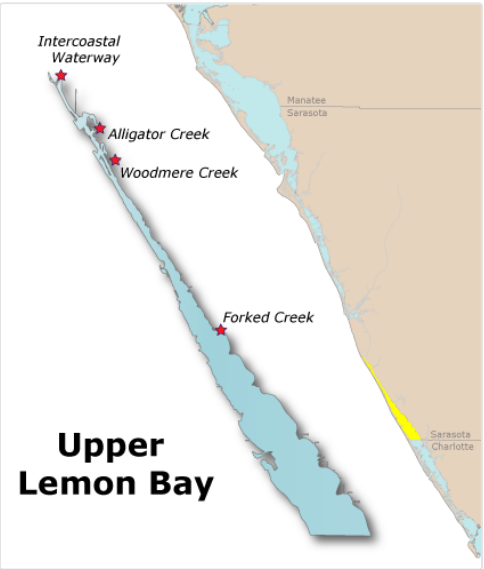
Upper Lemon Bay Condition Report for 2015

CAUTION

Chl-a N P

1 out of 3 indicators were rated as **PASS**.

All three indicators must pass for the bay to be rated as **PASS**.



Bays included in this report:
Lemon Bay

Summary:

Water quality indicators for Upper Lemon Bay showed a mixed message for 2015. After an improvement in chlorophyll *a* concentration in 2014, this water quality measure increased by over 21% in 2015, a worrisome sign. However, the mean concentration of both total nitrogen and total phosphorus improved somewhat, and dissolved oxygen levels were also slightly better. The higher chlorophyll *a* levels downgraded the rating for that water quality measure from "Good" back down to "Caution", causing the overall rating for Upper Lemon Bay also to decrease to "Caution".

Water Quality: Chlorophyll *a* mean concentration in 2015 was of 0.0107 mg/l, exceeding the threshold of 0.0089 mg/l. Mean nitrogen concentration improved slightly, to 0.5948 mg/l, but was still slightly above the threshold of 0.540 mg/l. Mean phosophorus concentration also was slightly lower, and at 0.1297 mg/l is "Excellent", roughly half the threshold concentration. The mean for chlorophyll *a* was calculated as an arithmetic mean and the means for nitrogen and

phosphorus were calculated as geometric means (per the Numeric Nutrient Criteria outlined in the Florida Administrative Code, section 62-302.532).

Biotic Indicator: Measurement of the biotic indicator, seagrass, was performed in 2014 by the Southwest Florida Water Management District. Between 2012 to 2014, seagrass coverage in Lemon Bay (including both the Upper and Lower segments) increased from 3,727 to 3,913 acres, exceeding the combined target value of 3,890 acres. Upper Lemon Bay was not surveyed separately, but has a target level of 1,010 acres.

Water Chemistry Ratings

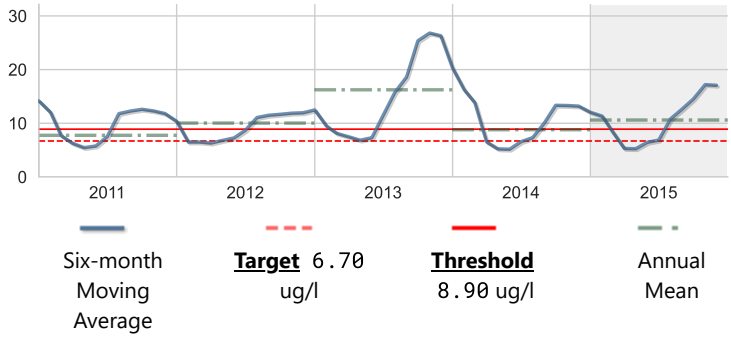
Total nitrogen, total phosphorus, and chlorophyll *a* levels are monitored carefully by water resource managers and used by regulatory authorities to determine whether a bay meets the water quality standards mandated by the Clean Water Act. The trend graphs for these indicators are shown below, along with their target and threshold values. A target value is a desirable goal to be attained, while a threshold is an undesirable level which is to be avoided. An individual indicator receives an "Excellent" rating if its mean value is below the target, a "Good" rating if its mean value is above the target but does not exceed the threshold, and a "Caution" rating if the mean value exceeds the threshold.

The charts below illustrate the general trend of water quality parameters. They show a six-month running average, which moderates high and low values in the data.

