Water Quality Assessment and Regional Facility Planning for the Canyon Reservoir Watershed

GBRA and Comal County

with PBS&J

For the

Texas Water Development Board

STUDY BACKGROUND

- Canyon Reservoir is the major water resource in the basin and has excellent water quality
- In the past decade population growth in the immediate watershed has been rapid, and similar growth is expected
- Concern that water quality could be impacted was basis for study

BACKGROUND CONTINUED

- There is good water quality today, with no indication of a recent decline
- Despite recent population growth, there appear to be few indications of problems with existing septic systems
- Accordingly, study focused on avoiding future problems rather than fixing present problems

Canyon Water Quality Data

		1981-1992	1993-2002
TN	(mg/L)	220	263
TKN	(mg/L)	296	244
TP	(mg/L)	53	50
Chl *a*	(mg/L)	3.4	2.0
TSS	(mg/L)	5.7	4.1
Secchi Depth	(m)	2.3	2.3

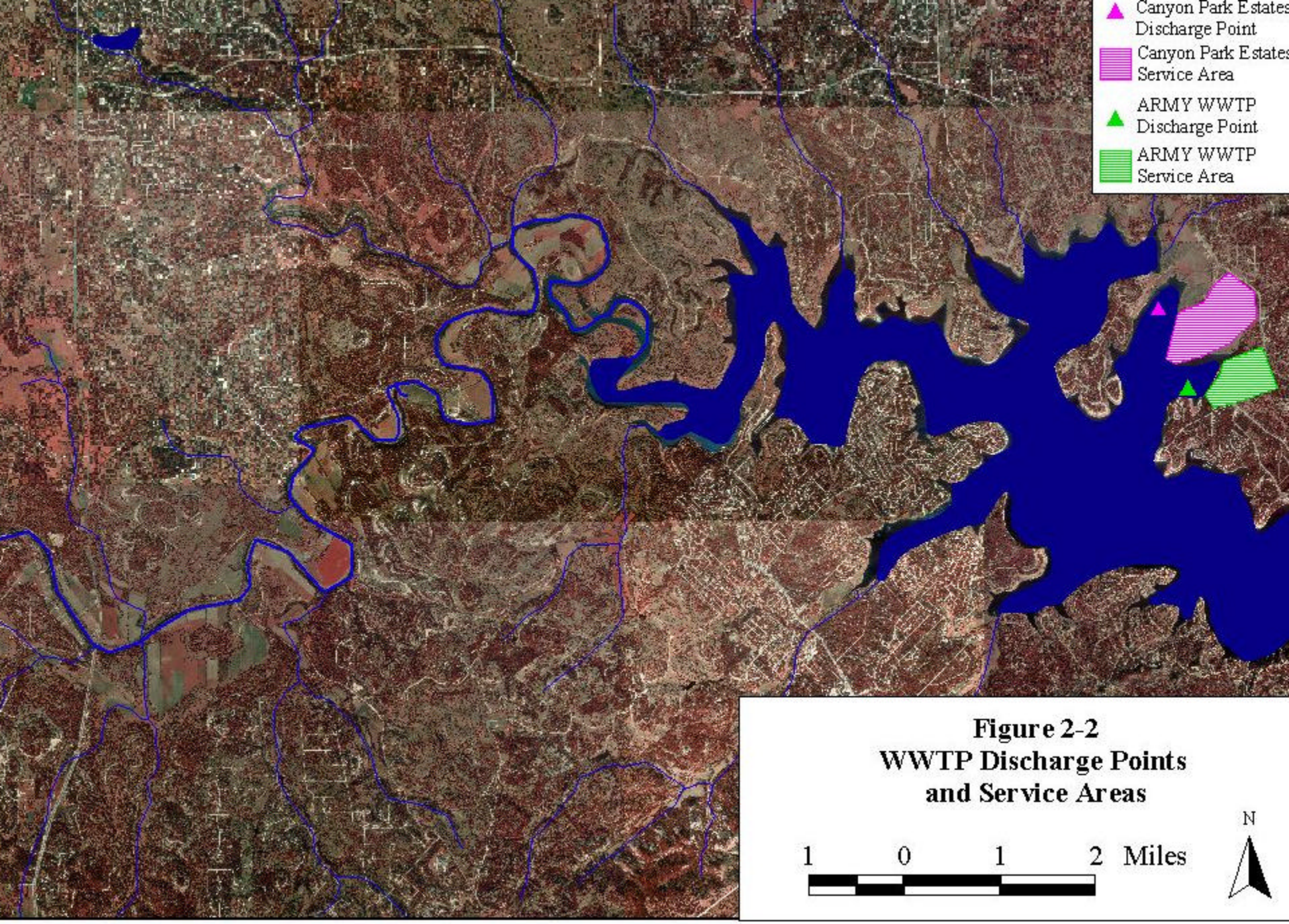


Figure 2-2
WWTP Discharge Points and Service Areas

POPULATION PROJECTIONS

- Texas State Data Center projections employed
- High growth scenario used to insure that study projections would be conservative

