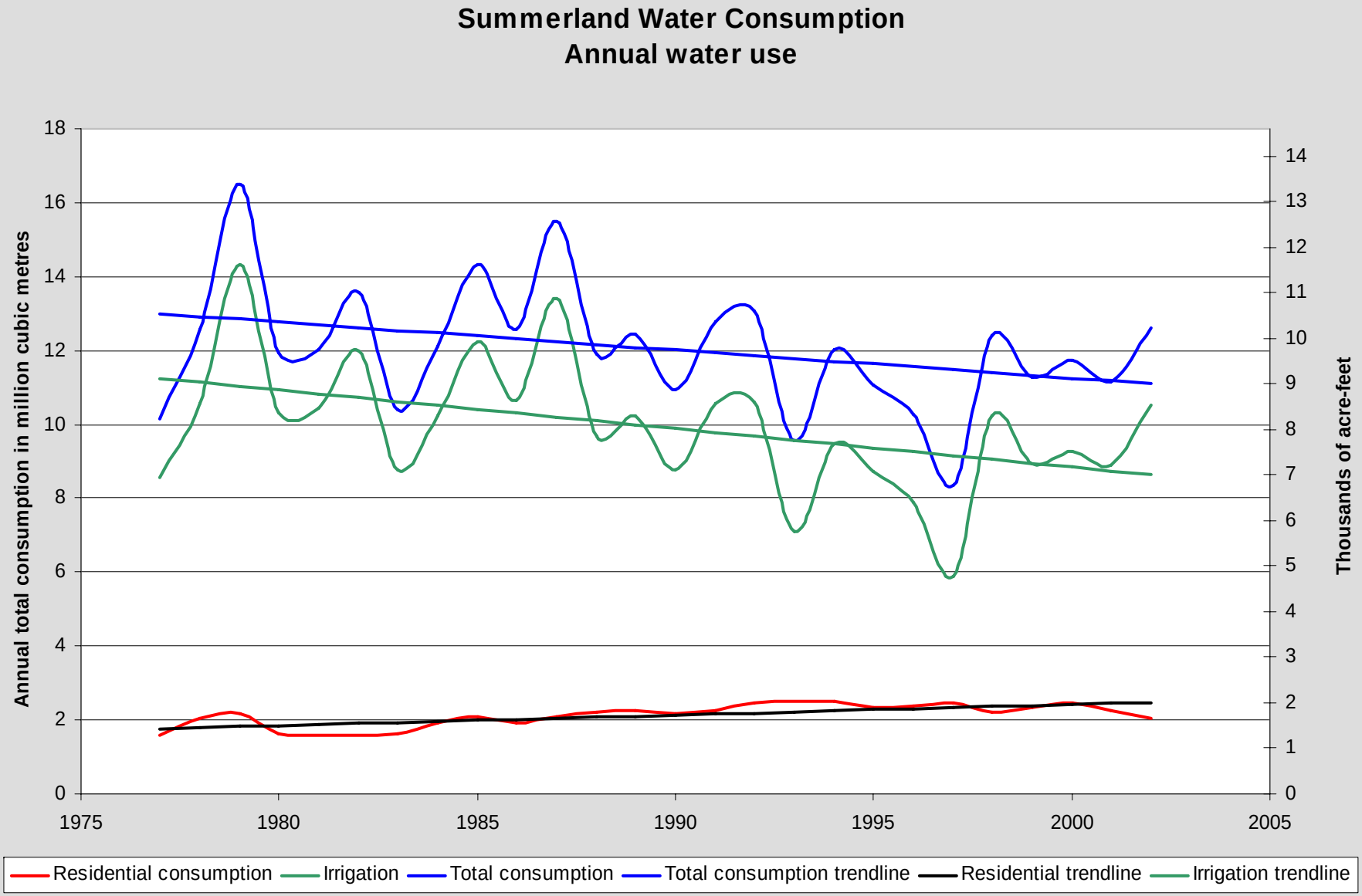

CRESCENT
HEADWATERS
Camp Creek
WHITEHEAD
THIRSK
TROUT CREEK
WATERSHED
ISINTOK
SUMMERLAND
1
2
3
4
5
6
7
8
9
Elevation
300-600
600-900
900-1200
1200-1500
1500-1800
1800-2100
Watershed Boundary
1:250,000

