Owens Lake: A Dust Control Update

For the Imperial County APCD

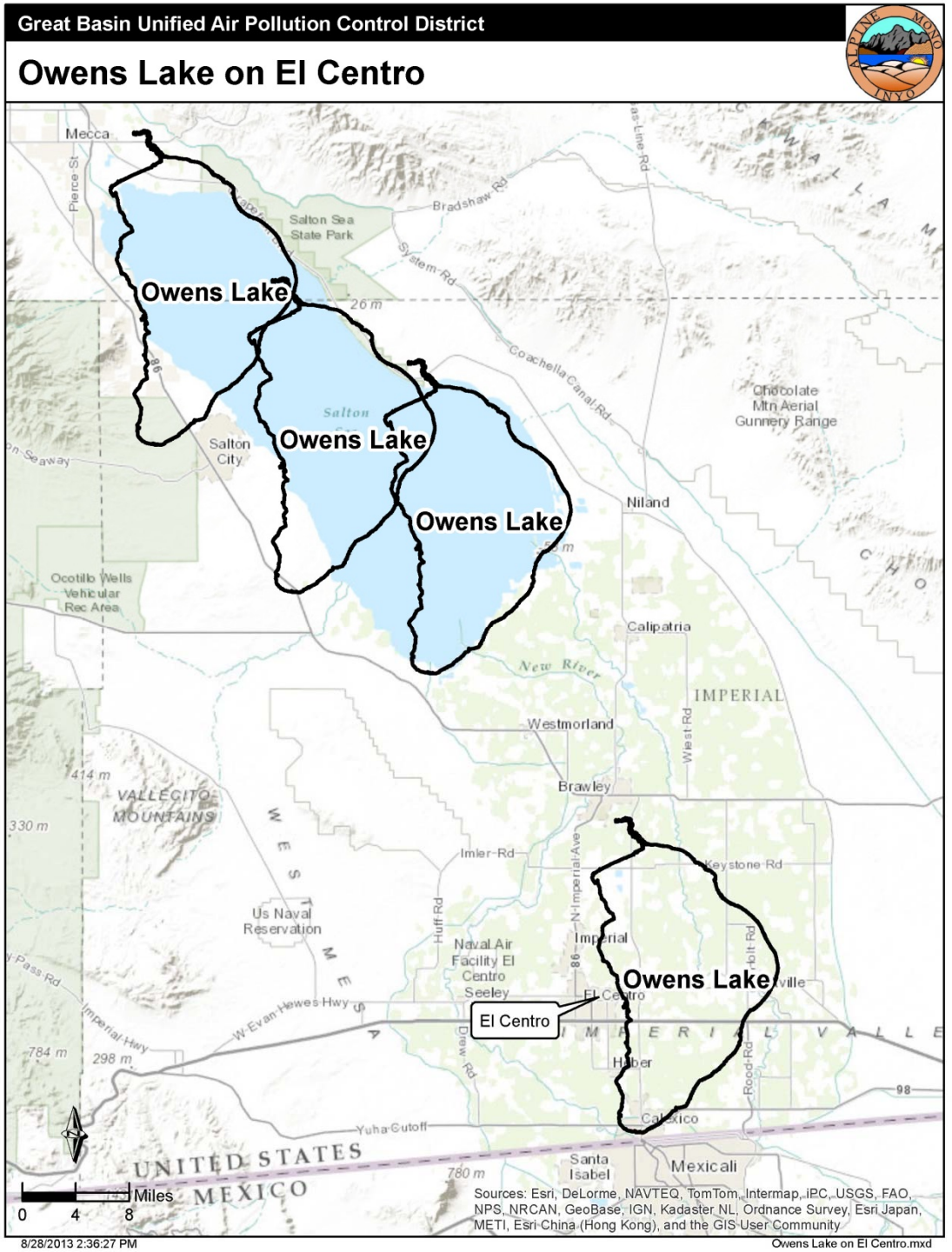
Owens Lake – March 2010

By Ted Schade, Air Pollution Control Officer, Great Basin Air Pollution Control District

September 10, 2013

100 years ago, the 110 square mile Owens Lake was one of the largest natural lakes in California.

However, the Salton Sea is about 3 times as big as the historic Owens Lake.



Like the Salton Sea, Owens Lake was a saline terminal lake at the low point of the Owens Valley between the Sierra and Inyo Mtns.