NUTRIENT LOADS CONSIDERED

- Upstream loads from River
- Point source discharges to reservoir
- OSSF loads in study area
- Runoff loads in study area

UPSTREAM LOADS

- Data from Spring Branch gage analyzed
- Average TSS, TN and TP loads/acre computed
- These loads applied to study area as a start
- Used to calibrate runoff calculations

RUNOFF LOADS

- Calculated using procedures developed from City of Austin data
- Adjusted to Spring Branch rate in 2000
- Method quantifies effect of new development impervious cover and rapid drainage causing scour of tributary streams

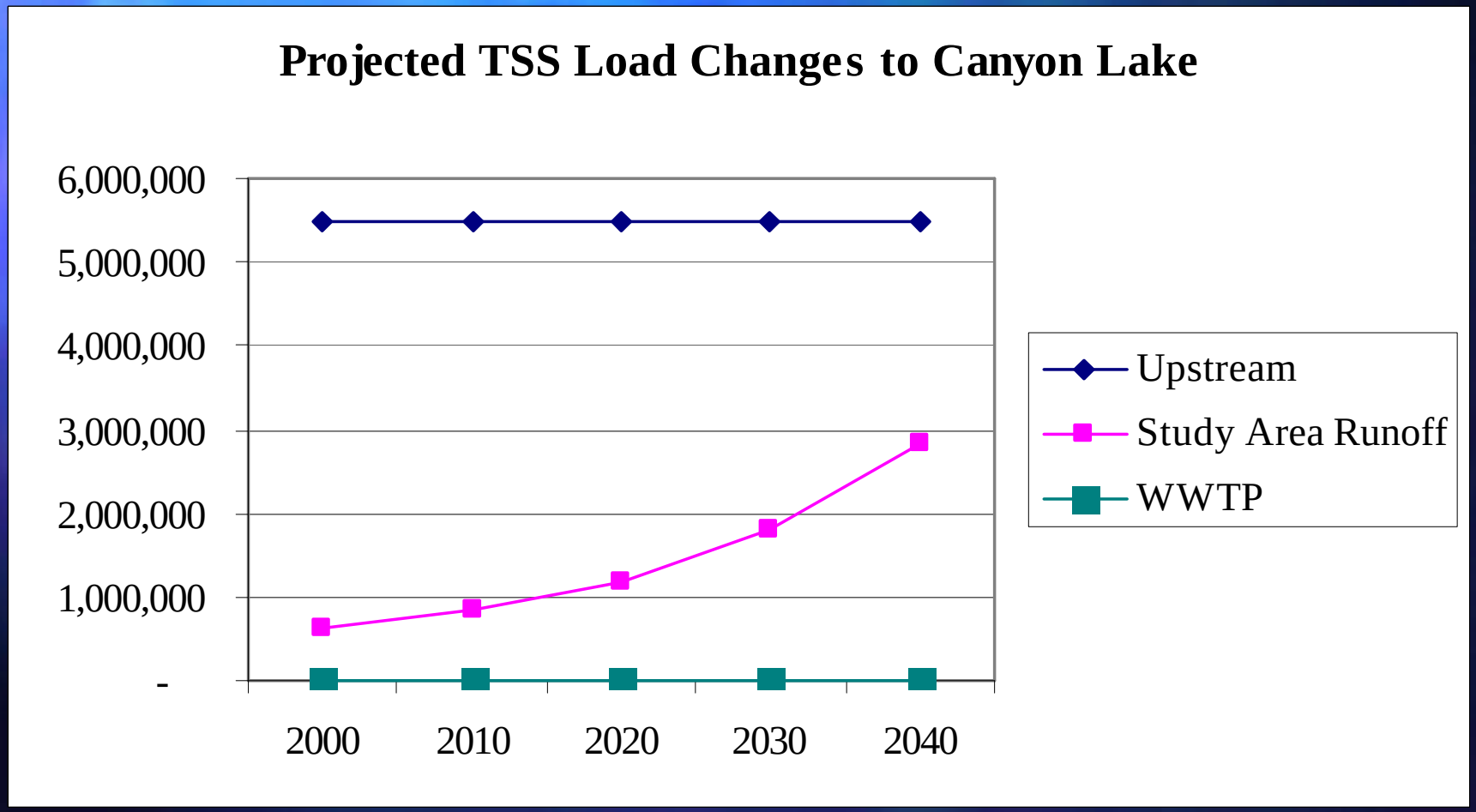
PERCENTAGE LOAD REMOVAL BY CANYON RESERVOIR

