ACHIEVING A SUSTAINABLE LOS OSOS VALLEY WATER BASIN

(February 2009 Draft Update)

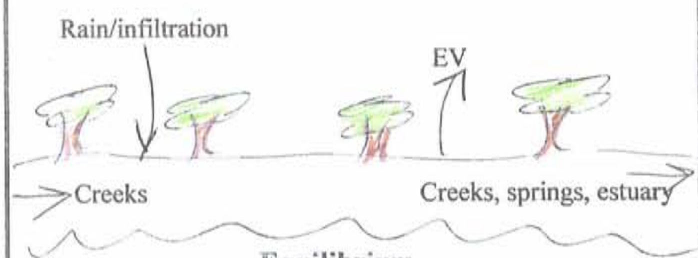
Framework for a 21st Century basin management plan integrating
the Los Osos Wastewater Project (LOWWP)

Prepared by Keith Wimer
Los Osos Sustainability Group
Los Osos, CA 93402
kwimer1@gmail.com

Basin Balance—Draft

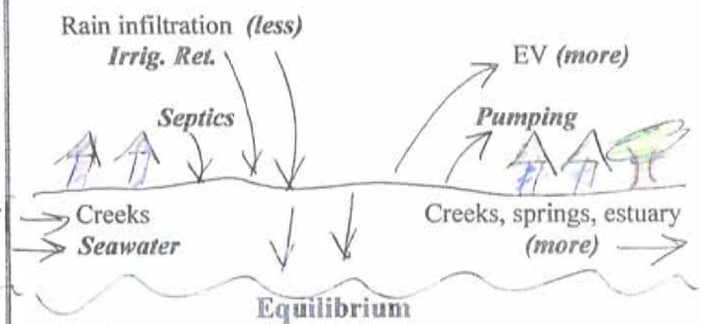
A look at alternatives and their effect on water balance

Predevelopment—Balanced Closed System



(Established over millions of years. **Basin deficit:** 0)

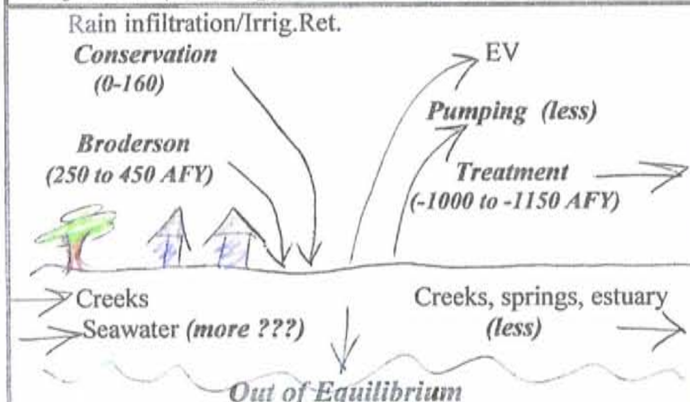
Current—Overdraft w/seawater intrusion (SWI)



(Established over 30 years. **Basin deficit: -100 AFY to -300 AFY)**

Note: 200 AFY is added to current deficit estimates as a margin of safety.

Project 2b (Start up) —Overdraft/SWI—

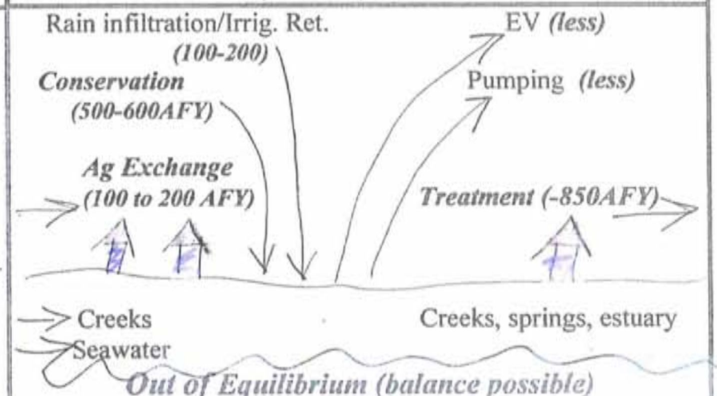


(Basin deficit: -500 to -1200 AFY deficit)

(Recycled water remaining (spray fields): 540 to 900 AFY)

Note: Assumes 1150 flows. DEIR states 160 AFY of conservation will not take full effect until 2020 (shown as range), and 250 AFY will be discharged at Broderson initially (also shown as range).