It had a salinity about 1½ that of seawater.

This photo, taken in 1891, from the eastern shore of Owens Lake near Keeler, shows the crest of the Sierra in the background.

(Collection of the Henry E. Huntington Library)

In 1913, the City of Los Angeles' Department of Water and Power (LADWP) completed construction of the Los Angeles Aqueduct. The Aqueduct diverted Owens River water destined for Owens Lake 223 miles south to Los Angeles.

With the lake's main source of water diverted, by the mid-1920s, Owens Lake had shrunk to a small hyper-saline remnant brine pool of about 26 square miles, but only a few feet deep.

Owens (Dry) Lake

Close-up of Heaved Salt Crust Exposing Emissive Material

As a result of Owens Lake water diversions, the Southern Owens Valley has experienced some of the highest levels of PM-10 air pollution ever measured in the United States.

The exposed Owens Lake bed showing wind eroded salt crust

The up-wind edge of a dust storm

Leading Edge of an Owens Lake Dust Plume

Dust storms originating from the dried bed of Owens Lake made it the largest single source of PM-10 air pollution in the United States.

Great Basin estimates that the lake bed emitted over 76,000 tons of PM-10 annually (almost 7,000 tons on a peak day.)

Two views of the Owens Valley from the same aerial vantage point – the top photo was taken on a calm day, the bottom photo on a windy day.

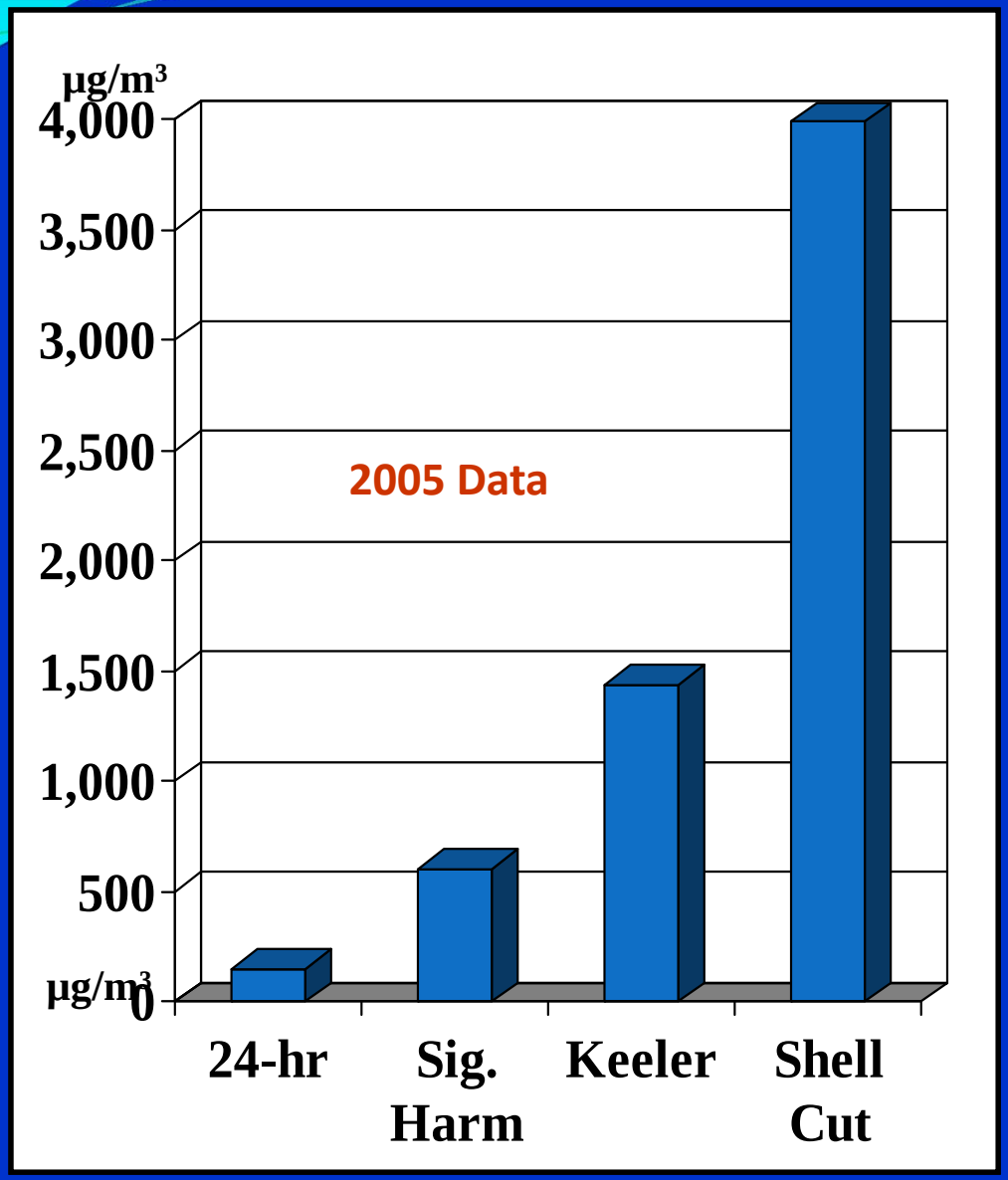
Lone Pine – March 15, 2006 – Whitney Portal Rd at Hwy 395 – Looking West