	TSS	TN	TP
All Data	41	38	74
Dry Year 1996	65	64	85
Wet Year 1997	43	87	75

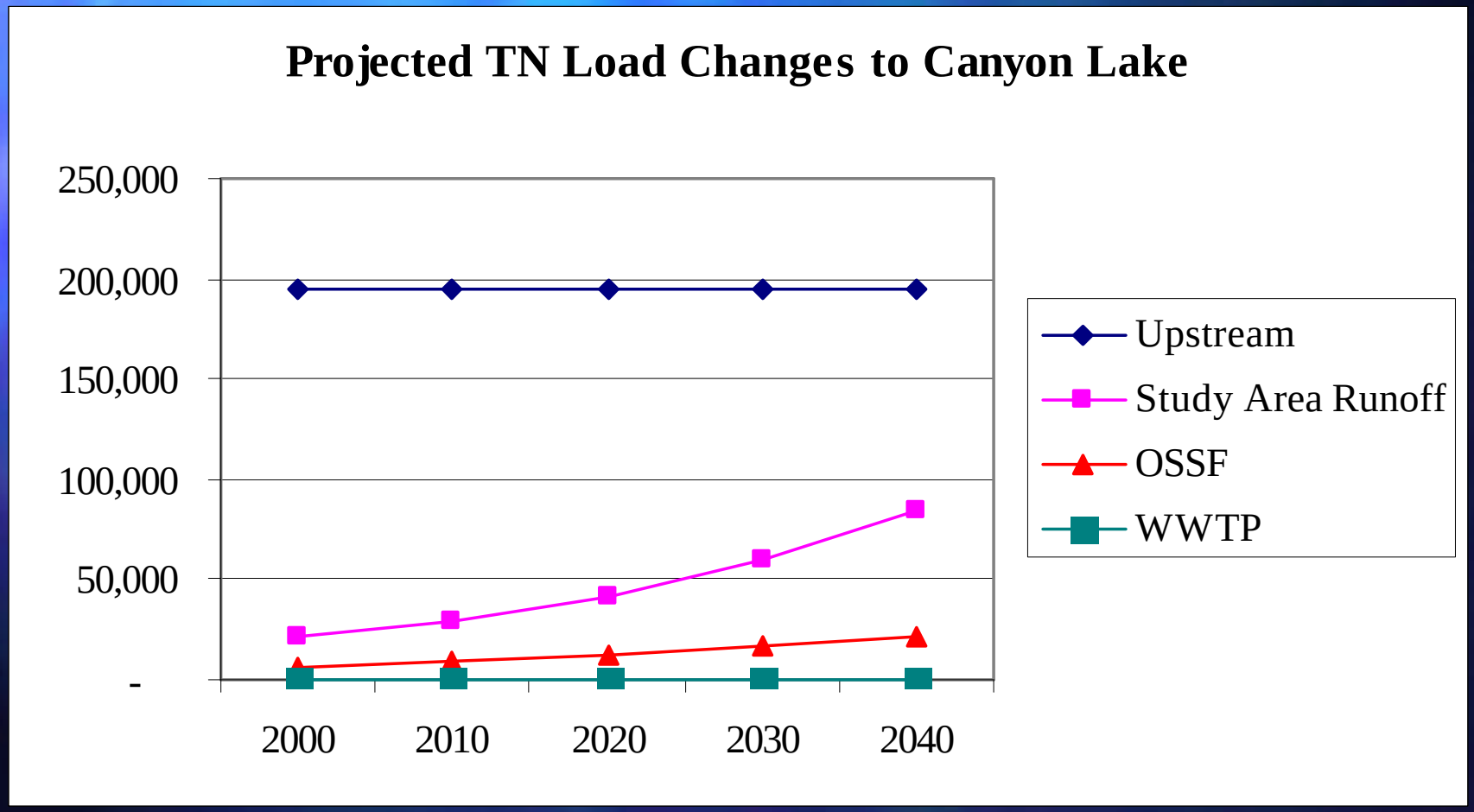
OSSF LOADS

- Calculated from literature values
- Assumed that all worked as intended
- Used conservative flow and concentration values leaving septic tank
- Assumed 90% removal of nutrients in drainfield

