Reclamation Water Quality and Plankton Monitoring – current and future activities

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Reclamation water quality monitoring

- Focus 1: Water quality sampling for detection of contaminants and trending conditions –
  - Salinity/TDS
  - Selenium
  - Nutrients
  - Water clarity
- Focus 2: Long term monitoring of Quagga Mussel effects
  - Plankton biomass
  - Plankton composition change

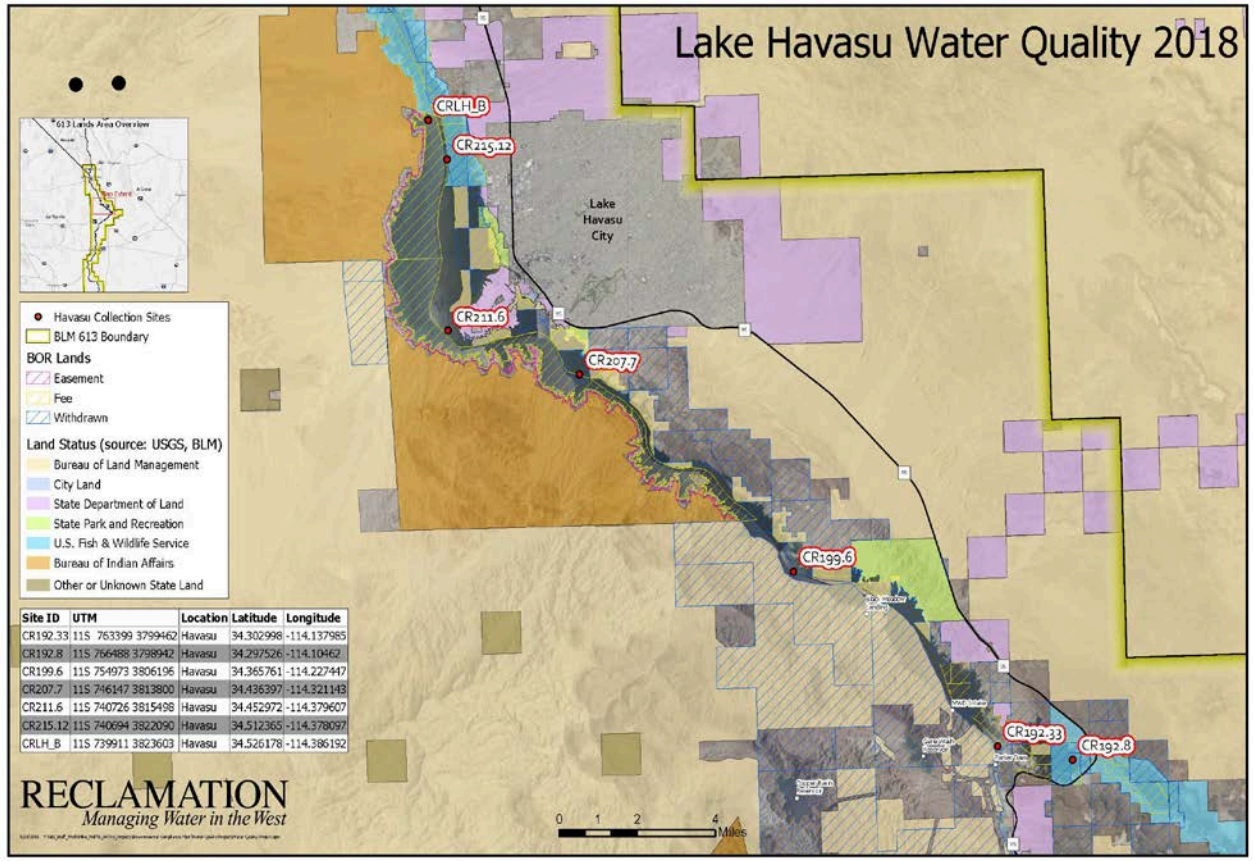
Reclamation water quality monitoring

- 6 Recurring projects
  - Lake Havasu
    - Fish habitat survey
  - Lake Mead
  - Las Vegas Wash
  - Colorado River Contaminants monitoring
  - Palo Verde Irrigation District Groundwater
  - Salton Sea

