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# Appendix H

## Report Cards

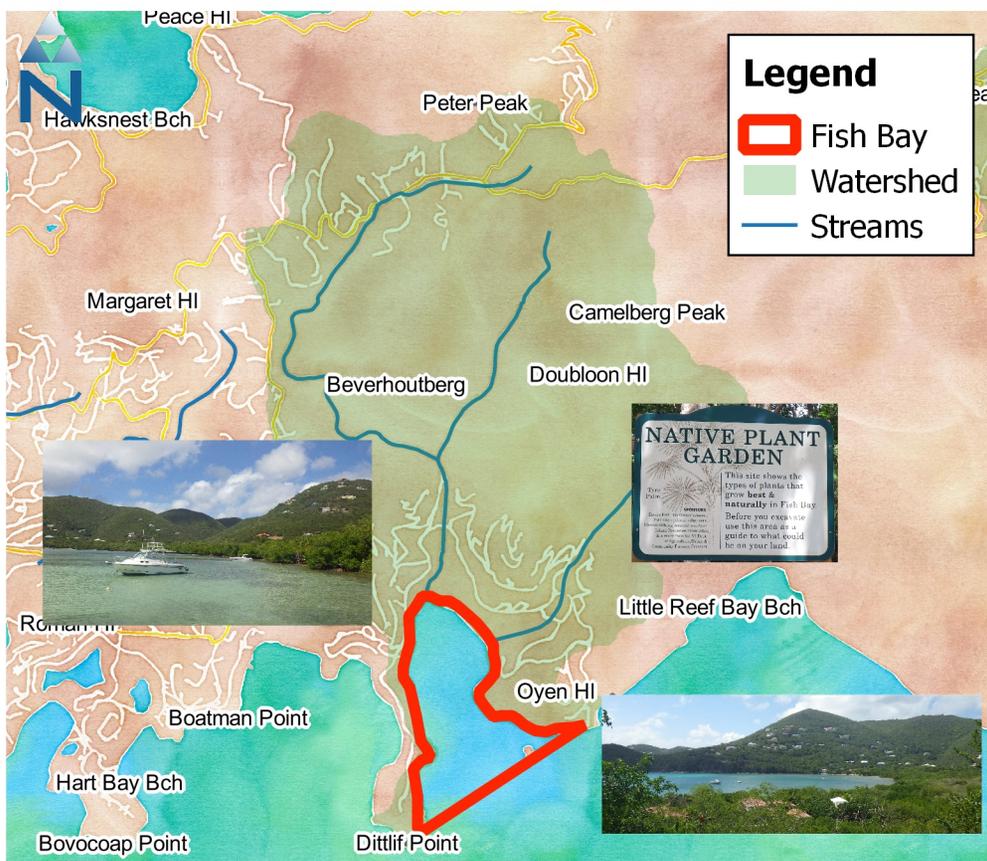
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JULY 31, 2016

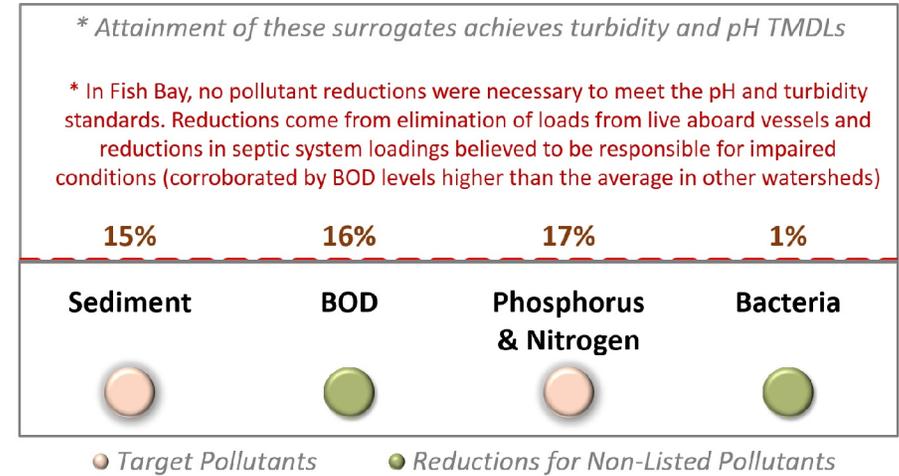
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# Fish Bay, St. John USVI

Fish Bay is included on the federal impaired waters list due to turbidity and pH. The cause of the turbidity is believed to be sediment erosion from steep slopes, unpaved roads, and ghuts. Nutrients and bacteria are also delivered to receiving waters from upland sediment sources as well as from over-burdened septic systems & cesspools and live aboard vessels. Practices that reduce sediment loadings will also reduce loadings of all pollutants. Recommended practices include paving roads (particularly close to receiving waters), reducing steep cutslopes, protection of mangrove forests, and regular inspection and maintenance of erosion control practices.



## Load Reduction



## Relative Impacts of Implementation Actions

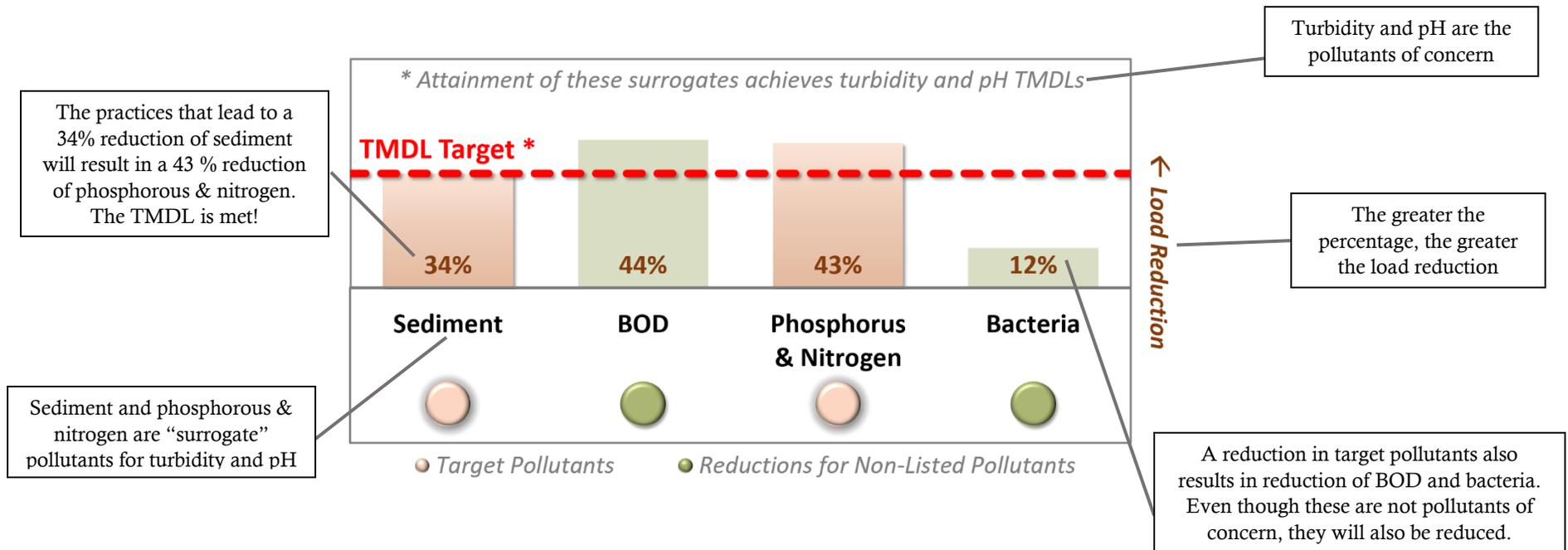
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Erosion control measures for construction sites and roads	\$\$	High	2 yrs	●	●	●	●
Pave eastern Marina Drive	\$\$\$	Medium	2 yrs	●	●	●	●
Implement erosion control on cut slopes over 50%	\$\$	High	5 yrs	●	●	●	●
Paving & Stabilization of steep driveways	\$	Medium	5 yrs	●	●	●	●
Mangrove protection	\$	High	5 yrs	●	●	●	●
Acquire development rights or convert to protected areas	\$ to \$\$\$	High	5 yrs	●	●	●	●
Delineate wetlands & enforce no development zoning	\$	High	1 yr	●	●	●	●
Ensure hydrologic connectivity with bay and mangroves	\$\$	High	2 yrs	●	●	●	●
Perform regular maintenance and repair of road and drainage structures	\$\$	Medium	2 yrs	●	●	●	●
Identify and fund responsible parties for maintenance and enforcement	\$\$	Medium	1 yr	●	●	●	●
Reduce pollutant sources in upper watershed reaches	\$\$	High	10 yrs	●	●	●	●
Remediate Susannaberg Landfill	\$\$\$	Medium	10 yrs	●	●	●	●
Replace overstressed septic systems with modern systems	\$\$\$	High	5 yrs	●	●	●	●

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

## How to interpret load reduction:

This load reduction graphic depicts how much reduction (as a percent) is required to comply with the established TMDL. Each assessment unit has one or more target pollutants, which are depicted on the graph in red. Pollutants that are not a significant threat to water quality are depicted in green, although they may also face percent reductions (an added benefit) when target pollutants are reduced. The limiting pollutant determines the placement of the TMDL target line because, once reduced, the TMDL has been met. Surrogate parameters are used to determine the TMDL for some target pollutants.

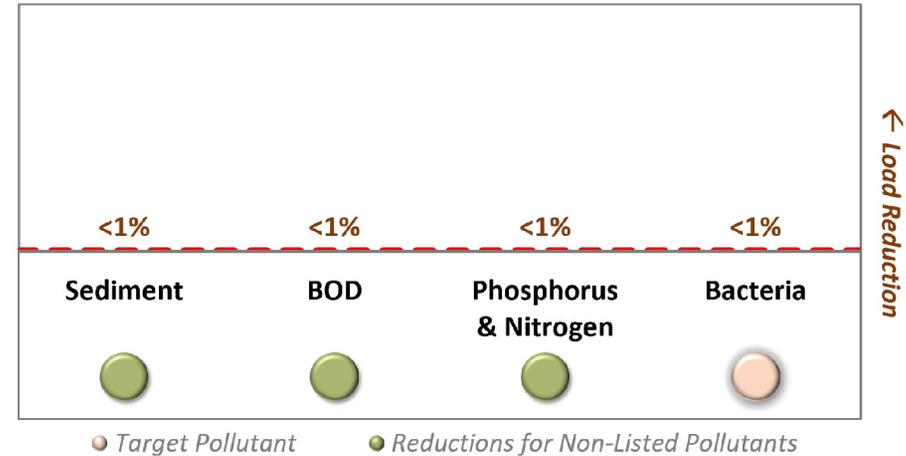


# Coral Bay Harbor, St. John USVI

Coral Bay Harbor is included on the federal impaired waters list due to turbidity, pH, and enterococcus bacteria. The increase in turbidity is primarily caused by erosion/sedimentation and can also be a short-term issue related to a storm event. Sources of bacteria are primarily the result of failed/failing septic systems, sewage disposal from boats, and nonpoint source runoff. Recommended practices include paving roads (particularly close to receiving waters), reducing steep cutslopes, protection of wetland areas & riparian zones, maintenance of hydrologic connectivity, and stormwater & wastewater improvements in Coral Harbor.