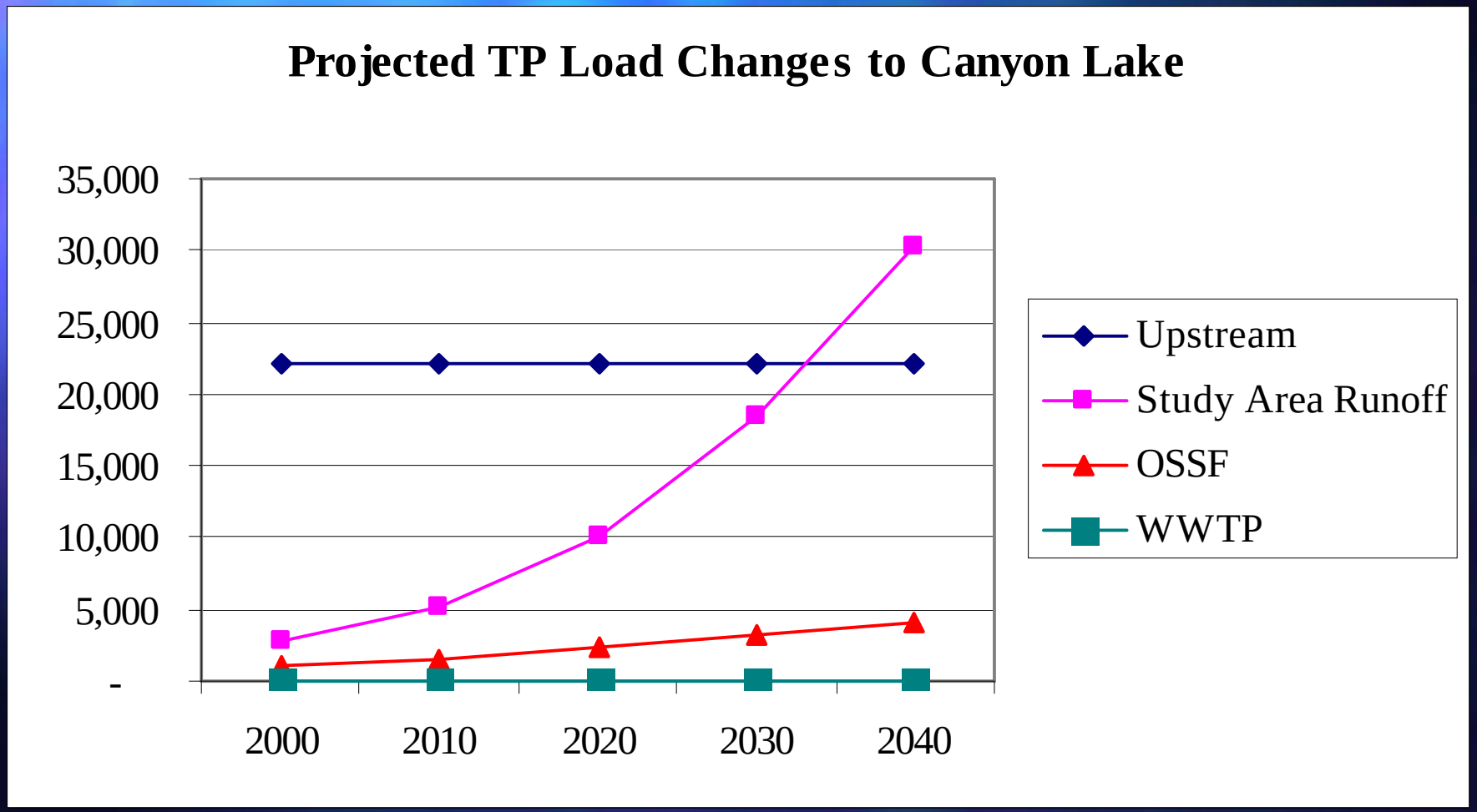
Projected TSS Load Changes to Canyon Lake



