

RECLAMATION

Managing Water in the West

Colorado River Water Delivery and Salinity Management

Colorado River Citizens Forum

March 9, 2016



U.S. Department of the Interior
Bureau of Reclamation

Overview

- **Managing salinity in the context of the drought**
- **The evolution of salinity agreements and U.S. actions**
- **Water deliveries to Mexico at the Northerly International Boundary (NIB)**
- **Operational trends**
- **Salinity variability in the Colorado River**
- **Conclusions**

Scale of the Current Drought

- The Colorado River remains in the worst drought in over 100 years of written record keeping
- The period from 2000 through 2015 has been the driest 16-year period ever recorded in the Lower Colorado River Basin
- Paleo studies indicate the current drought is one of the worst in the Basin in the past 1200 years
- The drought has inspired several programs to reduce water use so that reservoir elevations are preserved
- Lowered volume in the river results in increased salinity
- Salinity management activities must be improved to keep up with the changes



Photo: Lake Mead, February 23, 2015: Elevation 1,089 ft.

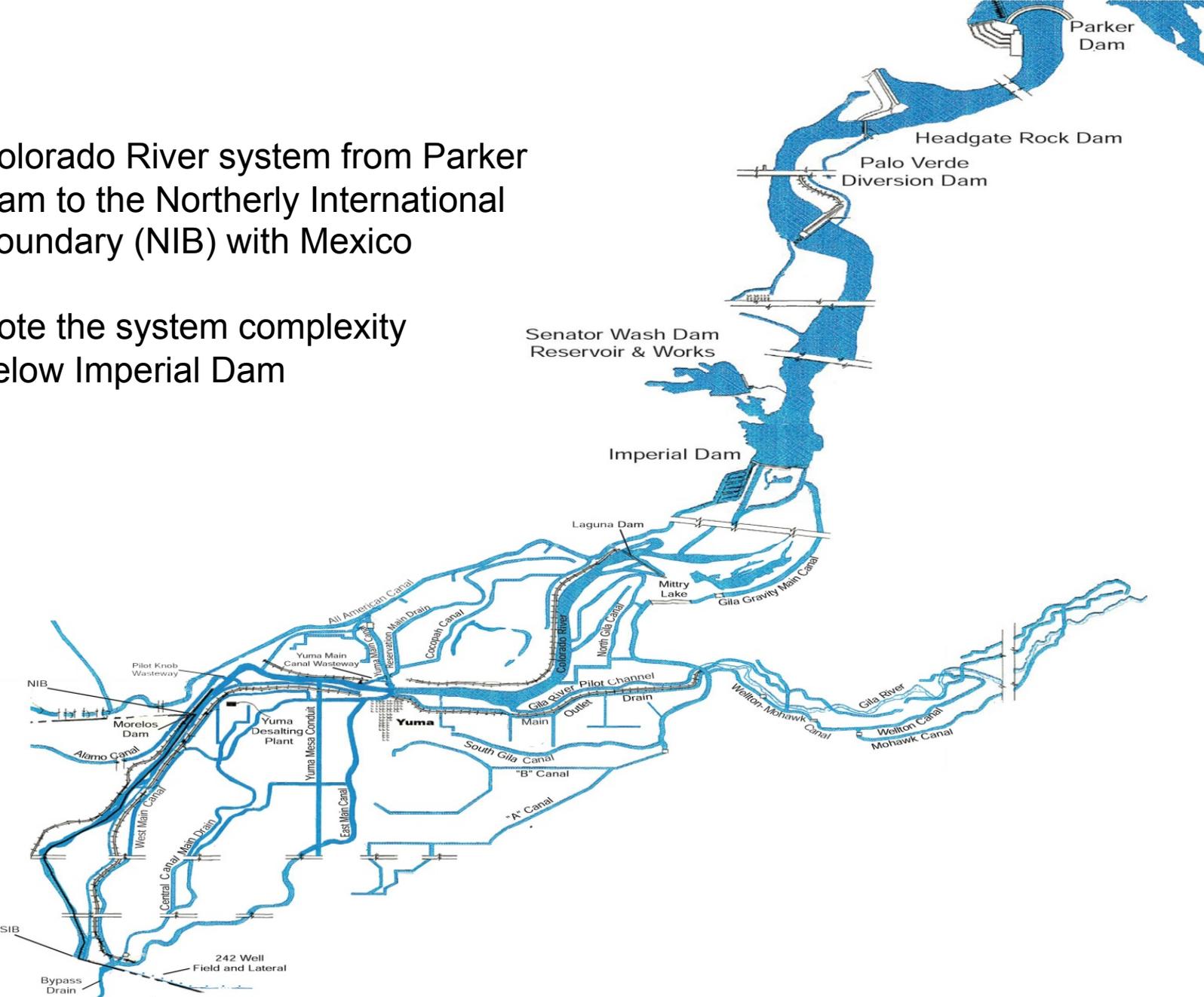
Current elevation as of March 8, 2016: 1,083 ft.