Chl-a Chlorophyll a

Score: Caution

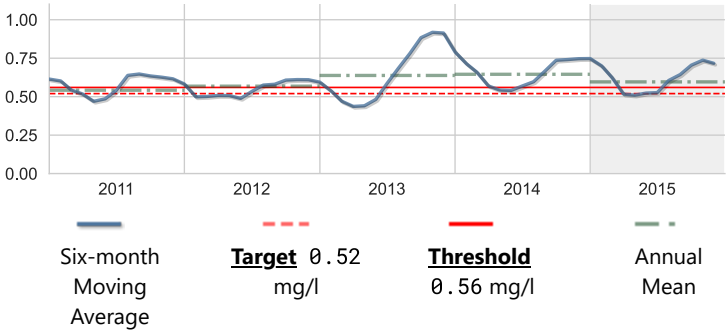
Units: ug/l	Year 2015	Historical period of record
High	47.90	88.00
Mean	10.60	9.22
Low	1.50	0.37
No. of Samples	86	1554



Nitrogen, Total

Score: Caution

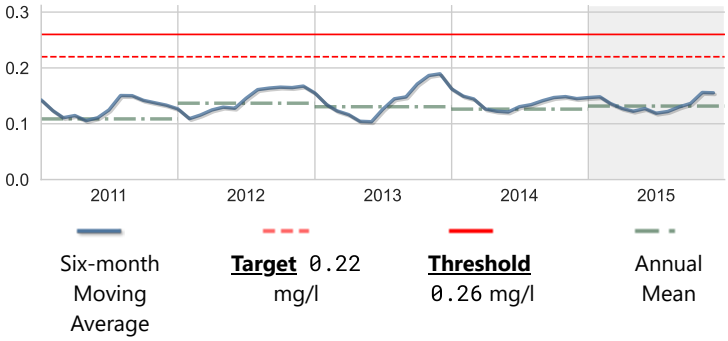
Units: mg/l	Year 2015	Historical period of record
High	1.104	2.800
Mean	0.596	
Low	0.245	0.000
No. of Samples	86	1553



Phosphorus, Total

Score: Excellent

Units: mg/l	Year 2015	Historical period of record
High	0.300	0.880
Mean	0.132	0.172
Low	0.050	0.050
No. of Samples	70	1220

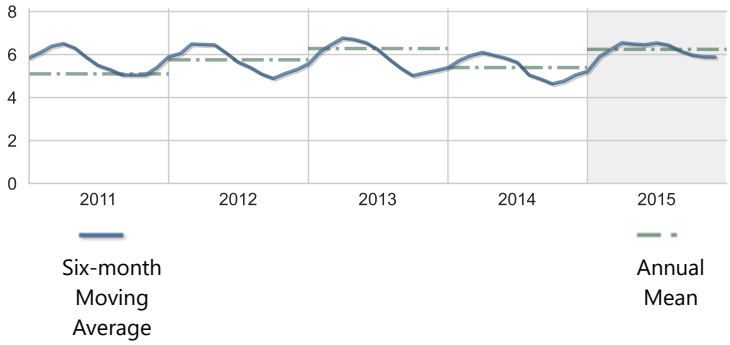


Other Measures of Bay Health

In addition to nutrient levels and chlorophyll concentration, dissolved oxygen levels, and water clarity are also objective indicators of bay health. These have complex interactive cycles which are affected by rainfall, temperature, and tidal action, as well as other factors. High nutrient levels (nitrogen and phosphorus) can stimulate excessive growth of marine algae (indicated by chlorophyll *a* level), resulting in reduced water clarity (and increased light attenuation) and depleted oxygen levels. Both plants and animals in a bay need oxygen to survive, and the seagrasses which provide food and cover for bay creatures need light for photosynthesis.

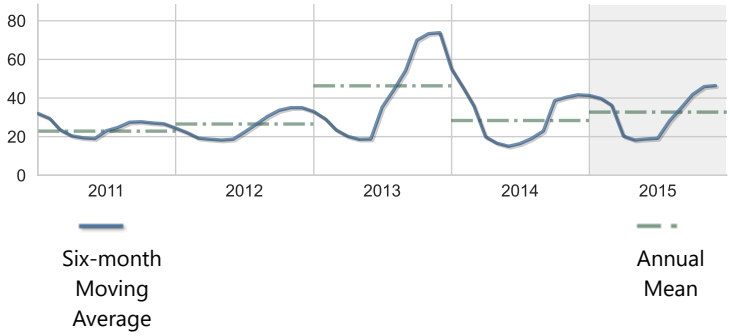
Dissolved Oxygen

Units: mg/l	Year 2015	Historical period of record
High	8.30	12.00
Mean	6.24	6.04
Low	3.10	1.20
No. of Samples	66	2999