## Load Reduction



## Relative Impacts of Implementation Actions

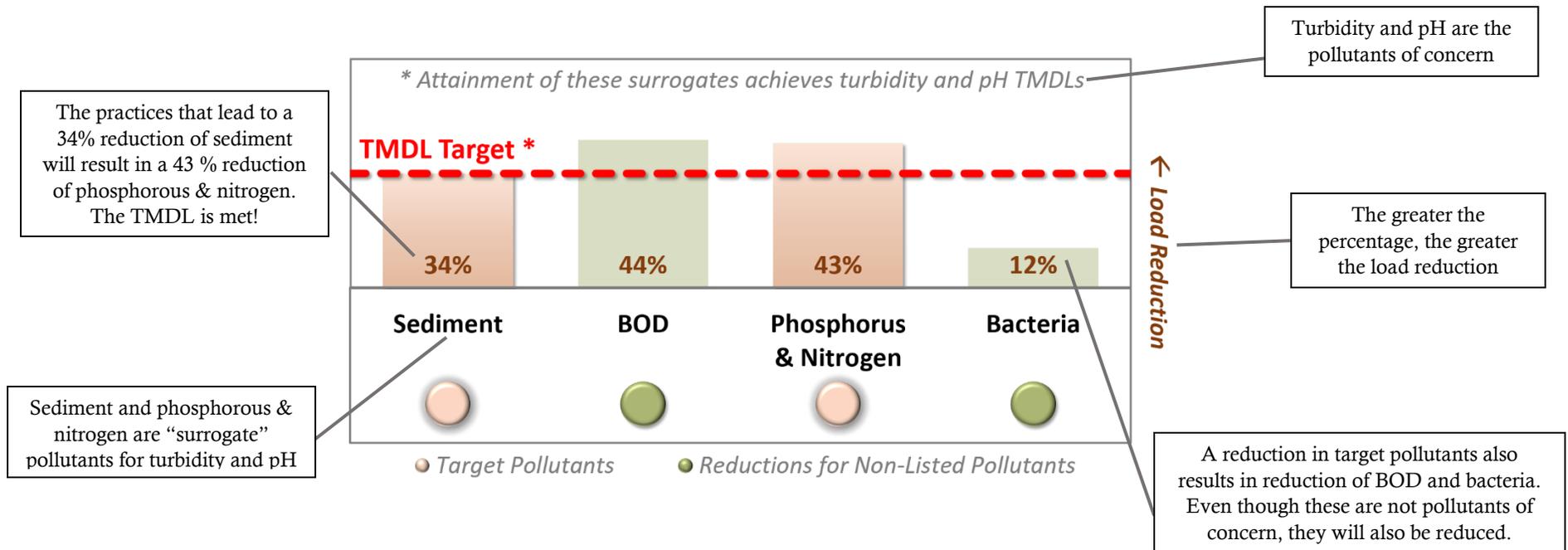
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Implement Coral Bay Community Council Priority projects for road erosion	\$ - \$\$\$	High	5 yrs	●	●	●	
Implement erosion control on cut slopes over 50%	\$\$	High	5 yrs	●	●	●	
Paving & Stabilization of steep driveways	\$	Medium	5 yrs	●	●	●	
Provide on-site technical assistance and enforcement to implement BMPs	\$	High	1 yr	●	●	●	●
Support small NGOs to receive and administer grant opportunities	\$	Medium	3 yrs	●	●	●	●
Streamline permitting, review, site inspection & enforcement	\$	Medium	1 yr	●	●	●	●
Implement stormwater and wastewater improvements around Coral Harbor	\$ - \$\$\$	High	3 yrs	●	●	●	●
Access to mobile pump facility for liveaboard yachting community	\$\$	Medium	3 yrs		●	●	●
Protection and riparian enhancement for primary ghat systems	\$\$	High	5 yrs	●	●	●	●
Protection of critical wetland areas & maintain hydrologic connectivity of mangroves	\$	High	5 yrs	●	●	●	●
Support post-construction demonstration projects that use BMPs	\$	Medium	3 yrs	●	●	●	●
Conduct inspections and CZM involvement for areas >200 ft in elevation	\$	Medium	3 yrs	●	●	●	●
Inspect and replace septic systems to match actual uses	\$\$	High	5 yrs		●	●	●

## What is a TMDL?

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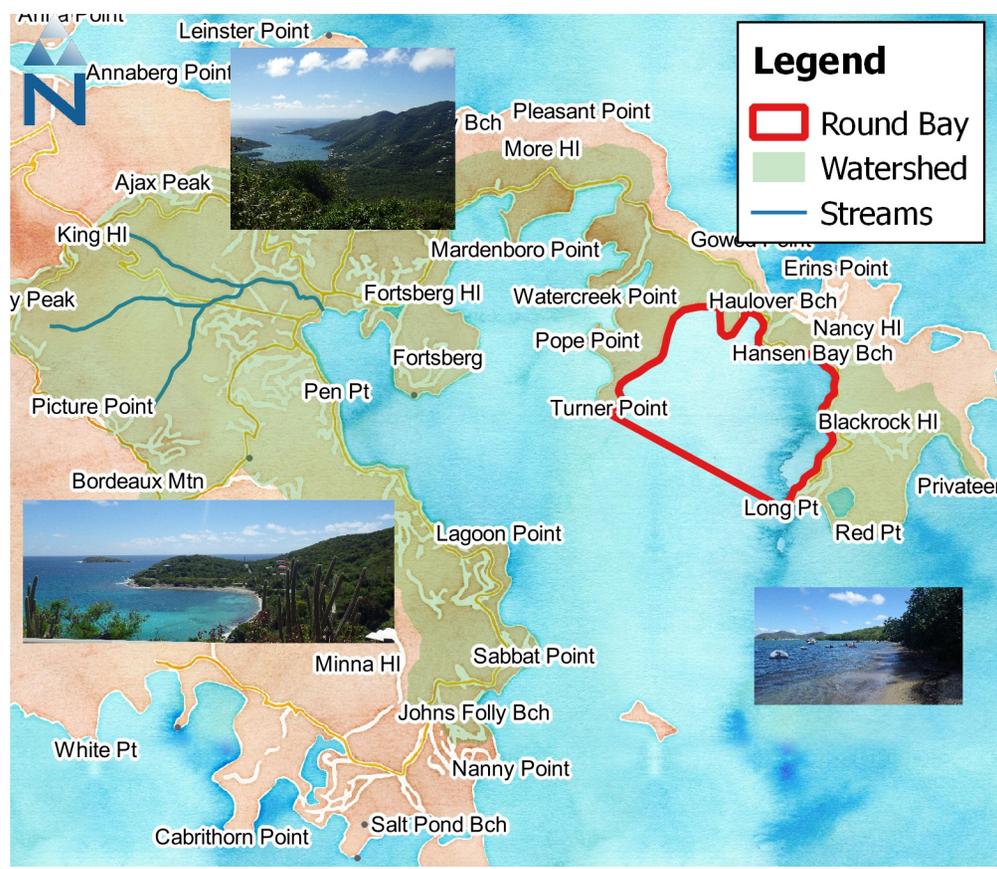
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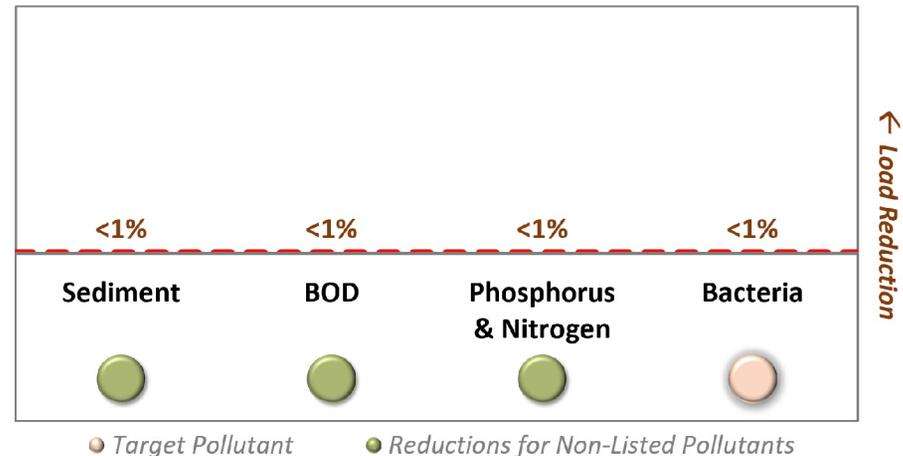


# Round Bay, St. John USVI

Round Bay is included on the federal impaired waters list due to enterococcus bacteria. Sources of bacteria in Round Bay are primarily the result of donkey and goat populations, residences, and live-aboard populations that have high connectivity to the open ocean. Erosion and sedimentation from uplands and ghuts could also be a contributor to loading of pollutants in the bay. Recommended practices include paving roads (particularly close to receiving waters), reducing steep cutslopes, protection of wetland areas & riparian zones, maintenance of hydrologic connectivity, and stormwater & wastewater improvements in the bay.



## Load Reduction



## Relative Impacts of Implementation Actions

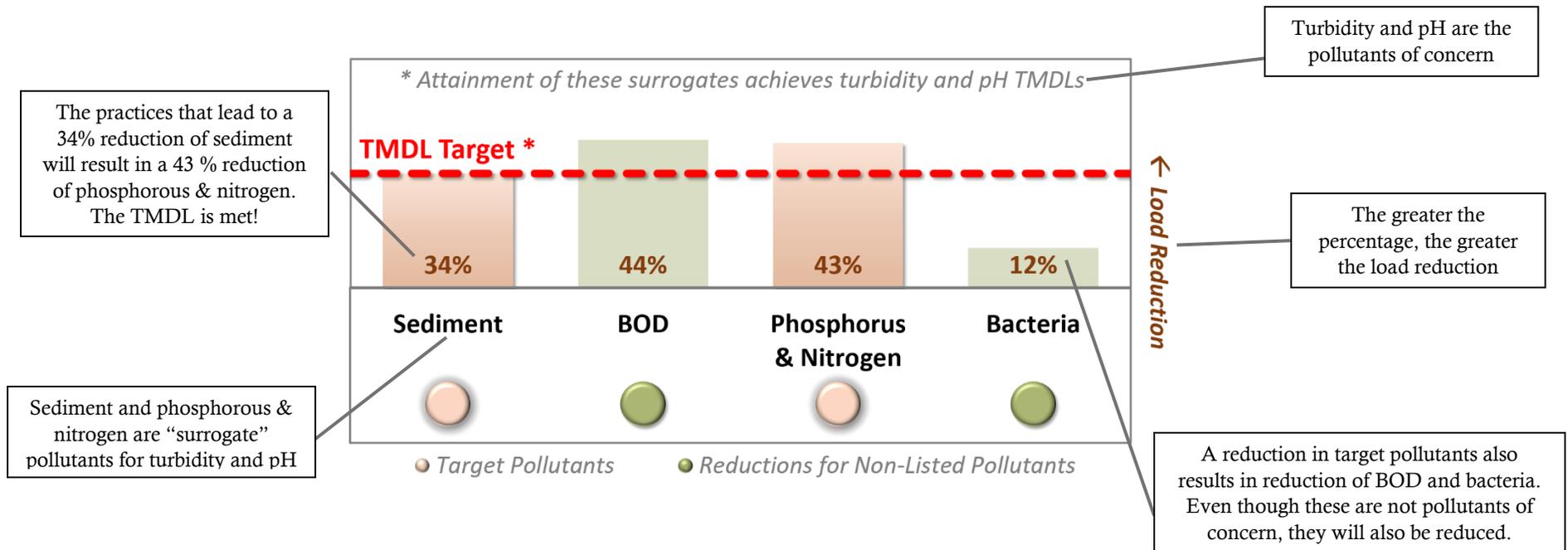
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Implement Coral Bay Community Council Priority projects for road erosion	\$ - \$\$\$	High	5 yrs	●	●	●	
Implement erosion control on cut slopes over 50%	\$\$	High	5 yrs	●	●	●	
Paving & Stabilization of steep driveways	\$	Medium	5 yrs	●	●	●	
Provide on-site technical assistance and enforcement to implement BMPs	\$	High	1 yr	●	●	●	●
Support small NGOs to receive and administer grant opportunities	\$	Medium	3 yrs	●	●	●	●
Streamline permitting, review, site inspection & enforcement	\$	Medium	1 yr	●	●	●	●
Implement stormwater and wastewater improvements around Coral Harbor	\$ - \$\$\$	High	3 yrs	●	●	●	●
Access to mobile pump facility for liveaboard yachting community	\$\$	Medium	3 yrs		●	●	●
Protection and riparian enhancement for primary ghut systems	\$\$	High	5 yrs	●	●	●	●
Protection of critical wetland areas & maintain hydrologic connectivity of mangroves	\$	High	5 yrs	●	●	●	●
Support post-construction demonstration projects that use BMPs	\$	Medium	3 yrs	●	●	●	●
Conduct inspections and CZM involvement for areas >200 ft in elevation	\$	Medium	3 yrs	●	●	●	●
Inspect and replace septic systems to match actual uses	\$\$	High	5 yrs		●	●	●

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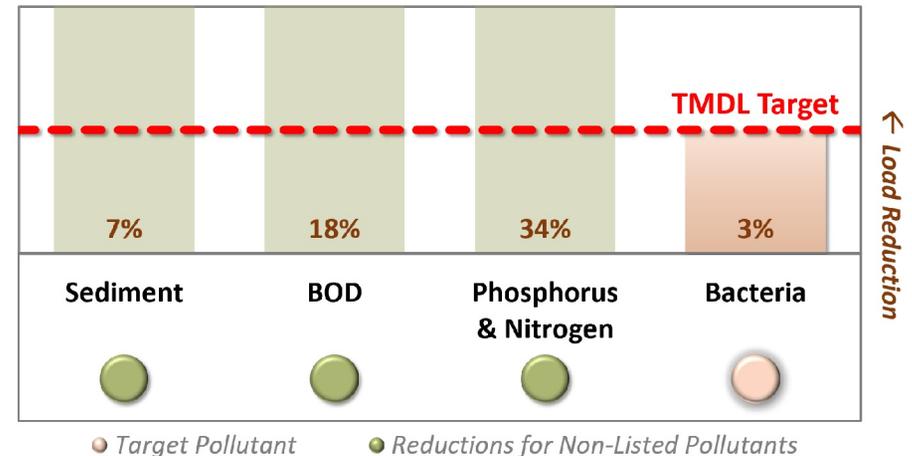


# Benner Bay, St. Thomas USVI

Benner Bay (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to enterococcus bacteria. Sources of bacteria are likely fecal matter from feral animals, vessels docked within the bay, and discharges from storm sewers, failing septic, and sewers. Recommended practices include gully cleanup & protection, mangrove, salt pond, & freshwater wetland protection, improvement of wastewater treatment & overflow from heavy rain events, and incentives for businesses to maintain newer wastewater treatment systems. Practices that reduce bacteria will also result in reductions in watershed loadings of all pollutants.