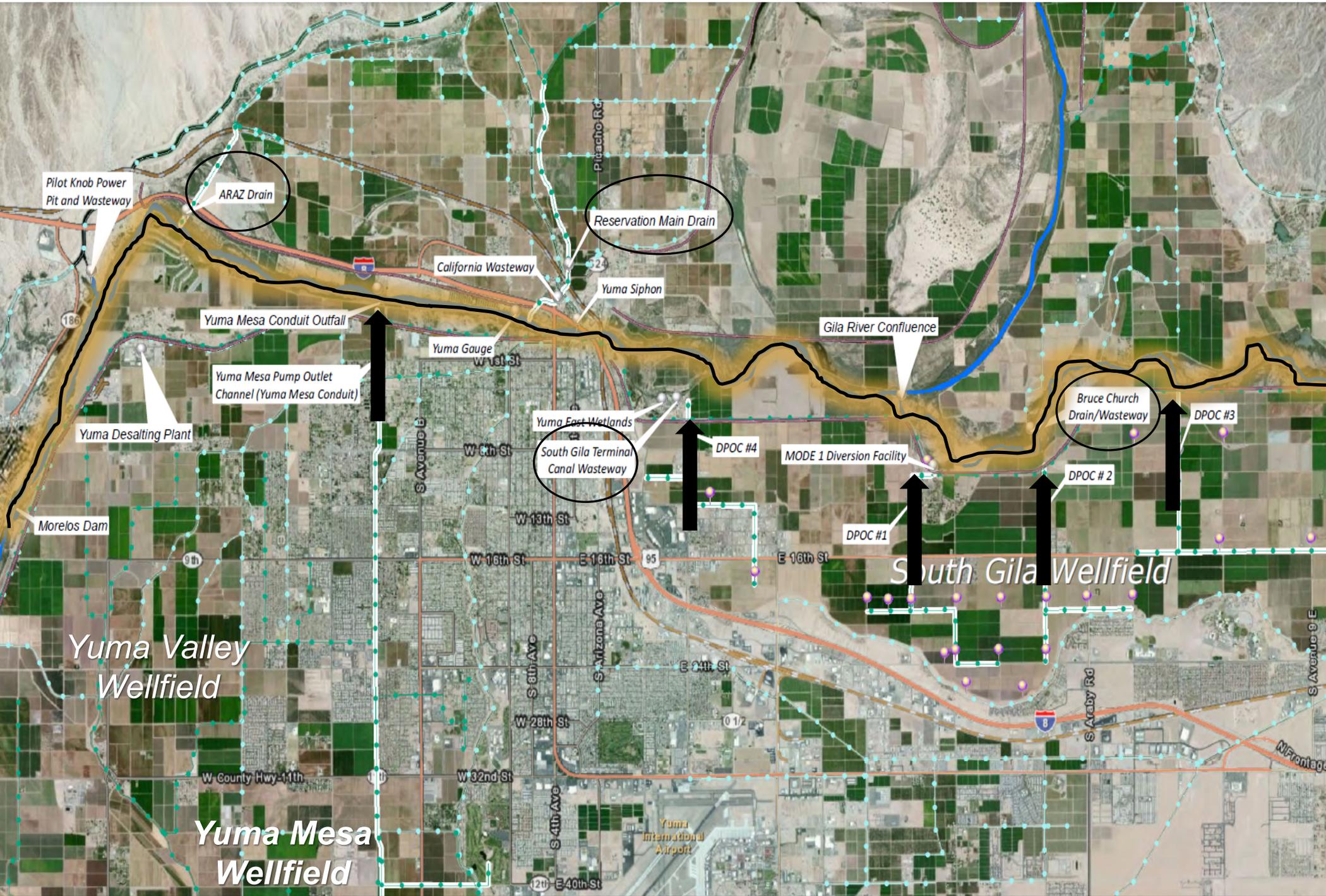
River and Reservoir Operations Overview

- **Colorado River Water Delivery**
 - Parker Dam → Imperial Dam → International Border
 - Customers in California, Arizona, and Mexico
 - 6.7 million acre-feet/year (~70 % of all Lake Mead releases)
- **Goals**
 - #1 Always Satisfy Water Orders (Never “Prorate”)
 - #2 Minimize Excess Flows to Mexico
 - #3 Maximize groundwater delivery to Mexico

Colorado River system from Parker Dam to the Northerly International Boundary (NIB) with Mexico

Note the system complexity below Imperial Dam





Pilot Knob Power Pit and Wasteway

ARAZ Drain

Reservation Main Drain

California Wasteway

Yuma Siphon

Gila River Confluence

Yuma Mesa Conduit Outfall

Yuma Gauge

Yuma Mesa Pump Outlet Channel (Yuma Mesa Conduit)

Yuma Desalting Plant

Yuma East Wetlands

DPOC #4

South Gila Terminal Canal Wasteway

MODE 1 Diversion Facility

Bruce Church Drain/Wasteway

DPOC #3

Morelos Dam

W 13th St

W 16th St

E 16th St

E 16th St

DPOC #1

DPOC #2

Yuma Valley Wellfield

South Gila Wellfield

Yuma Mesa Wellfield

Yuma International Airport

W County Hwy-11th

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Salinity

- Salinity is the measure of the dissolved salt content in a water source
- The Colorado River system is naturally very saline
- Natural variability of river salinity is uncontrollable
- The U.S. adds pumped drainage water to Mexican deliveries to conserve water in upstream reservoirs
- Minute 242 prescribes a salinity differential
- Salinity, and the salinity differential play significant roles in Yuma-area operations

The Evolution of Salinity Agreements

Minute No. 218 – “Recommendations on the Colorado River Salinity Problem.”
March 22, 1965

- A binational effort seeking a permanent solution to the problem of increased salinity due to Wellton-Mohawk (WM) return flows
- Mexico & U.S. entered agreement for construction of 353 cubic feet per second (cfs) concrete-lined channel known as the Main Outlet Drain Extension (MODE) to carry Wellton-Mohawk (WM) Valley return flows

Minute No. 241 – “Recommendations to Improve Immediately the Quality of Colorado River Waters Going to Mexico.” July 14, 1972

- Authorized U.S. to continue operation & maintenance of the MODE & discharge 118,000 AF of WM drainage below Morelos Dam

Minute No. 242: Key Provisions

“The Permanent and Definitive Solution”