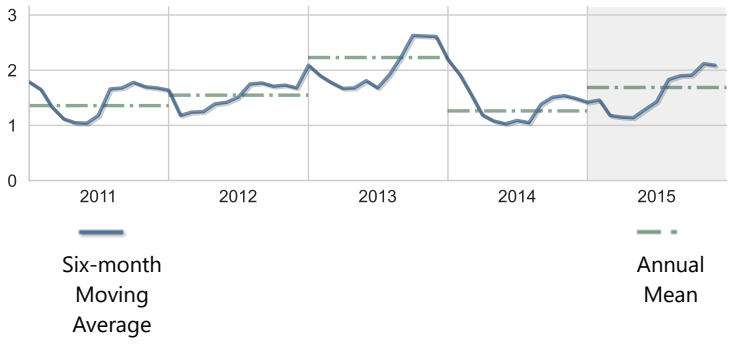
Apparent Color

Units: PCU	Year 2015	Historical period of record
High	100.00	280.00
Mean	32.70	31.33
Low	10.00	5.00
No. of Samples	70	1219



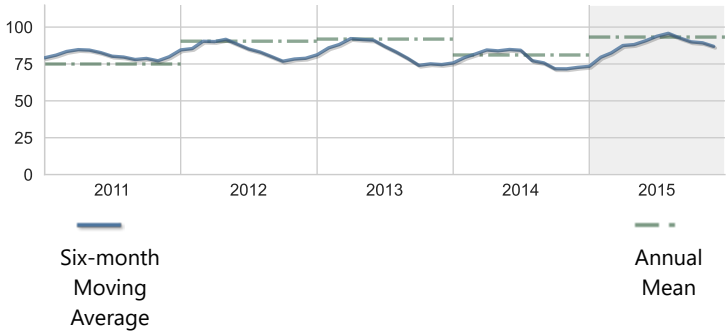
BOD, Biochemical oxygen demand

Units: mg/l	Year 2015	Historical period of record
High	4.80	7.60
Mean	1.69	1.77
Low	0.60	0.50
No. of Samples	70	1077



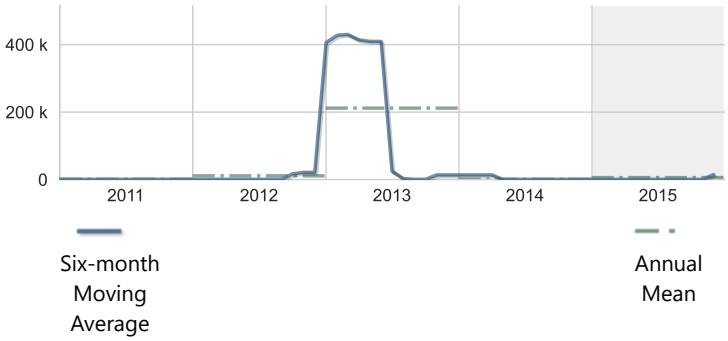
Dissolved oxygen saturation

Units: percent (%)	Year 2015	Historical period of record
High	123.00	180.07
Mean	93.23	89.36
Low	59.00	21.60
No. of Samples	60	2664



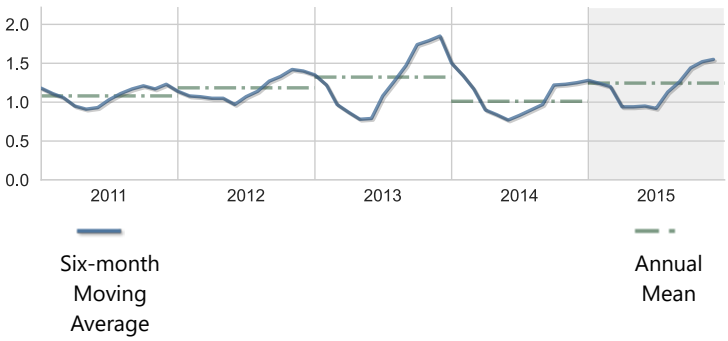
Karenia brevis ("red tide")

Units: #/l	Year 2015	Historical period of record
High	205000.00	4480000.00
Mean	5903.85	28465.71
Low	1000.00	1000.00
No. of Samples	52	700



