Ranch #2

Pond details:

- Licensed water right (1969)
- 70 acre-feet collection to storage
- 2 outlets, 3 uses: crop irrigation, livestock watering, dairy washdown

Regulatory requirements:

DIVERSION (to storage)	
Measurement	Weekly
Reporting	Annual (April) w/ monthly numbers Jan-Dec
Method	+/- 15% accuracy Equipment installed by "individual experienced with measurement & reporting"
USAGE	
Measurement	Monthly
Reporting	Annual (April) w/ monthly numbers Jan-Dec
Method	Reasonable means

Solution:

- ***Diversion*** measured by pressure transducer (water level sensor) at 18-hour intervals with data uploaded regularly to mobile device. Exported to spreadsheet for reporting.
  - ***Alternatives:***
    1. Use pressure transducer with direct-connect to laptop or "shuttle" on shore (-$)
    2. Connect pressure transducer to data logger (can also connect to meters), retrieve data via laptop (+$)
    3. Use staff gauge, record level changes every week (-$)

- ***Usage*** measured by flow meters on all (2) outlets from pond, recorded in datebook.
  - ***Alternatives:***
    1. Track total hours each pump operates per month, multiply by pumps' rates (gallons/minute) (-$)
    2. See #2 above – connect meters to data logger for combination with water level data (+$)

Devices	**Source**	**Price**
Onset HOBO MX2001 bluetooth water level sensor	www.onsetcomp.com	$840
840Netafim 4" IRT flow meter	Harmony Farm Supply	$790
Netafim 2" WMR flow meter	Harmony Farm Supply	$385
Miscellaneous materials: pvc pipe, air vents, hardware	Harmony Farm Supply Hardware stores (various)	$450
Monthly calendar		$15
	TOTAL:	**$2480**

Installation (water level sensor):

1. Acquire Depth Capacity Curve (DCC) from State Water Board
   - *Call or email the State Division of Water Rights: 916-341-5300, DWR@waterboards.ca.gov*
   - *Ask for the "Field File" for your water right. They will copy up to 30 pages for free*
2. Establish depth from spill to lowest typical drawdown – DCC can be helpful with this
3. Measure linear run from lowest point to dry, accessible onshore location
4. Order MX2001 with depth range matching #2 and cable length matching #3
5. Assemble 2" pvc line matching #3 above, perforate with holes
6. Pull sensor from shore end of pipe to bottom of pipe
7. Drop pipe into pond, keeping end off of bottom to avoid sediment
8. Connect transmitter to shore end of cable, attach to pipe
9. Cap shore end of pipe

10. Establish distance from current water level to spill height – this is "Reference Level"
11. Start sensor according to Onset instructions, enter Reference Level as a negative number

<u>Installation (flow meters):</u>

1. Establish minimum flow rate in pipe (gallons per minute)
2. Select meter to match pipe size, water quality and minimum flow rate
3. Install air vent upstream of meter in highest point of line
4. (If necessary) install foot valve or check valve upstream and downstream of meter
    - *<u>Note</u>: Many meters can be installed vertically with flow going upwards to achieve full pipe*

5. Install meter in straight stretch of pipe (note upstream and downstream straight-pipe requirements for your meter)