Lake Havasu Long Term Monitoring

- Monitoring began on 2009
  - Earlier work mostly plankton fish gut analysis
- 6x year – Jan, Mar, May, Jul, Sept, Nov
  - Alternates months with AZ DEQ
- 7 stations:
  - 0-5m or surface: nutrients, chlorophyll, phytoplankton, ions, alkalinity, TDS, microcystin
  - Meta (mid-depth or under thermocline): nutrients
  - Bottom (0.5m above): nutrients
  - Profile (pH, DO, temp, SC, turb)
  - Secchi, zoops (up to 30m tow)

Lake Havasu Long Term QM Monitoring



Site ID	UTM	Location	Latitude	Longitude
CR192.33	11S 763399 3799462	Havasu	34.302998	-114.137985
CR192.8	11S 766488 3798942	Havasu	34.297526	-114.10462
CR199.6	11S 754973 3806196	Havasu	34.365761	-114.227447
CR207.7	11S 746147 3813800	Havasu	34.436397	-114.321143
CR211.6	11S 740726 3815498	Havasu	34.452972	-114.379607
CR215.12	11S 740694 3822090	Havasu	34.512365	-114.378097
CRLH_B	11S 739911 3823603	Havasu	34.526178	-114.386192

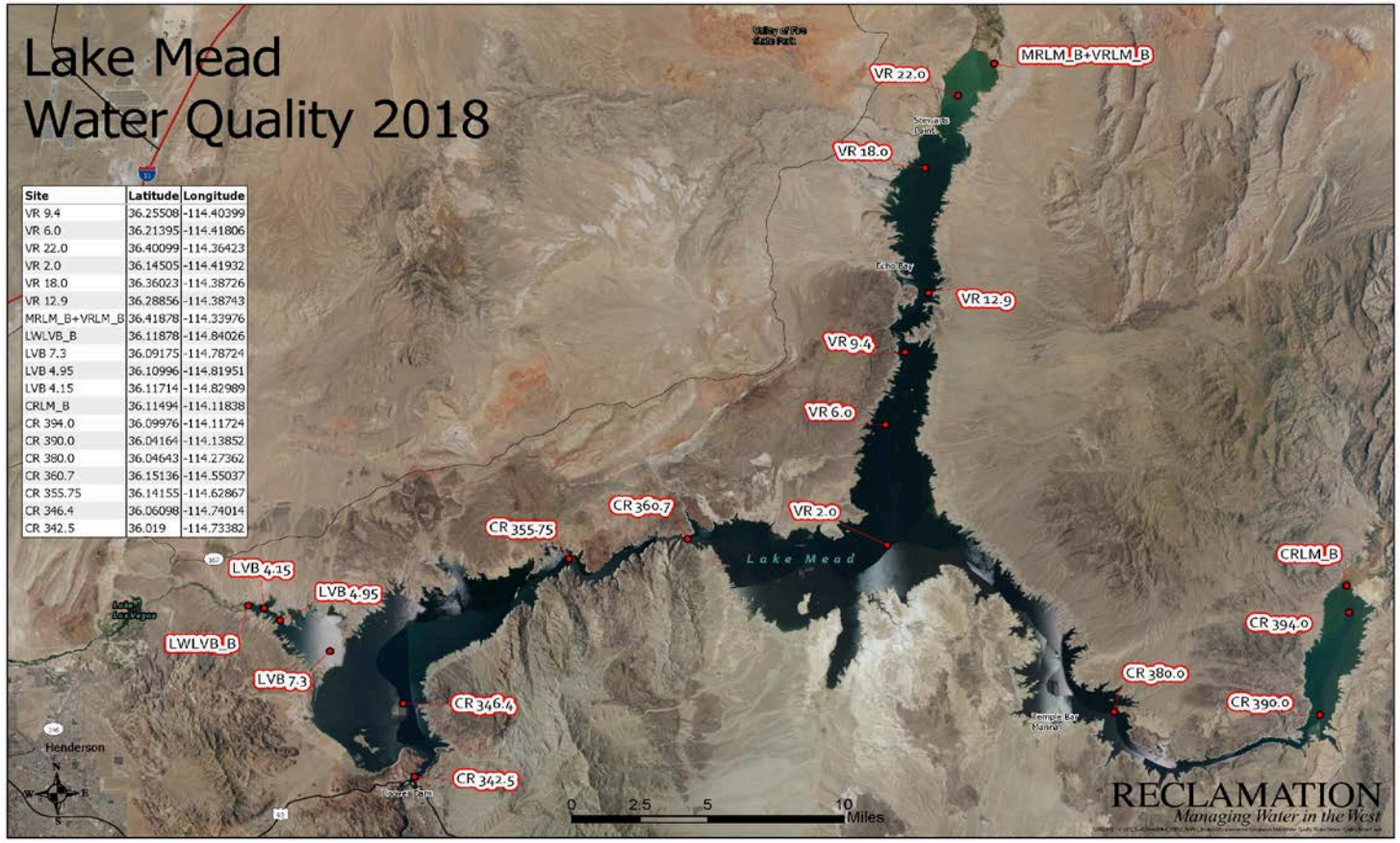
Station
Bill Will inflow
CR192.33
CR199.6
CR207.7
CR211.6
CR215.12
CR Inflow