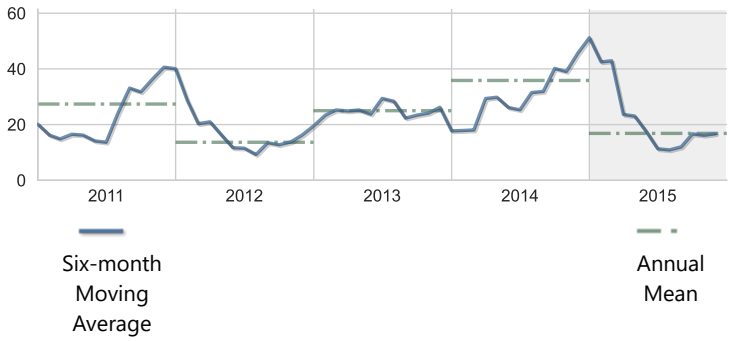
Light Attenuation

Units: K(1/m)	Year 2015	Historical period of record
High	3.21	3.85
Mean	1.25	1.10
Low	0.55	0.16
No. of Samples	60	1046



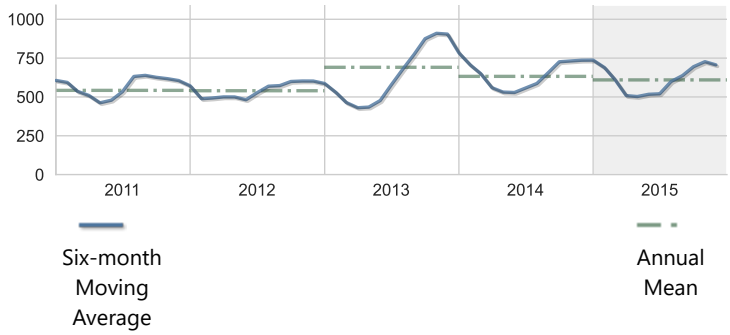
Nitrogen, Ammonia + Ammonium as N

Units: ug/l	Year 2015	Historical period of record
High	124.00	359.00
Mean	16.84	25.94
Low	5.00	5.00
No. of Samples	70	1221



Nitrogen, Kjeldahl

Units: ug/l	Year 2015	Historical period of record
High	1020.00	1330.00
Mean	609.71	550.27
Low	240.00	0.05
No. of Samples	70	1220

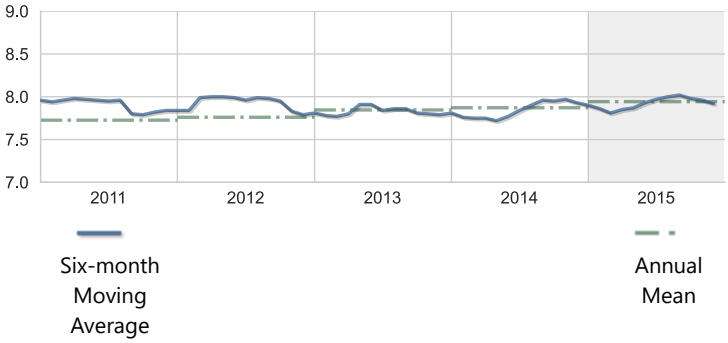


Nitrogen, Nitrite + Nitrate as N

Units: ug/l	Year 2015	Historical period of record
High	71.00	130.00
Mean	8.33	9.04
Low	5.00	5.00
No. of Samples	70	1651

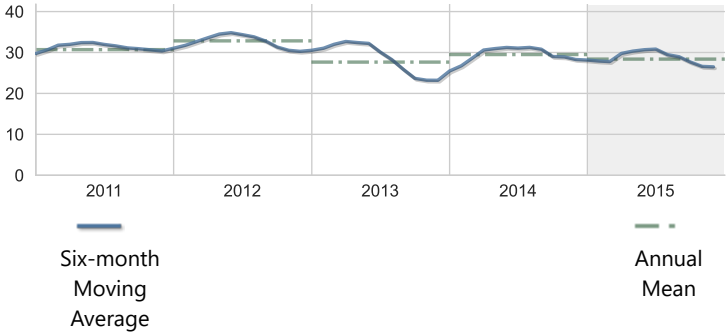
pH

Units: None	Year 2015	Historical period of record
High	8.20	8.90
Mean	7.94	7.97
Low	7.40	4.80
No. of Samples	73	2331



