Approach to Evaluating Sediment Impairment (cont.)

2. Evaluated data with respect to thresholds for determining properly functioning conditions for BU's

   - Standard measures for evaluating sediment conditions of streams, and measures for assessing impacts to salmonids

   - Peer-reviewed literature

   - Thresholds identified in adopted TMDLs

3. Considered anecdotal information

Redwood Creek

- 1992: Added to 303(d) List for sediment
- 1998: US EPA established TMDL
- 2002: Based on review of readily available data, staff concludes:

  - Continued evidence of sediment impairment, though some areas of Redwood Creek showing improvement

  - Continued threat of sedimentation

  - Staff recommends continued listing

Redwood Creek (cont.)

- In-stream conditions:

  - Percent fines and D_{50} data does not meet TMDL thresholds

  - Channel morphology is vulnerable due to sediment supply

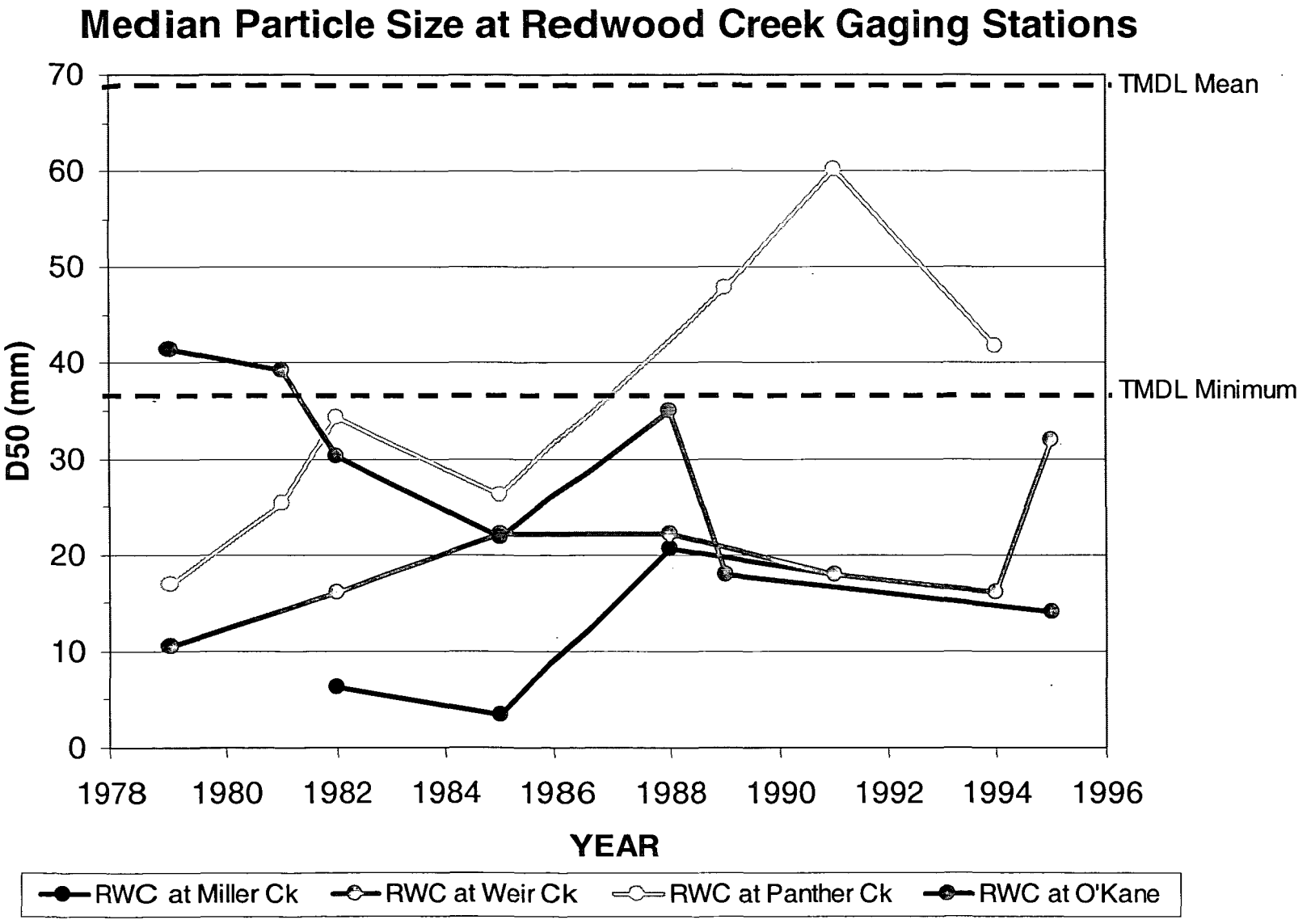
  - Suspended sediment loads are not consistently meeting TMDL threshold