## Load Reduction



## Relative Impacts of Implementation Actions

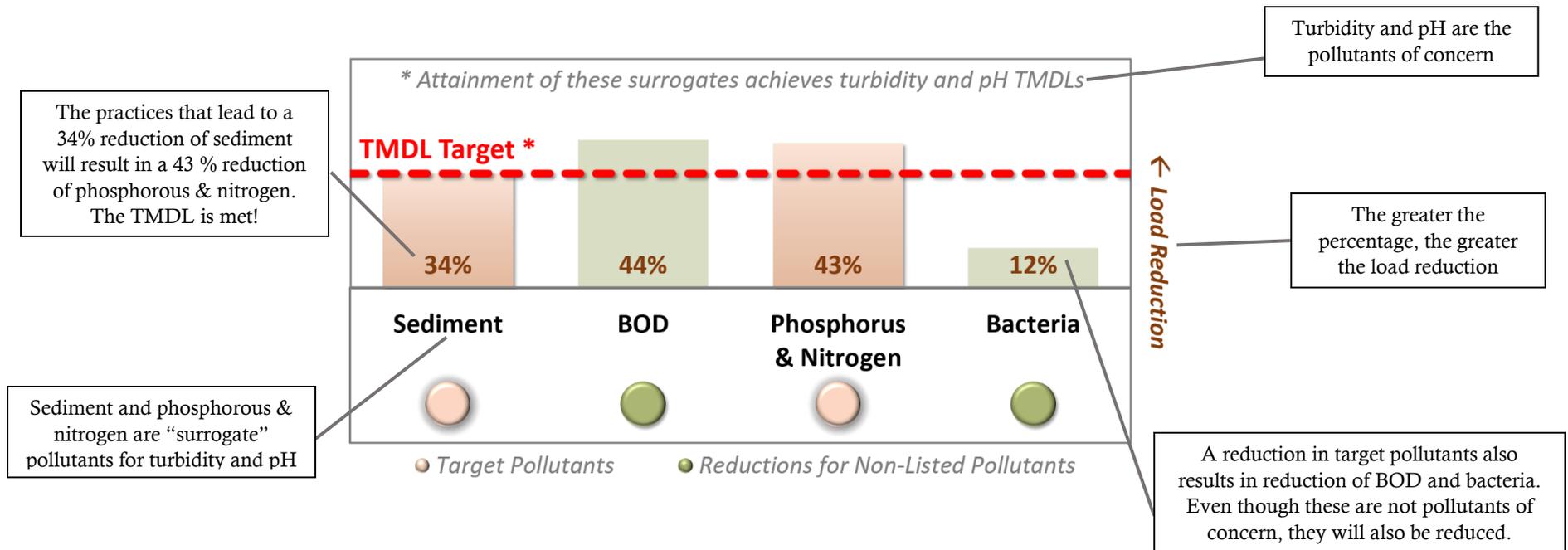
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement gully cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

## What is a TMDL?

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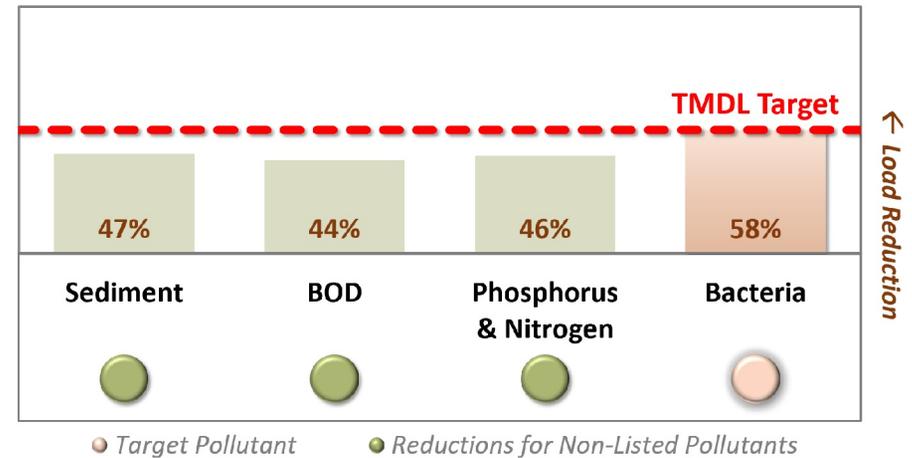


# Mangrove Lagoon, St. Thomas USVI

Mangrove Lagoon (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to temperature and enterococcus bacteria. Sources of bacteria are likely fecal matter from feral animals, vessels docked within the bay, and discharges from storm sewers, failing septic, and sewers. Temperature increase is due to higher sea temperatures, drought, and sedimentation. Recommended practices include ghat cleanup & protection, mangrove, salt pond, & freshwater wetland protection, control of solid waste and runoff from Bonovi Landfill to Mangrove Lagoon, and incentives for businesses to maintain newer wastewater treatment systems.



## Load Reduction



## Relative Impacts of Implementation Actions

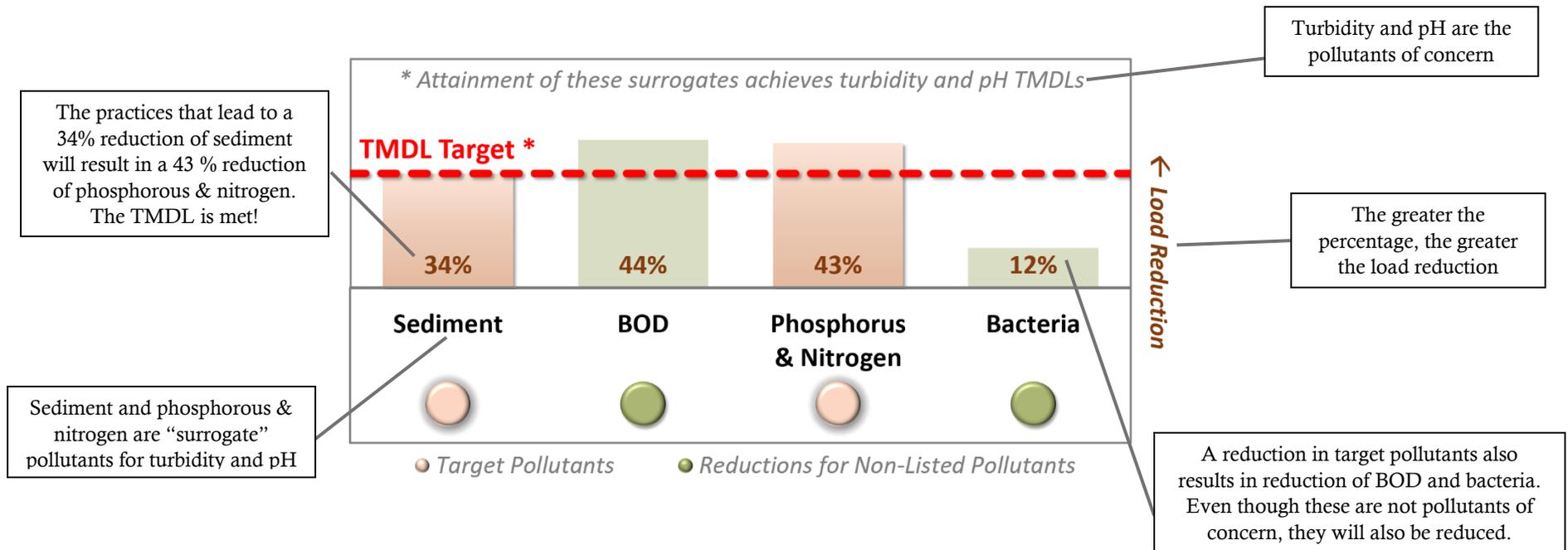
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement ghat cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

## What is a TMDL?

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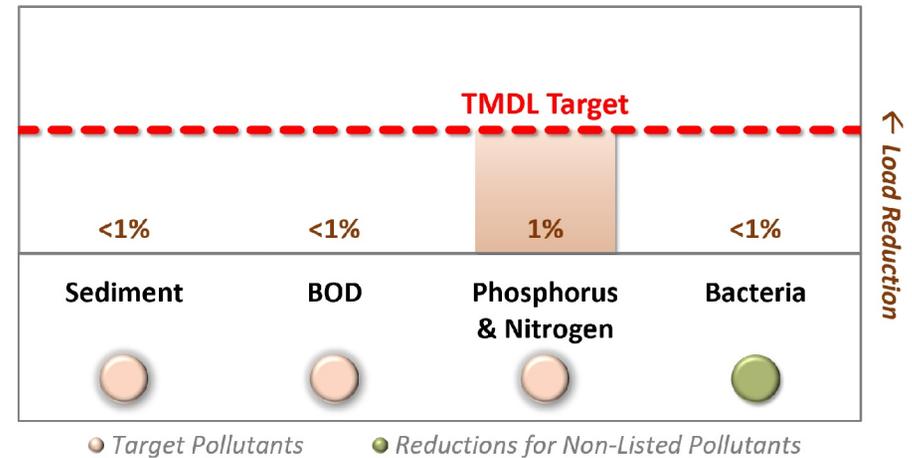


# Great Bay, St. Thomas USVI



Great Bay (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to dissolved oxygen and turbidity. Increased turbidity could be a result of seagrass habitat loss, which causes resuspension of fine sediment in the water column, also resulting in dissolved oxygen impairment. Recommended practices include ghut cleanup & protection, mangrove, salt pond, & freshwater wetland protection, improvement of wastewater treatment & overflow from heavy rain events, and the creation of incentive for waterfront businesses to install and maintain newer wastewater treatment systems.

## Load Reduction



## Relative Impacts of Implementation Actions

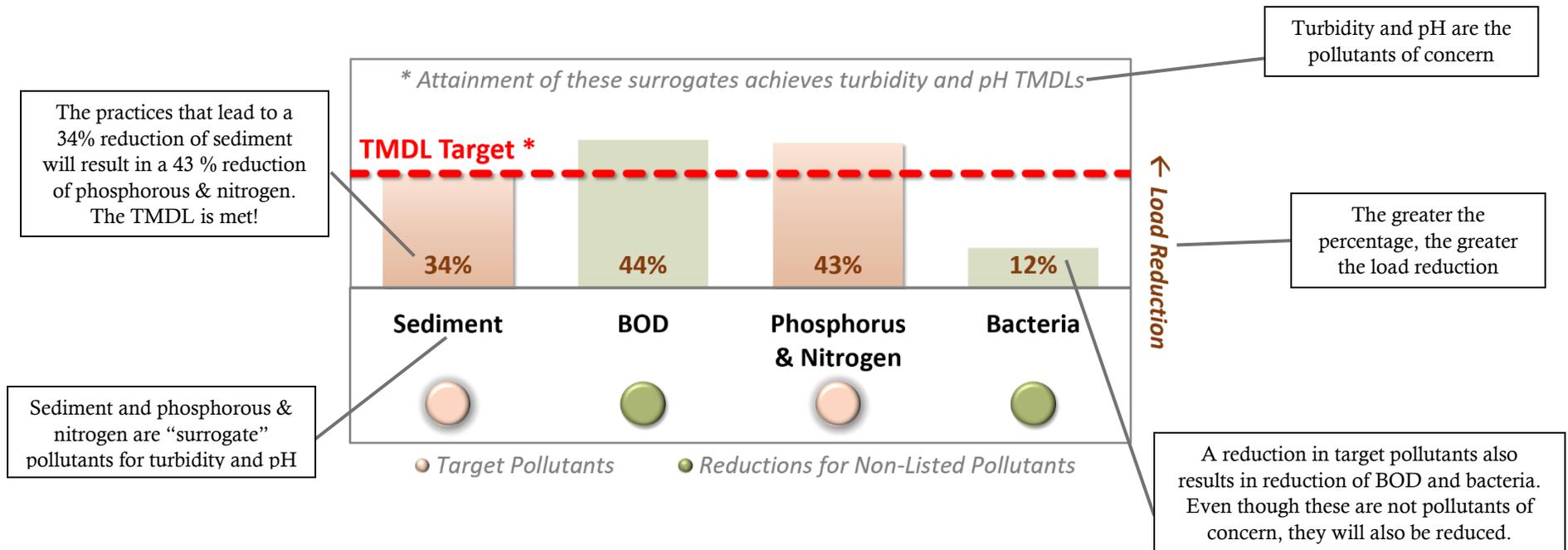
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement ghut cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

## What is a TMDL?

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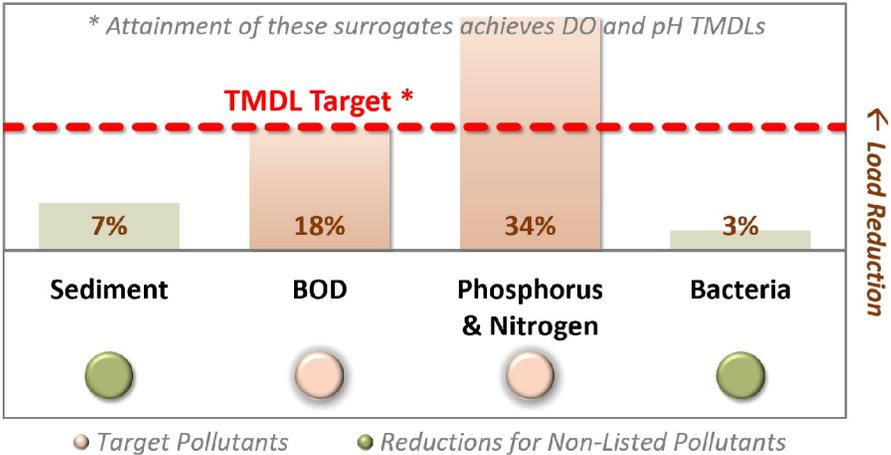


# Cowpet Bay, St. Thomas USVI

Cowpet Bay (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to dissolved oxygen. Dissolved oxygen (DO) impairment may be a result of older resorts near the bay and residential homes with aging small capacity treatment systems. Recommended practices include replacement of old and over-burdened septic systems in the area, ghut cleanup & protection, improvement of wastewater treatment & overflow from heavy rain events, and incentives for businesses to maintain newer wastewater treatment systems. Practices that improve DO impairment will also result in improvement in watershed loadings of nutrients.