Figure 2.2 Camp Creek Measured and Calculated Monthly Flows




Calculated and Observed Total Storage Volume
Total Storage (m3)
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
01-Jan-02
01-Jan-03
01-Jan-04
Calculated
Historical Storage


Summerland 2002 Disaggregated Water Demand
Demand (millions of m3/month)
Thousands of acre-feet/month
Irrigation
Residential Outdoor
Residential/Commercial Indoor
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2.5
2.0
1.5
1.0
0.5
0.0
Month
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec


Summerland Water Consumption
Annual water use
Annual total consumption in million cubic metres
Thousands of acre-feet
0
2
4
6
8
10
12
14
16
18
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
1975
1980
1985
1990
1995
2000
2005
Residential consumption
Irrigation
Total consumption
Total consumption trendline
Residential trendline
Irrigation trendline

Water Use Plan Agreement for Trout Creek Operations

- The operating agreement was developed by the Trout Creek Water Use Plan Consultative Committee
- It was demonstrated by modelling that it was not feasible to met the objectives of all stakeholders in full
- Compromises were made until a feasible operating regime was developed
- The District of Summerland remains solely responsible for operating the system
- A usage reduction Trigger Graph was developed by modelling the system. Stage 1 reductions are in effect for all years.

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Fish flows

- The fish flows are based on an index of watershed conditions.
- The real-time Camp Creek flows are used as the index. Camp Creek represents about 5% of the watershed area of Trout Creek.
- Fish flows are established as a factor times the declining Camp Creek hydrograph
- Fish flow factors are based on reservoir storage levels from the Trigger Graph.

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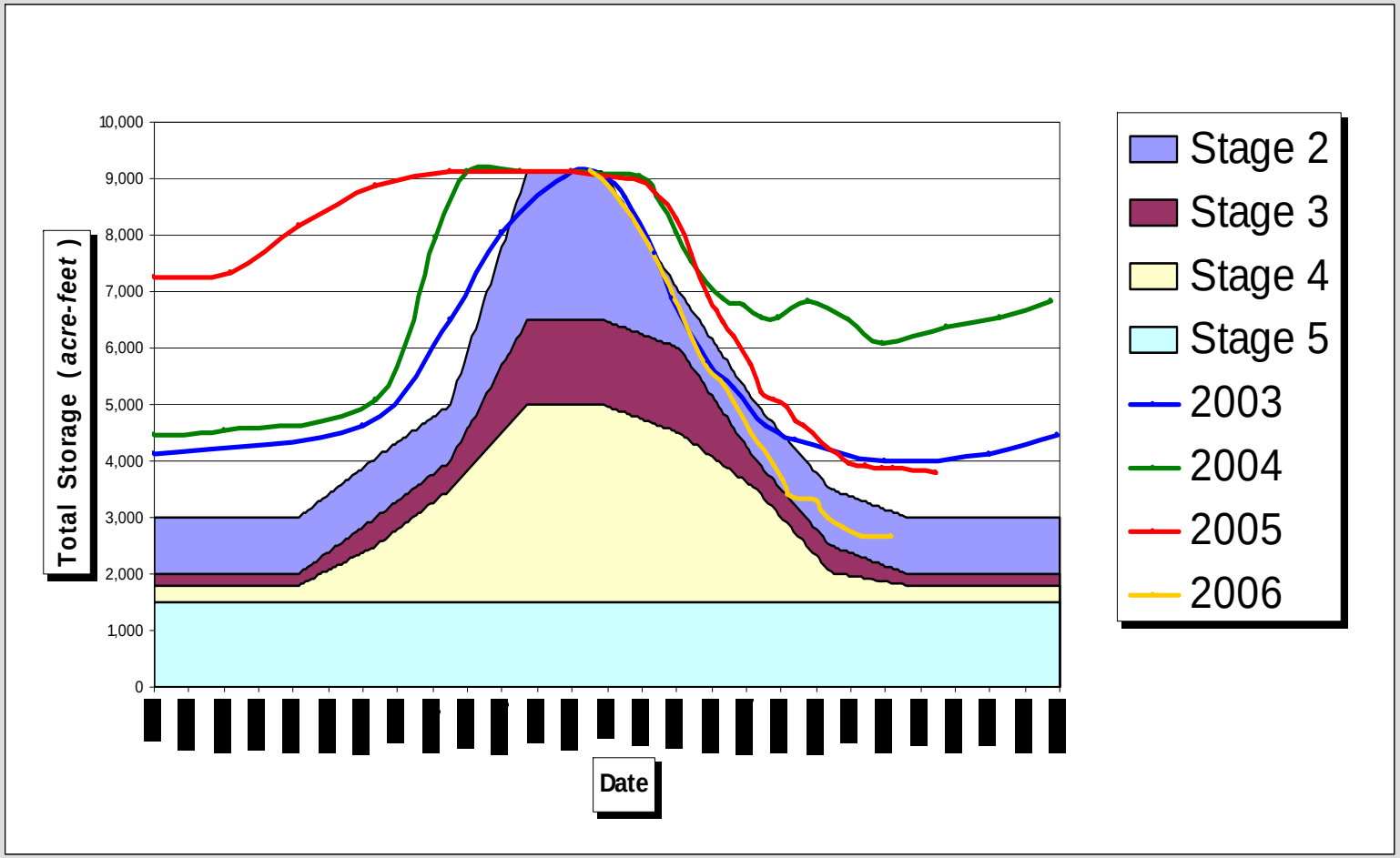
Operating Agreement water usage reductions

