

Harris Chain of Lakes TP loading estimates

TMDL Baseline (1991-2000),
Future (2010),
Updated (2001-2013)

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Baseline period (1991-2000) TP loading estimates

- Major tributaries (Palatlakaha River and tributaries connecting lakes)
 - Daily discharge volumes measured at dams
 - TP concentrations measured generally monthly
- Atmospheric deposition
 - TP in rainfall and in dry deposition measured from wet/dry deposition collector located near Lake Apopka
 - Network of rain gauges in or near basin



Baseline period (1991-2000) TP loading estimates

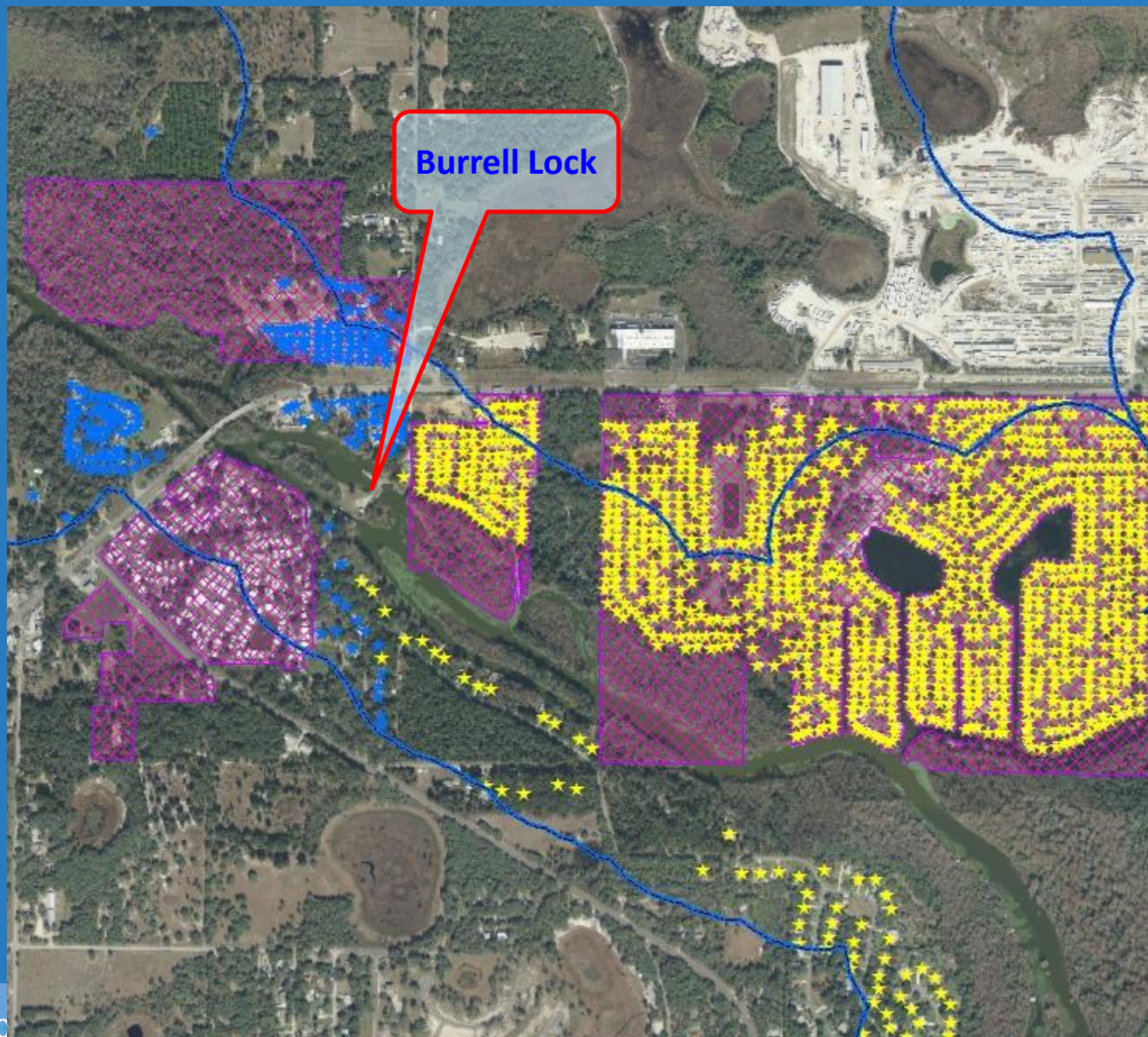
- Stormwater runoff
 - No direct measurements in basin; estimated by modeling approach, based on studies conducted elsewhere that determined runoff from different types of land use
 - Data needed for estimates – maps of drainage basins, land use, soil type, distance of drainage subbasins from lake, and rainfall
 - Runoff estimates based on 1987 and 1995 land use maps
 - Stormwater treatment assumed for land developed after 1987; treatment efficiency based on studies in Florida – 63% removal of TP