## Load Reduction



## Relative Impacts of Implementation Actions

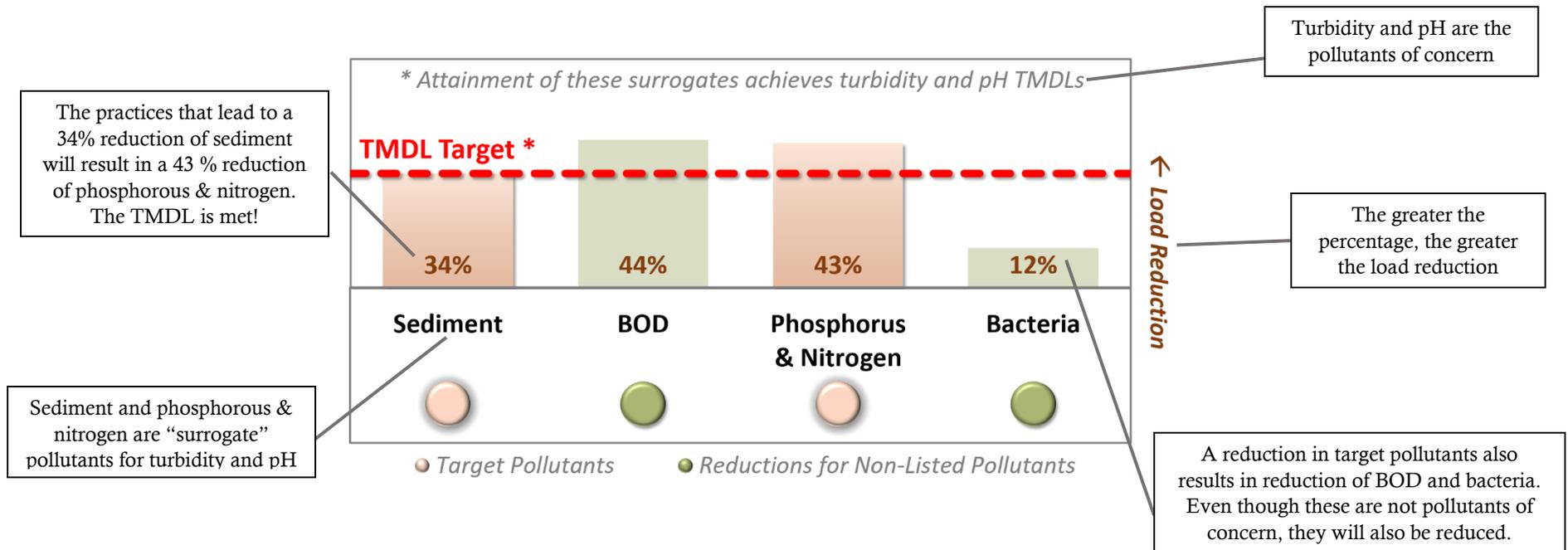
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement ghut cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

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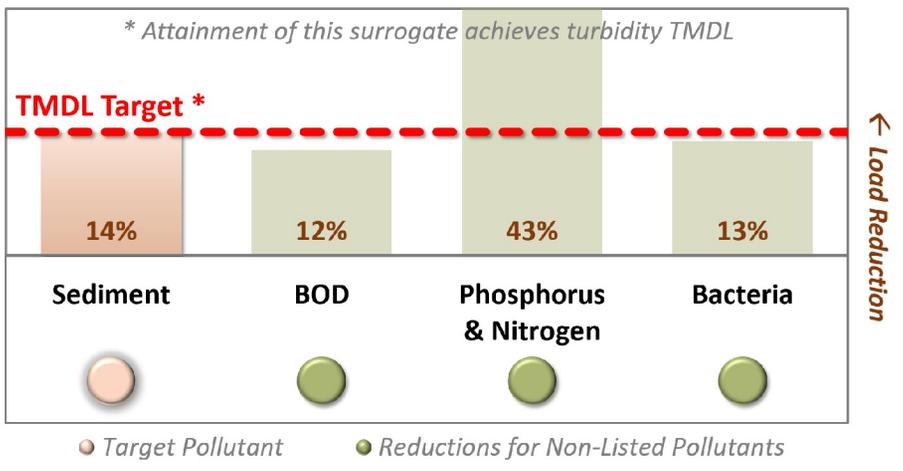


# Nazareth Bay, St. Thomas USVI

Nazareth Bay (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to turbidity. Turbidity increases are likely due to high erosion from steep slopes, over-development, and erosion & sedimentation from construction sites and neighborhoods. Recommended practices include mapping and inventory of impervious cover & unpaved roads/surfaces, gully cleanup & protection, improvement of wastewater treatment & overflow from heavy rain events, and incentives for businesses to maintain newer wastewater treatment systems. Practices that improve sediment loading will also result in improvement in watershed loadings of nutrients.



## Load Reduction



## Relative Impacts of Implementation Actions

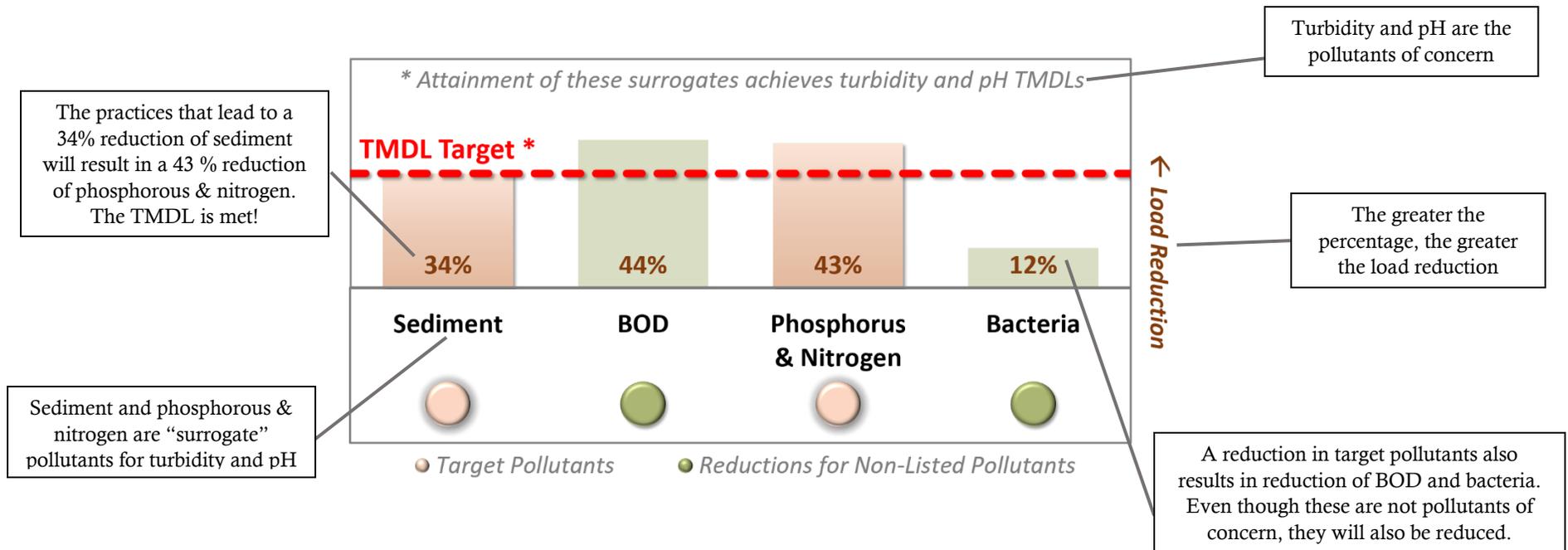
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement gully cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

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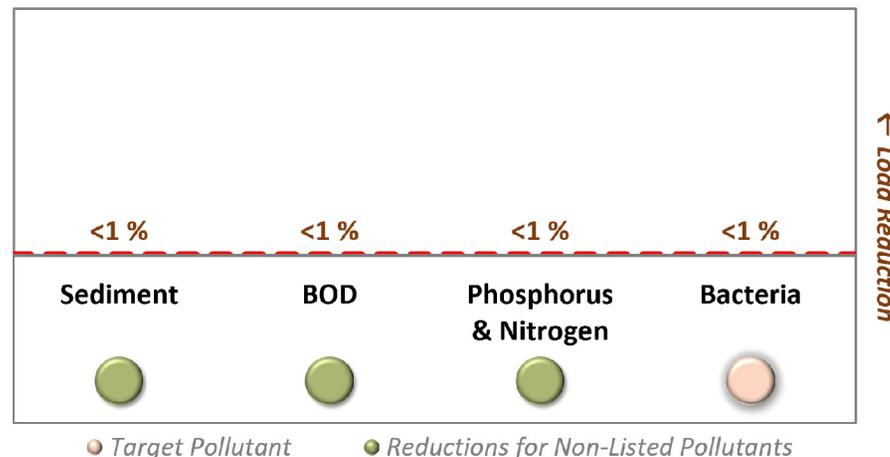


# Jersey Bay, St. Thomas USVI

Jersey Bay (within the St. Thomas East End Reserve) is included on the federal impaired waters list due to fecal coliform. Elevated levels of bacteria may be due to inputs from the Tutu industrial complex, housing projects, and residential septic systems. Recommended practices include mapping and inventory of impervious cover & unpaved roads/surfaces, gully cleanup & protection, improvement of wastewater treatment & overflow from heavy rain events, and incentives for businesses to maintain newer wastewater treatment systems. Practices that improve sediment loading will also result in improvement in watershed loadings of nutrients.



## Load Reduction



## Relative Impacts of Implementation Actions

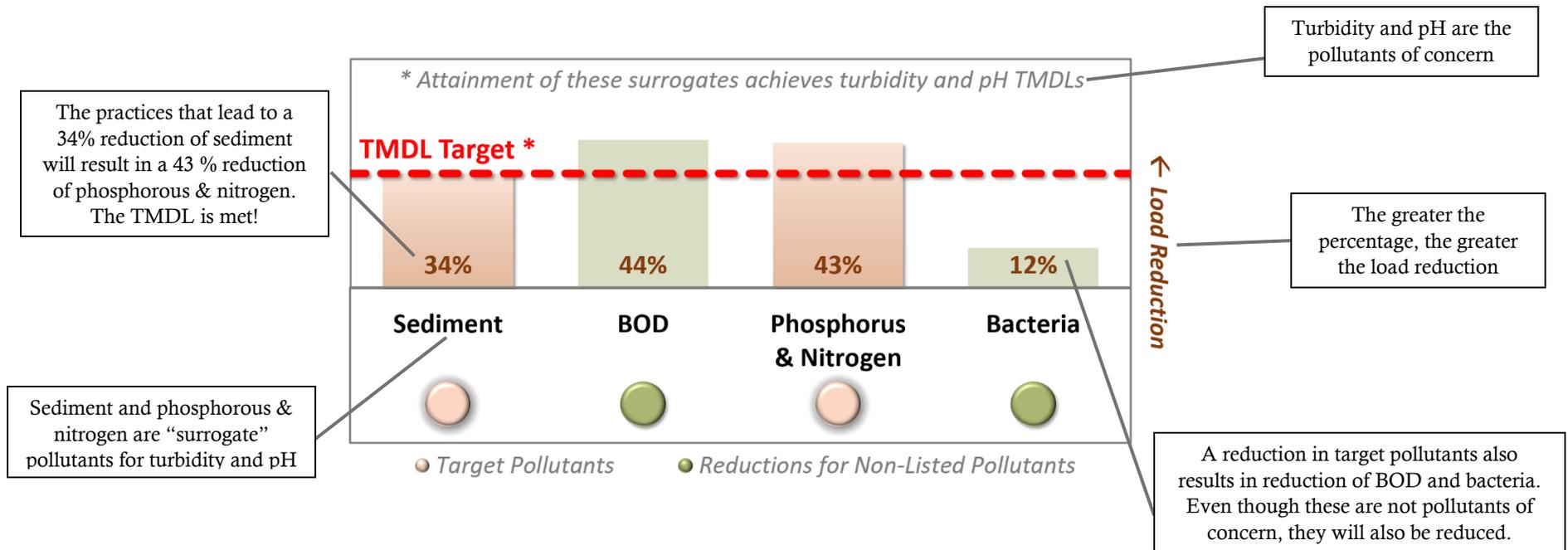
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Inventory and map large impervious surfaces and stormwater runoff conditions	\$	Medium	1 yr	●	●	●	●
Inventory and map unpaved roads/surfaces and connectivity to STEER to prioritize treatment	\$	Medium	1 yr	●	●	●	●
Implement gully cleanup and protection (vegetation, stabilization)	\$\$	High	2 yrs	●	●	●	●
Improve and inventory wastewater management systems	\$ - \$\$\$	High	5 yrs		●	●	●
Protect the mangroves, salt ponds and freshwater wetlands	\$\$	High	2 yrs	●	●	●	●
Control solid waste and runoff from Bovoni Landfill to Mangrove Lagoon	\$\$	High	2 yrs	●	●	●	●
Protect and enhance Mangrove Lagoon wetlands; assess contaminant load	\$	High	2 yrs	●	●	●	●
Provide incentives for waterfront businesses to install, replace and maintain wastewater treatment systems	\$-\$\$\$	High	5 yrs	●	●	●	●
Improve wastewater treatment and address overflow associated with heavy rainfall events	\$\$\$	High	10 yrs	●	●	●	●