Projected TN Load Changes to Canyon Lake

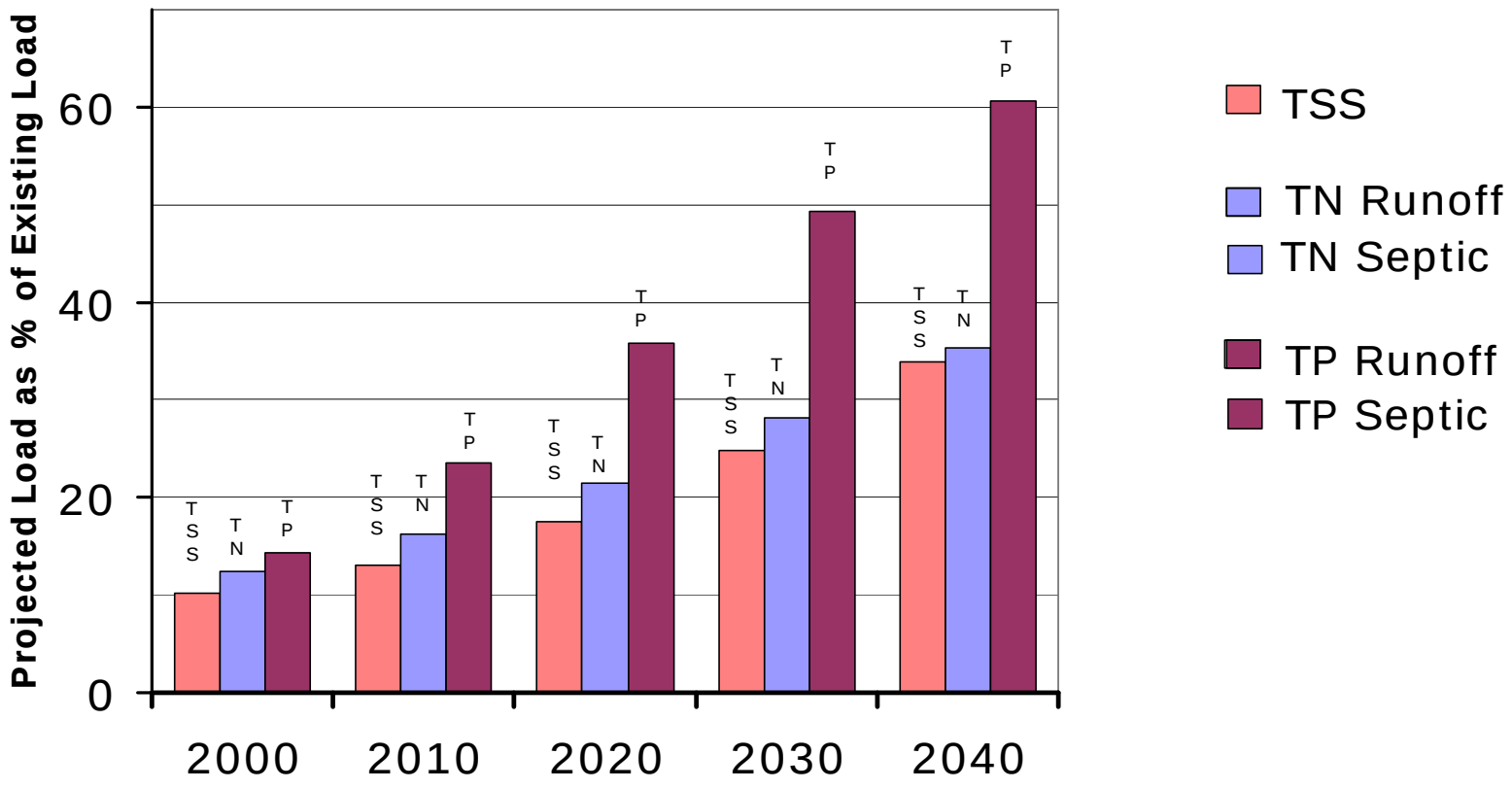


Projected TP Load Changes to Canyon Lake



Projected Load

Figure 5-3
Projected Runoff and Septic TSS, TN, and TP Loads as % of Existing Loads at Canyon Lake



Development Scenarios

- **Path A** - Continuation of the present path
- **Path B** - Regional Plan to encourage central wastewater systems on smaller lots and incorporating Low Impact Development features.

Elements of Protection Plan

- **Wastewater Treatment**
  - New WWTP
  - OSSFs
- **Runoff**

Regional WWTPs

- For smaller lot developments
- Would be “zero discharge” facilities emphasizing beneficial reuse:
  - Irrigation of parks, commercial properties and golf courses
  - Possible supply to homeowners for irrigation
- Emphasize management by public entity
- Majority Steering Committee support
- Minority of Committee opposed

RUNOFF
Low Impact Development

- Minimize impervious areas
- Disconnect impervious area drainage
- Rainwater harvesting
- Bioretention
- Pond retention and irrigation use

