

# Water: Can Alberta do more with less

## Economic and/or Market Based Instruments to Allocate Water and Promote Conservation

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# Old wine on new bottles

- What are economic instruments?
  - Economic signals to influence human behavior so that they reflect current values
- Economic instruments have been widely used
  - Cheap or free water and land
  - Generous allocation of water
  - Government bailing irrigation out
  - Government guaranteeing loans
  - Government paying for upgrade and maintenance
  - Subsidies for land clearing, fertilizer etc



# Why have they been used until now

- In pursuit of government policy
  - Expand irrigation
  - Closer settlement
  - Increase food production
  - Increase export earning
- The level of water use for irrigation today is a result of past economic instruments
- Reflecting values, priorities and goals of the time



# Changing priorities, values and goals

- Why all the recent talk about economic and market based instruments?
- Water is increasingly scarce
- Correct problems created by past behavior
- Change water users' behavior to reflect current values, priorities and goals
- Water from social to economic good



# The Alberta Context

## Water for Life Strategy – 2003 and 2008

- Improve the efficiency and productivity of water use by 30%
- evaluate the merits of using economic instruments to meet water conservation and productivity objectives
- implement economic instruments as necessary to meet water conservation and productivity objectives




# Conflicting objectives

- Is increasing water use efficiency/productivity and water conservation the same?
- In Alberta the answer is NO
- Increased water use efficiency is likely to cause increased productivity but not water conservation
- The challenge is to find economic instruments which encourage both



# Back to economic instruments

- What are they?
    - Water markets
    - Subsidies
    - Pricing
    - Ecological goods and services
  - Why are there so few examples
    - Entrenched practices and values
    - Concern over ‘water as an economic good’
  - 76% of district board members and managers do not believe in economic instruments
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# Percentage of respondents who agree with the use of economic instruments

Economic Instrument	Percentage of respondents by group			
	Total	Bow	Central	Southern
In General	24	31	27	17
Water Rights Transfers	8	14	0	9
Water Allocation Transfers	15	21	15	9
Fixed Price for Water	13	14	0	27
Price Based on Volume Used	13	7	23	9
Subsidize Producers to Improve Irrigation Equipment	21	21	23	18
Cash Incentives to Conserve Water	15	14	23	9

n values are as follows: total = 39, Bow = 14, Central = 13, Southern = 11

From: Bjornlund, H.; Nicol, L. and Klein, K. (2007): Challenges in Implementing Economic Instruments to Manage Irrigation Water on Farms in Southern Alberta. *Journal of Agricultural Water Management* 92, 131-141

# Subsidies - more efficient irrigation

- Likely to result in increased use of water and reduced return flow - not conservation
- Literature suggest 60% subsidy needed
- Many argue against subsidies if the objective is water conservation
- Only conservation if area under irrigation reduced or fewer applications or less water intensive crops
- Maybe if the objective is to reduce cost rather than increase production.



# Reasons for Improving Irrigation Water Management

Factor	Private Irrigators		District Irrigators	
	Imp	Most Imp	Imp	Most Imp
To improve crop yield and quality <sup>1</sup>	64	30	91	56
To reduce energy costs <sup>1</sup>	46	24	73	13
To reduce water use <sup>1</sup>	41	9	68	9
To reduce labor input <sup>2</sup>	55	27	69	16
To reduce fertilizer or pesticide losses <sup>1</sup>	14	1	63	1
To reduce soil erosion <sup>1</sup>	21	1	59	2
To irrigate more land with the same water <sup>1</sup>	26	3	73	1

<sup>1</sup> Sign. different at the 0.01 level; <sup>2</sup> Sign. different at the 0.10 level

From: Nicol, L; Bjornlund, H. and Klein K. (forthcoming): Towards Sustainable Irrigation – Economic Instruments to Save and Reallocate Water in Private and District Irrigation in Alberta, Canada. In Bjornlund, H. Ed. *Incentive and Instruments for Sustainable Irrigation*, WITPress, Southampton

# Level of Subsidization Based on 65 ha

(Percent of irrigators)