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

## How to interpret load reduction:

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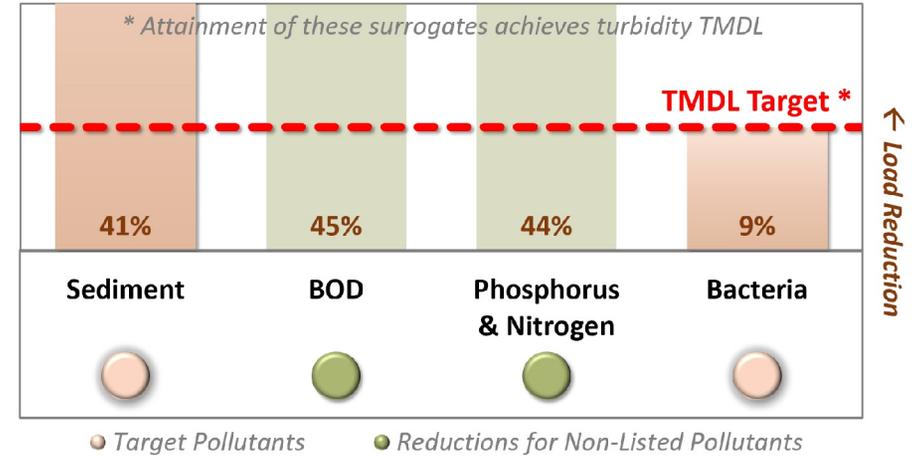




# Salt River Lagoon, Marina, St. Thomas USVI

Salt River Lagoon, Marina, is included on the federal impaired waters list due to turbidity, enterococcus bacteria, and fecal coliform. Turbidity increases are likely due to a large gravel road and erosion from commercial facilities especially during large rain events. Bacteria loading is likely due to houses above the marina, wildlife loading, dock storage areas, and low water flow. Recommended practices include protection of the Salt River Canyon Ghut, protection of mangroves & salt ponds, and routine inspections of earth changes above waterbodies. Practices that improve sediment & bacteria loading will also improve watershed loadings of nutrients & BOD.

## Load Reduction



## Relative Impact of Implementation Actions

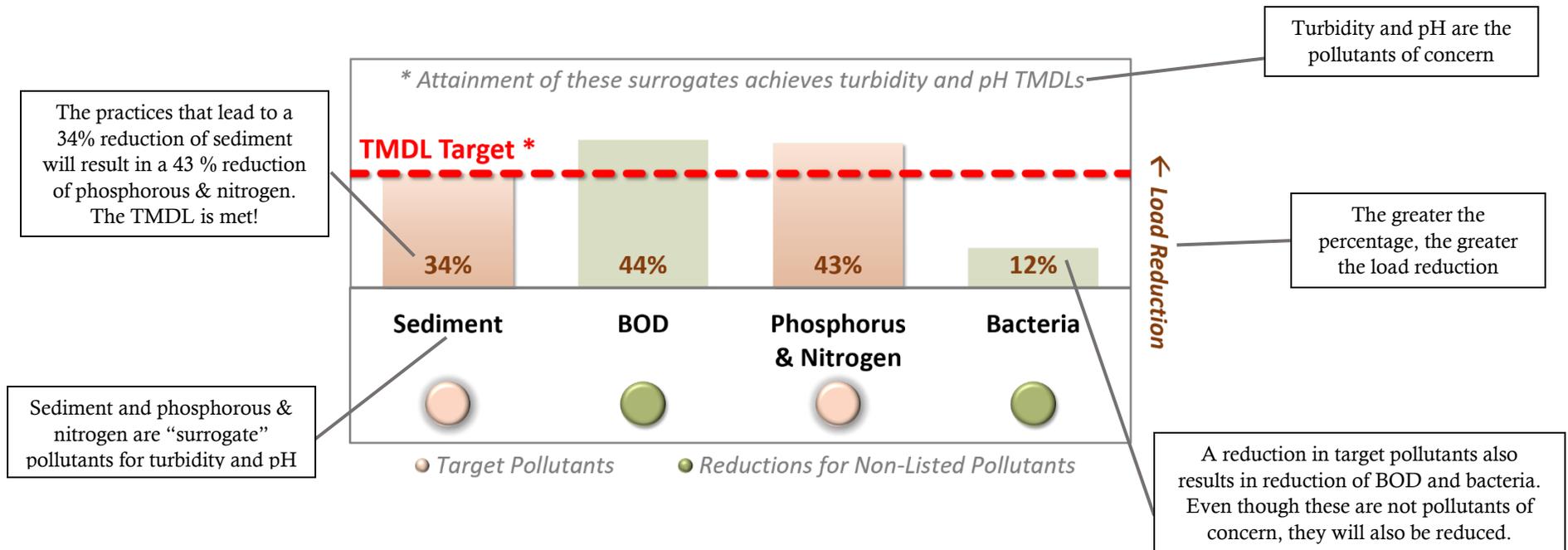
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Protection of Salt River Canyon Ghut from upland stormwater and wastewater runoff from upland housing	\$\$	High	10 yrs	●	●	●	●
Protection of shoreline mangrove lagoon and salt ponds	\$	High	5 yrs	●	●	●	●
Clean up and incentive improvements at marina and waterfront area around commercial properties	\$\$	High	5 yrs	●	●	●	●
Enforce permitting and inspections for earth change directly above waterbodies	\$	High	2 yrs	●	●	●	●
Conduct watershed assessment focused on large stormwater project in the upper reaches	\$	Medium	2 yrs	●	●	●	●
Conduct watershed assessment to consolidate all current activities to prioritize enhancement projects	\$	Medium	2 yrs	●	●	●	●

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

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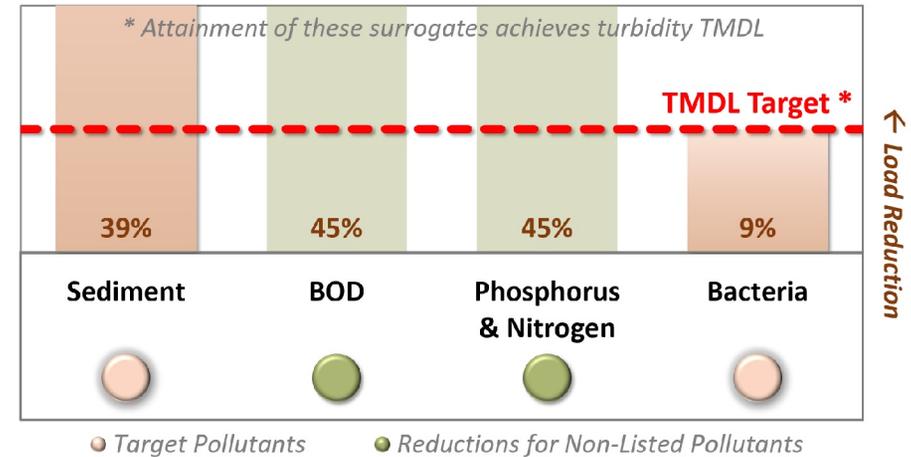


# Salt River Bay, St. Thomas USVI

Salt River Bay is included on the federal impaired waters list due to turbidity, enterococcus bacteria, and fecal coliform. Turbidity increases are likely due to a large gravel road and erosion from commercial facilities especially during large rain events. Bacteria loading is likely due to houses above the marina, wildlife loading, dock storage areas, and low water flow. Recommended practices include protection of the Salt River Canyon Ghut, protection of mangroves & salt ponds, and routine inspections of earth changes above waterbodies. Practices that improve sediment & bacteria loading will also improve watershed loadings of nutrients & BOD.



## Load Reduction



## Relative Impacts of Implementation Actions

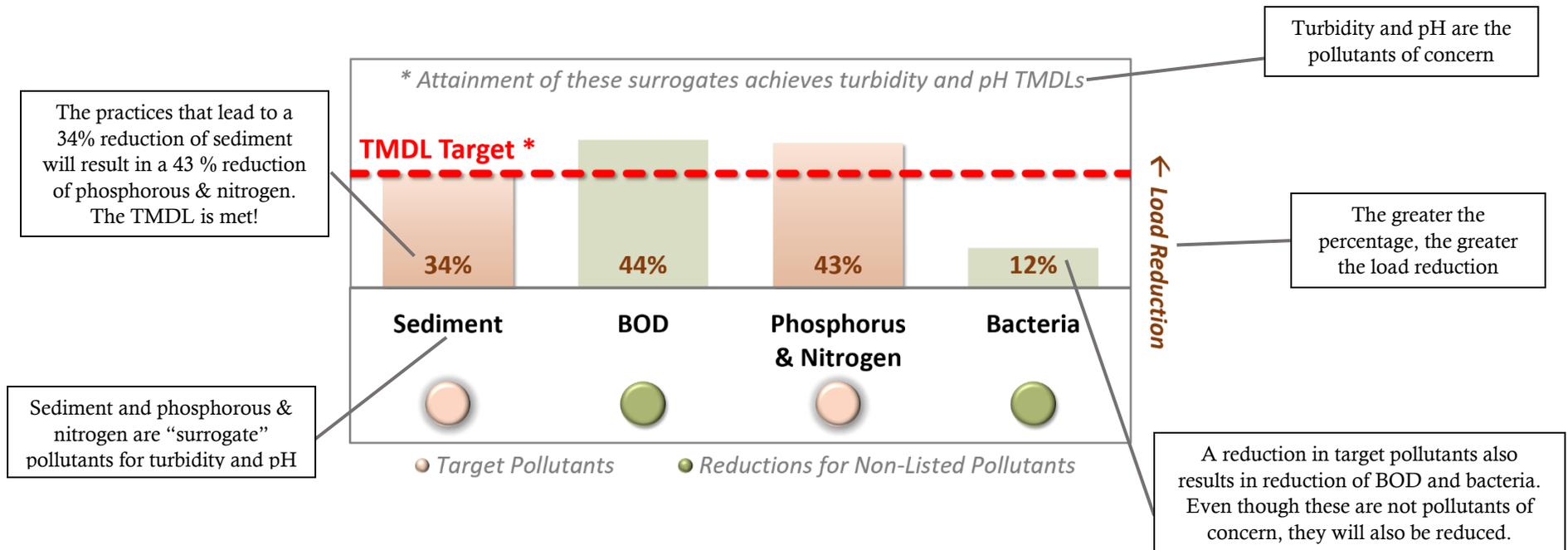
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Protection of Salt River Canyon Ghut from upland stormwater and wastewater runoff from upland housing	\$\$	High	10 yrs	●	●	●	●
Protection of shoreline mangrove lagoon and salt ponds	\$	High	5 yrs	●	●	●	●
Clean up and incentive improvements at marina and waterfront area around commercial properties	\$\$	High	5 yrs	●	●	●	●
Enforce permitting and inspections for earth change directly above waterbodies	\$	High	2 yrs	●	●	●	●
Conduct watershed assessment focused on large stormwater project in the upper reaches	\$	Medium	2 yrs	●	●	●	●
Conduct watershed assessment to consolidate all current activities to prioritize enhancement projects	\$	Medium	2 yrs	●	●	●	●

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

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This load reduction graphic depicts how much reduction (as a percent) is required to comply with the established TMDL. Each assessment unit has one or more target pollutants, which are depicted on the graph in red. Pollutants that are not a significant threat to water quality are depicted in green, although they may also face percent reductions (an added benefit) when target pollutants are reduced. The limiting pollutant determines the placement of the TMDL target line because, once reduced, the TMDL has been met. Surrogate parameters are used to determine the TMDL for some target pollutants.