Lone Pine – March 14, 2006 – Whitney Portal Rd at Hwy 395 – Looking West

Why is the Dust a Problem?

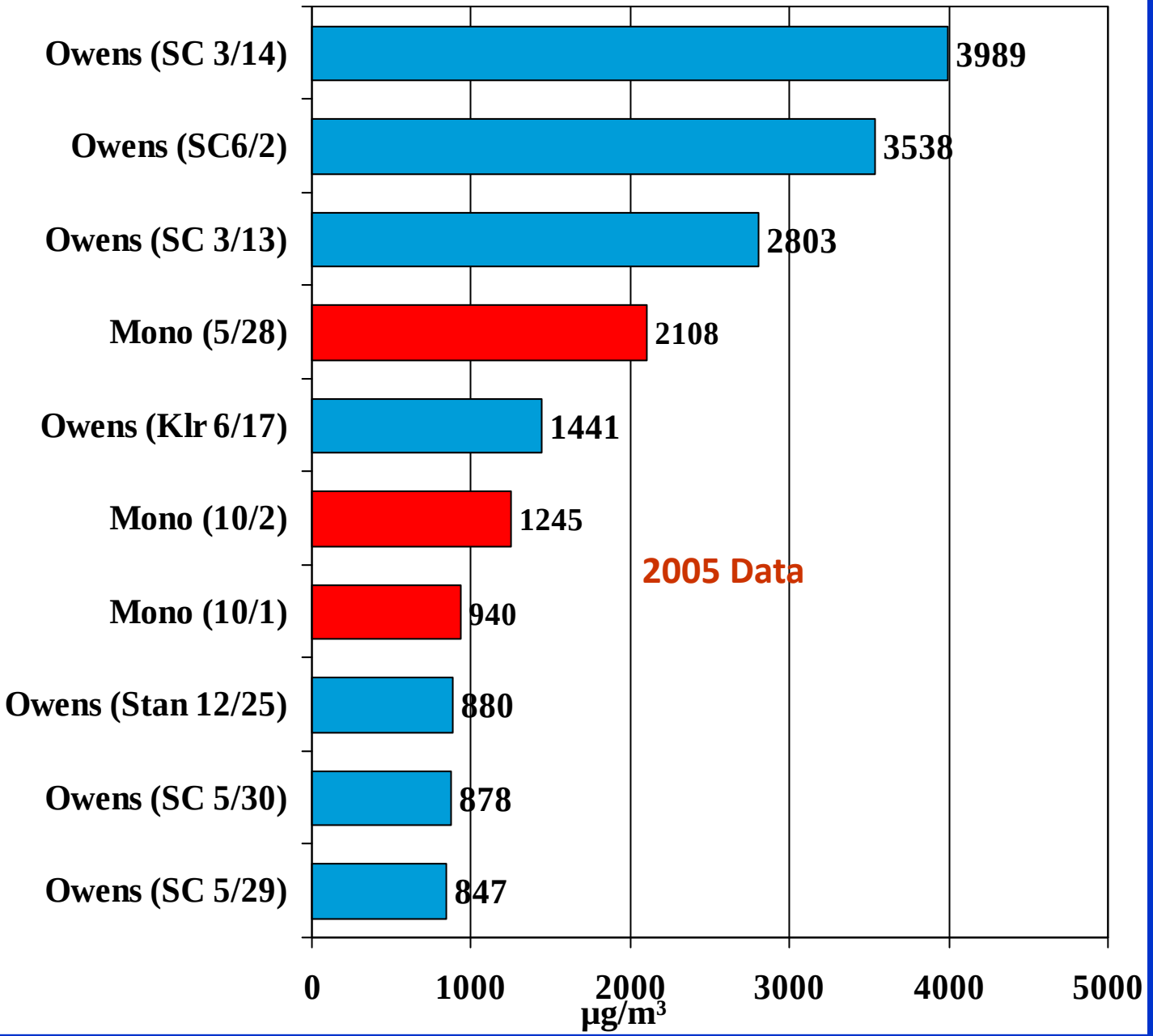
Owens Lake Dust Descending on Inyokern, California (1977)