Improve existing equipment			Invest in new low pressure pivot		
Level	Private	District	Level	Private	District
<\$5,000	23	18	<\$10,000	12	20
\$5,000-\$10,000	18	47	\$10,000-\$30,000	16	49
>\$10,000	59	34	>\$30,000	68	31

From: Nicol, L; Bjornlund, H. and Klein K. (forthcoming): Towards Sustainable Irrigation – Economic Instruments to Save and Reallocate Water in Private and District Irrigation in Alberta, Canada. In Bjornlund, H. Ed. *Incentive and Instruments for Sustainable Irrigation*, WITPress, Southampton



# EID and subsidies

- EID subsidize conversion to more efficient irrigation technology
- From flood to centre pivot \$60 per acre and the district then offers to buy 13 acres of water right for \$700 per acre.
- Total payment \$17,020 or 15-20% of cost
- If farmer don't sell the 13 acres – \$4,020
- Less than the literature suggests but consistent with our findings



# EID and subsidies

- Area under low pressure centre pivot incr by 50%
- 50 – 60 conversions per year
- Some irrigators will be allowed to increase their irrigated area
- Saved 8,000 acre feet, some will be used to further increase
- Significant increase in water use efficiency and productivity
- So EID is to be congratulated



# EID and subsidies

- However, no or very little water conserved
- No more water left in the rivers
- Return flow reduced, reducing river flows and downstream supply
- If the government had purchased the 13 acres for the environment then increased efficiency, productivity and conservation



# Pricing

- Probably most controversial
- Literature suggest that increased water prices will not result in reduced water use
- Only if prices is very high
- In Alberta need to consider how much prevailing production can pay
- High price can be an extra incentive to sell water in the market



# Water markets

- Community concern
  - Irrigator concern
  - Irrigation district concern
  - Irrigation community concern
  - Environmental concern
- Separation of economic, environmental and social water through planning processes
- Trading only in economic water



# Water markets

- Complexity / challenges
  - Unused water licenses
  - Separation of land and water
  - Separation of ownership and use rights
  - Metering of water use
  - First in time, first in right
  - Market intermediaries, flow of information
  - Restrictions on trade and transfers processes
  - Consumptive rights