Sustainable Plan (Phase I)

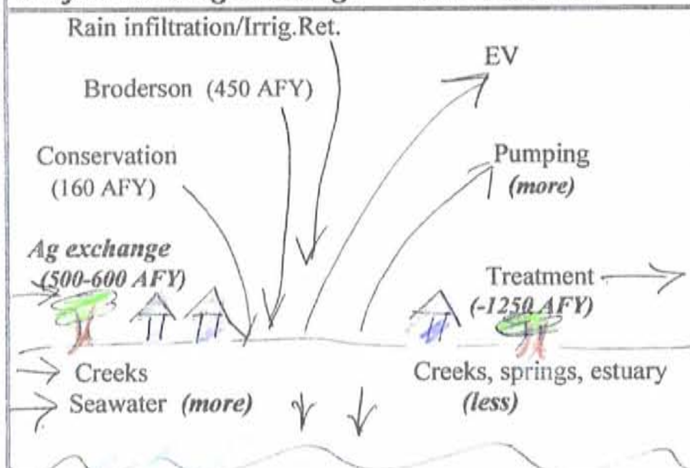


(Basin deficit: -450 to +50 AFY)

(Recycled water remaining (ag/crop/storage): 650 to 750 AFY)

Note: Assumes 850 AFY of flows, with conservation (75% of 1150). More is possible. Subtracts existing deficit of 100-200 AFY, for "Basin deficit."

Project 2b w/ ag exchange —Overdraft/SWI—

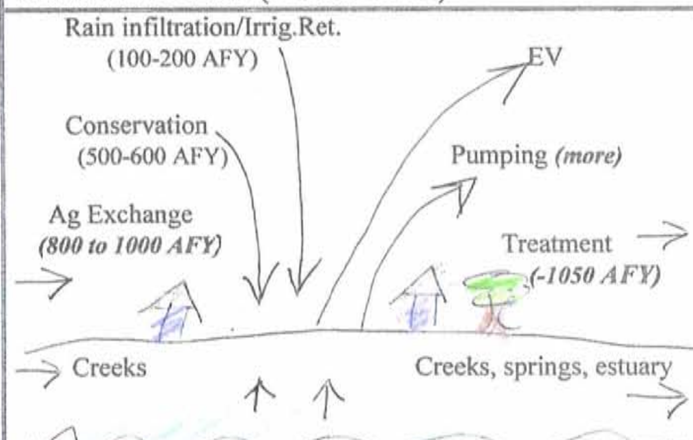


Out of Equilibrium and out of balance

(Basin deficit: -150 to -450 AFY deficit)

Note: Assumes flows of 1250 AFY with conservation (1400-160 AFY) and water available for ag exchange is reduced by recycled water used for Broderson, with less than 1:1 exchange. Subtracts existing deficit of 100-200 AFY, for "Basin Surplus."

Sustainable Plan (Phases I & II)



Equilibrium & balance with sea level rises

(Basin surplus: 50-650 AFY)

(Ample water for uncertainties; may produce surplus.)

Note: Assumes 1050 AFY of flows with conservation, (75% of 1400) and exchange produces 800-1000 AFY of ag water with less than 1:1 rate. Subtracts existing deficit of 100-200 AFY, for "Basin Surplus."

How the plan provides benefits to stakeholders and addresses potential concerns

Public	➢ One-on-one education during water auditor visits to explain purpose and benefits of the plan ➢ Offers homeowners a menu of choices to meet targets ➢ Provides amenities such as new appliances and landscaping enhancements ➢ Generous rebates and/or no out-of-pocket costs ➢ Ensures an affordable water supply indefinitely, and may provide a revenue source in the future
Water purveyors	➢ Recommends cooperation/coordination with water purveyors ➢ Offers opportunities for grant funding and other ways the plan can be cost-effective to operate ➢ Offers opportunities for data collection, outreach, and positive PR ➢ Ensures a sustainable basin and secure water source ➢ Enables capital investments to be used effectively and profitably—e.g., denitrification to be used on ag exchange water if pumping is reduced in upper aquifer
County	➢ Addresses reliability concerns with a tops down management approach (plan administrator) ➢ Addresses reliability concerns by being self-correcting—water auditors provide feedback from field to administrator; strategies adjusted ➢ Addresses reliability concerns by the use of Water Sense-recommended appliances/fixtures ➢ Coordinates with water purveyors ➢ Provides an opportunity to leverage additional grant funding needed for the ISJ basin process and influence the process toward a sustainable basin ➢ Anticipates emerging laws and regulations, adopting a proactive approach that reduces future costs ➢ Offers opportunities for data collection, outreach, and positive PR ➢ Avoids water shortages in County ➢ Avoids sunk costs, possible liability and other expense for controversial components of the LOWWP possibly abandoned later (Broderson, spray fields) ➢ Avoids duplicated costs and expensive infrastructure

