

## An Assessment of Water Levels for Osoyoos Lake during Drought Years

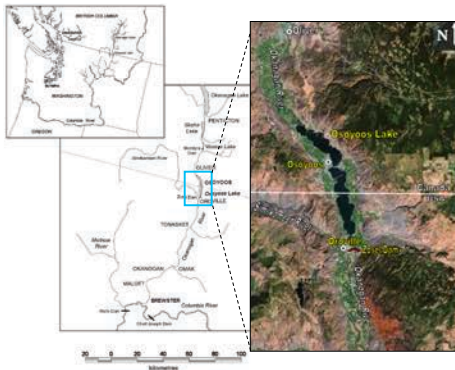


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- **John Arterburn** of the Confederated Tribes of the Colville Reservation, Fish and Wild Life Department for providing fisheries requirements related input; and
- **Susan Burgdorff Beery** from the Washington State Department of Ecology for providing instream flow requirements related input.

## Study Area



## Current Regulations for Osoyoos Lake

- International Joint Commission Order of Approval, 1982 (Lake Levels)
- British Columbia/Washington State trans-border flows, 1980 (Flow at Oliver, BC)
- Washington Administrative Code Instream flow requirements , 1988 (Flow at Oroville, WA)
- Washington State Department of Fish and Wildlife, fisheries flow requirements, 1990 (Flow at Oroville, WA)

## Key Questions:

- 1) What is the volume of water that will be needed from Osoyoos Lake by the year 2040?
- 2) What range of lake levels needed to meet demand? What about impacts of drought years?
- 3) Can wet and dry years be managed under a single set of lake elevation targets?

## Current and 2040s Water Demand?

- Residential, commercial and municipal demand
- Agricultural demand
- Instream/Fisheries requirements



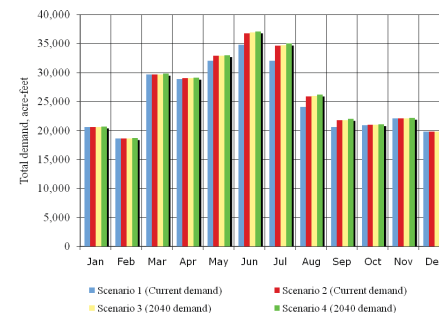
Scenario	Residential/Municipal/Commercial Demand	Agricultural Demand	Instream flow/ Fisheries Demand
Scenario 1 (Current demand)	Current	Current-irrigation demand	Max flow of WA Administrative Code instream flow and Fisheries criteria flow
Scenario 2 (Current demand)	Current	Water rights of 4 feet/acre	Max flow of WA Administrative Code instream flow and Fisheries criteria flow
Scenario 3 (2040 demand)	Year 2040 (Low population growth scenario)	Water rights of 4 feet/acre	Max flow of WA Administrative Code instream flow and Fisheries criteria flow
Scenario 4 (2040 demand)	Year 2040 (High population growth scenario)	Water rights of 4 feet/acre	Max flow of WA Administrative Code instream flow and Fisheries criteria flow

## Current and 2040s Water Demand?

1	2	3	4	5	6	7
Month	Current population demand (acre-feet)	2040 demand; low growth rate (acre-feet)	2040 demand; high growth rate (acre-feet)	WA and BC agricultural demand (acre-feet)	WA and BC Agricultural 4 ft/acre water right demand (acre-feet)	Instream/ fisheries; maximum criteria (acre-feet)
Jan	76	104	180	0	0	20,500
Feb	76	104	180	0	0	18,500
Mar	76	104	180	0	0	29,600
Apr	76	104	180	120	180	28,700
May	91	125	216	2,260	3,220	29,600
Jun	228	313	539	4,830	6,890	29,700
Jul	228	313	539	6,020	8,620	25,800
Aug	228	313	539	4,170	5,970	19,700
Sep	197	271	467	2,620	3,760	17,800
Oct	91	125	216	260	360	20,500
Nov	76	104	180	0	0	22,000
Dec	76	104	180	0	0	19,700
Total	1,519	2,087	3,594	20,280	29,000	282,100

Total Water Demand (acre-feet)

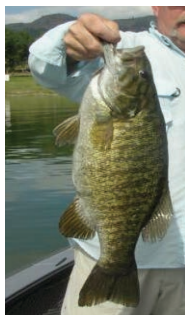
## Current and 2040s Water Demand?