1. Because the PM-10 values are very high



- The Federal 24-hr standard for particulate matter is 150 µg/m³.
- The State standard is 50 µg/m³.
- The "significant harm to human health" level is 600 µg/m³.
- In 2005, 24-hr levels of 1,441 µg/m³ (10 times Std.) were measured in the town of Keeler and 3,989 µg/m³ (26 times Std.) at the Shell Cut monitor.

2. Because severe exceedances are frequent



The US EPA Data for 2005 shows that of the 10 highest PM-10 values reported in the entire U.S., 7 occurred at Owens Lake and 3 occurred at Mono Lake.

Owens Lake's highest value of 3,989 µg/m³ was 5 times higher than the highest non-Great Basin value (#13 – New Mexico @ 760 µg/m³).

How is the dust being controlled?

Approved Dust Control Measures

Great Basin's research has resulted in three approved methods of controlling dust that are feasible on a large scale: native vegetation, flooding with shallow sheets of water and a gravel blanket.

Shallow Flooding

Shallow flooding controls dust emissions by wetting the lake bed with shallow sheets of water. When 75 percent of the emissive area consists of standing water and saturated soil, dust emissions are reduced by 99 percent.

Managed Vegetation

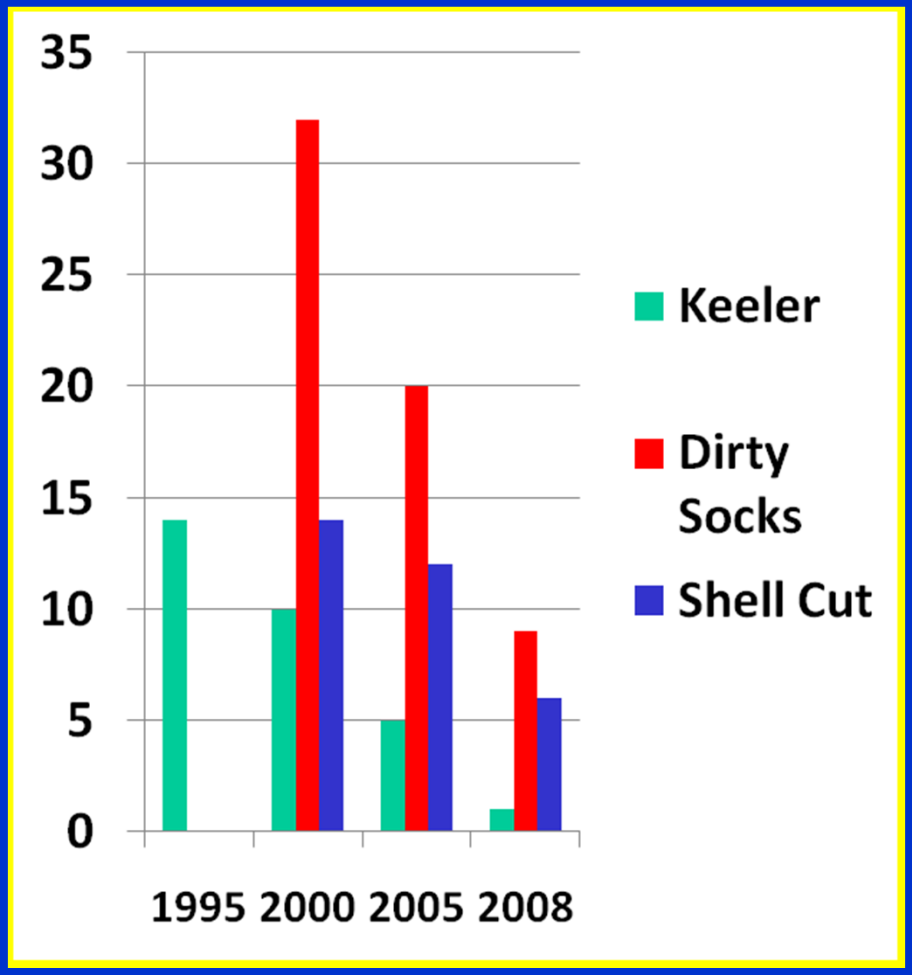
Wildlife Attracted to Shallow Flood

The work has been extremely challenging with:

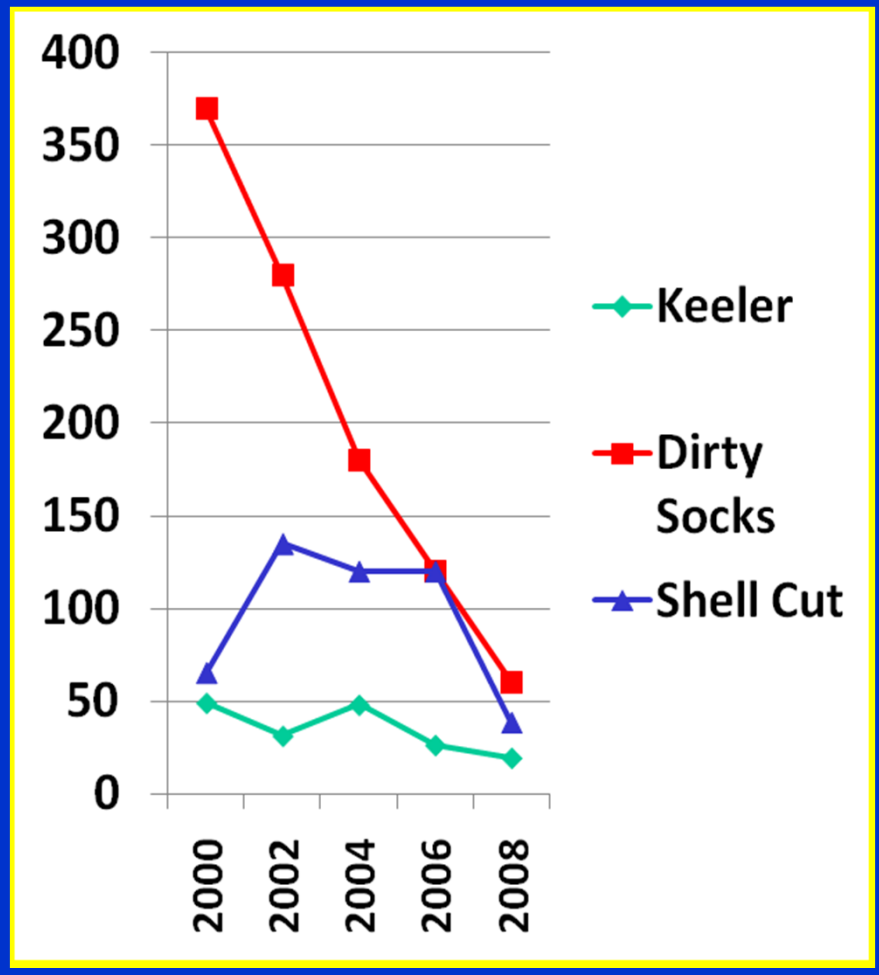
- 500 miles of pipe and drains
- 10 million cu.yds. of grading
- 3,500 miles of drip tube
- 7,300 flood bubblers
- 75,000 ac-ft of water per year

However, there have been significant decreases in both the number of federal PM_{10} exceedances per year, as well as the average annual PM_{10} values.