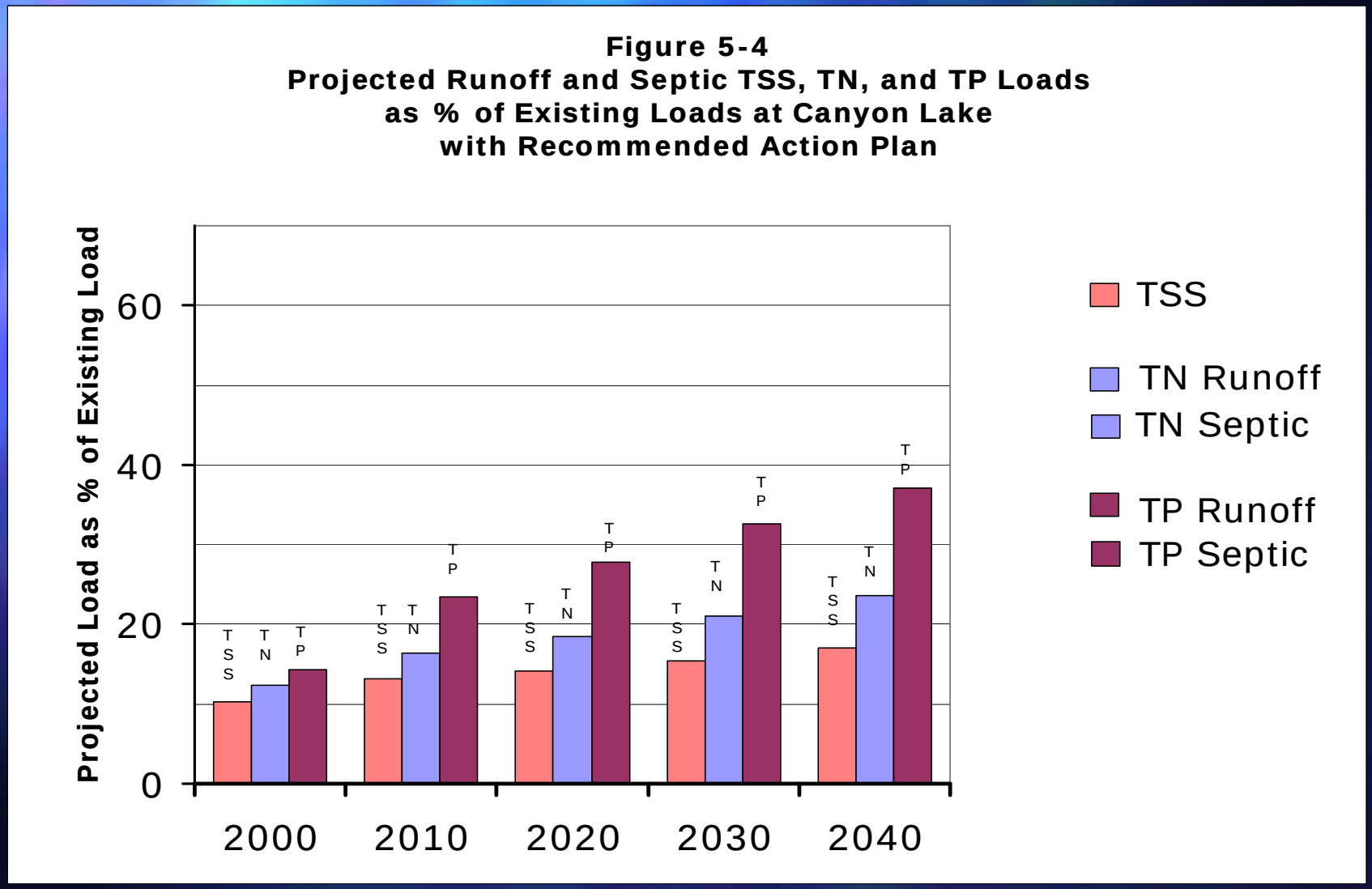
IMPLEMENTING LID

- Goal of keeping post-development runoff the same as pre-development can be achieved in many ways
- Recommend that developments above a minimum size be required to have a PE certify that runoff will be similar to pre-development condition