(Draft)

Achieving a Sustainable Los Osos Valley Water Basin

Phase I (Safely avoids impacts from the LOWWP, focuses on Prohibition Zone, assumes about 850 AFY of wastewater flows with conservation, and assumes tertiary treatment)

Method/target	***Strategies***	***Implementation***	***Timeframe***
Indoor conservation 25% (250-350 AFY)	Water auditors, leak detection/repair, retrofits, recirculators	BOS crafts ordinances and coordinates with purveyors in ISJ to implement ordinances, apply for grants, hire water auditors, contract with providers, farmers, etc.	A.S.A.P.
Outdoor conservation 50% (250-300 AFY)	Water auditors, leak detection/repair, xeriscape	(above)	A.S.A.P.
LID recharge 100-200 AFY	Onsite LID, graywater, and integrated systems; Community infiltration systems	(above) Coordinate with LID Center for grant assistance, leverage with LOWWP	A.S.A.P.
Ag Exchange 100-200 AFY		(above) Contracts reward early participants	A.S.A.P.
Ag In lieu/Urban Reuse 100-700 AFY		(above) Contracts have sunset clauses/time when ag exchange begins and include on-site storage	A.S.A.P. (Make contacts, begin negotiations)
Storage 300-400 AFY (flow for winter months)		Lease land/exchange water for storage facility/pond, use numerous ponds	A.S.A.P. (Make contacts, begin negotiations)
Community Crop		Lease/cooperative arrangement with farmers to grow crop	A.S.A.P. (Make contacts, begin negotiations)

Phase II (Stops seawater intrusion with some buildout, begins to build system capacity for sea level rises, assumes about 900 AFY of wastewater flows with conservation—can be concurrent with Phase I)

Method/target	***Strategies***	***Implementation***	***Timeframe***
Ag Exchange 700-800	(same as above)	Maximize	Within 7 years
Ag In Lieu/Urban Reuse 100-200 AFY	(same as above)	Maximize urban reuse, reduce in lieu	Within 7 years
Storage 300-400 AFY	(same as above)	Adjust/shift to farmers as needed/possible	Within 7 years
Community Crop	(same as above)	Adjust/phase out as needed	Within 7 years

Phase III (Builds system capacity/resiliency with full buildout, prepares for uncertainties and sea level rises, focuses outside Prohibition Zone, may produce surplus water—Conservation can be concurrent with Phases I & II)