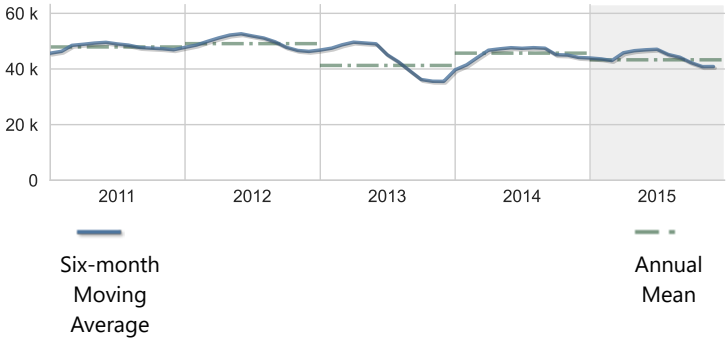
Salinity

Units: PSS	Year 2015	Historical period of record
High	35.70	41.50
Mean	28.38	29.93
Low	15.50	3.20
No. of Samples	72	3311



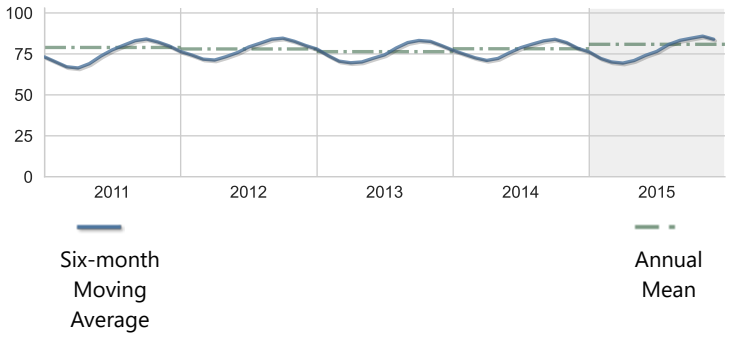
Specific conductance

Units: umho	Year 2015	Historical period of record
High	53860.00	60590.00
Mean	43298.83	46004.81
Low	25430.00	5800.00
No. of Samples	60	1243



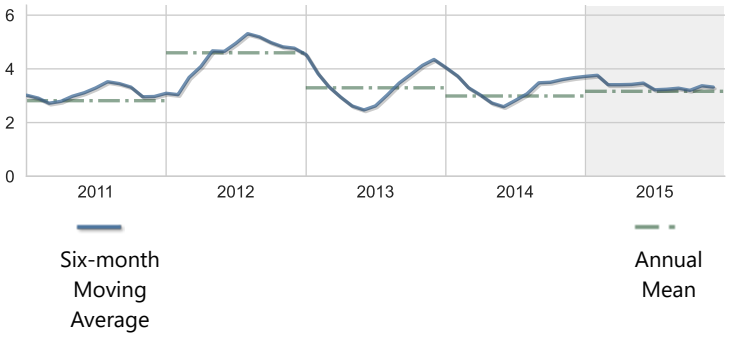
Temperature, water

Units: deg F	Year 2015	Historical period of record
High	107.60	107.60
Mean	80.86	77.82
Low	59.72	46.76
No. of Samples	92	3066



Turbidity

Units: NTU	Year 2015	Historical period of record
High	8.30	66.00
Mean	3.16	2.96
Low	1.30	0.21
No. of Samples	86	2799



Annual Averages

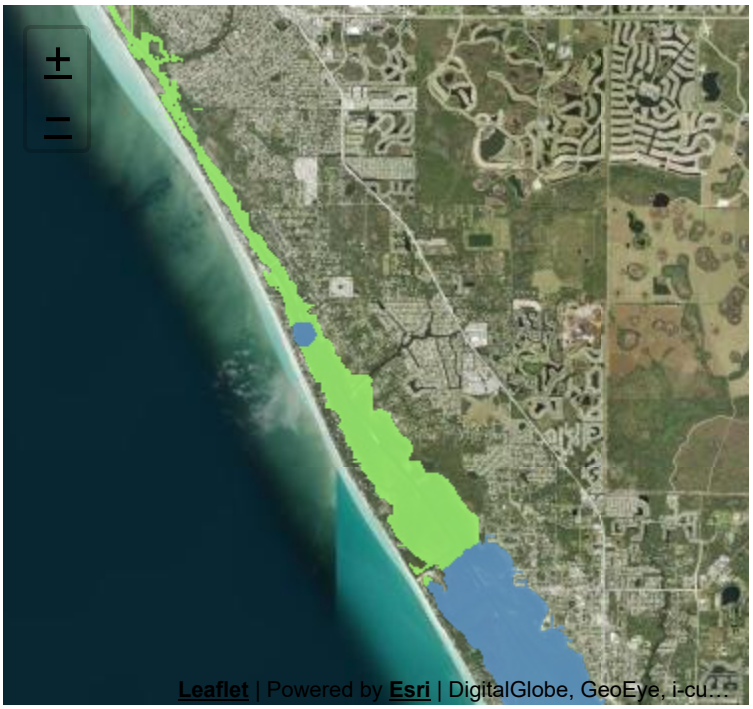
Indicator	Units	2011	2012	2013	2014	2015	Trend
Dissolved Oxygen	**mg/l**	5.10	5.76	6.28	5.39	6.24	
Dissolved oxygen saturation	**percent (%)**	74.97	90.43	91.86	81.08	93.23	
Light Attenuation	**K(1/m)**	1.08	1.18	1.32	1.01	1.25	
Salinity	**PSS**	30.70	32.84	27.65	29.50	28.38	
Turbidity	**NTU**	2.81	4.60	3.29	2.99	3.16	