Number of federal 24-hr PM_{10} exceedances per year (150 µg/m³)

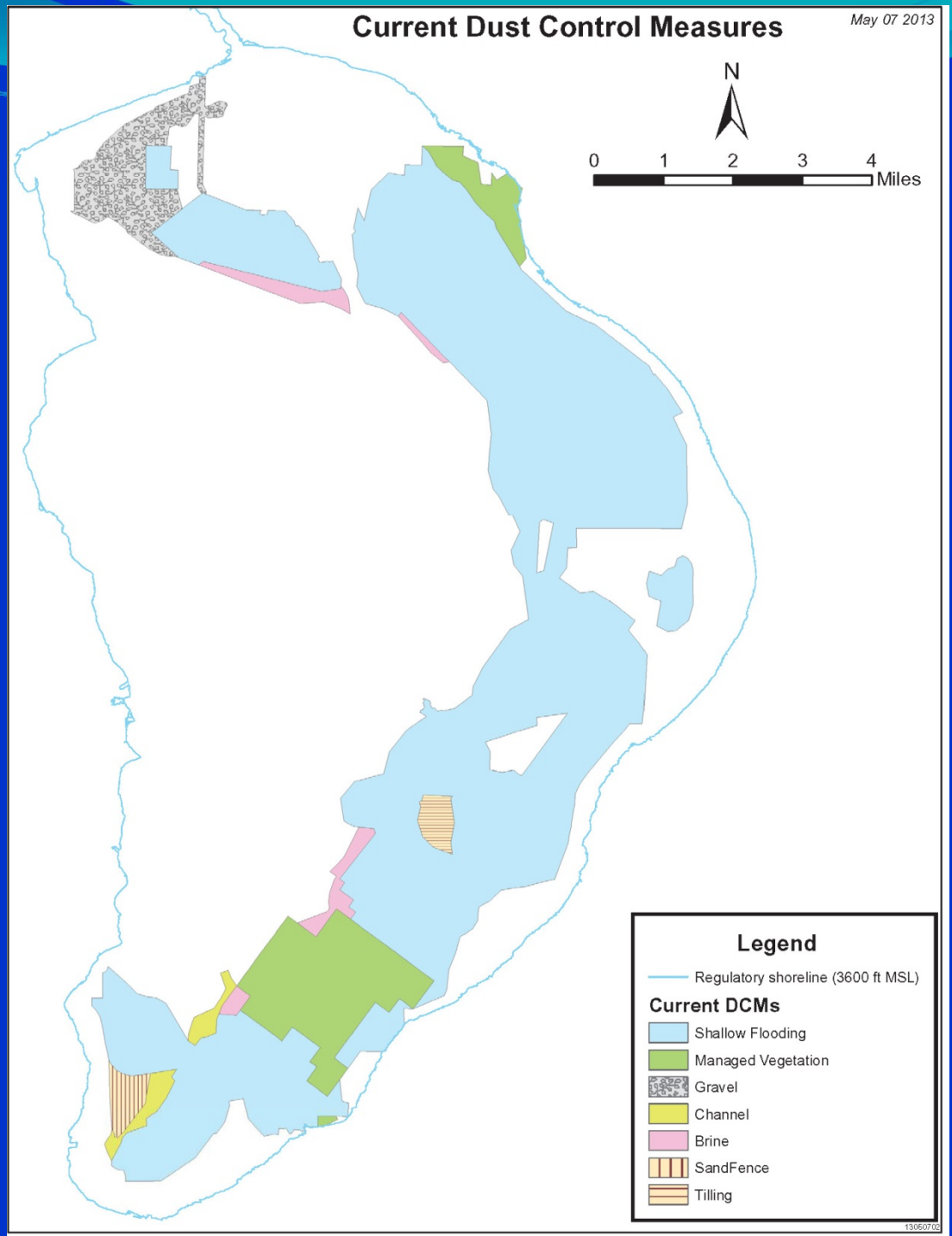


Average annual PM_{10} level (µg/m³)