Baseline period (1991-2000) TP loading estimates

- **Septic tanks**
 - No direct measurements in basin; estimated by modeling approach, based on studies conducted elsewhere
 - Assumed no loading from houses within service areas of municipal wastewater treatment plants (WWTP), or from areas served by package treatment plants located > 200 m from lakes
 - All houses outside of WWTP service areas and package plants within 200 m of lakes assumed to contribute septic tank loading
 - Number of contributing houses estimated from 1995 aerial photos





Septic tank loading estimates

- For contributing septic systems:
 - 6.7 pounds TP/year discharged to drainfield
 - 90% of TP discharged is retained within drainfield
 - Assumed no septic tank failures



Comparison of septic tank loading estimates for Lake Weir

	Old UORB method	FDEP TMDL (ArcNLET model)
TN (kg/year)	7,005	5,893
TP (kg/year)	397	974



Baseline period (1991-2000) TP loading estimates

- Muck farms – permit records of discharges when available, otherwise estimated by relating available discharge data to rainfall
- SJRWMD restoration areas – TP measurements, combined with pump records or stormwater runoff methods
- Point sources – FDEP permit files
- Springs – periodic measurements of TP and discharge volumes



Future (2010) TP loading projection

- Assemble existing (2005) land use map:
 - 2002 Lake County map (unincorporated areas)
 - SJRWMD and Lake County conservation area maps
 - City existing land use maps (Tavares, Leesburg, Mt. Dora)
 - City of Eustis **future** land use map
 - Orange County 2020 **future** land use map
 - SJRWMD 2000 land use map (other cities, north Griffin basin)



Future (2010) TP loading projection

- Estimate stormwater TP loading for existing (2005) conditions using new land use map and same methods as used for baseline period (1991-2000)
- Extrapolate to 2010
 - Eustis and Orange County future land uses – no change in stormwater runoff from 2005 map
 - Other areas – continue trends in loading from 1995 to 2005 land use



Future (2010) TP loading projection

- **Septic tanks**
 - New count of contributing houses from 2004 aerial photos
 - Extrapolate to 2010 by continuing trends in loading from 1995 to 2004
- **SJRWMD restoration areas – assume 1 lb TP/acre/year**



Future (2010) TP loading projection

- Tributary loads from Palatlakaha River or from upstream lakes – assume to change proportionately to the loads to those upstream basins
- Other sources assumed no change in loading from baseline (atmospheric, springs, remaining muck farms, point sources)