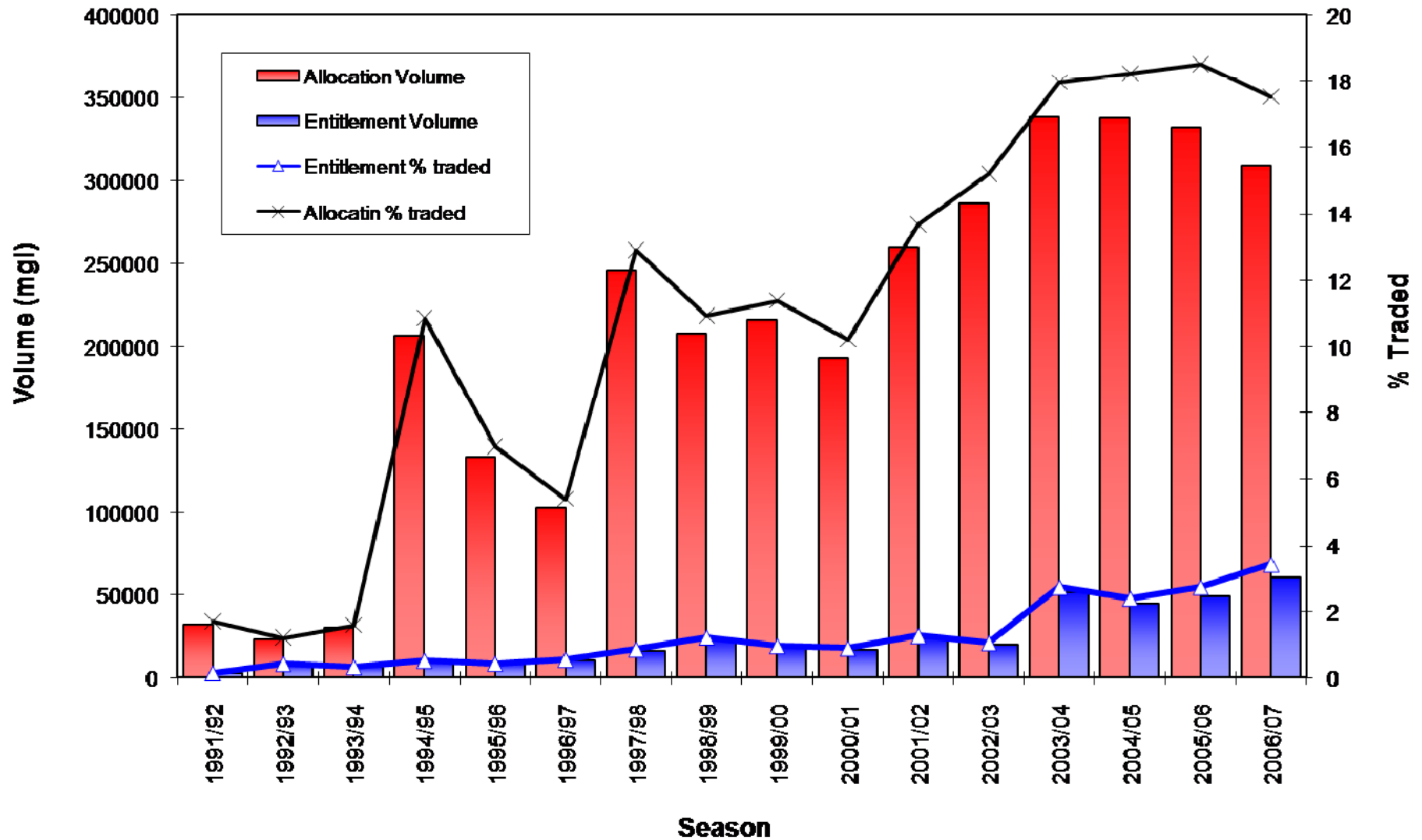


# Water markets and the environment

- Government could
  - buy water and leave it in the river
  - allow NGO's to own water licenses for in-stream purposes
  - construct offers to buy to also meet EGS and structural adjustment objectives
  - levy existing water users and use proceeds to finance purchase



