WESTERN LAKES MEETING

REGION 5 SUMMARY

PURPOSE AND OBJECTIVES

- SIERRA NEVADA FRAMEWORK ADAPTIVE MGT AND MONITORING PLAN.
- PSD RESPONSE OBJECTIVE FOCUSED ON LARGE STATIONARY SOURCES CAPABLE OF CONTAMINATING OR ACIDIFYING WATER BODIES.
- INITIAL CLASS I FOCUS

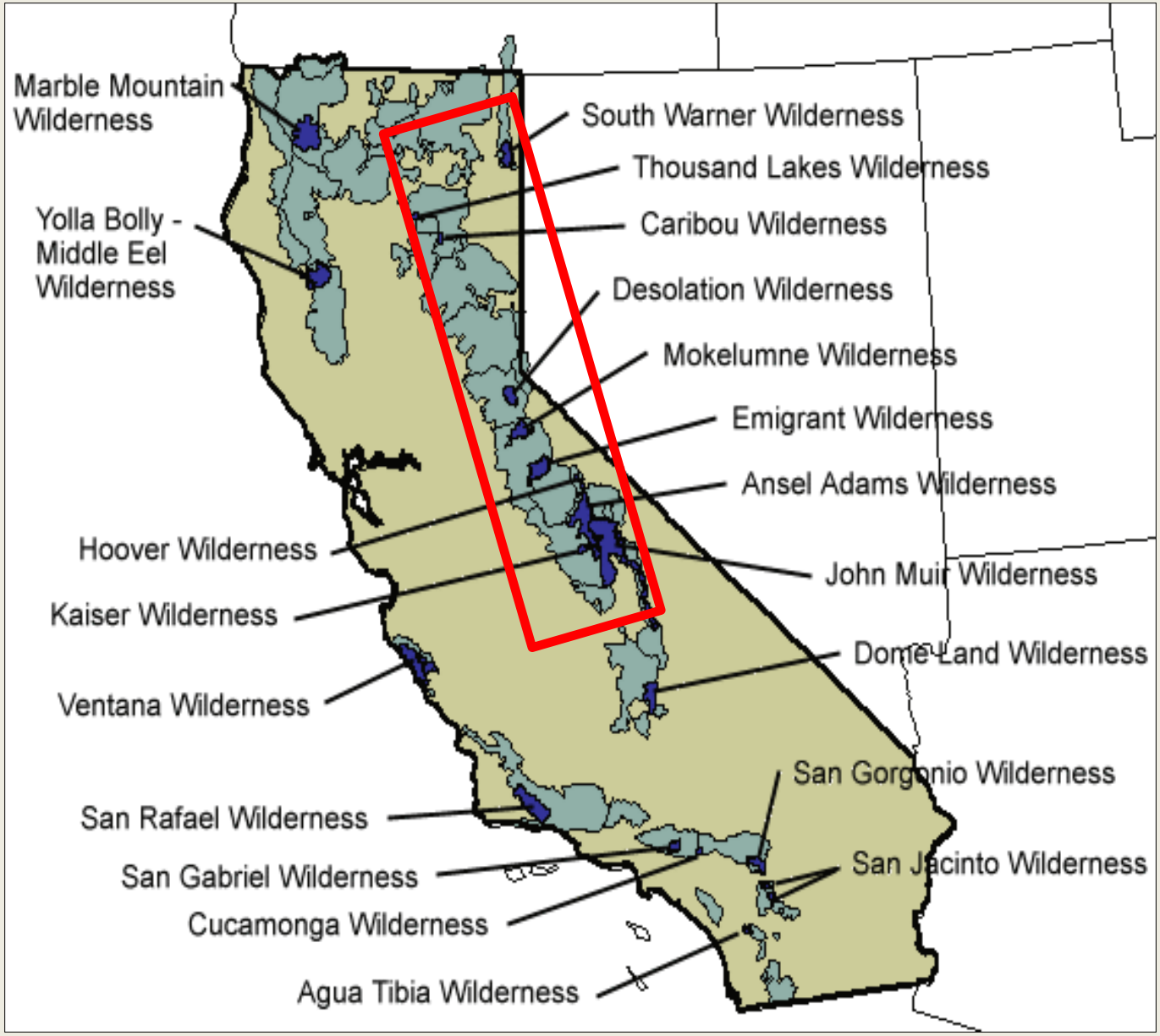
WHAT WAS THE GENERAL APPROACH?

- MONITORING EMPHASIS ON LOW ANC LAKES AS AN INDICATOR OF POTENTIAL ACIDIFICATION.
- USED EPA 1985 WESTERN LAKES SURVEY DATA TO DEVELOP A PREDICTIVE MODEL FOR LOW ANC. (BERG 2006)
- SYNOPTIC SAMPLING (FROM SHORELINE) OF OVER 300 PREDICTED LOW ANC LAKES TO VALIDATE MODELING AND I.D. MOST SENSITIVE CANDIDATES FOR LONG TERM MONITORING. Sampling protocol (Berg and Grant 2002)
- LONG TERM SAMPLING (FROM MID-LAKE) . Sampling protocols (Berg and Grant 2004)
- ZOOPLANKTON

WHEN AND WHERE WAS SAMPLING CONDUCTED?