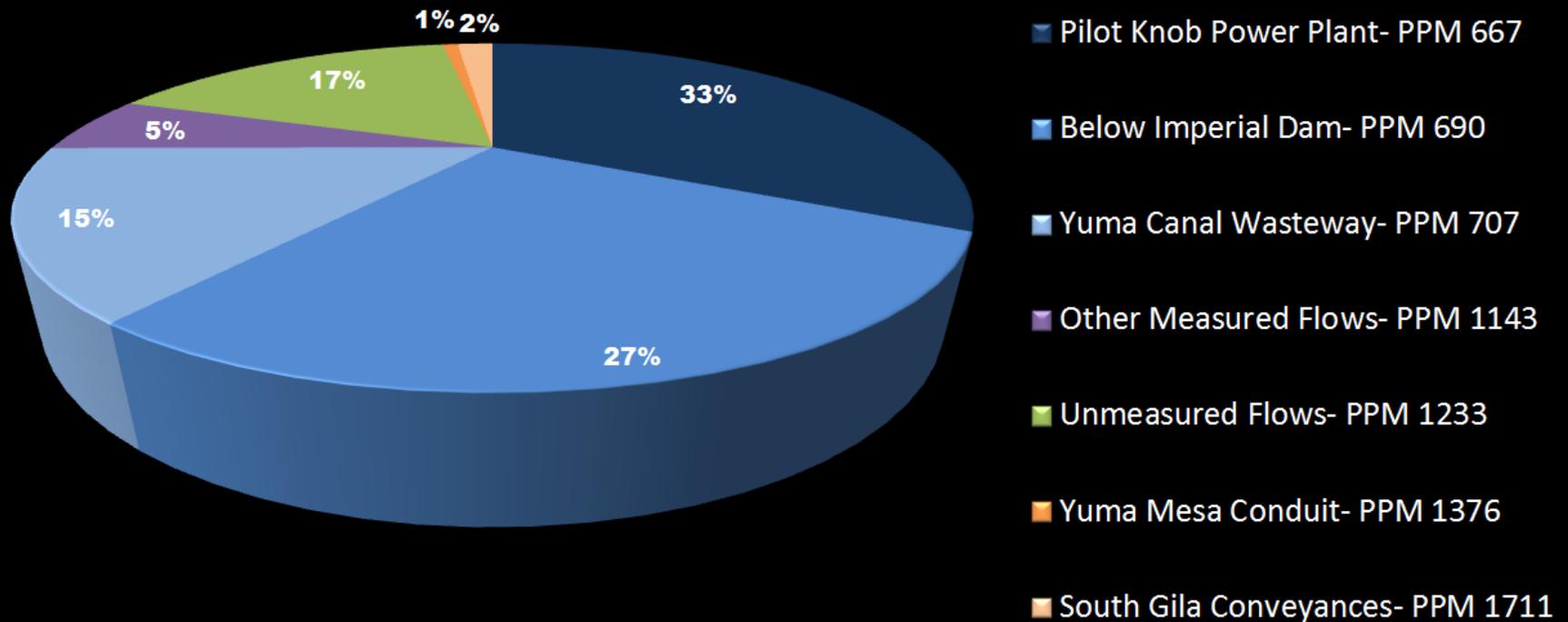
1. Beginning July 1, 1974, the salinity of water delivered at the Northerly International Boundary (NIB) will have average annual salinity of not more than:
 - 115 ppm +/- 30 parts per million (ppm) U.S. count (121 ppm +/- 30 ppm Mexican count) over the annual average salinity at Imperial Dam
2. U.S. shall continue to deliver approximately 140,000 acre-feet to Mexico on the land boundary at San Luis, Mexico as part of the 1.5 maf/yr Treaty requirements, with a salinity essentially the same as that of the waters customarily delivered there (approximately 1200 to 1800 ppm)
3. The existing concrete-lined WM drain shall be extended approximately 53 miles to Santa Clara Slough (Gulf of CA). Construction & maintenance are performed by Mexico at the expense of the U.S.

U.S. Actions to Improve Water Quality

- The U.S delivers the most saline Colorado River returns to the Bypass Canal to meet Minute 242.
 - Since 1990, the U.S. has delivered over 1.6 maf to the Bypass Canal
This represents approximately 20 feet of elevation in Lake Mead
 - This water delivery to Mexico has supported habitat in the Cienega de Santa Clara and is not counted toward Mexico's 1.5 maf treaty allotment
- The United States makes annual investments of ~\$32 M/yr to reduce salinity in the river through the Colorado River Salinity Control program
- Efforts since 1973 have resulted in removal of 1.3 million tons of salt from the river or 90 ppm in the water arriving at Imperial Dam