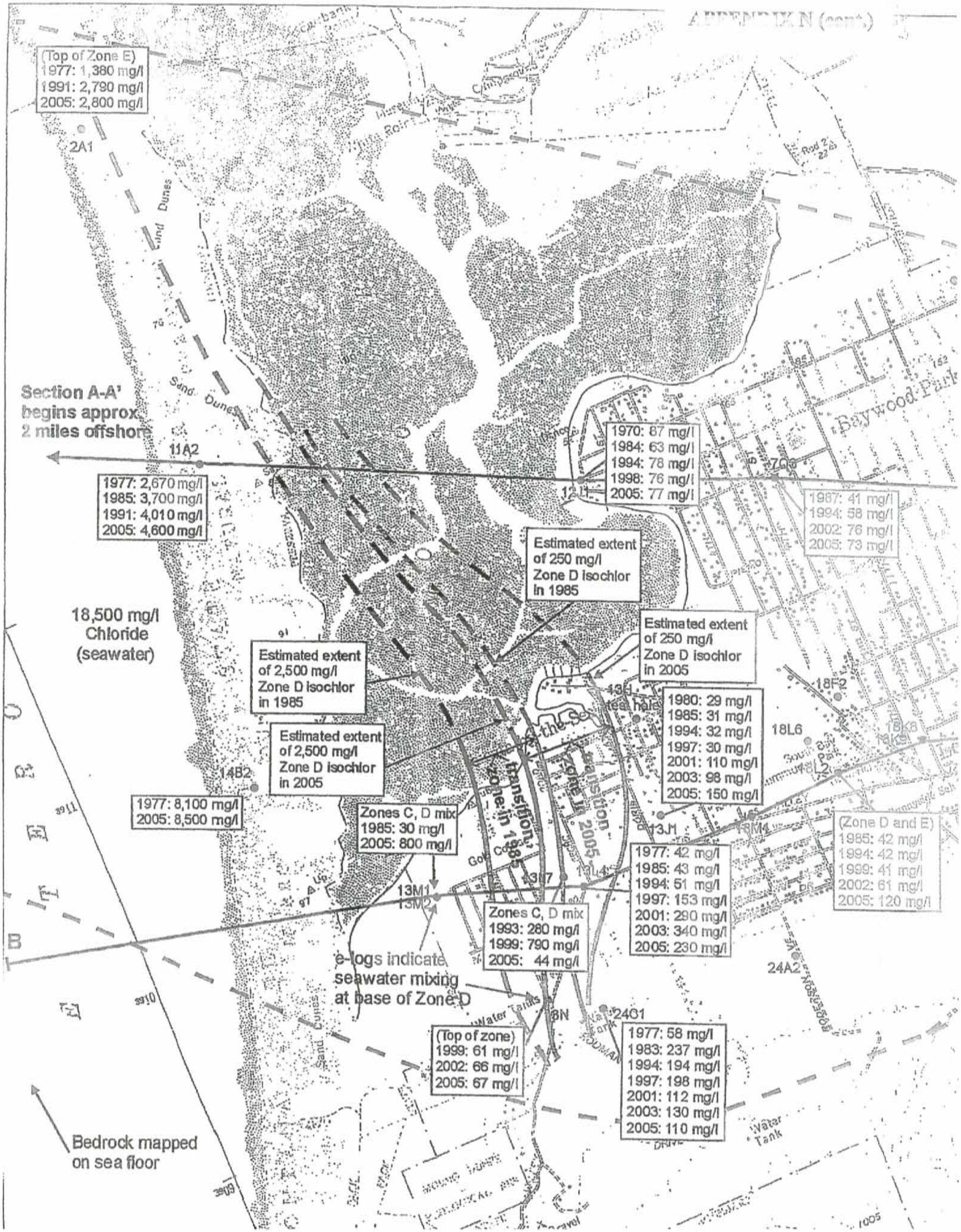
Method/target	***Strategies***	***Implementation***	***Timeframe***
Conservation indoor & outdoor (100-500 AFY)	(same as above)	(same as above)	Within 7 years
Develop interbasin agreements, if surplus water		Under strict restrictions to maintain a budget surplus (reserve capacity) within the basin	

COSTS & FUNDING (Generalized estimates based on plan, assumes responsibility will be apportioned by water use/SWI mitigation. See plan for further detail, e.g., p. 17)

Components	***Approximate Costs***	***Funding Sources***	***Who pays***
Phase I	$13-18 million (Adds a contingency of about $5 million to plan estimates)	Grants $5-10 m, rebates $1-2 m, Project $10-12 m (in lieu of Project 2b costs—spray fields, added land costs, Broderson leach fields, etc.), 218 for undeveloped properties/impact fees, rates and charges.	PZ residential $7-9 m, PZ Class II $2-5 m, outside PZ $2-4 m
Phases II & III	$4-5 million	(same)	Future development $4-5 m

Alternatives for Balancing the Basin
(Prioritized list using best-value indicators)