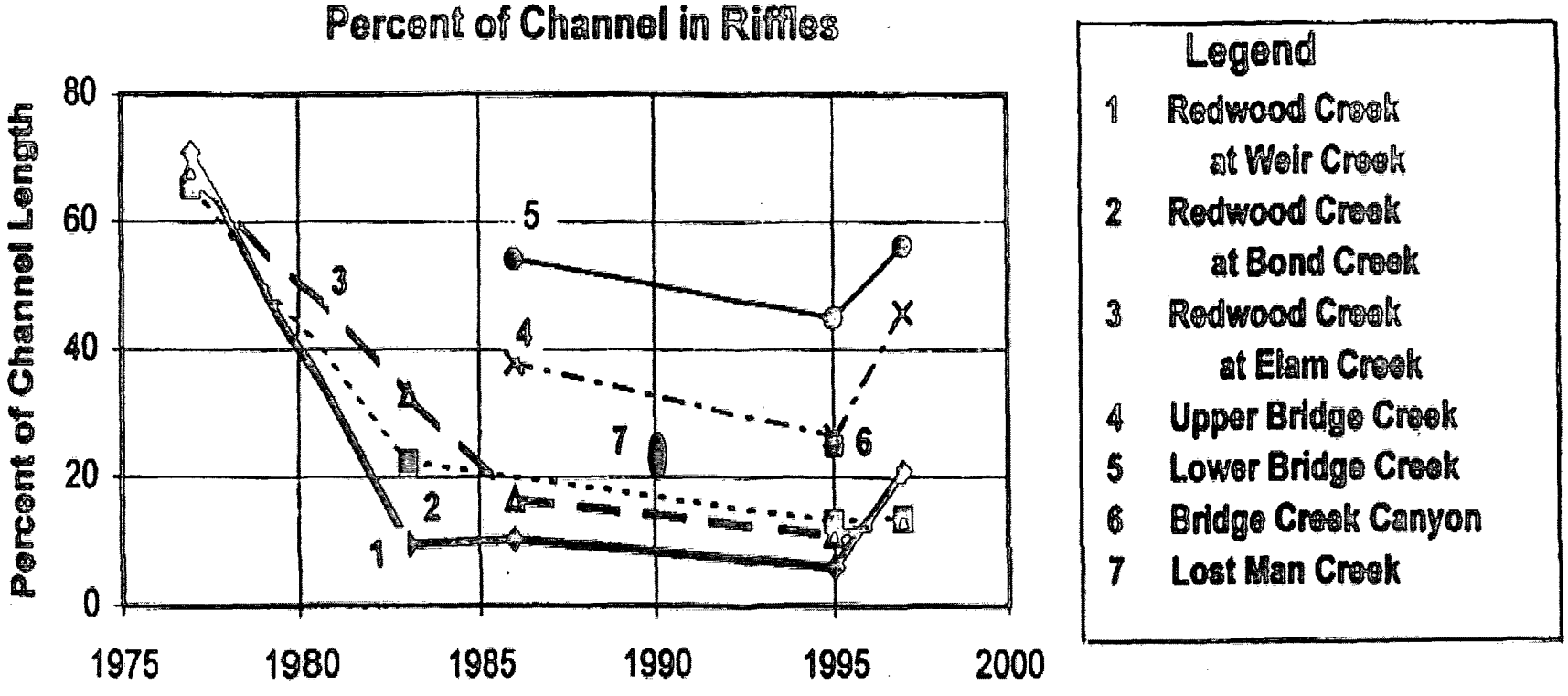
  - Suspended sediment concentrations at levels that impair salmonids

- Up-slope conditions:

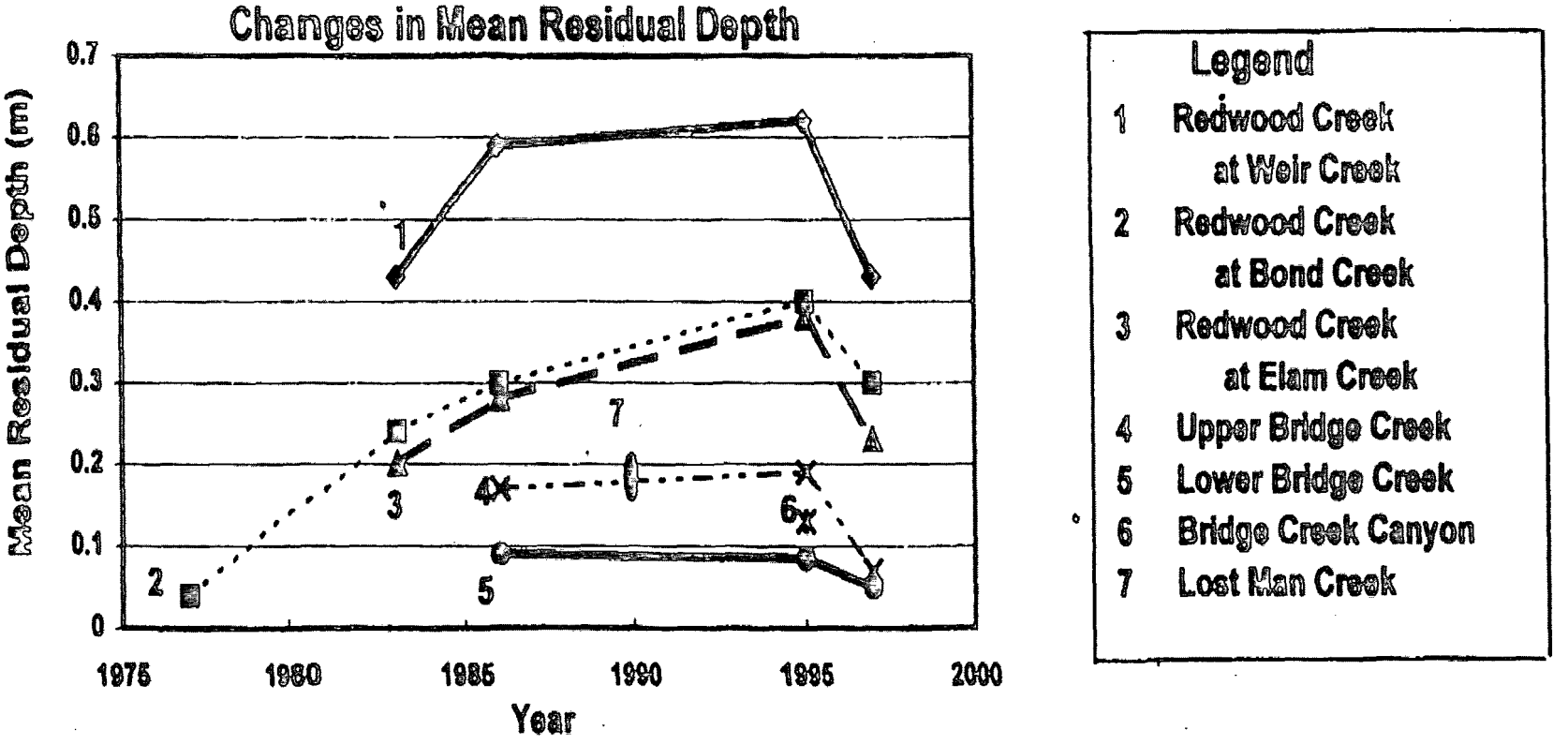
  - Record of landslides in 1997

  - Road density


Median Particle Size at Redwood Creek Gaging Stations
70
60
50
40
30
20
10
0
D50 (mm)
TMDL Mean
TMDL Minimum
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
YEAR
RWC at Miller Ck
RWC at Weir Ck
RWC at Panther Ck
RWC at O'Kane

