Water Quality Inputs to the Salton Sea

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Background

The Salton Sea in popular literature is usually described as an "engineering mistake" caused by a cut into the Colorado River. In reality it is an un-engineering mistake caused by an unengineered cut into the Colorado River.

More importantly the Salton Sea has periodically appeared and disappeared over the past 2000 years. The Colorado River created a delta across the Sea of Cortez and during high flow years the river would sometimes reverse flow and fill the Salton Sink. As the Sink filled it would eventually over top the delta and flow to the Sea of Cortez, which would then permit the Sea to dry up over a period of 50 years or so, depending on weather conditions.

The current Salton Sea, although created by the unengineered cut, exists because of agricultural runoff. This flow stabilized the Sea, until the initiation of the 2003 Quantification Settlement Agreement. Flow diversions are causing the Sea to shrink, exposing shoreline and creating potential for dust storms.

Solutions are being proposed but all should require improved Sea water quality, capable of support aquatic life. It is the purpose of the project to organize and analyze inputs to the Sea from the Alamo and New Rivers. From this a nutrient balance can be created to determine needed water quality.

Sampling Stations Along the Rivers

Data Composition

Pollutants of Interest:
- Nutrients: **NH_3-N, NO_2^--N, NO_3^--N, PO_4^{3-}-P, TP**
- Metal: Selenium

Station Numbers:
- New River: 23
- Alamo River: 20

Time Period: 2002-2019
- Average sampling days/year: 6

Data Sources:
- California Environmental Data Exchange Network(CEDEN)
- Bureau of Reclamation
- Imperial Irrigation District
- Sandia National Lab
- UCLA

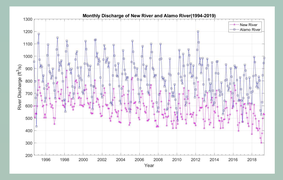
Tributary Rivers Flow Rates

Alamo River Mouth Site:

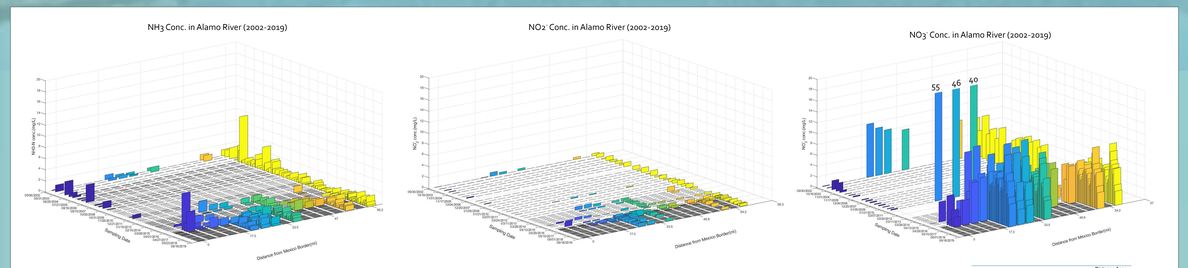
- USGS 10254730 ALAMO R NR NILAND CA
- Hydrologic Unit Code 18100204

New River Mouth Site:

- USGS 10255550 NEW R NR WESTMORLAND CA
- Hydrologic Unit Code 18100204

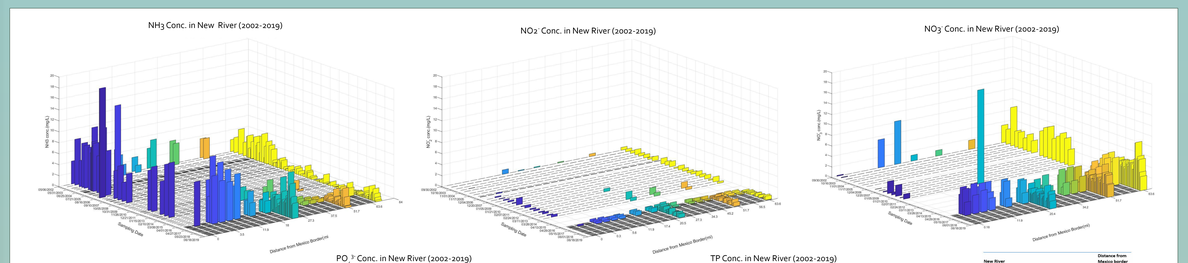


Nutrients Input in Alamo River (2002-2019)



Alamo River Station ID	Alamo River Station Names	Distance from Mexico Border (miles)
AR1	Alamo River at International Boundary	0.00
AR2	SR8	1.06
AR3	W Heber Road	6.43
AR4	S32 in Holtville	15.12
AR5	Crossing 115	17.36
AR6-1	Alamo River at Drop 10 Central Drain	20.01
AR6-2	AR Drop 10	20.01
AR7-1	Alamo River at Drop 6	24.11
AR7-2	AR Drop 6	24.11
AR8	Keystone Rd	28.00
AR9-1	Alamo River at Drop 6A Holtville Drain	29.00
AR9-2	AR Drop 6A	29.00
AR10	S78	33.91
AR11-1	Alamo River at Drop 6 Rose Drain	34.10
AR11-2	AR Drop 6	34.10
AR12	Share Alamo wetland	34.42
AR13	Rutherford Rd Near West Lake	39.95
AR14	On 111 near rest stop	44.22
AR15	Ruger Road	46.99
AR16	Alamo River Above Drop 3	47.18
AR17	On Brant St near Bowles Rd	49.18
AR18-1	Alamo River at Drop 3	51.33
AR18-2	AR Drop 3	51.33
AR19	W Sinclair Rd	54.17
AR20-1	Alamo River Outlet	56.34
AR20-2	W Schrempf Rd/Garst Rd	56.34
AR20-3	AR Outlet	56.34
AR20-4	Alamo River	56.34