Total demand for the four scenarios (acre-feet)

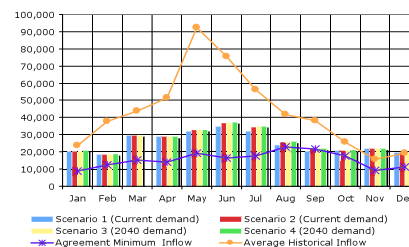
## Take Home Message

- Instream and fisheries flows requirements account 90% of the total demand



## Range of lake levels to meet demand?

- Normal Years (15 out of 22 years between 1987-2008) – Target instream flows shown



## Range of lake levels to meet demand?

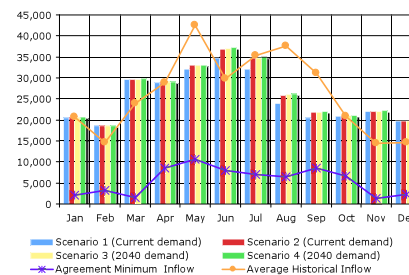
- Drought Years (1988, 1992, 1993, 1994, 2001, 2003 and 2005)

1	2	3	4	5	6	7	8
				[2/4]*100	[4-2] / Lake Area	[3/4]*100	[4-3] / Lake Area
Month	Total Minimum Inflow (acre-feet)	Total Average Historical Inflow (acre-feet)	Total Current Demand (Scenario 1)	% Demand Met by Agreement Inflow	Lake Storage to meet Agreement Deficit (ft)	% Demand Met by Historical Inflow	Lake Storage to meet Historical Deficit (ft)
Jan	2,000	20,700	20,500	10%	3.0	101%	0.0
Feb	3,300	14,600	18,600	18%	2.5	78%	0.5
Mar	1,600	23,900	29,700	5%	5.0	80%	1.0
Apr	8,600	28,900	28,900	30%	3.5	100%	0.0
May	10,700	42,600	32,000	33%	3.5	133%	0.0
Jun	8,000	29,800	34,800	23%	4.5	86%	1.0
Jul	7,100	35,400	32,000	22%	4.5	111%	0.0
Aug	6,500	37,600	24,000	27%	3.0	157%	0.0
Sep	8,600	31,100	20,600	42%	2.0	151%	0.0
Oct	6,600	20,900	20,800	32%	2.5	100%	0.0
Nov	1,300	14,400	22,100	6%	3.5	65%	1.5
Dec	2,200	14,700	19,700	11%	3.0	75%	1.0

Demand versus Inflow

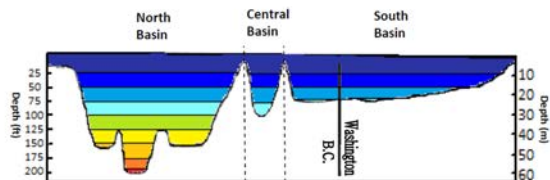
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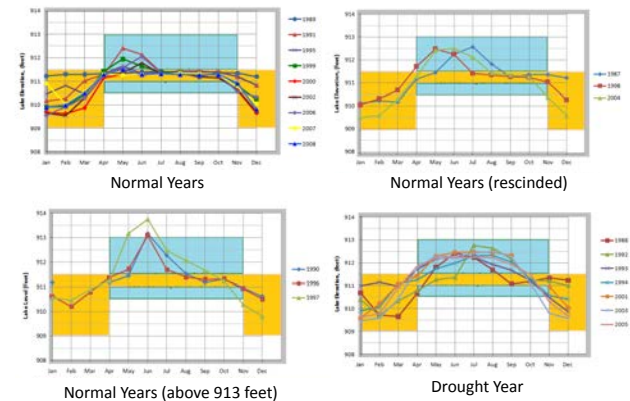


## Take Home Message

- The inflows are the primary water supply to Osoyoos Lake.
- Osoyoos Lake has limited storage capacity to accommodate all demands.



## Managed under a single set of lake elevation targets?



## Take Home Message

- Manage Osoyoos Lake based on flows rather than elevation targets.



## Stakeholders affected by lake levels?

Stakeholders	Unacceptable Lake Levels	Impact
Residents/Property Owners	> 912.5 feet in summer	Erosion issues
	< 912.0 feet in summer	Not optimal for boating
	> 909.0 feet in winter	Ice pressure causes damage to the shore line
	> 909.0 feet in winter	Does not help control milfoil
Irrigators	Changes in lake levels	Causes inconvenience in terms of raising and lowering the docks.
	< 910.5 feet in summer	Water right will be terminated
	> 912.5 feet in summer	Floods camp sites and results in mosquito infestation
	< 912.0 feet in summer/winter	Can Lead to safety issues
Boaters	Flow not lake level	Generally concerned with flow magnitudes for fishes more than lake level itself
	Varies	Different species residing in the lake could have different elevation requirements as part of their life cycle. One optimal lake level for all species may not be practical
Fisheries and ecological needs stakeholders		
Regulators	< 913.0 feet in summer	If the Order prescribes lesser elevation, future uncertainties may not be met. Hence the option of keeping lake levels as high as possible with least detrimental impact to stakeholders, especially during drought years is necessary.

## Take Home Messages

- The elevations can be managed at levels desired by stakeholders affected by lake levels.
- Holistic system-wide water management within the basin must be used to meet demands.



## Conclusions

- Instream and fisheries flows requirements account 90% of the total demand.
- Osoyoos Lake has limited storage capacity to accommodate all demands. Management of upstream inflows critical.
- The elevations can be managed at levels desired by stakeholders affected by lake levels.
- Manage Osoyoos Lake based on flows rather than elevation targets – more certainty.
- Future research for other alternative sources of water is needed. Too many unknowns at this time.

## Thank You

- Questions?
- Comments?