Bay Contour Maps (2015)

Contour mapping is one of the best ways to visualize spatial differences in coastal water quality. The interactive map shown below presents monthly data for one selected water quality indicator atop an aerial view of the bay. Choose a different water quality parameter from the list at the top to change the map.

Showing 2015 Monthly Contour Maps for: Chlorophyll a

January



Contour Legend:

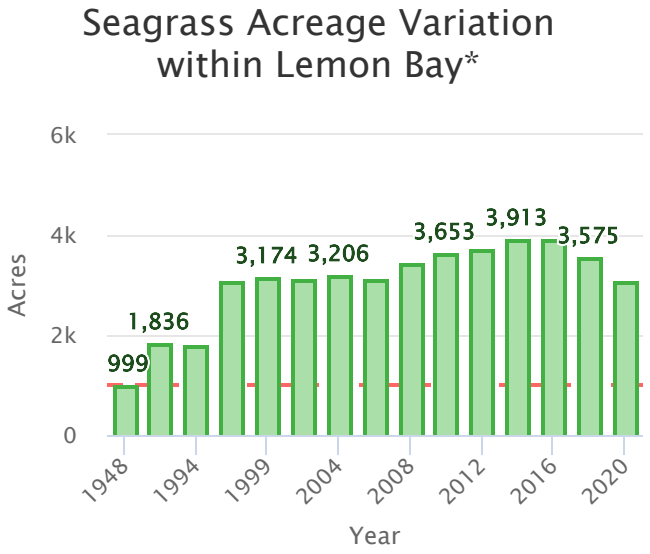
- Less than 1 mg/l
- 1.0 - 5.9 mg/l
- 6.0 - 10.9 mg/l
- 11.0 - 17.9 mg/l
- Greater than 18 mg/l

Seagrasses

Among the most important habitats in Florida's estuarine environments, seagrass beds are indispensable for the role they play in cycling nutrients, supplying food for wildlife, stabilizing sediments, and providing habitat for juvenile and adult finfish and shellfish. Use the interactive map below to observe the size, density and location of seagrass beds from year to year. The graph shows how the total amount of seagrass in the bay has changed over time. Seagrass calculations are aggregates of patchy and continuous seagrass measurements only. Recordings of attached algae are not included in these summaries.

Showing Seagrass Coverage for 2020:

Legend:
Continuous Seagrass Patchy Seagrass



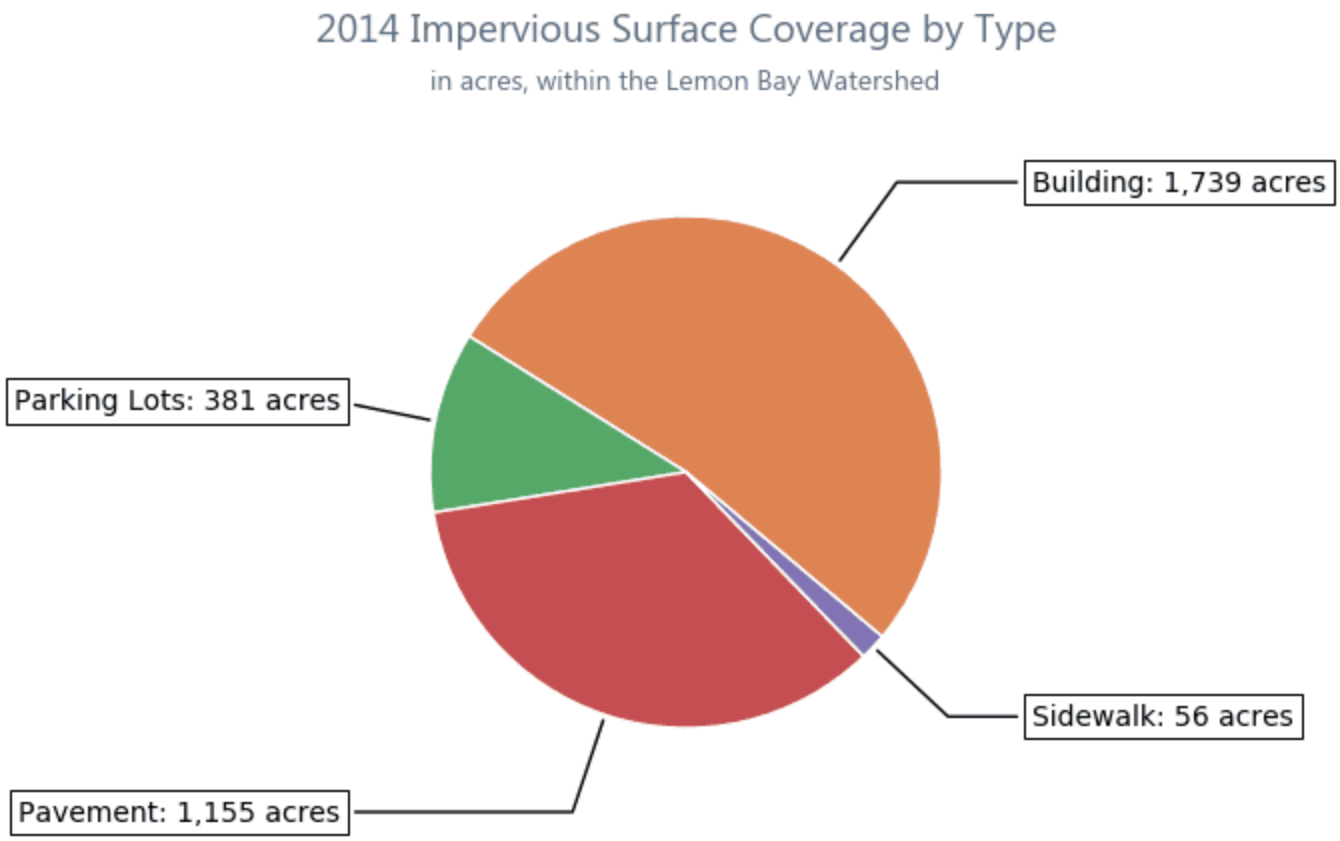
***Note**: Seagrass acreage values shown above are for Lemon Bay in its entirety. The target for seagrass acreage for Upper Lemon Bay is 1,010 acres; for Lower Lemon Bay it is 2,880 acres.

Impervious Features

Rain that falls on land that is in a natural state is absorbed and filtered by soils and vegetation as it makes it way into underground aquifers. However, in developed areas, "impervious surfaces" impede this process and contribute to polluted urban runoff entering surface waters. These surfaces include human infrastructure like roads, sidewalks,

driveways and parking lots that are covered by impenetrable materials such as asphalt, concrete, brick and stone, as well as buildings and other permanent structures. Soils that have been disturbed and compacted by urban development are often impervious as well.

10% of the land area within the **Lemon Bay Watershed** is covered by impervious surfaces