	Reduction Stage					
	1	2	3	4	5	
June	10	8	6	4	0	Fish flow x Camp
	90	85	80	70	0	Community target factor %
July	9	8	7	4	0	Fish flow x Camp
	90	85	80	70	0	Community target factor %
Aug	10	9	8	4	0	Fish flow x Camp
	90	85	80	70	0	Community target factor %
Sept	10	10	10	4	0	Fish flow x Camp
	90	85	80	70	0	Community target factor %
Oct	10	10	10	4	0	Fish flow x Camp
	50	50	50	50	0	Community target factor %

The irrigation percent factors are based on the 2002 demand


10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Total Storage (acre-feet)
Date
Stage 2
Stage 3
Stage 4
Stage 5
2003
2004
2005
2006

Operations in 2004

- Detailed irrigation survey carried out for Summerland provided data on irrigated areas by crop type
- Crop water demands were calculated and aggregated for each month.
- Results showed that recorded usage was greater than calculated demand in 2002
- With the Interim Agreement in place the recorded usage in 2004 was generally less then the calculated demand

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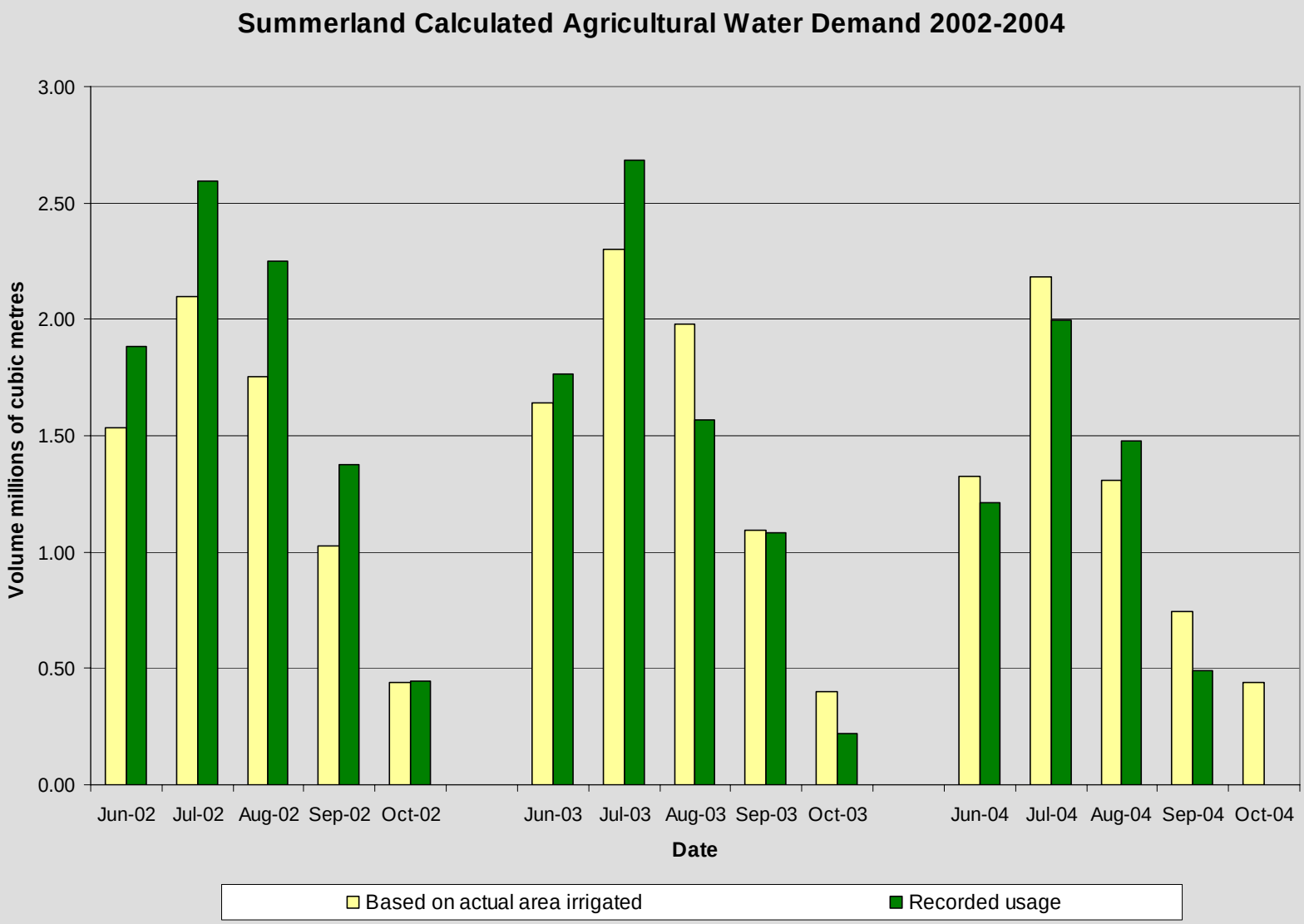
Summerland Calculated Agricultural Water Demand 2002-2004
Volume millions of cubic metres
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Jun-02
Jul-02
Aug-02
Sep-02
Oct-02
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Date
Based on actual area irrigated
Recorded usage

Lessons learned

- The Water Use Plan process can be very effective at developing plans for drought management. Clarifies responsibilities and objectives and identifies feasible alternatives
- The Summerland agreement provided certainty to the reservoir operators, security for fish flows and targets for the community to achieve water usage reductions
- A computer model of the water supply system is essential for examining alternative scenarios and enhancing the understanding of stakeholders