- **11 NATIONAL FORESTS IN THE SIERRA NEVADA. 10 CLASS I AREAS AND 1 CLASS II WILDERNESS ADJACENT TO THE KINGS RIVER CRITICAL LOAD PILOT. LAKES RANGE FROM THE SIERRA NF IN THE SOUTH TO THE LASSEN NF IN THE NORTH.**
- **CANDIDATE LAKES WERE SELECTED FROM THE MODELING EXERCISE WITH SOME WEIGHTING TO LOGISTICS AND KNOWN EXPOSURE PATTERNS.**
- **22 LONG TERM LAKES HAVE BEEN SAMPLED FROM A MINIMUM OF 3 TO A MAXIMUM OF 13 YEARS.**

	Wilderness	Years of Data	Years Sampled
Powell	Emigrant	8	2000, 2002-08
Key	Emigrant	9	2000-08
Karls	Emigrant	6	2000, 2003-04, 2006-08
Long	Kaiser	8	2000, 2002-08
Patterson	S. Warner	7	2002-08
Mokelumne 14	Mokelumne	7	2002-08
	Mokelumne	7	2002-08
Hufford	1000 Lakes	7	2002-08
Caribou 8	Caribou	7	2002-08
Waca	Desolation	13	1985, 1991-93, 2000-08
Smith	Desolation	9	1985-86, 1991-92, 2000, 2005-08
Walton	Ansel Adams	5	2004-08
Dana	Ansel Adams	5	2004-08
Little East Marie	Ansel Adams	4	2004, 2006-08
Bullfrog		5	2004-08
East Chain	John Muir	3	2005, 2007-08
Treasure SE	John Muir	3	2005, 2007-08
Vermillion	John Muir	3	2005, 2007-08
Bench	John Muir	3	2005, 2007-08
East Wahoo	John Muir	3	2005, 2007-08
Cascade		3	2006-08
Moat		3	2006-08


Marble Mountain Wilderness
South Warner Wilderness
Thousand Lakes Wilderness
Yolla Bolly - Middle Eel Wilderness
Caribou Wilderness
Desolation Wilderness
Mokelumne Wilderness
Emigrant Wilderness
Ansel Adams Wilderness
Hoover Wilderness
John Muir Wilderness
Kaiser Wilderness
Dome Land Wilderness
Ventana Wilderness
San Gorgonio Wilderness
San Rafael Wilderness
San Jacinto Wilderness
San Gabriel Wilderness
Cucamonga Wilderness
Agua Tibia Wilderness

HOW WERE CANDIDATE LAKES SELECTED?

- TARGETED LOW ANC LAKES
- USED EPA 1985 WESTERN LAKES SURVEY DATA TO DEVELOP A PREDICTIVE MODEL FOR LOW ANC. (BERG 2006)
- SYNOPTIC SAMPLING (FROM SHORELINE) OF PREDICTED LOW ANC LAKES TO VALIDATE MODELING AND I.D. MOST SENSITIVE CANDIDATES FOR LONG TERM MONITORING.
- CANDIDATE LAKES WERE SELECTED FROM THE MODELING EXERCISE WITH SOME WEIGHTING TO LOGISTICS AND KNOWN EXPOSURE PATTERNS.

WHICH PARAMETERS WERE SAMPLED?

- LOCATION
- TEMPERATURE PROFILE
- WATER CHEMISTRY SAMPLE
- TRANSPARENCY
- ZOOPLANKTON

HOW WAS THE DATA ANALYZED?

- WATER CHEMISTRY ANALYZED AT THE ROCKY MTN LAB.
- REGIONAL ANALYSIS BY ANNUAL CONTRACT WITH NEIL BERG INCLUDES:
  - EVALUATION OF FIELD PROCEDURE QUALITY AND LAB ANALYSES
  - ANALYSES OF RELATIONSHIPS BETWEEN CURRENT YEAR AND PAST DATA. IDENTIFY TRENDS
  - RECOMMENDATIONS

WHAT HAVE YOU BEEN ABLE TO ~~CONCLUDE?~~ OBSERVE

- That we need more data to develop any trends
- 2008 data revealed no evidence of acidification or nutrification.
- 2008 measurements at most lakes showed increased acid neutralizing capacity compared to 2007 and most prior years.
- In 2008 statistically significant changes in lake chemistry were identified at eight lakes but the changes were small and not linked with acidification or nutrient buildup.

WHAT HAVE YOU BEEN ABLE TO ~~CONCLUDE?~~ OBSERVE?

- **Statistically significant sulfate decreases at the two lakes with the longest record near Lake Tahoe reflect national trends.**
- **4 lakes in the central Sierra continue to demonstrate nitrate increases. Up 30% from 2007.**
- **Experimenting with critical load calculations**

WHAT DIFFERENCE DID THE SAMPLING PROGRAM MAKE IN MANAGING THE RESOURCE

- **PSD modeling against ANC values in Class I areas.**
- **Providing annual reports to CARB in hope that it may influence control strategies.**

LESSONS LEARNED

- NEED TO CONTINUE MONITORING ON AN ANNUAL BASIS IN ORDER TO INCREASE OPPORTUNITY TO DETECT SUBTLE CHANGES AND TO MAKE SUPPORTABLE INTERPRETATIONS ABOUT TRENDS
- IMPORTANCE OF REFRESHER TRAINING TO MAINTAINING GOOD QUALITY CONTROL
- NO SIGNIFICANT DIFFERENCE BETWEEN MID-LAKE SAMPLING AND SHORELINE SAMPLING. DECISION TO RETURN TO SHORELINE IN 2010
- QUESTION AS TO THE VALUE OF ZOOPLANKTON DATA??
- QUESTION AS TO THE VALUE OF DIATOM DATA??

- COST PER LAKE APPROX. $1,000