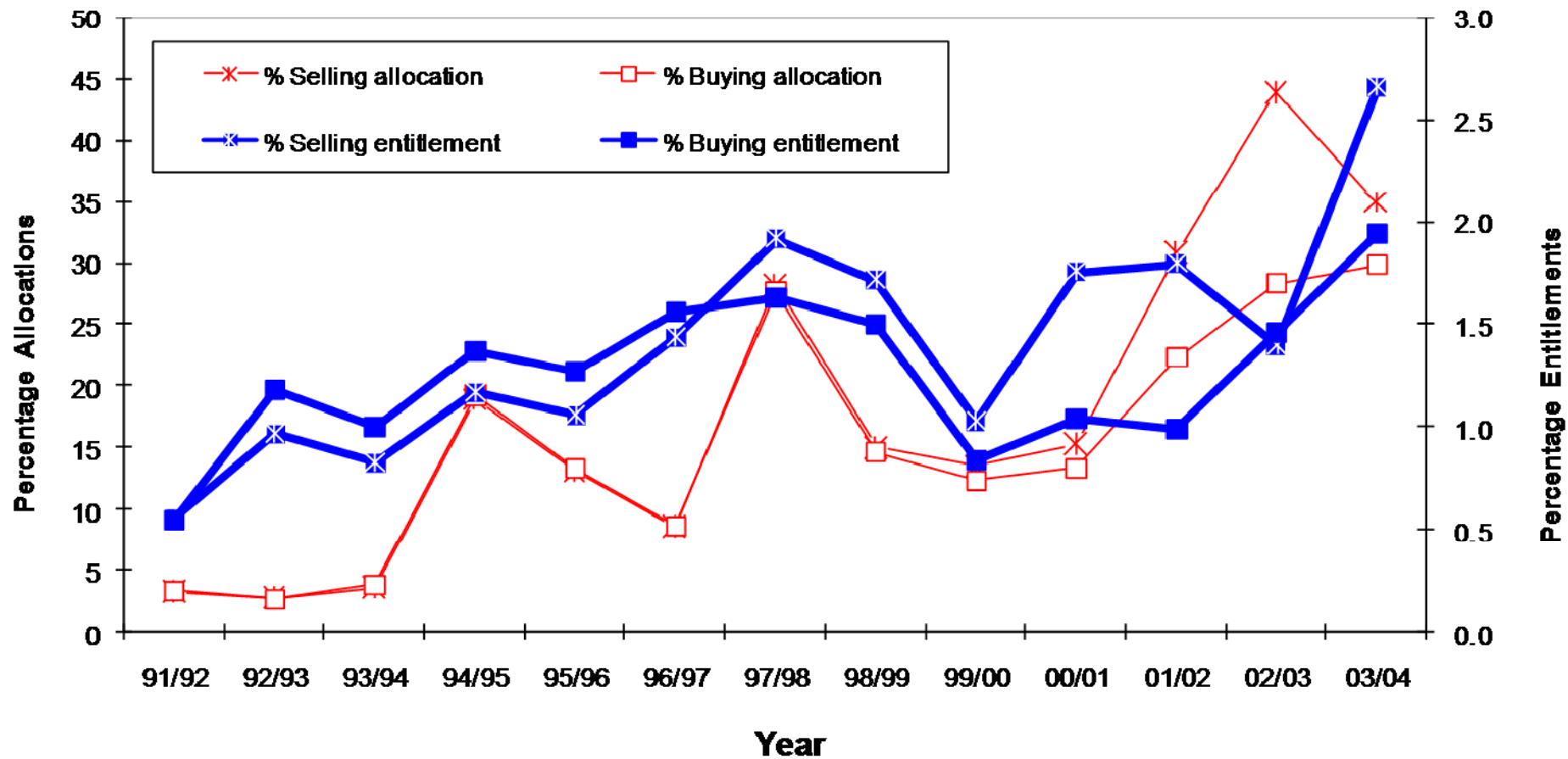
# Development of trading in entitlement and allocation markets



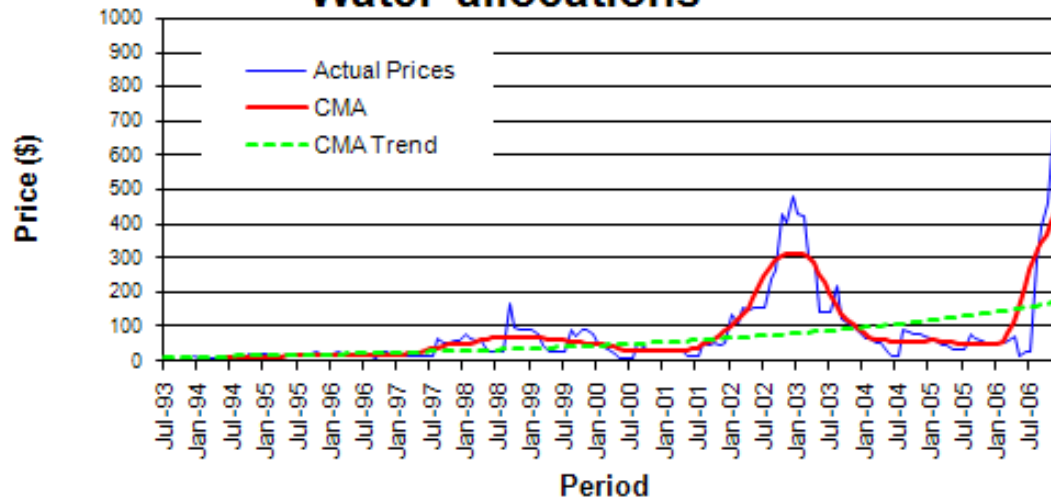
**Table 1 Opening and closing allocations 1991 to 2008**