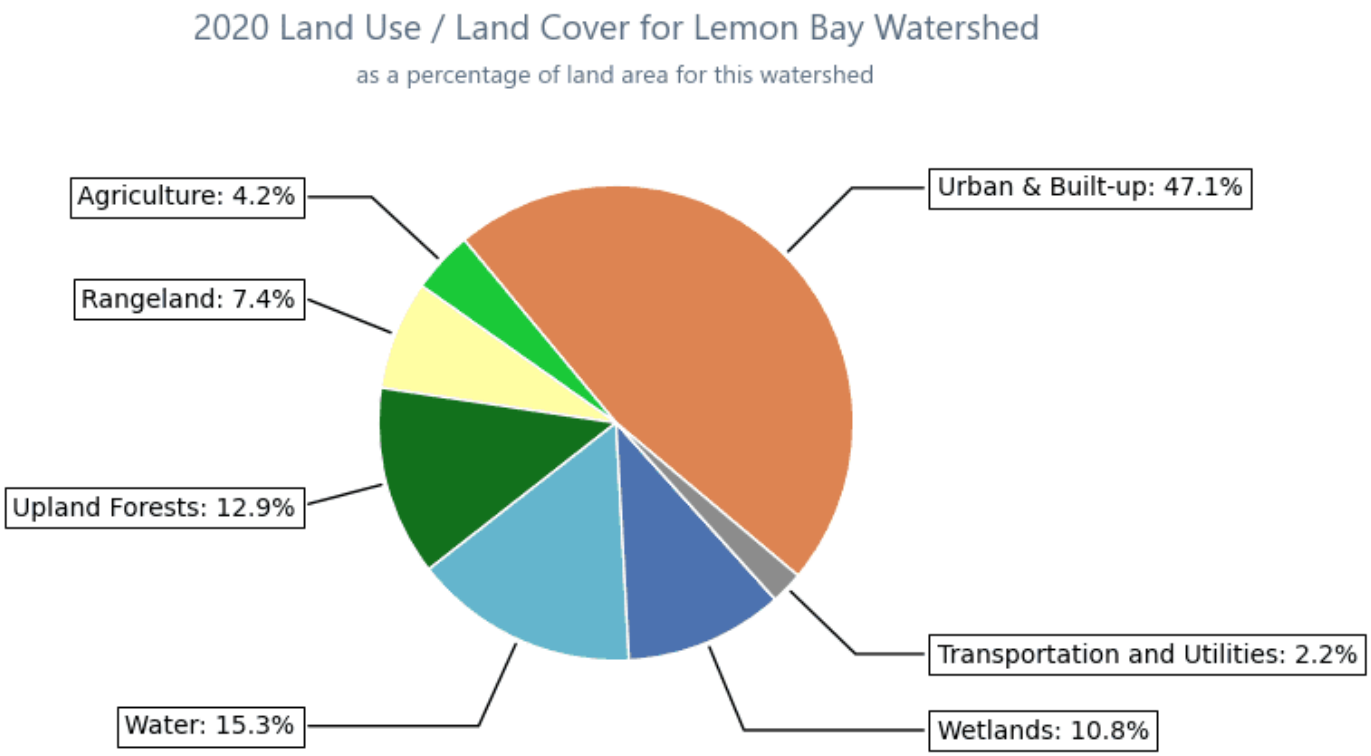
Land Use / Land Cover

Land use within a bay's watershed has a major effect on its water quality. In general, less development means better water quality. Land Cover/Land Use classifications categorize land in terms of its observed physical surface characteristics (upland or wetland, e.g.), and also reflect the types of activity that are taking place on it (agriculture, urban/built-up, utilities, etc.). Florida uses as its standard a set of statewide classifications which were developed by the Florida Department of Transportation.

Upper Lemon Bay is located within the Lemon Bay Watershed. The chart below shows the land use / land cover characteristics for Lemon Bay Watershed within the boundary of this Water Atlas. **View details about the Lemon Bay Watershed »**

Acreage and Percentage within each Land Use / Land Cover Category for Lemon Bay Watershed

Land Use Classification	1990	2005	2011	2014	2017	2020	Trend
Urban & Built-up	11,331 **33.6%**	12,872 **38.2%**	13,589 **40.4%**	13,589 **40.4%**	14,050 **41.7%**	22,467 **47.1%**	
Agriculture	2,515 **7.5%**	2,325 **6.9%**	2,255 **6.7%**	2,255 **6.7%**	2,075 **6.2%**	2,023 **4.2%**	
Rangeland	2,209 **6.6%**	4,479 **13.3%**	4,115 **12.2%**	4,115 **12.2%**	3,662 **10.9%**	3,544 **7.4%**	
Upland Forests	9,360 **27.8%**	5,637 **16.7%**	5,109 **15.2%**	5,109 **15.2%**	5,231 **15.5%**	6,168 **12.9%**	
Water	3,104 **9.2%**	3,437 **10.2%**	3,501 **10.4%**	3,501 **10.4%**	3,586 **10.6%**	7,284 **15.3%**	
Wetlands	4,689 **13.9%**	4,265 **12.7%**	4,375 **13%**	4,375 **13%**	4,355 **12.9%**	5,144 **10.8%**	
Barren Land	29 **0.1%**	0 **0%**	0 **0%**	0 **0%**	0 **0%**	6 **0%**	
Transportation and Utilities	443 **1.3%**	655 **1.9%**	726 **2.2%**	726 **2.2%**	723 **2.1%**	1,071 **2.2%**	


2020 Land Use / Land Cover for Lemon Bay Watershed
as a percentage of land area for this watershed
Agriculture: 4.2%
Urban & Built-up: 47.1%
Rangeland: 7.4%
Upland Forests: 12.9%
Transportation and Utilities: 2.2%
Water: 15.3%
Wetlands: 10.8%