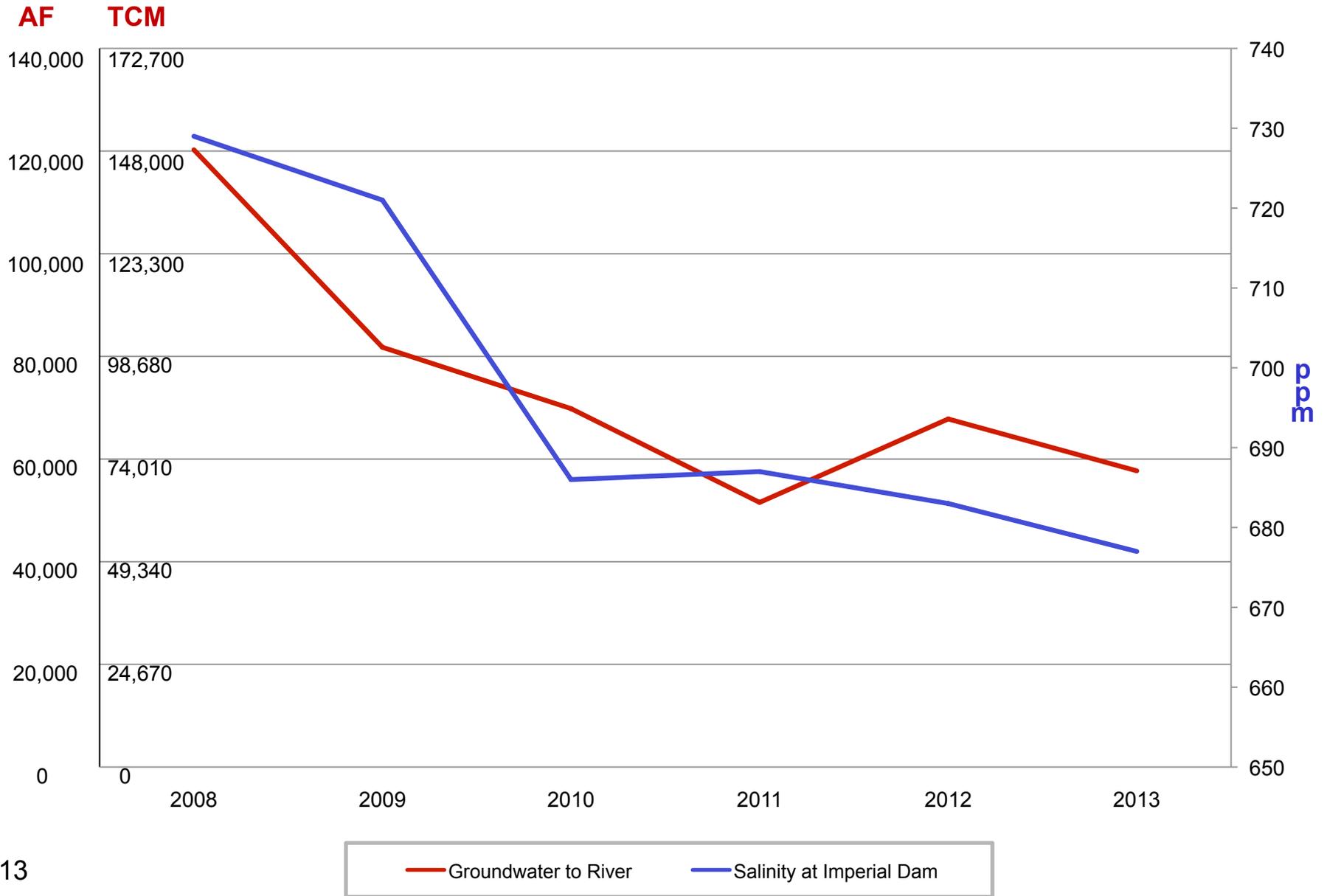
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Contributing Sources at the Northerly International Boundary (NIB) in CY 2014