- Hydrometric data and consumption data are essential for model calibration

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Lessons learned cont.

- By engaging in the WUP process, the stakeholders gain an understanding of the needs of other water users and develop a commitment to implementation of the plan.
- The Summerland WUP would not have been feasible without the conservation measures that had been put in place by the agricultural community over the past 10-15 years
- Because those conservation measures were undetected, the conserved water was not reallocated and reservoir operations were not modified
- Before the WUP, Summerland did not have an effective drought management plan that addressed the needs of all stakeholders.

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Wider application of WUP process

- The WUP process could be used for the entire Okanagan Basin. Two kinds of WUPs are envisaged.
- **Okanagan River WUP** to define overall basin objectives and target flows in the Okanagan River at the basin outlet.
  - A simple water balance model would be used for the Okanagan River WUP
- **Individual WUPs** for sub-basins, led by the major licensee in each basin
  - More complex reservoir operation models would be needed for these WUPs
- Stream flow and consumption monitoring to complete gaps in the network, should be initiated

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Design drought

- In water resources planning, engineering hydrologists focus on the concept of the design drought
- The design drought for the Okanagan has been defined as three consecutive dry years of 36% of the mean flow (1929,1930 and 1931?)
- Drought management planning should include both water allocation in “normal” dry years and for the design drought condition.