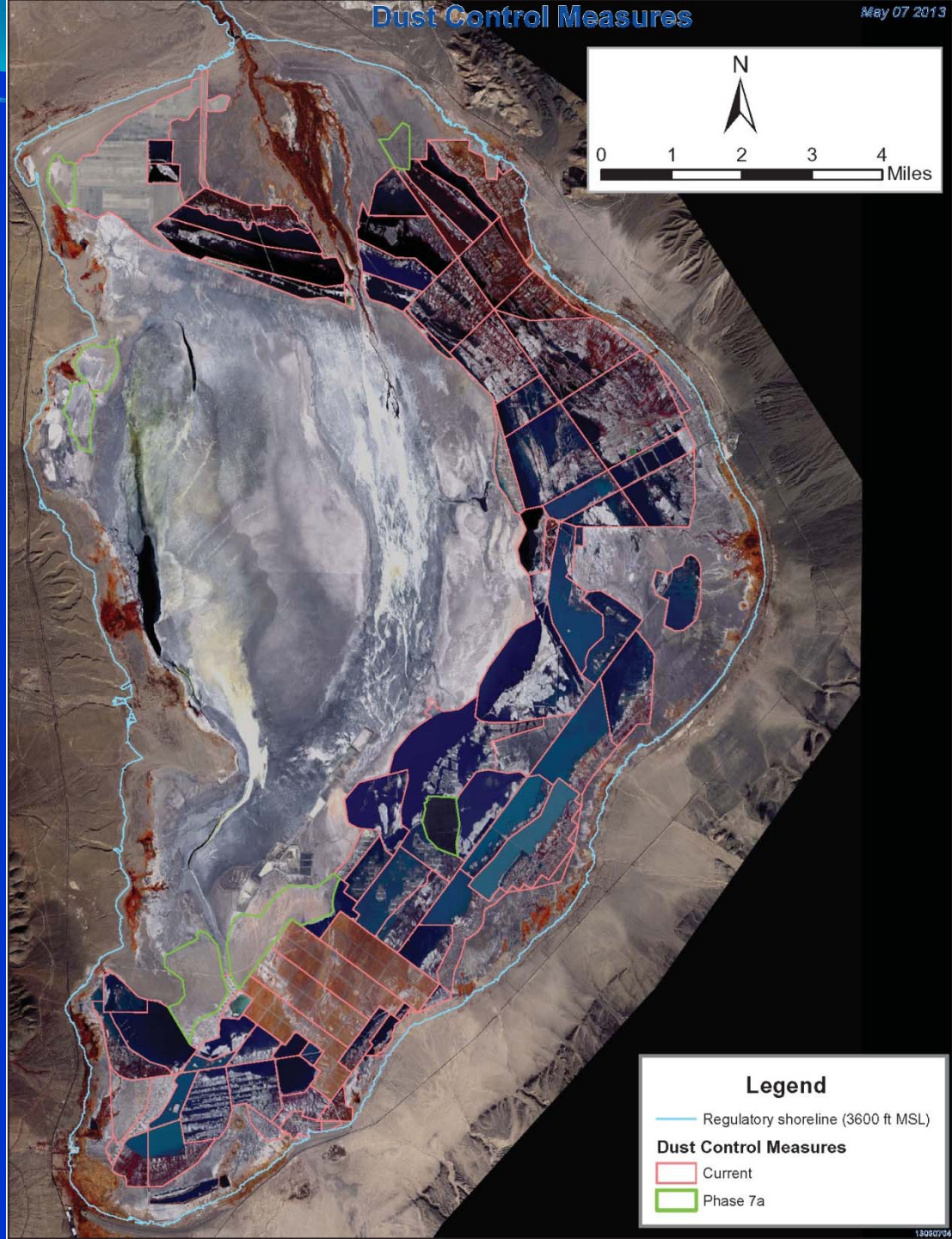


Current (2013) Owens Lake Dust Controls

Shallow Flood	36.5 sq. mi.
Vegetation	3
Gravel	2
Sand Fence	0.5
TOTAL	42 sq. mi.