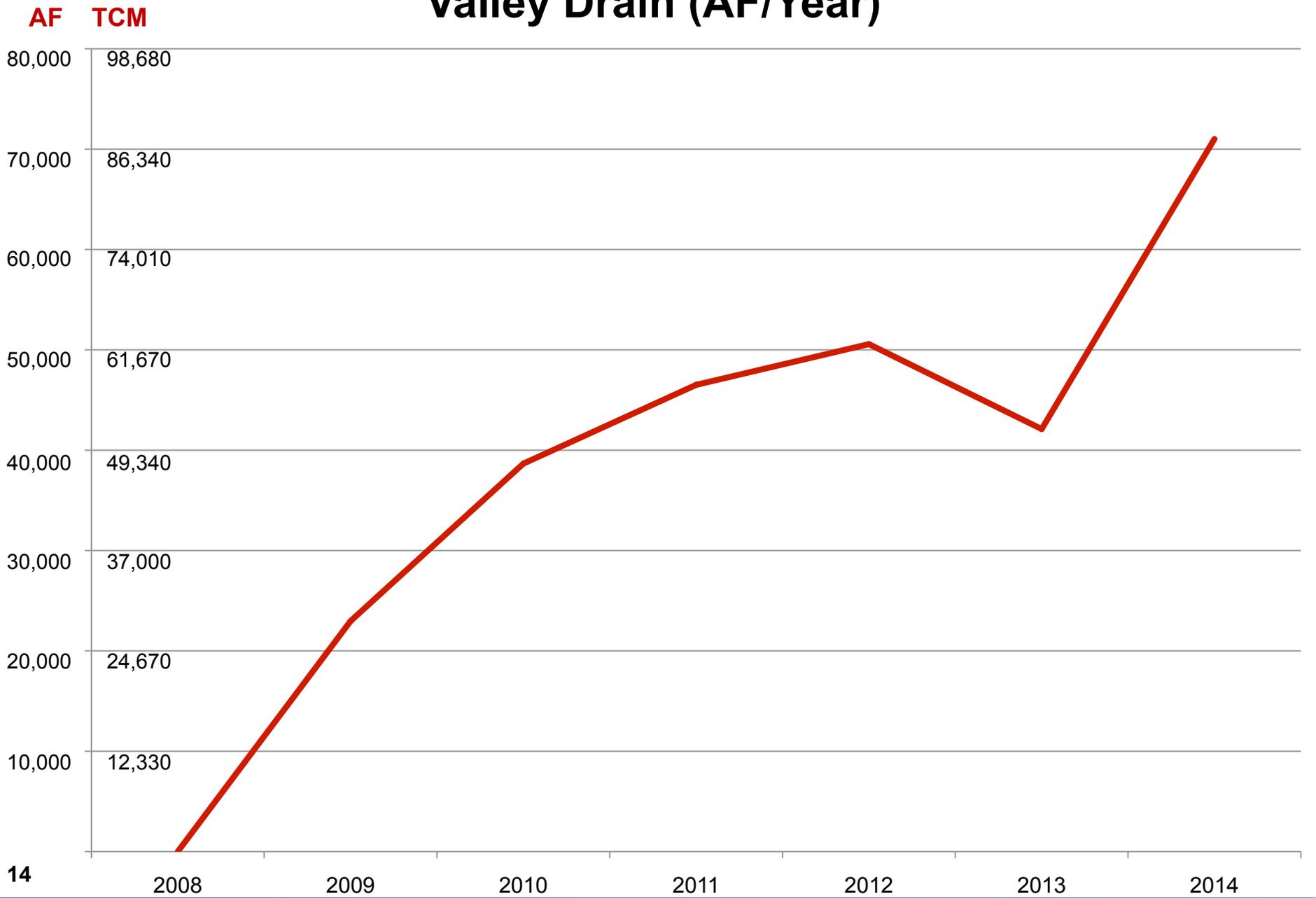


- Note that groundwater accounted for only ~3% of NIB deliveries in 2014. Previous years averaged ~20% GW at NIB. The reduction is primarily due to changing river salinity arriving at Imperial Dam.