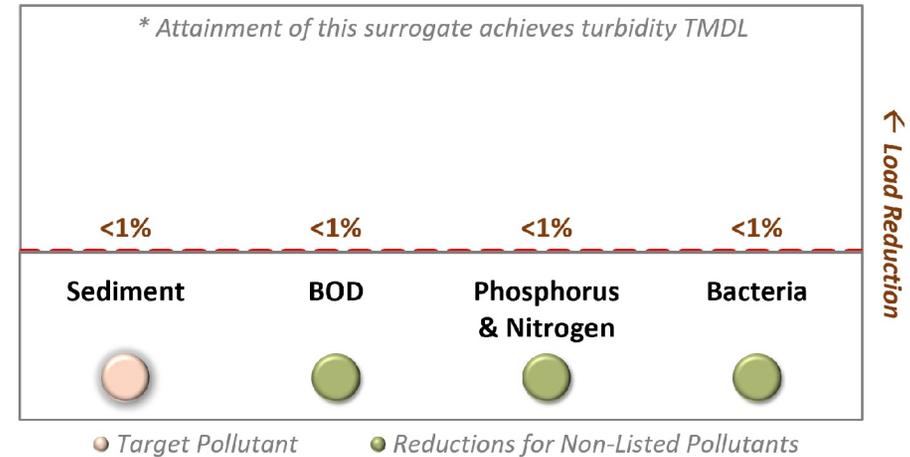


# Punnett Bay, St. Croix USVI

Punnett Bay is included on the federal impaired waters list due to turbidity. Sources of sediment are likely stormwater runoff generated from unpaved roads, earth change, and large denuded areas void of vegetation. Upland and inland portions of Punnett Bay also likely contribute to sedimentation in the bay. Recommended practices include paving roads, implementation of water gardens / bio-swales to minimize stormwater runoff, and incentives for the community to repair roads.



## Load Reduction



## Relative Impact of Implementation Actions

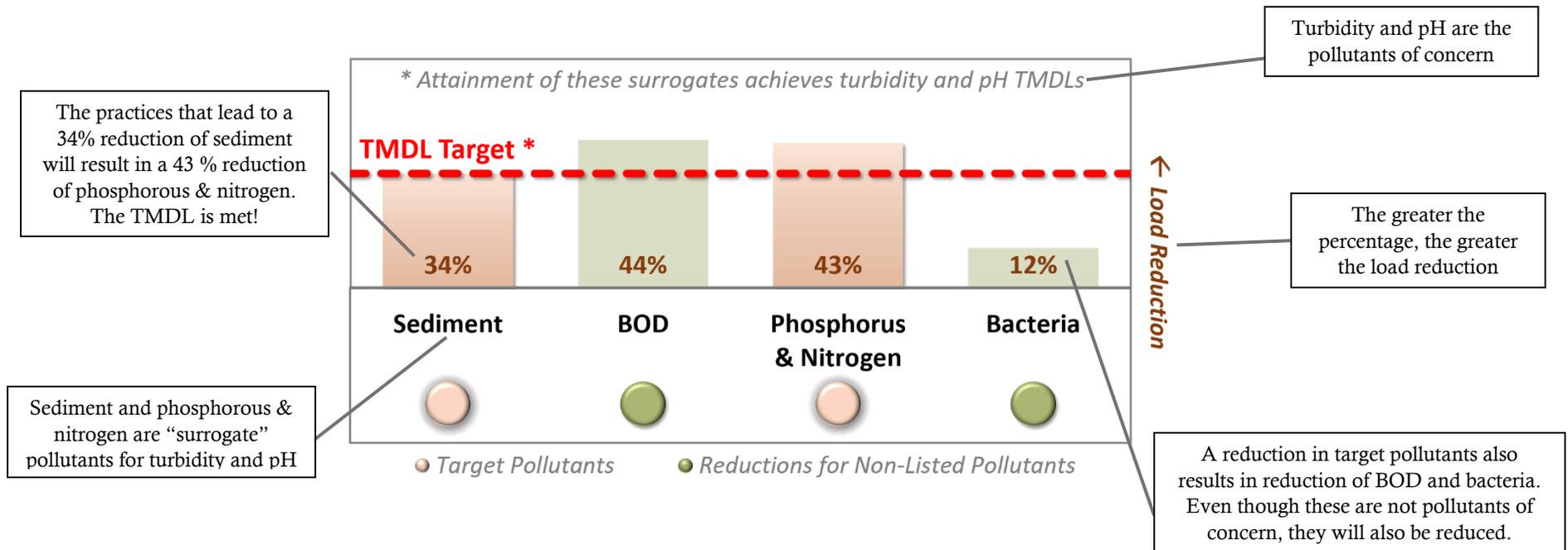
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

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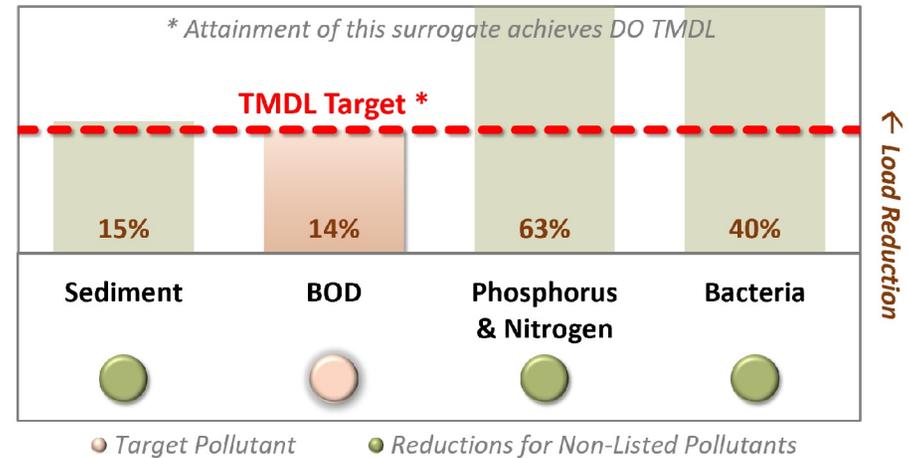


# Tamarind Reef Lagoon, St. Croix USVI

Tamarind Reef Lagoon is included on the federal impaired waters list due to DO and fecal coliform bacteria. Elevated sediment loads and low DO are most likely due to the dirt road between the pond and marina. Fecal coliform pollution is likely from the marina. Because there is little major reef offshore, flow and connectivity with the ocean is high in this area compared to further east, which helps in reduction of pollutant loads. Reduction in BOD results in reduction of all pollutants. Recommended practices include paving roads, enforcing stormwater best management practices for the marina, and implementing pumpout stations in the marina.



## Load Reduction



## Relative Impact of Implementation Actions

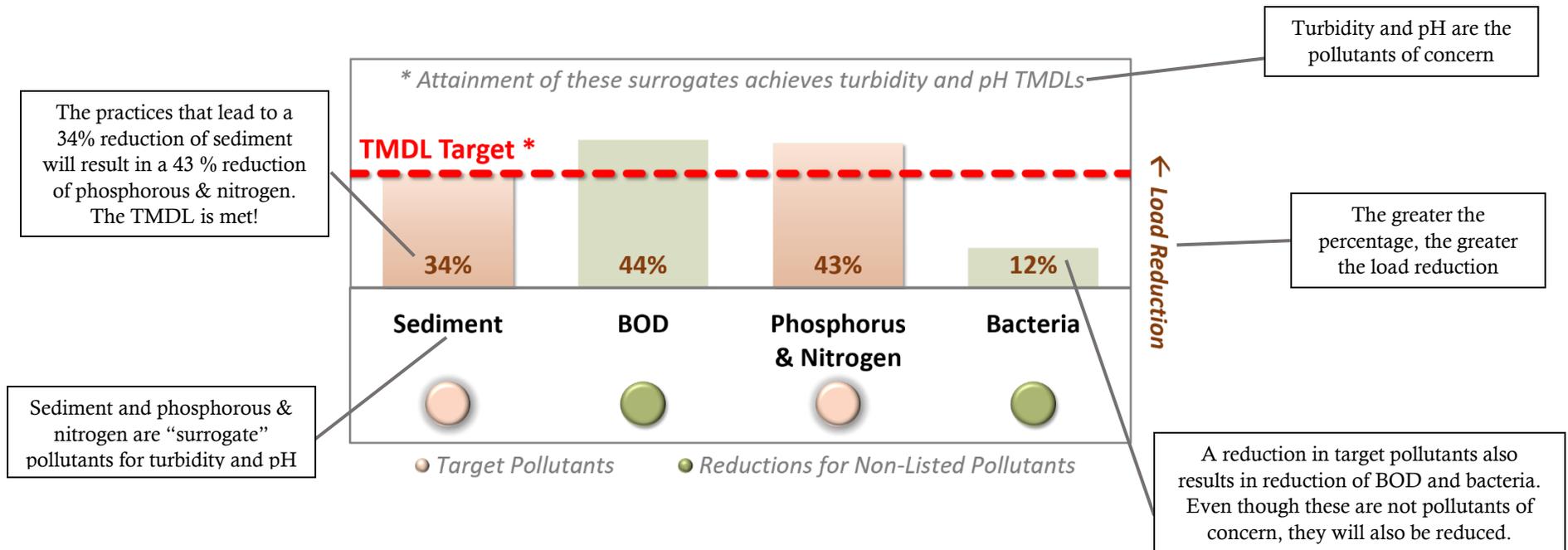
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

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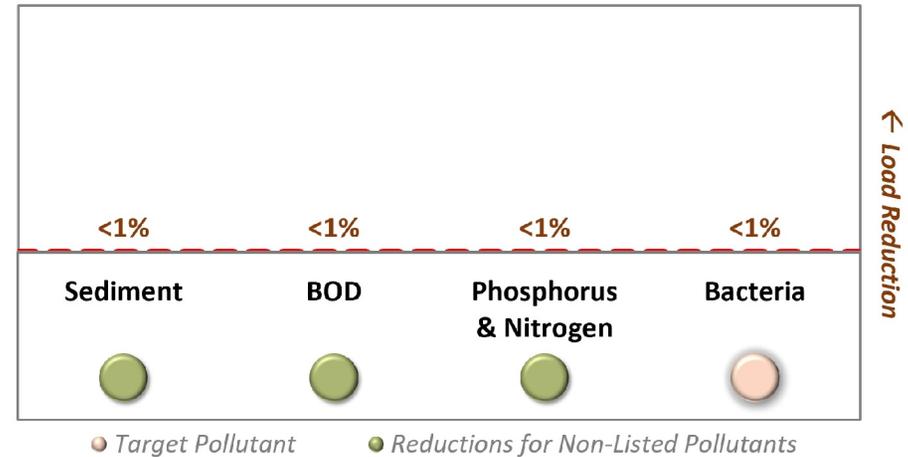


# Green Cay Beach, St. Croix USVI

Green Cay Beach is included on the federal impaired waters list due to Enterococcus bacteria. Green Cay is a natural island and the most likely source contributing to turbidity and bacteria is the marina or from stirred up sand and soft bottom habitat. Feces were observed on the beach, presumably from an underperforming wastewater treatment plant. Recommended practices are to inspect, repair, and enhance the wastewater treatment plant.



## Load Reduction



## Relative Impact of Implementation Actions

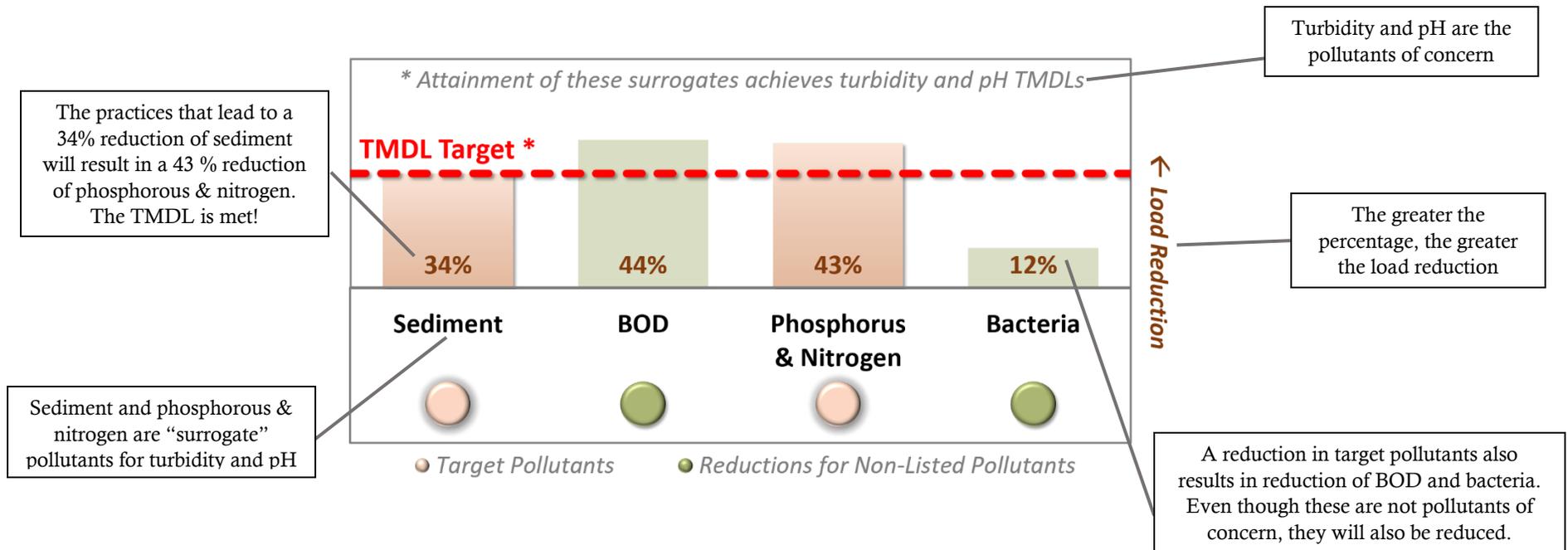
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	●
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	●
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	●
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	●
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	●
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	●
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	●