Lake Mead Long Term Monitoring

- Reclamation has a long history of sampling Lake Mead
  - 2005 to present data are readily available
- 4x year – February, May, August, December
- 19 stations:
  - 0-5m or surface: nutrients, chlor, phytop, ions/alk/TDS*, microcystin*
  - 20m: nutrients
  - 100m: nutrients
  - Bottom (0.5m above bottom): Nutrients
  - Profile (pH, DO, temp, SC, turb), secchi, zoops (up to 30m tow)
- Expanded sampling at CR342.5 (dam site)

*Select sites only

Lake Mead Long Term Monitoring



Site	Latitude	Longitude
VR 9.4	36.25508	-114.40399
VR 6.0	36.21395	-114.41806
VR 22.0	36.40099	-114.36423
VR 2.0	36.14505	-114.41932
VR 18.0	36.36023	-114.38726
VR 12.9	36.28856	-114.38743
MRLM_B+VRLM_B	36.41878	-114.33976
LWLVB_B	36.11878	-114.84026
LVB 7.3	36.09175	-114.78724
LVB 4.95	36.10996	-114.81951
LVB 4.15	36.11714	-114.82989
CRLM_B	36.11494	-114.11838
CR 394.0	36.09976	-114.11724
CR 390.0	36.04164	-114.13852
CR 380.0	36.04643	-114.27362
CR 360.7	36.15136	-114.55037
CR 355.75	36.14155	-114.62867
CR 346.4	36.06098	-114.74014
CR 342.5	36.019	-114.73382

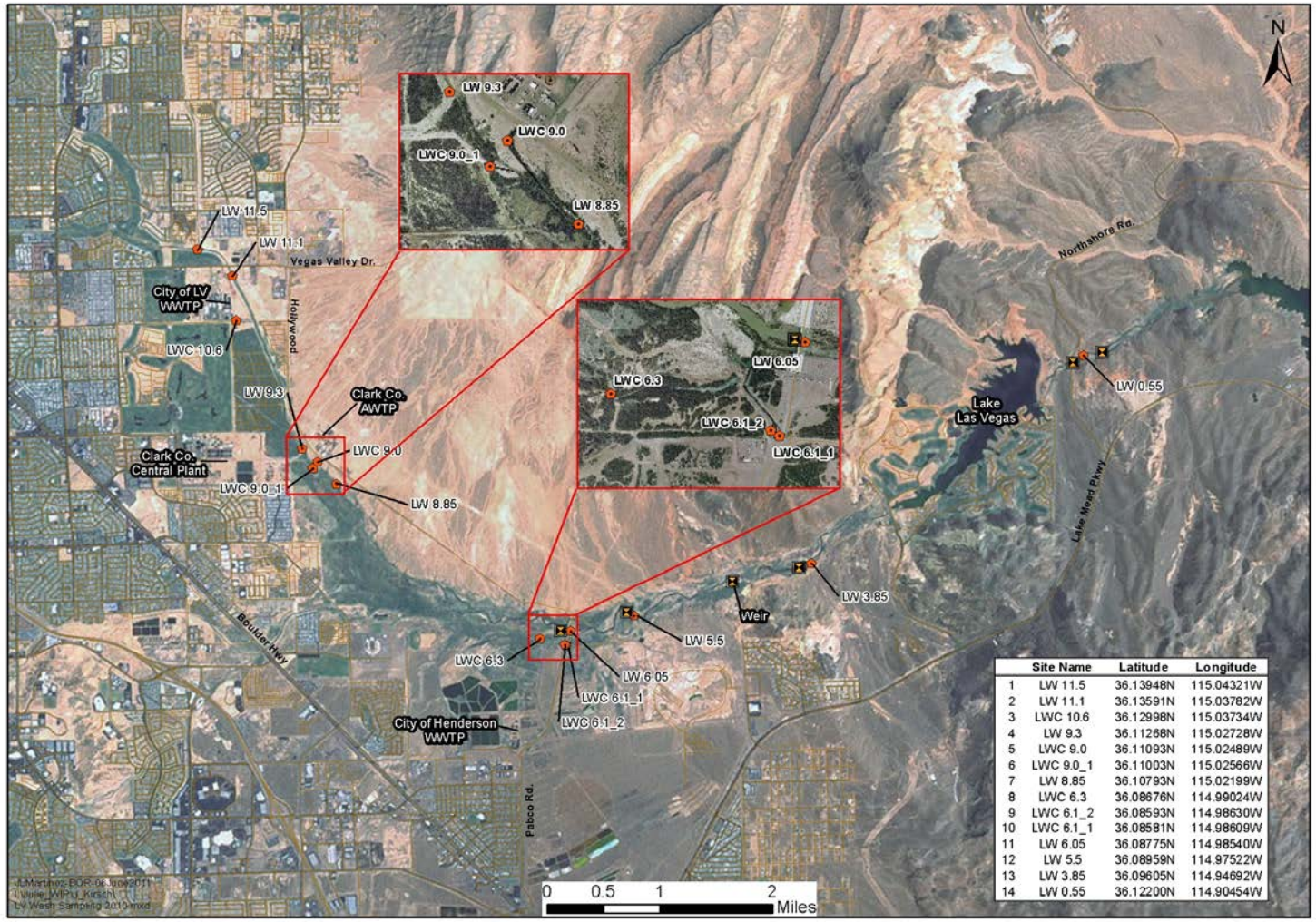
Station
CR Inflow
CR 394.0
CR 390.0
CR 380.0
CR 360.7
CR 355.75
CR 346.4
CR 342.5
Virgin Inflow
VR 22.0
VR 18.0
VR 12.9
VR 9.4
VR 6.0
VR 2.0
LV Wash Inflow
LVB 7.3
LVB 4.95
LVB 4.15