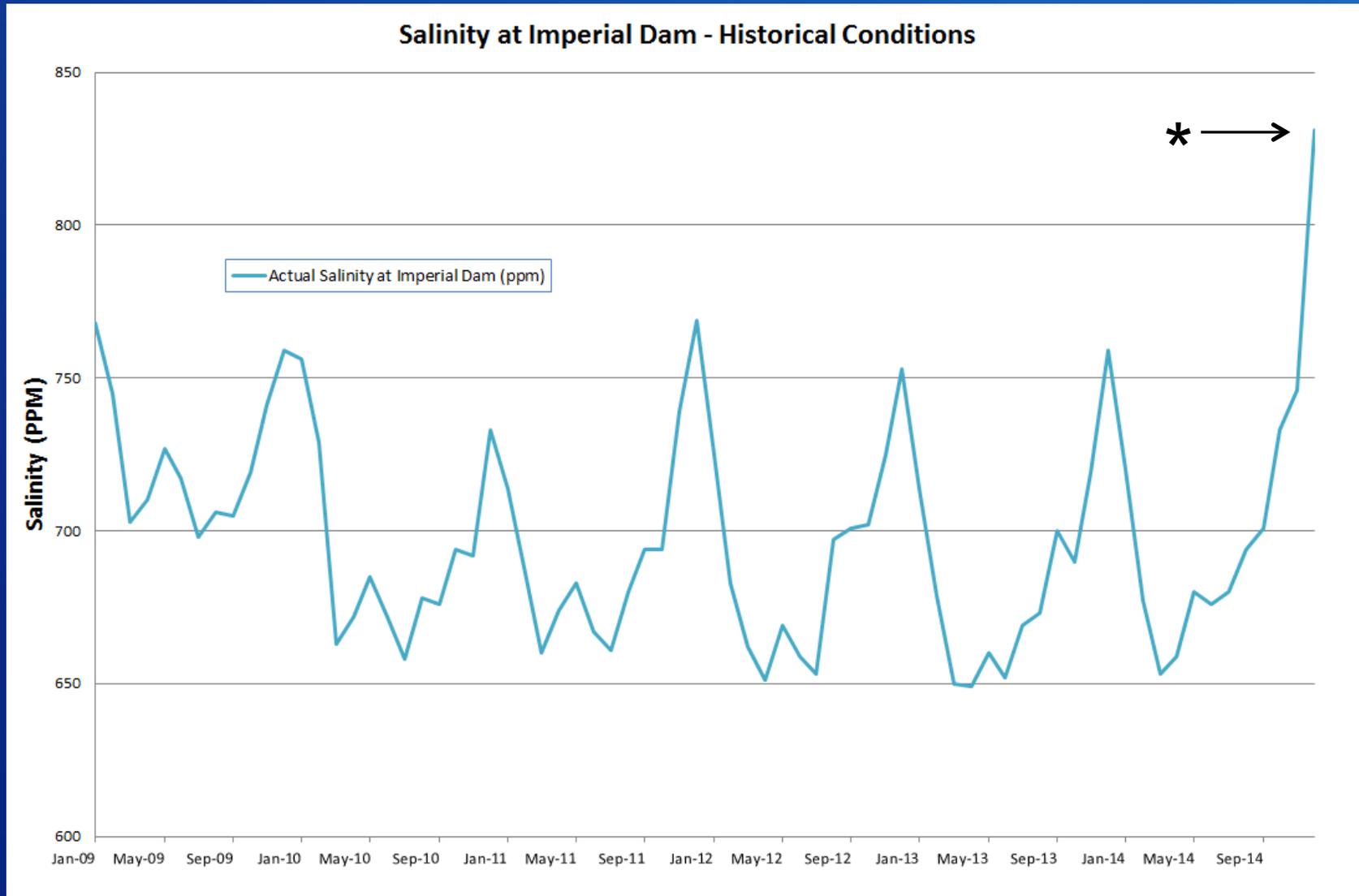
Key Operational Trends



Trends: Groundwater Sent to MODE or Yuma Valley Drain (AF/Year)



Variable Monthly Salinity at Imperial Dam



Conclusion

- In light of the current historic drought, all users share the concern for elevations in Lakes Mead and Powell
- Minute 242 has been in place for over 40 years and conditions have changed significantly on the Colorado River
- Continuing to meet the salinity differential under Minute 242 is increasingly difficult without releasing additional water from Lake Mead
- Water conservation and water sustainability are paramount to both countries
- Therefore, the U.S. is continuing discussions to find cooperative, binational support for projects and initiatives that benefit all Colorado River water users

Opportunity for Questions and Discussion

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