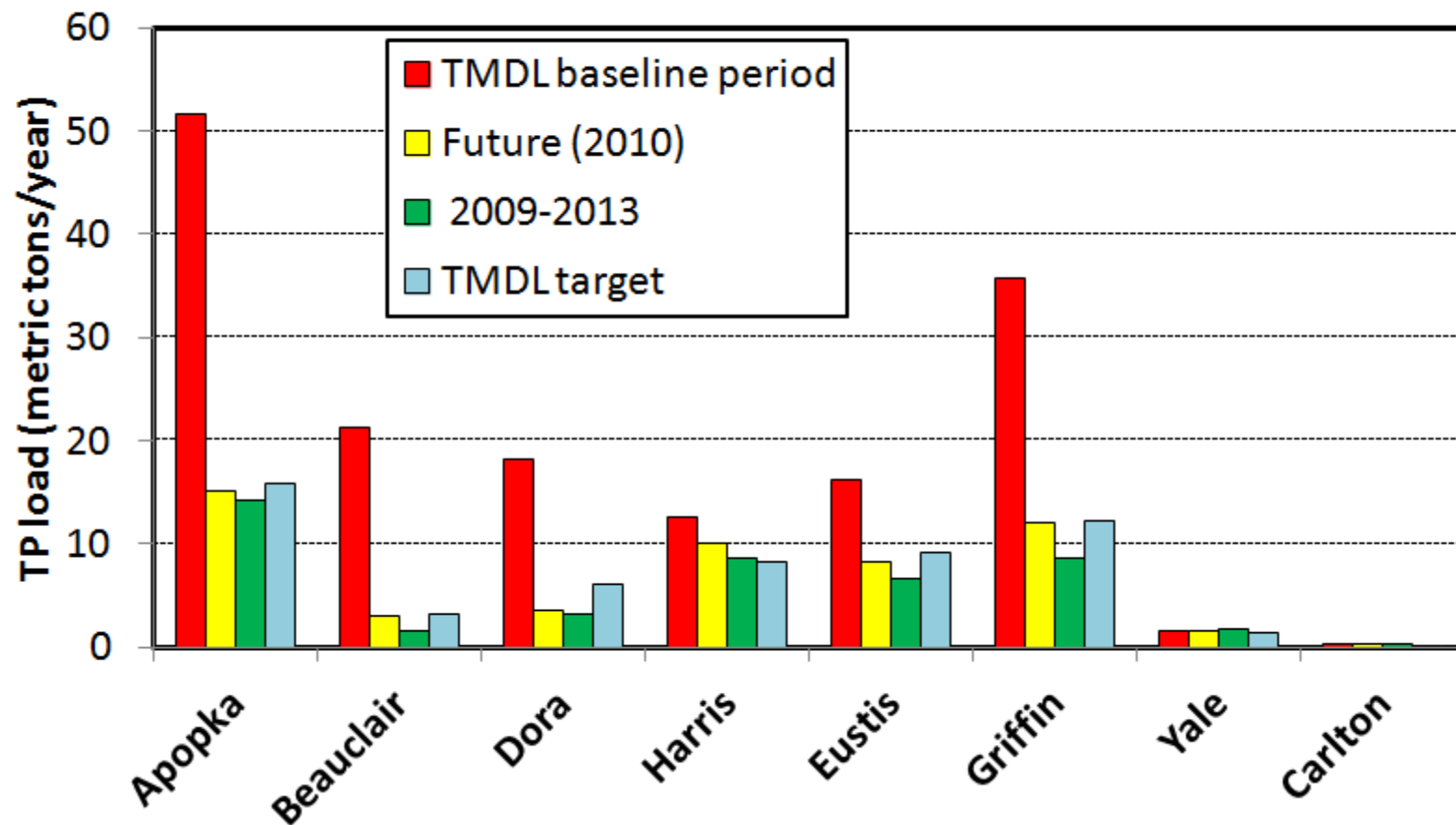


Updated (2001-2013) TP loading estimates

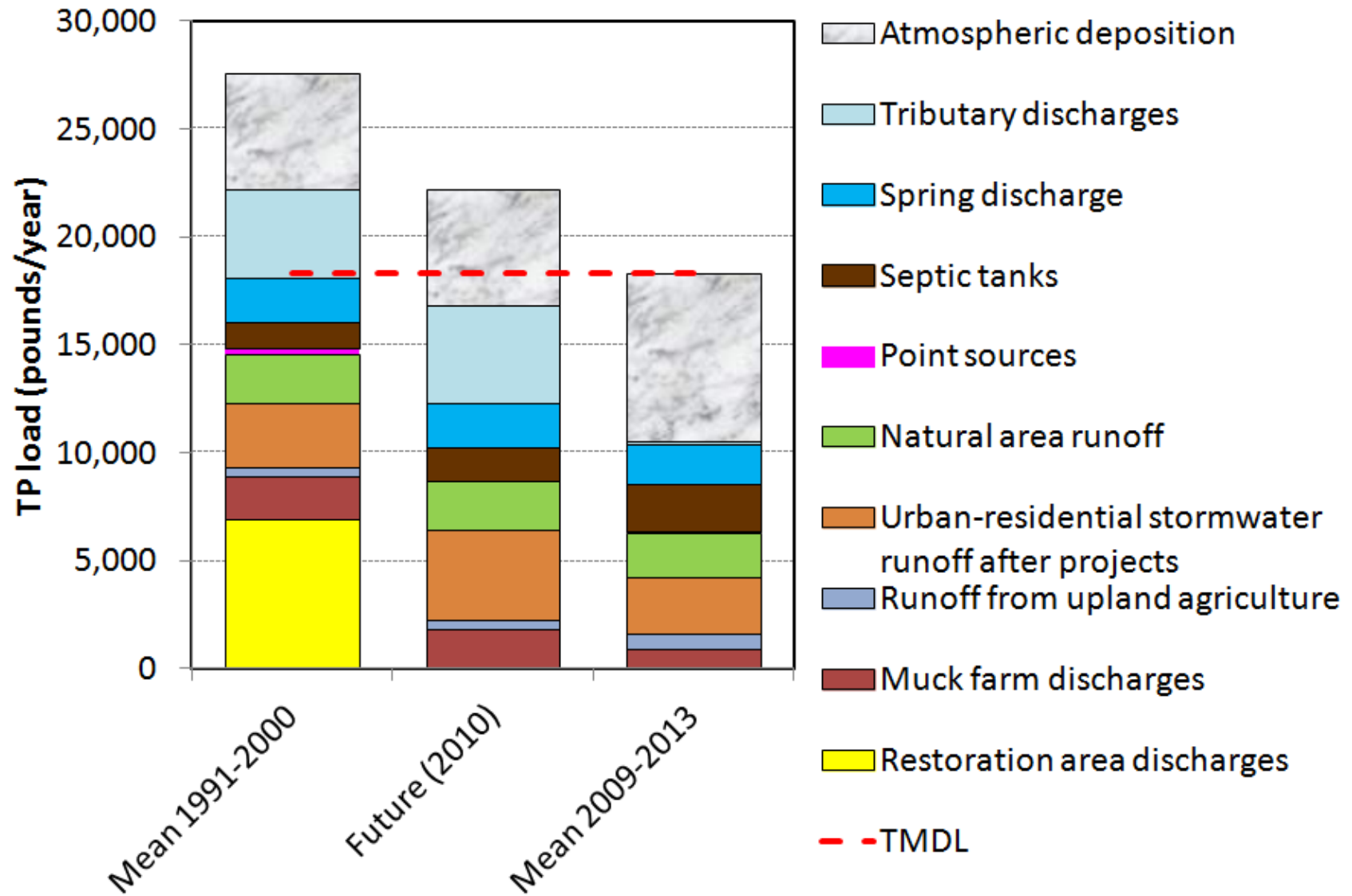
- Generally use same methods as for baseline period, except use Doppler radar rainfall estimates, instead of a limited number of rain gauges
- Stormwater runoff updated based on 2000, 2004, and 2009 land use maps
- Incorporated estimated TP load reductions from stormwater projects identified in BMAP
- Septic tank loading estimates updated based on 2004 and 2009 aerial photos
- Point source loading estimates last updated 2010