## What is a TMDL?

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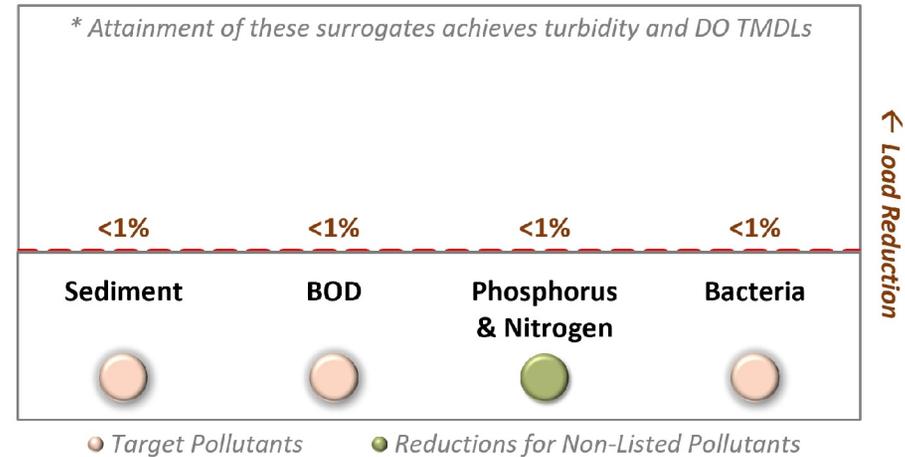


# Southgate Offshore, St. Croix USVI

Southgate subwatershed, offshore, is included on the federal impaired waters list due to turbidity, DO, fecal coliform & Enterococcus bacteria. Sources of pollutants are likely the marina and Chenay Resort. The resort is potentially using the ghut as a dumping site, which is filled with sewage and appears to be used as a cesspool. The treatment plant at the forest edge is subject to overflow. Recommended practices include remediation of the ghut, enforcing stormwater best management practices for the marina and inspecting areas surrounding the ghut, and implementing pumpout stations.



## Load Reduction



## Relative Impact of Implementation Actions

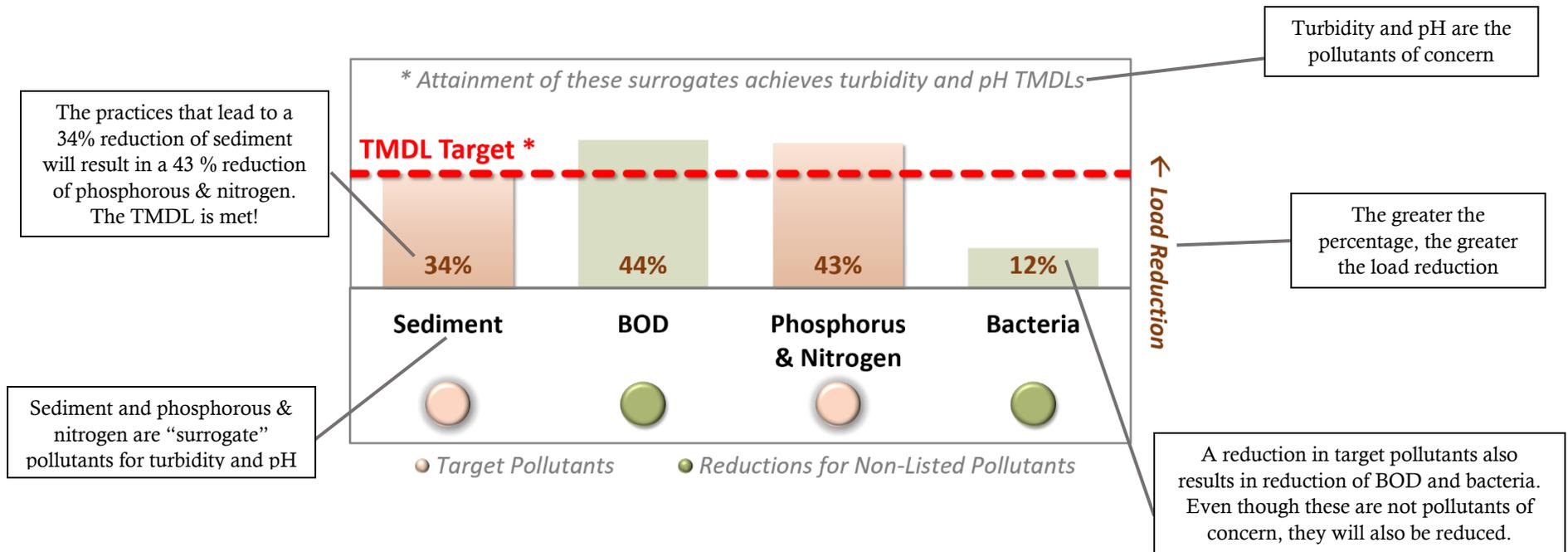
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

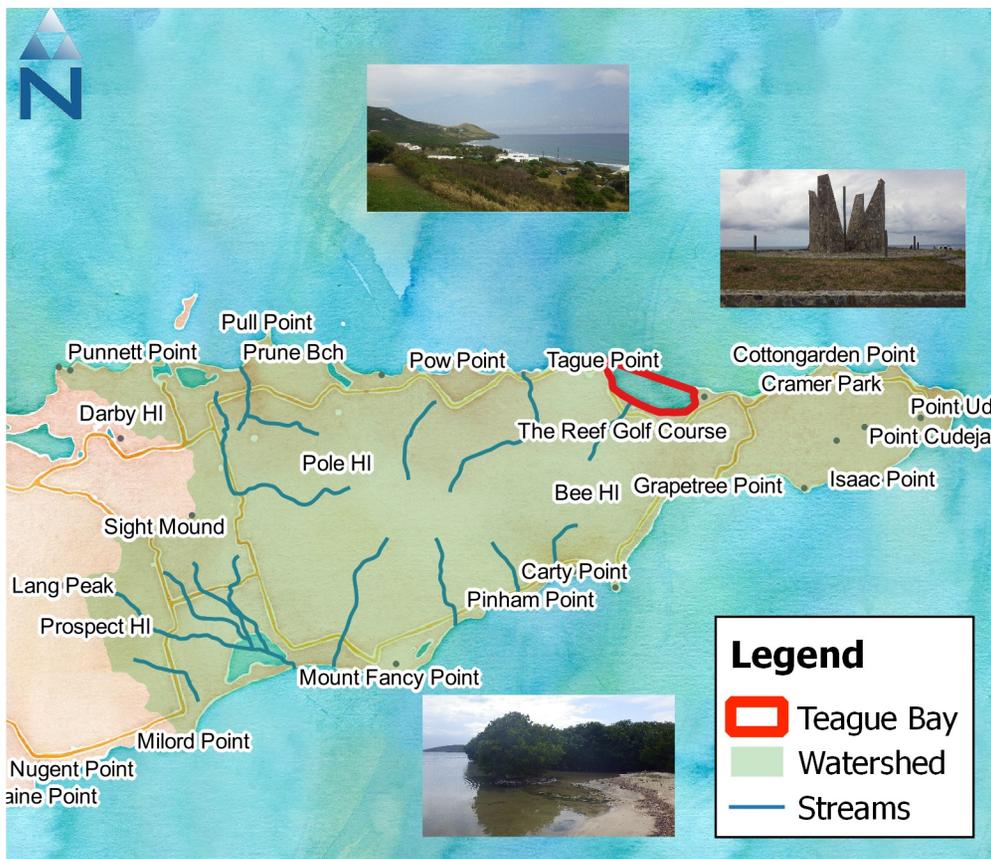
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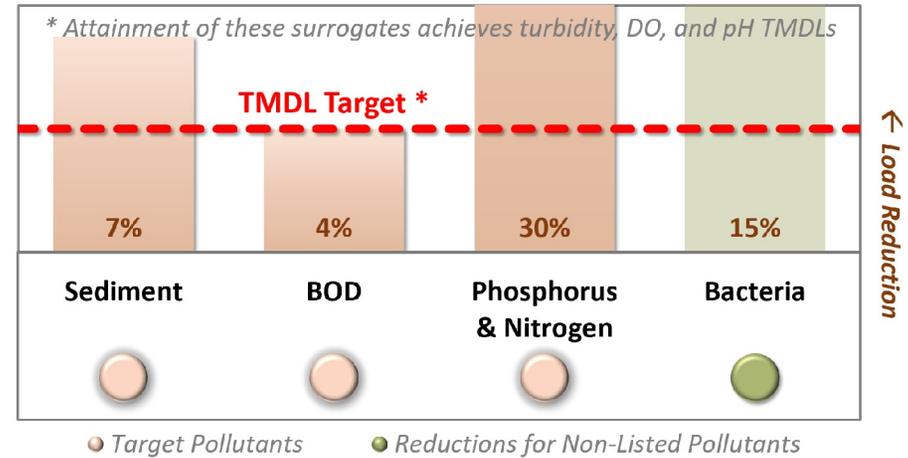


# Teague Bay, St. Croix USVI

Teague Bay is included on the federal impaired waters list due to DO, turbidity, pH, and fecal coliform bacteria. Elevated sediment loads are most likely due to erosion from steep terrain and few paved roads. Possible bacteria pollutant sources include septic systems and failing leach systems from homes, condos, and commercial properties. There are no central sewer lines located in the watershed, therefore residential areas must rely on individual septic systems. These also impact DO. Recommended practices include paving roads, enforcing stormwater best management practices for the marina, and implementing pumpout stations.



## Load Reduction



## Relative Impact of Implementation Actions

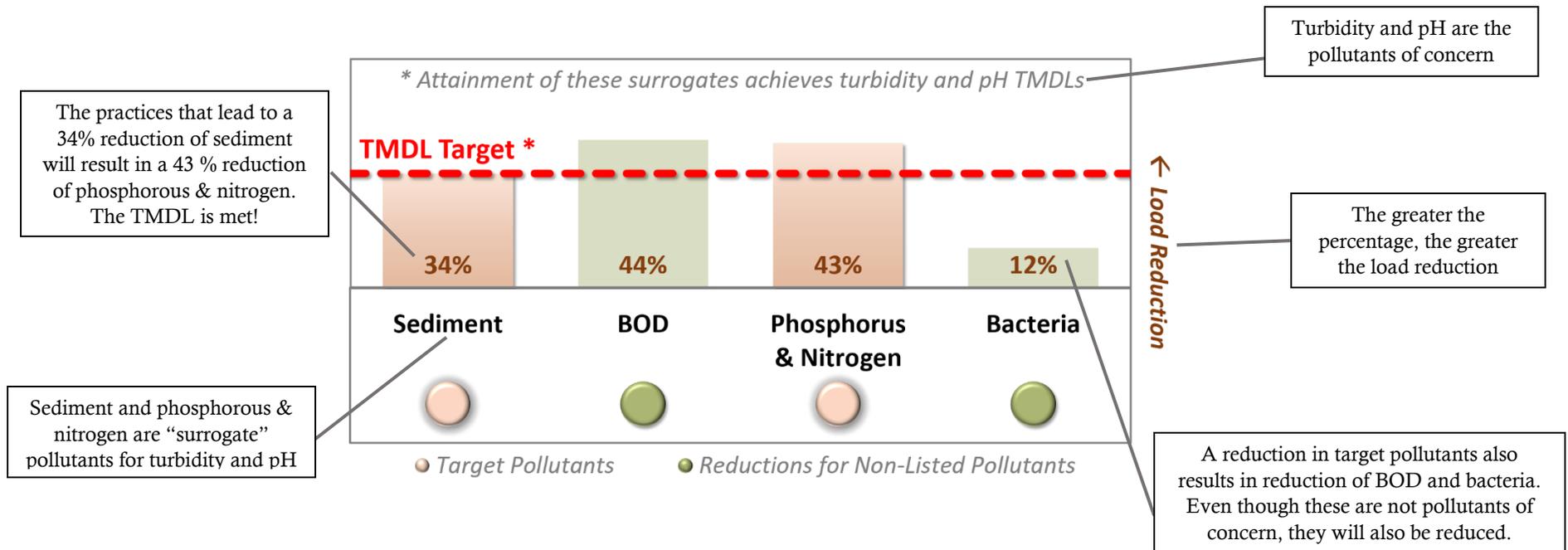
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

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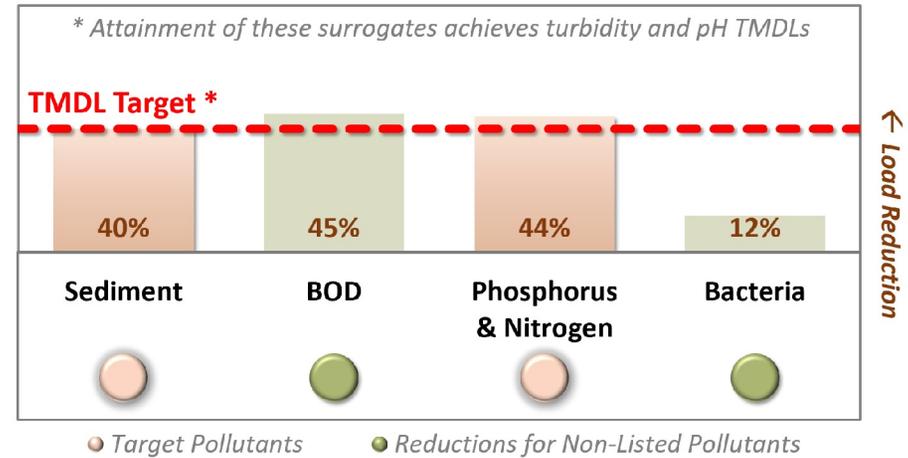


# Teague Bay Backreef, St. Croix USVI

Teague Bay Backreef is included on the federal impaired waters list due to turbidity, pH, and fecal coliform bacteria. Elevated sediment loads are most likely due to sedimentation from dirt roads, especially the road that goes up the ridge from Cotton Garden Bay. Bacteria pollutant sources are likely from the Teague Bay residential and commercial area. There are no central sewer lines located in the watershed, therefore residential areas must rely on individual septic systems. Recommended practices include paving roads, enforcing stormwater best management practices for the marina, and implementing pumpout stations in marinas.