Nutrients Input in New River (2002-2019)

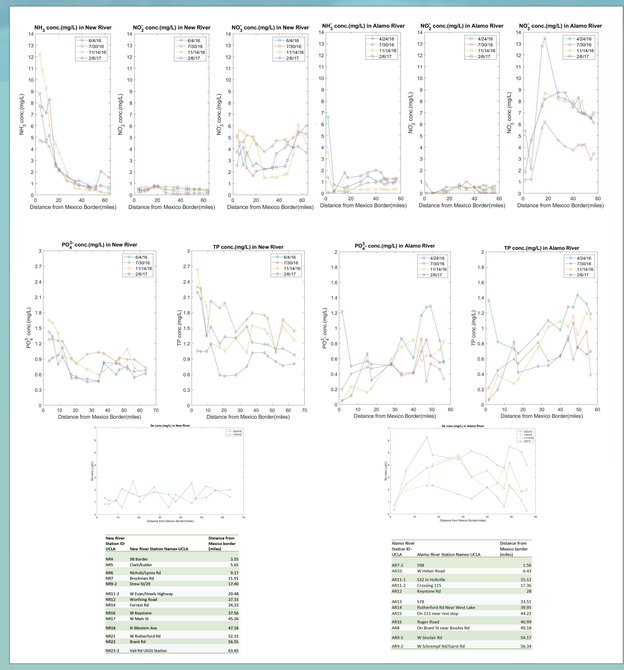


New River Station ID	New River Station Names	Distance from Mexico border (miles)
NR1	Mexicali Sanitation, International Drain 2.0	0.00
NR2	New River at Boundary	0.18
NR3	Mexicali Sanitation, Boundary 2.0	0.29
NR4	SR Border	3.55
NR5	Clark/Kubler	5.65
NR6	Nichols/Lyons Rd	9.27
NR7	Brockman Rd	13.91
NR8	New River at Greeson Drain	13.07
NR9-1	New R at Drew Road near Seeley	17.40
NR9-2	Drew Rd/I8	17.40
NR10	New River at Fig Drain	18.04
NR11-1	New River at Evan Hughes Hwy	20.53
NR11-2	W Evan/Hewis Highway	20.40
NR11-3	NR at Evan Hewes Hwy	20.53
NR12	Worthing Road	27.33
NR13	New River at Rice Drain NO.3	32.04
NR14	Forrest Rd	34.23
NR15	New River at Rice Drain	34.28
NR16	W Keystone	37.56
NR17	W Main St	45.26
NR18	N Western Ave	47.16
NR19	New River at Hw 111	48.37
NR20-1	New River at Drop 2	51.71
NR20-2	NR Drop 2	51.71
NR21	W Rutherford Rd	52.55
NR22	Brant Rd	56.55
NR23-1	New River Outlet	63.65
NR23-2	Vail Rd USGS Station	63.65
NR23.3	NR Outlet	63.66
NR23.4	New River	63.66

Conclusions

- River waters rich in nutrients continue to enter the Salton Sea. Follow-on work in our research group will compare these inputs to the potential for nutrient recycling from sediments and project the impacts on water quality.
- Presently the outlook appears bleak. The mass of nutrients is likely high enough to continue the eutrophication trends and deplete dissolved oxygen.
- The high temperature and salinity will further reduce dissolved oxygen so that even species that can survive the high salinity will most likely be oxygen starved.
- Anaerobic conditions will continue and odors and other problems associated with anaerobic conditions will grow, further deteriorating water quality.
- Solutions will require reduction in nutrient inputs and perhaps ways of minimizing nutrient recycling from sediments.

Data Collected by UCLA (2016-2017)



New River Station ID- UCLA	New River Station Names-UCLA	Distance from Mexico border (miles)
NR4	SR Border	3.55
NR5	Clark/Kubler	5.65
NR6-2	Nichols/Lyons Rd	9.27
NR7	Brockman Rd	13.91
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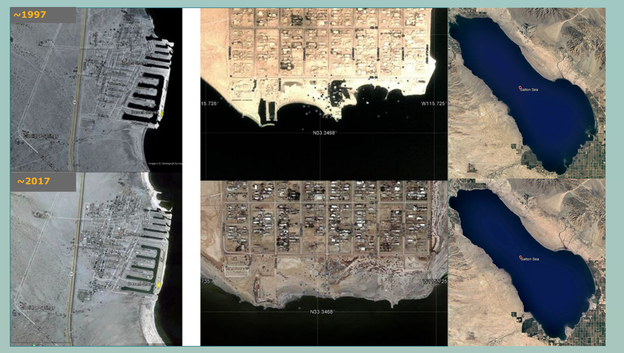
AR15	On 111 near rest stop	44.22
AR16	Ruger Road	46.99
AR8	On Brant St near Bowles Rd	49.18
AR9-1	W Sinclair Rd	54.17
AR9-2	W Schrempf Rd/Garst Rd	56.34

Shore Change from 1994 to 2017



Future Works

- To characterize the effect of nutrients being reintroduced to the euphotic zone by sediment resuspension activity in the projected future at the Salton Sea.
- To compile database of critical parameters that serves as the foundation of future modeling task using a hydrodynamic model for the Salton Sea system.