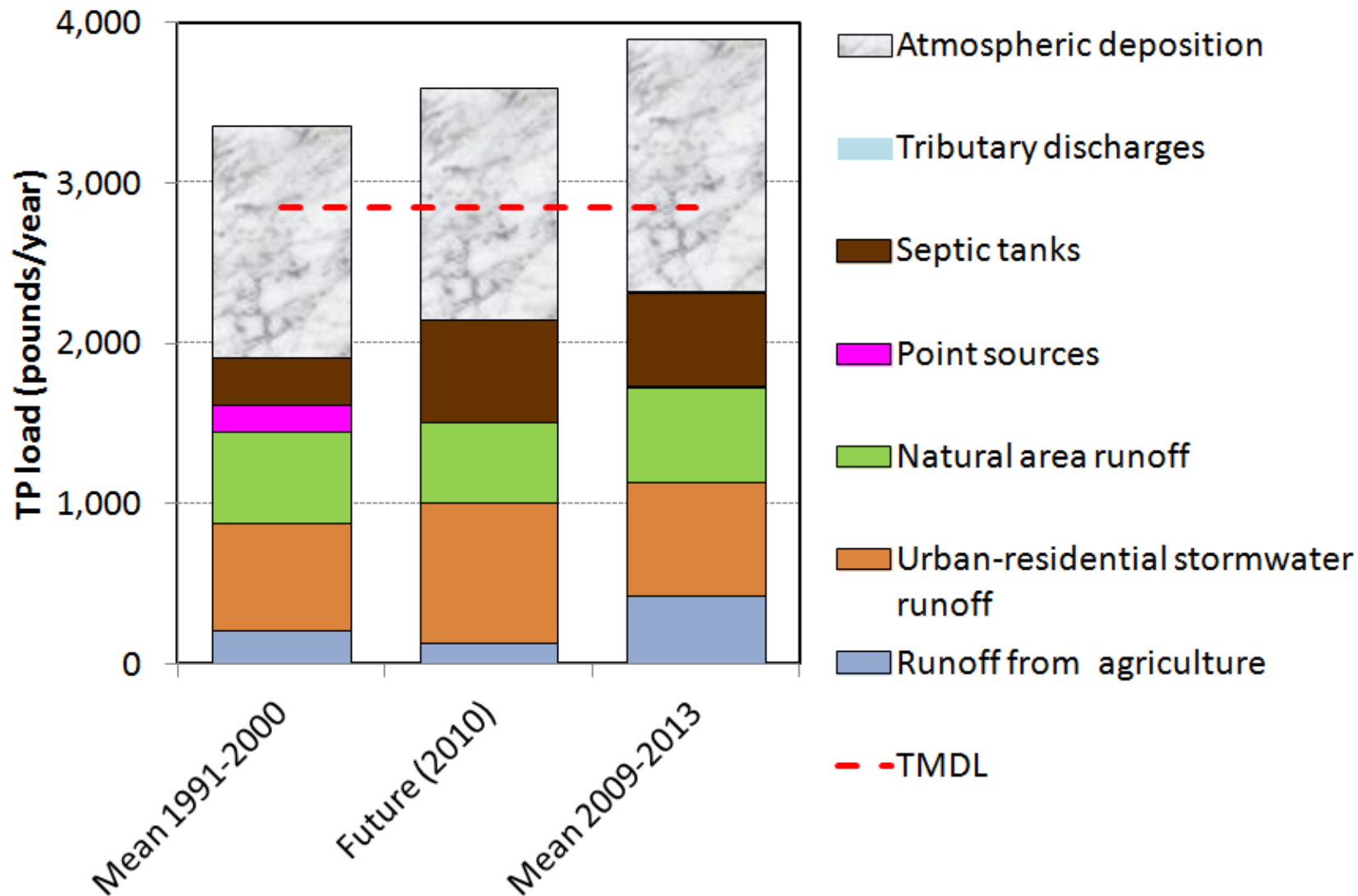
Upper Ocklawaha Basin lakes total phosphorus load



Lake Harris estimated total phosphorus loads



Lake Yale estimated total phosphorus loads



Lake Carlton estimated total phosphorus loads