Method	Ways it balances water budget	Quantity of source/ potential for balance and surplus	Quality of source/benefits to water quality	Reliability of source	Low energy and chemical use/cost savings (e.g., for pumping, treatment)	Flexibility (e.g., to protect ecosystems)	Regulatory support	Seawater intrusion mitigation effectiveness/ certainty	Provides co-benefits	Low lifecycle costs (not including energy)	Potential for grant, and cost-mitigations)
Conservation	(One) Reduced aquifer pumping (allows more natural recharge per year)	**Very good**—with a well-designed plan—	**Best**—Extends use of purest source, reduces turnover	**Very good**—with a well-designed plan—	**Lowest**—significantly reduces energy for pumping of water and wastewater, reduces heating of water, no water treatment required, reduces facility size	**Good**—by reducing pumping of upper and lower aquifers as needed	**Very Strong**—growing number of laws/regs calling for increased conservation	**Maximum**	**Yes**—Local jobs, homeowner amenities, community amenities	**Good**—with a well-designed program	**Best**—considered the most cost-effective source of new water, rebates available, high grant potential
Rainwater harvesting/ LID recharge	(Three) Reduced aquifer pumping, increased natural recharge, less EV	**Good**—depends on rain and size/design of system—very good if storms intensify causing more run off, reliability can be enhanced with storage	**Very good**—recharges with clean rainwater	**Poor to good**—depends on rain—very good if storms intensify causing more run off, reliability can be enhanced with storage	**Very good**—if passive system, some energy use if pump system	**Very good**—can be designed and located where most needed and adjusted	**Very strong** growing number of laws/regs requiring LID for recharge and storm water control	**Maximum** for reduced pumping, less for aquifer recharge	**Yes**—Storm water pollution control, home & community landscaping / passive recreational amenities	**Very good** for passive systems, higher costs for rainwater tanks systems	**Very good**—LID uses cost-effective designs, grant funding likely especially as part of integrated plan
Integrated rainwater, xeriscape, graywater, system (see p. 11)	(Three) Reduced aquifer pumping, increased natural recharge, less EV	**Very good**—could reduce outdoor potable water use to zero	**Poor to good**—graywater has contaminants but they are diluted and flushed by rainwater periodically	**Very good**—could be a self-cleaning, self-sustaining system, reducing outdoor potable water use to zero	**Very good**—washing machine pumps graywater to system rather than sewer, no increase in normal energy use	**Yes**—do not have to be installed in sensitive & high ground-water areas	**Becoming stronger**—laws being proposed to promote use, local discretion being used more	**Maximum** for reduced pumping, less for aquifer recharge	**Yes**—Storm water pollution control, home & community landscaping / passive recreational amenities	**Very good**—could be a self-cleaning, self-sustaining system,	**Good**—cost-effective design, grant funding is likely if supported by local authority and part of an integrated plan, could be a self-cleaning, self-sustaining system
Ag exchange	(One) Reduced aquifer pumping	**Good to very good**—large quantities, reliability good due to increasing demand from farmers	**Average to very good**—water quality depends on ag wells, can be treated if cost effective	**Good to very good**—large quantities from a diverse source, reliability good due to increasing demand from farmers	**Poor to good**—pumping can be reduced by placement of facilities, e.g., near town and user sites, above sites if possible, treatment depends on ag well quality	**Yes**—by reducing pumping of upper and lower aquifers as needed, and negotiating greater supply	**Strong**—trends support greater ag reuse (treatment levels may increase for some use—not as much as for direct recharge)	**Maximum** for reduced pumping (less for reduced pumping of aquifers east of LOV Creek)	**Yes**—reduces fertilizer use benefiting the watershed, reduces energy use by farmers	**Average to good**—depends on facilities and facility location	**Very good**—Grant funding likely if part of an integrated plan, costs are mitigated with trades and shared obligations
© K. Wimer,	**2009**										


(Top of Zone E)
1977: 1,380 mg/l
1991: 2,790 mg/l
2005: 2,800 mg/l
2A1
Sand Dunes
Section A-A'
begins approx.
2 miles offshore
11A2
1977: 2,670 mg/l
1985: 3,700 mg/l
1991: 4,010 mg/l
2005: 4,600 mg/l
1970: 87 mg/l
1984: 63 mg/l
1994: 78 mg/l
1998: 76 mg/l
2005: 77 mg/l
12J1
7Q3
1987: 41 mg/l
1994: 58 mg/l
2002: 76 mg/l
2005: 73 mg/l
Baywood Park
Estimated extent
of 250 mg/l
Zone D isochlor
in 1985
18,500 mg/l
Chloride
(seawater)
Estimated extent
of 250 mg/l
Zone D isochlor
in 2005
Estimated extent
of 2,500 mg/l
Zone D isochlor
in 1985
13H
18F2
1980: 29 mg/l
1985: 31 mg/l
1994: 32 mg/l
1997: 30 mg/l
2001: 110 mg/l
2003: 98 mg/l
2005: 150 mg/l
Estimated extent
of 2,500 mg/l
Zone D isochlor
in 2005
18L6
18K8
14B2
1977: 8,100 mg/l
2005: 8,500 mg/l
Zones C, D mix
1985: 30 mg/l
2005: 800 mg/l
transition zone in 1985
transition zone in 2005
13J1
18M1
(Zone D and E)
1985: 42 mg/l
1994: 42 mg/l
1999: 41 mg/l
2002: 61 mg/l
2005: 120 mg/l
13N7
13L4
1977: 42 mg/l
1985: 43 mg/l
1994: 51 mg/l
1997: 153 mg/l
2001: 290 mg/l
2003: 340 mg/l
2005: 230 mg/l
13M1
13M2
Zones C, D mix
1993: 280 mg/l
1999: 790 mg/l
2005: 44 mg/l
B
e-logs indicate
seawater mixing
at base of Zone D
24A2
Water Tanks
13N
24C1
(Top of zone)
1999: 61 mg/l
2002: 66 mg/l
2005: 67 mg/l
1977: 58 mg/l
1983: 237 mg/l
1994: 194 mg/l
1997: 198 mg/l
2001: 112 mg/l
2003: 130 mg/l
2005: 110 mg/l
Water Tank
Bedrock mapped
on sea floor