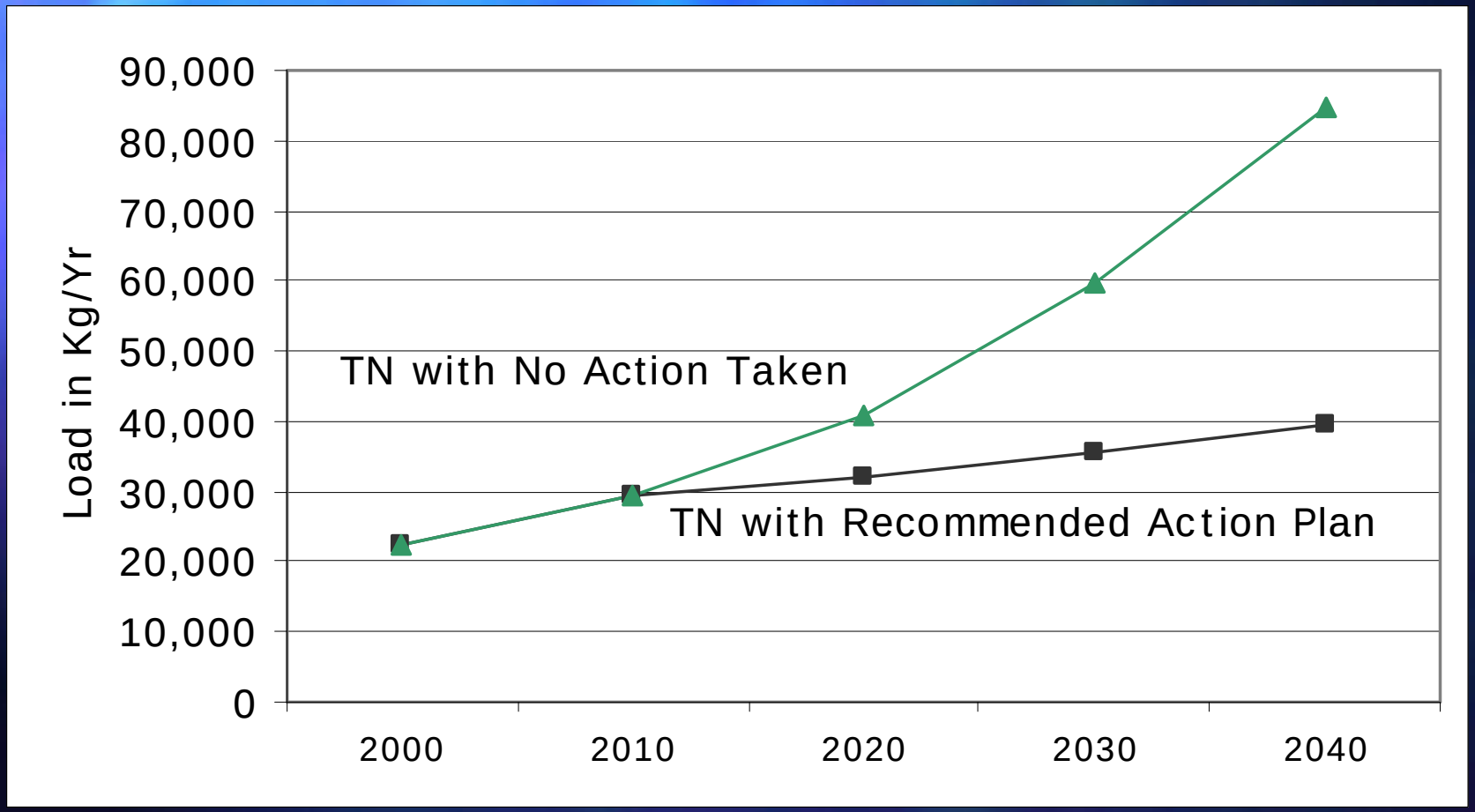
QUANTIFYING EFFECTS OF PLAN

- Existing flood control ordinance will have some effect in reducing runoff
- Not take effect until 2010 because of backlog of platted development
- Because most new homes in subdivisions, LID applied to 75% of population growth
- Central WWTPs assumed to be used in subbasin 9, with 1 and 10 also candidates

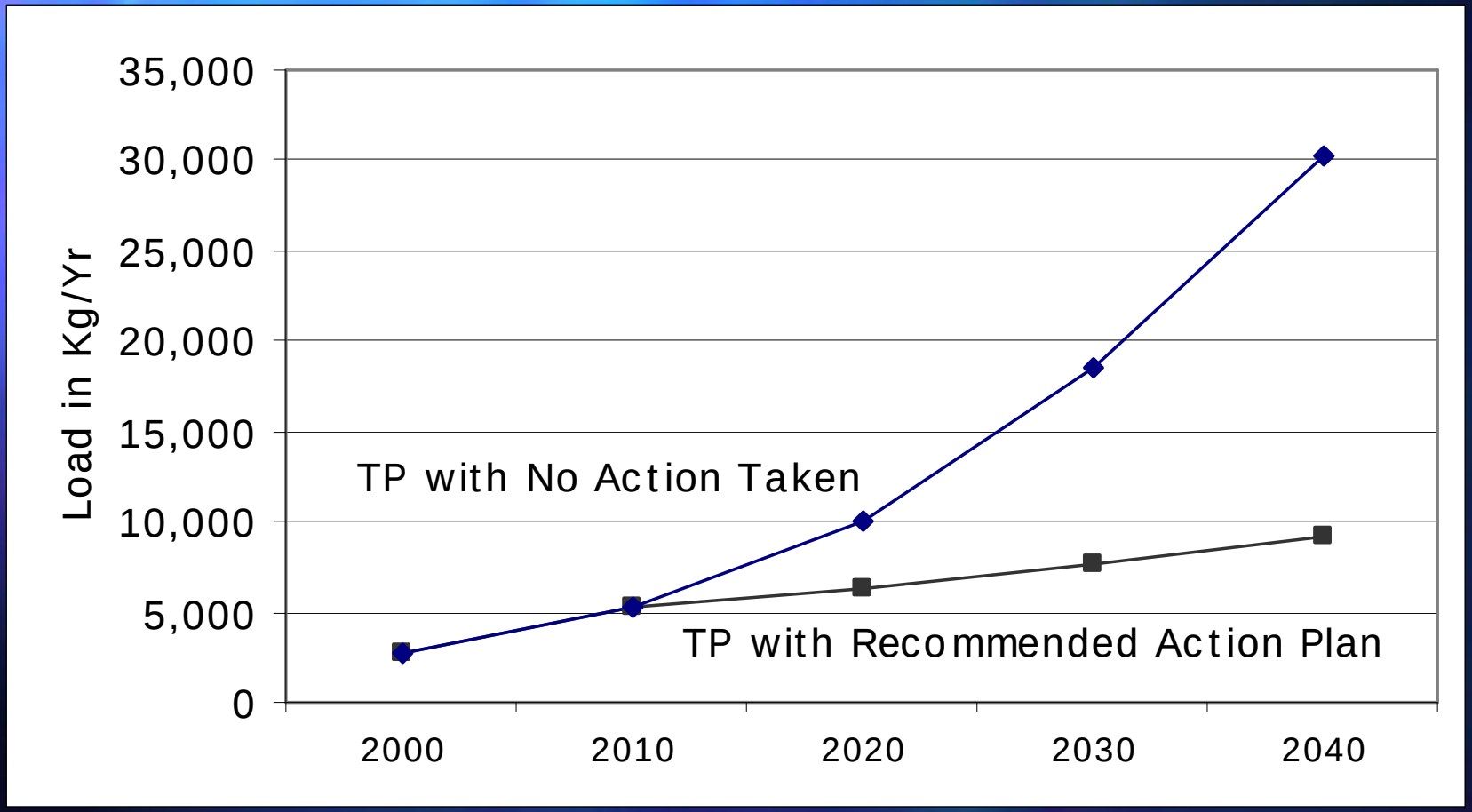
Load with Recommended Plan



STUDY AREA TN LOAD CHANGES



STUDY AREA TP LOAD CHANGES



Recommendations

- Low Impact Development
- On-Site Sewage Facilities
- Regional WWTPs
- Environmental Education
- Water Conservation
- Water Quality Protection Zone