Las Vegas Wash Long Term Monitoring

- Monitoring started in the 1990s
  - Data readily available from 2005 to present
- 4x year: February, May, August, December
- 15 stations:
  - Surface sample: Nutrients, TSS, ions, TDS, alkalinity, selenium, silica, perchlorate*
  - Multimeter (pH, DO, temp, SC, turb)

*at select sites

Las Vegas Wash Long Term Monitoring



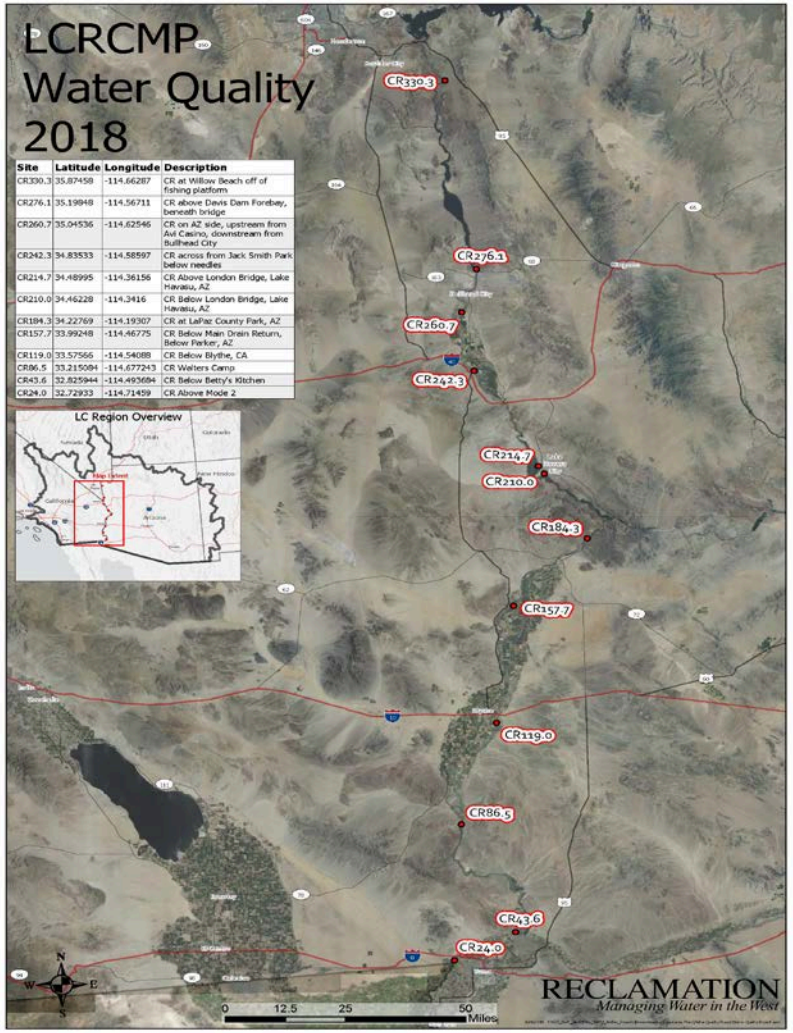
	Site Name	Latitude	Longitude
1	LW 11.5	36.13948N	115.04321W
2	LW 11.1	36.13591N	115.03782W
3	LWC 10.6	36.12998N	115.03734W
4	LW 9.3	36.11268N	115.02728W
5	LWC 9.0	36.11093N	115.02489W
6	LWC 9.0_1	36.11003N	115.02566W
7	LW 8.85	36.10793N	115.02199W
8	LWC 6.3	36.08676N	114.99024W
9	LWC 6.1_2	36.08593N	114.98630W
10	LWC 6.1_1	36.08581N	114.98609W
11	LW 6.05	36.08775N	114.98540W
12	LW 5.5	36.08959N	114.97522W
13	LW 3.85	36.09605N	114.94692W
14	LW 0.55	36.12200N	114.90454W