## Load Reduction



## Relative Impact of Implementation Actions

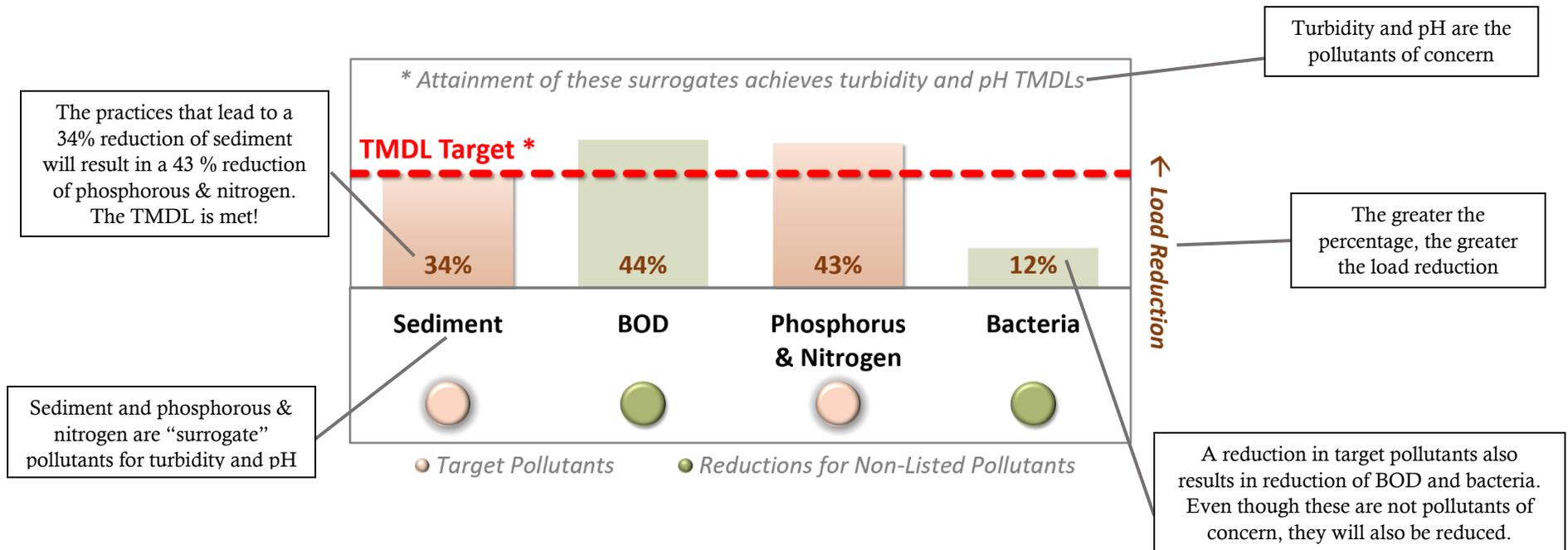
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

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A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

## How to interpret load reduction:

This load reduction graphic depicts how much reduction (as a percent) is required to comply with the established TMDL. Each assessment unit has one or more target pollutants, which are depicted on the graph in red. Pollutants that are not a significant threat to water quality are depicted in green, although they may also face percent reductions (an added benefit) when target pollutants are reduced. The limiting pollutant determines the placement of the TMDL target line because, once reduced, the TMDL has been met. Surrogate parameters are used to determine the TMDL for some target pollutants.

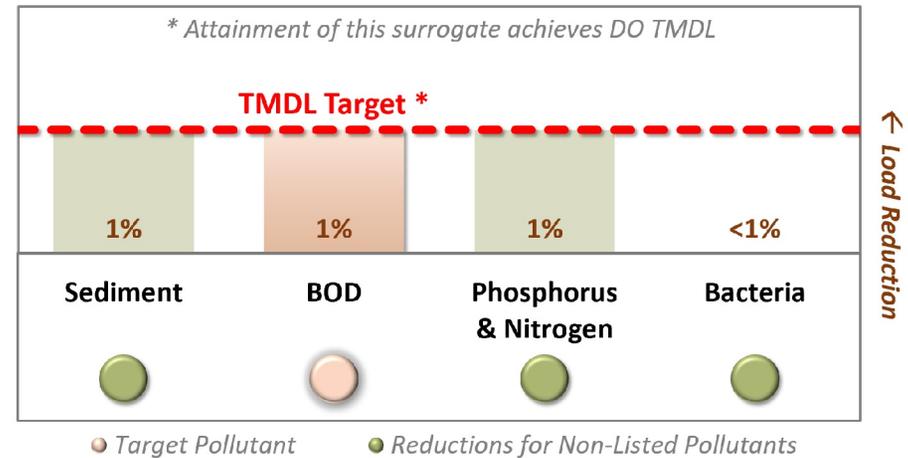


# Grapetree Bay, St. Croix USVI

Grapetree Bay is included on the federal impaired waters list due to turbidity. Sources of sediment are likely development activities, especially with new house construction. Additional sources include erosion from steep, unpaved roads. Stormwater runoff across unpaved roads, construction sites, or other bare soils can discharge plumes into nearshore waters even during average rain events. Recommended practices include paving roads, incentivizing road repair for the business community and townships, and enforcing stormwater best management practices.



## Load Reduction



## Relative Impact of Implementation Actions

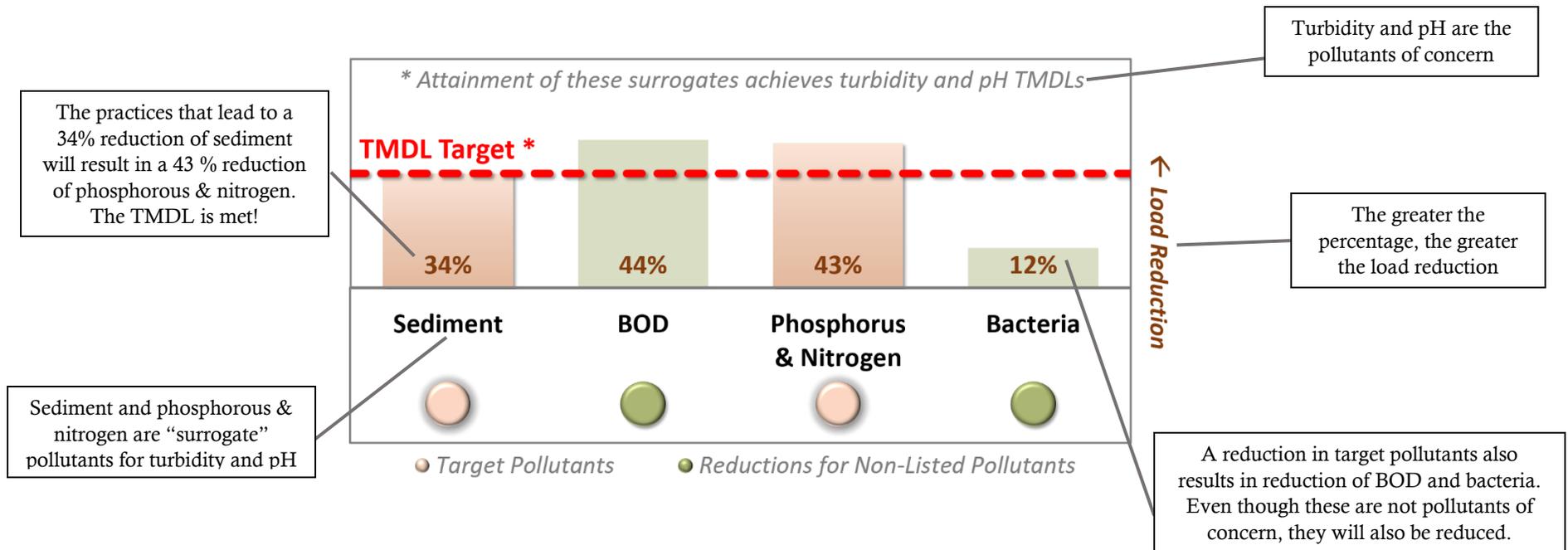
Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

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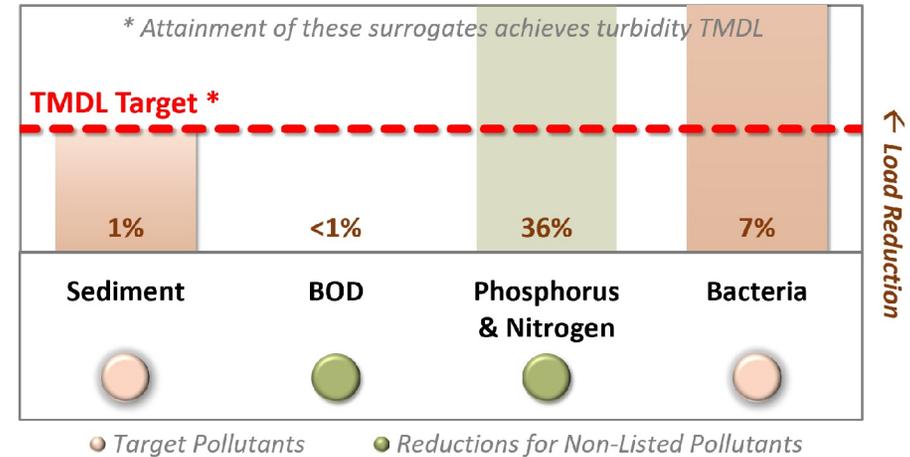


# Turner Hole Backreef, St. Croix USVI

Turner Hole Backreef is included on the federal impaired waters list due to turbidity and Enterococcus bacteria. Sources of sediment are likely from steep, unpaved roads, especially from a road leading to the 1970's hotel on the water. Much of the stormwater runoff from this road enters a small salt pond, cut off from the ocean, that serves as a basin for the flow. Runoff also accumulates largely due to the high impervious cover surrounding the backreef. Recommended practices include paving roads, incentivizing road repair for the business community and townships, and enforcing stormwater best management practices.



## Load Reduction



## Relative Impact of Implementation Actions

Implementation Action	Cost	Effectiveness	Time-Scale	Pollutant(s) Addressed			
				Sediment	BOD	N&P	Bacteria
Use existing road inventory to pave unpaved roads	\$-\$\$\$	High	5 yrs	●	●	●	
Enforce and incentivize stormwater best management for marinas	\$\$	Medium	5 yrs	●	●	●	●
Determine feasibility to implement pumpout station in major marinas	\$	High	2 yrs	●	●	●	
Inspect, repair & enhance existing wastewater treatment facilities	\$-\$\$\$	High	2 yrs	●	●	●	
Build on existing knowledge of current CZM staff to train additional inspectors	\$	Medium	2 yrs	●	●	●	
Implement plans for water gardens/ bio-swales to minimize stormwater runoff	\$\$	Medium	5 yrs	●	●	●	
Incentivize road repair for business community and townships	\$-\$\$\$	High	5 yrs	●	●	●	
Maintain and expand existing culvert network	\$\$	Medium	5 yrs	●	●	●	

## What is a TMDL?

A TMDL (Total Maximum Daily Load) is the allowable amount of a pollutant or other quantifiable parameter (called a “surrogate”) calculated based on the relationship between pollutant sources and instream water quality. Surrogate measures are used for TMDL allocations when the target pollutant does not have a quantifiable loading basis, or is too expensive or difficult to measure. When a waterbody is listed for turbidity, total suspended solids (TSS) concentrations are used as the surrogate pollutant, when listed for dissolved oxygen (DO), BOD is a surrogate and when listed for pH, nutrients (phosphorous and nitrogen) are surrogates.

## How to interpret load reduction:

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