OSSF

- Used for greater than 1 acre lots
- Educate on proper maintenance
- Document OSSF failure data

Environmental Education

- Materials on OSSF operation
- LID concepts
- Minimal use of fertilizers & pesticides

Water Conservation

- Native vegetation
- Rainwater harvesting

Water Quality Protection Zone

- Area where recommendations would be focused
- Regulations could be enforced by County
- May require legislative action to establish and grant authority to County

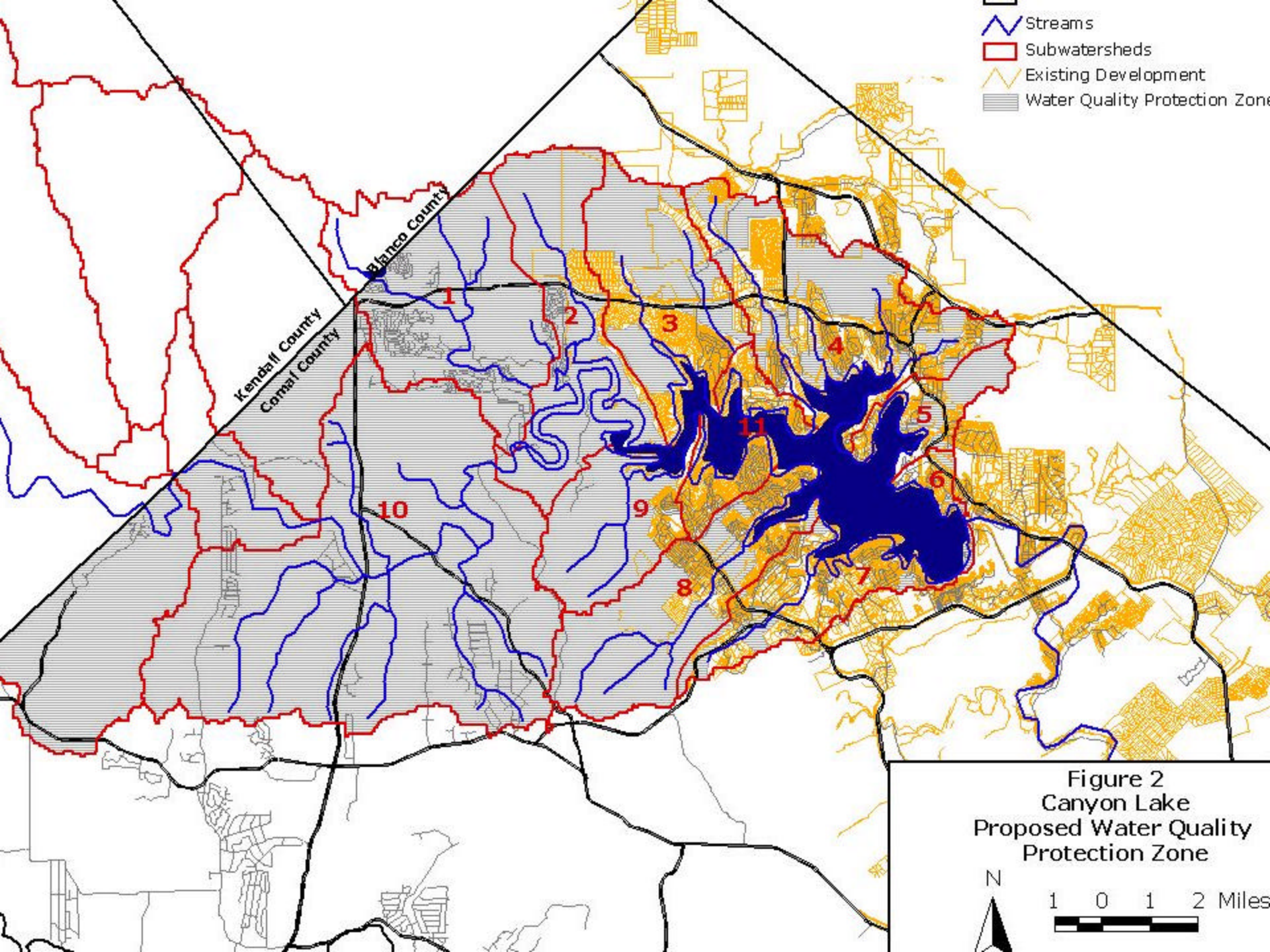


Figure 2
Canyon Lake
Proposed Water Quality
Protection Zone