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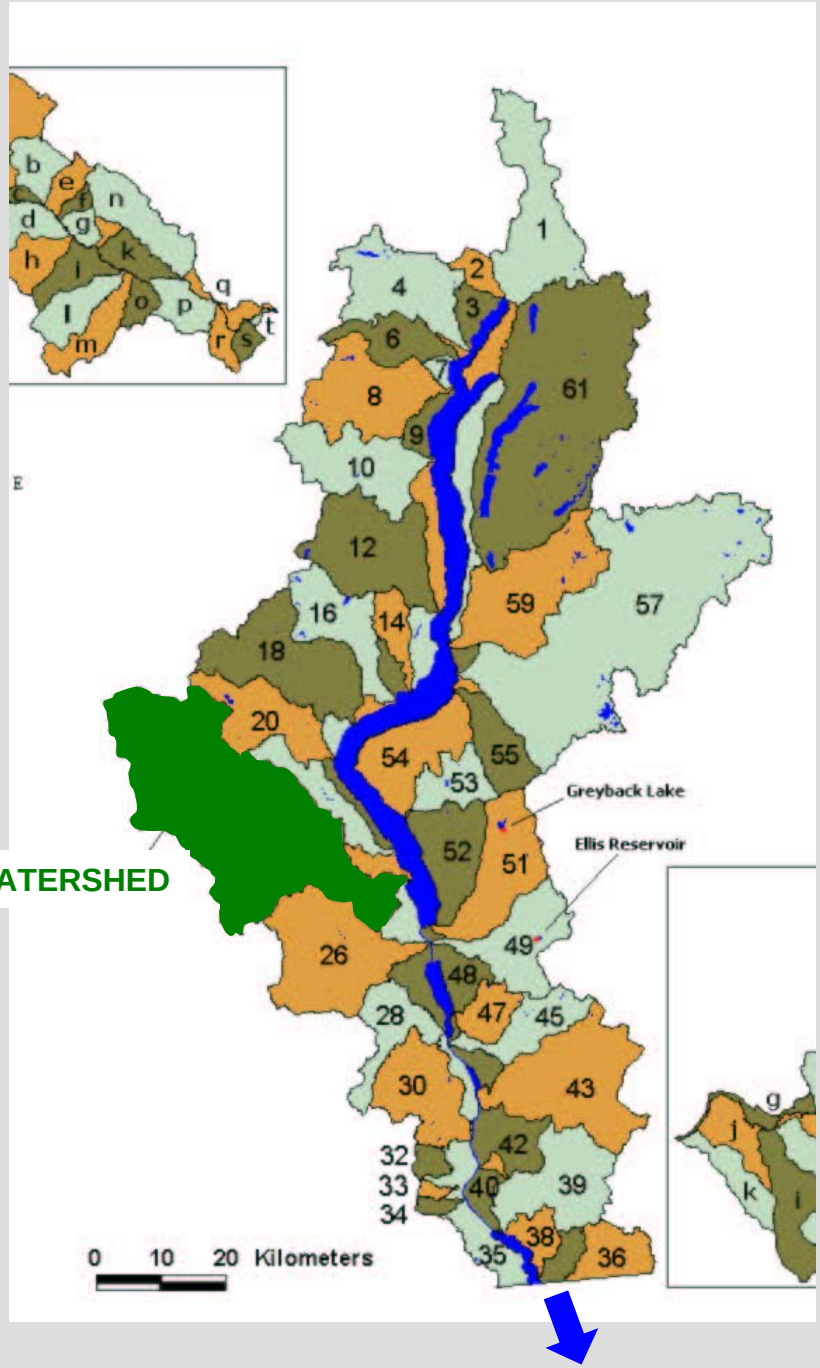
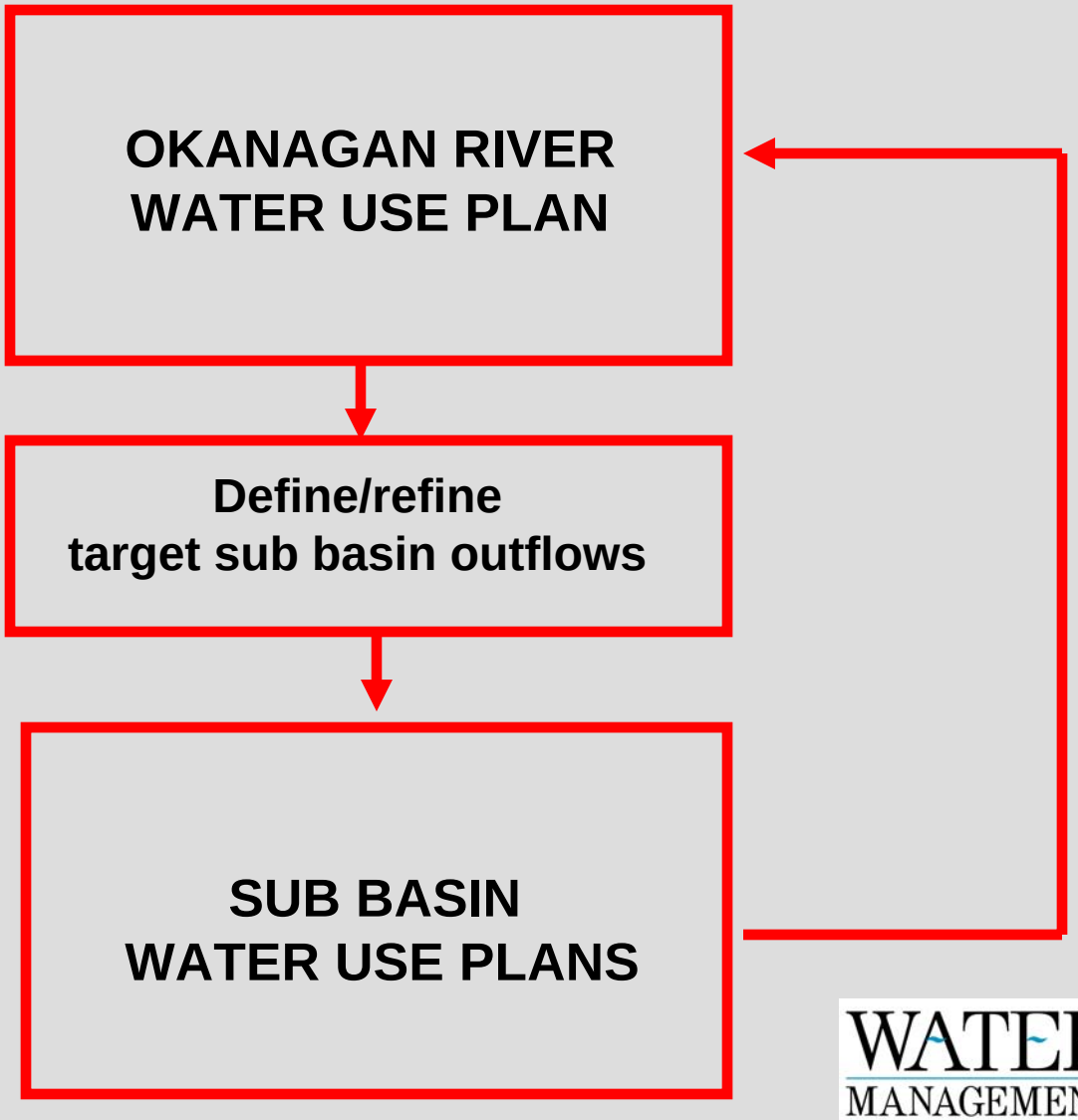


1. Define overall water balance for the Okanagan Basin
2. Establish required flow regime at basin outlet
3. Include 3-year drought scenario in the analysis
4. Determine required target contributions from each sub basin for a range of years including the design drought condition
5. Complete WUPs for each sub basin
6. Revisit Okanagan River Water Use Plan

Framework for Basin Wide Drought Management Plan



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“why should we promote conservation, if it just frees up more water for development and leads to overallocation”?

- Water **will** be used for development unless conservation measures are implemented within the context of a Water Use Plan
- Data shows that water was conserved in Summerland from 1977 to date as a result of improved irrigation practices. Water was not reallocated to fisheries use until a WUP was implemented.
- Without a WUP in Summerland, the conserved water was, by default, allocated to development rather than instream flows

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