Station
LW11.5
LW11.1
LWC10.6
LW9.3
LWC9.0_1
LWC9.0
LW8.85
LWC Well PC-97
LWC6.1_2
LWC6.1_1
LW6.05
LW5.5
LW3.4
LW0.9
LWC0.9

Colorado River Contaminants Monitoring

- Event started on 2003 – currently on phase III of study
- 2x year: August and December
- 12 stations:
  - Surface sample: Nutrients, anions, TSS, TDS, ions, alkalinity, chromium, hexavalent chromium, silica, mercury
  - Multimeter (pH, DO, temp, SC, turb)
  - Historic organic/pharmaceuticals/pesticides data

Colorado River Contaminants Monitoring



Site	Latitude	Longitude	Description
CR330.3	35.87458	-114.66287	CR at Willow Beach off of fishing platform
CR276.1	35.19848	-114.56711	CR above Davis Dam Forebay, beneath bridge
CR260.7	35.04536	-114.62546	CR on AZ side, upstream from Avi Casino, downstream from Bullhead City
CR242.3	34.83533	-114.58597	CR across from Jack Smith Park below needles
CR214.7	34.48995	-114.36156	CR Above London Bridge, Lake Havasu, AZ
CR210.0	34.46228	-114.3416	CR Below London Bridge, Lake Havasu, AZ
CR184.3	34.22769	-114.19307	CR at LaPaz County Park, AZ
CR157.7	33.99248	-114.46775	CR Below Main Drain Return, Below Parker, AZ
CR119.0	33.57566	-114.54088	CR Below Blythe, CA
CR86.5	33.215084	-114.677243	CR Walters Camp
CR43.6	32.825944	-114.493684	CR Below Betty's Kitchen
CR24.0	32.72933	-114.71459	CR Above Mode 2

Station
CR330.3
CR276.1
CR260.7
CR242.3
CR214.7
CR210.0
CR184.3
CR157.7
CR119.0
CR86.5
CR43.6
CR24.0

Additional Water Quality Monitoring

- Palo Verde Irrigation District
  - Historic annual groundwater sampling (January)
- Salton Sea
  - Inflows and three mid-sea sites
  - 4x year
- Lake Havasu Fish Habitat SCUBA surveys (annual)
  - Evaluate condition of fish habitat structures
  - Quagga mussel presences and densities
  - Underwater infrastructure inspections

Future Water Quality Monitoring

- Modify current sampling protocols
  - LV Wash
    - Evaluate reducing or dropping Las Vegas Wash monitoring
  - Havasu
    - Add off channel site(s) at Lake Havasu
  - Contaminants Monitoring program
    - Add contaminants monitoring sites above Lake Mead
    - Adjust current sites
    - Reestablish contract for organic analysis

Future research interests/collaboration

- Additional analysis of quagga mussel/plankton trends
- Comparative analysis of fishery and plankton data
- Enhanced protocols for water quality/dive equipment AIS decontamination

Future research interests/collaboration

Questions?

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