Satellite Image of Current Dust Controls



Additional Controls are Required in Order to Attain the Standards

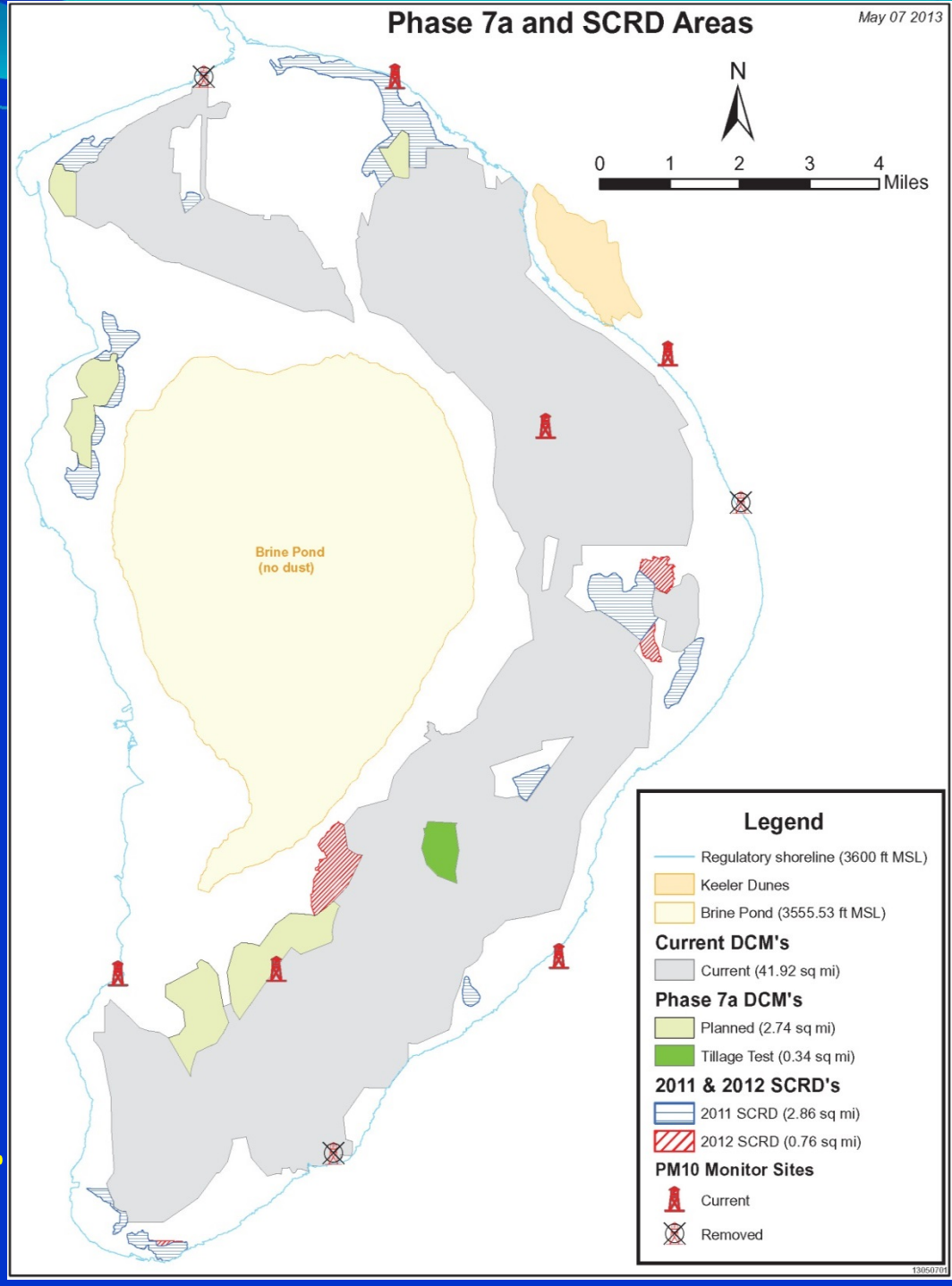
Committed

Phase 7a	3.10 sq. mi.

Ordered

2011 Ordered	2.86
2012 Ordered	0.76
2013 Ordered	0.00

Total required: 48.7 sq. mi.



Cost of Owens Lake Air Pollution Control

- The City of Los Angeles claims to have spent **$1.2 Billion** on Owens Lake dust controls since 2000.
- With 42 sq. mi. currently controlled, the cost of controls is about **$29 million** per square mile.
- Annual operation costs are about **$25 million**
- Annual water replacement cost are about **$46 million**

- PM10 controlled = **75,000 tons per year**

- Cost effectiveness (25-yr life) is about **$2,700 per ton**

  This is far less than the cost effectiveness of most PM10 controls. (SCAQMD c/e limit = $5,300/ton)

Recent Litigation

Two lawsuits in LA Superior Court	Withdrawn by DWP
DWP appeals 2011 Order to ARB	ARB finds for Great Basin
DWP sues in Federal Court	Dismissed by Court
Great Basin sues for fee payment	DWP ordered to pay
DWP cross-complaint in fee case	Dismissed by Court
DWP sues CARB and GB re: 2011	Pending in Sacramento Court
DWP appeals 2012 Order to ARB	Hearing to be held Nov. 15
DWP appeals 2012 GB fees to ARB	Hearing held June 7
Great Basin sues for penalties	Trial scheduled for Oct 2013
DWP appeals 2013 GB fees to ARB	????

Unresolved Issues

- Limit on control area
- “Moving the Goalposts”
- Additional approved waterless dust controls
- Water use - Transition to drier measures
- Time to come into attainment
- Impacts to lake bed archaeology