Year	Goulburn System			Murray System		
	Closing allocation	Opening allocation	% of use by trade	Closing allocation	Opening allocation	% of use by trade
1995/96	150	150	7	200	150	3
1996/97	200	200	4	200	200	3
1997/98	120	120	9	130	130	13
1998/99	100	40	13	200	95	5
1999/00	100	35	14	190	100	8
2000/01	100	48	16	200	200	2
2001/02	100	55	18	200	200	5
2002/03	57	34	24	129	129	16
2003/04	100	0	16	100	16	18
2004/05	100	0	18	100	42	22
2005/06	100	0	22	142	82	14
2006/07	29	0	37	95	76	20
2007/08	45	0	29	33	0	36

**Figure 1: % of farm businesses buying and selling allocations and entitlements annually**



### Water allocations

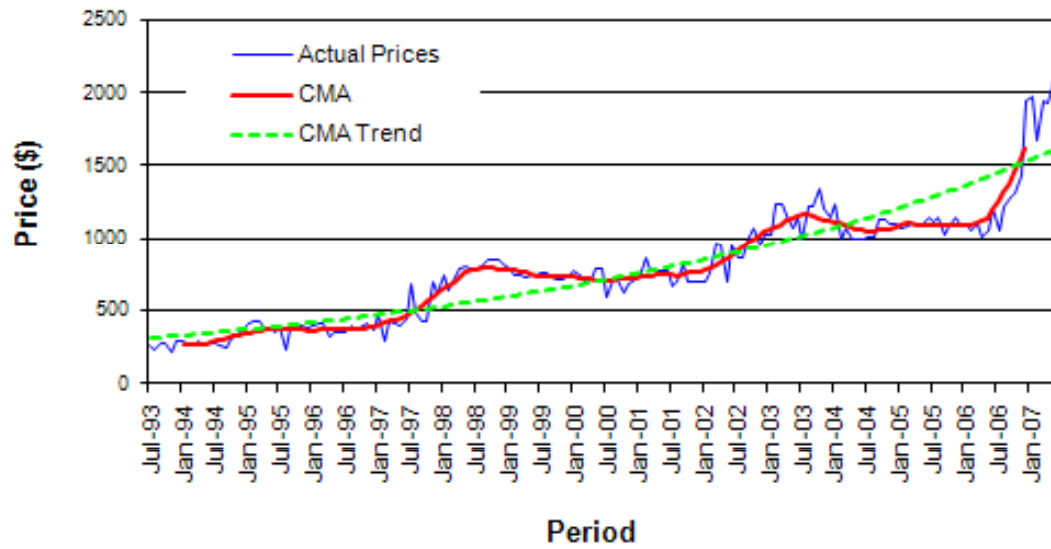


Monthly Growth **1.5%**  
Annual Growth **20.2%**

#### Seasonal Indices

Jan	1.237
Feb	1.078
Mar	0.934
Apr	0.820
May	0.542
Jun	0.551
Jul	0.543
Aug	1.233
Sep	1.238
Oct	1.307
Nov	1.274
Dec	1.243

### Water entitlement



Monthly Growth **1.0%**  
Annual Growth **12.3%**

#### Seasonal Indices

Jan	1.052
Feb	1.009
Mar	1.045
Apr	0.998
May	0.970
Jun	0.997
Jul	0.978
Aug	0.951
Sep	0.982
Oct	0.989
Nov	1.016
Dec	1.013

# Conclusions

- Limited support of economic instruments within both irrigation and environmental sectors
- Very weak support for water markets
- Limited government and irrigator support for reallocation of water
- Strong argument for more education and marketing within all sectors of the community
- Maybe opportunities for the use of subsidy under the right conditions

# Conclusions

- Water market reforms are needed
  - separating land and water
  - separating ownership and use
  - clearer guidelines of what is likely to be approved
- Reconsider first in time first in right.
- Extractive v. consumptive rights
- Complete the planning process and determine in-stream flow needs
  - Include community and cultural needs?
  - Ensuring that these needs are met