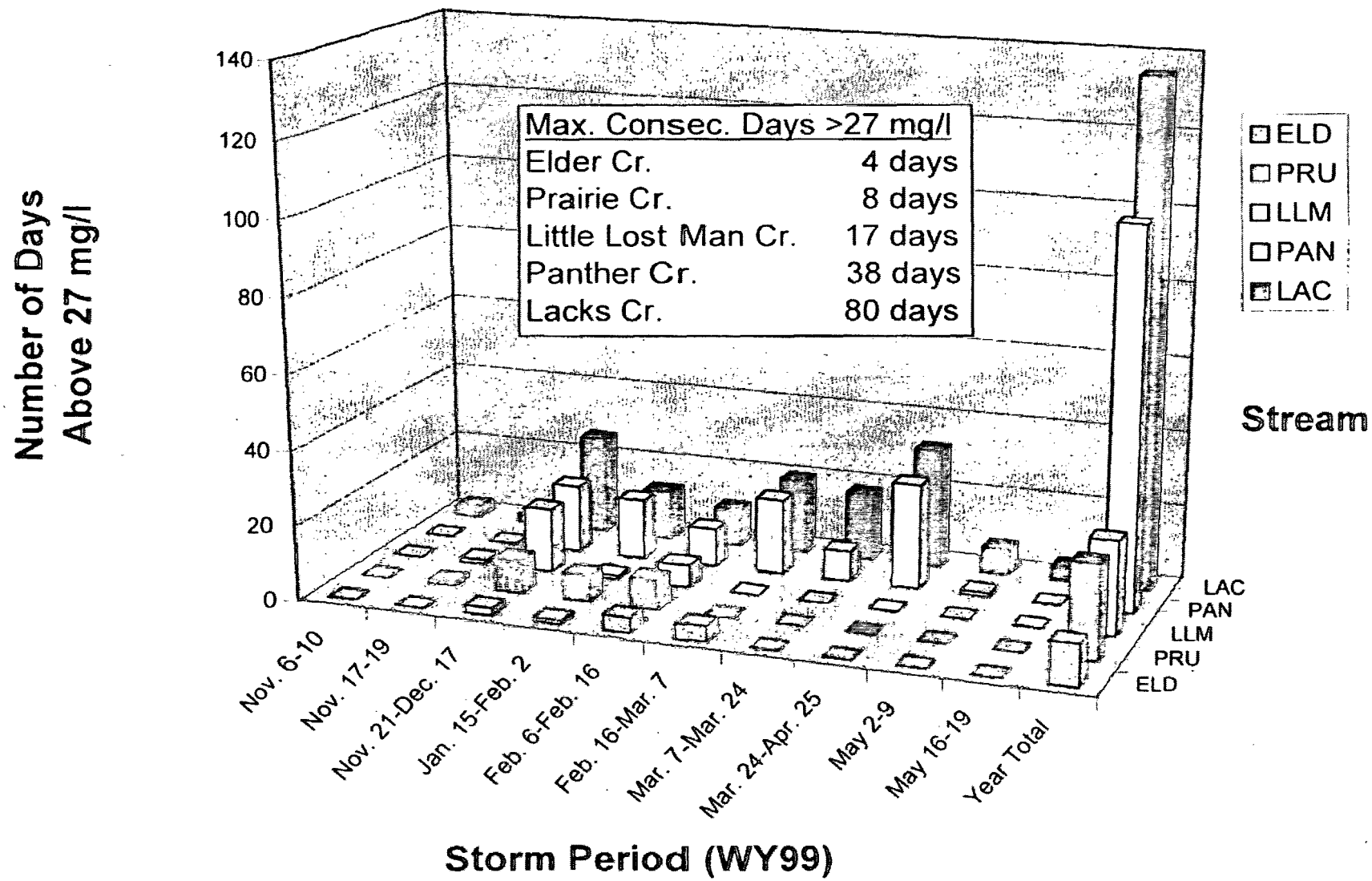

Percent of Channel in Riffles
Percent of Channel Length
80
60
40
20
0
1975
1980
1985
1990
1995
2000
1
2
3
4
5
6
7
Legend
1 Redwood Creek at Weir Creek
2 Redwood Creek at Bond Creek
3 Redwood Creek at Elam Creek
4 Upper Bridge Creek
5 Lower Bridge Creek
6 Bridge Creek Canyon
7 Lost Man Creek

Source: USGS


Changes in Mean Residual Depth
Mean Residual Depth (m)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1975
1980
1985
1990
1995
2000
Year
1
2
3
4
5
6
7
Legend
1 Redwood Creek at Weir Creek
2 Redwood Creek at Bond Creek
3 Redwood Creek at Elam Creek
4 Upper Bridge Creek
5 Lower Bridge Creek
6 Bridge Creek Canyon
7 Lost Man Creek

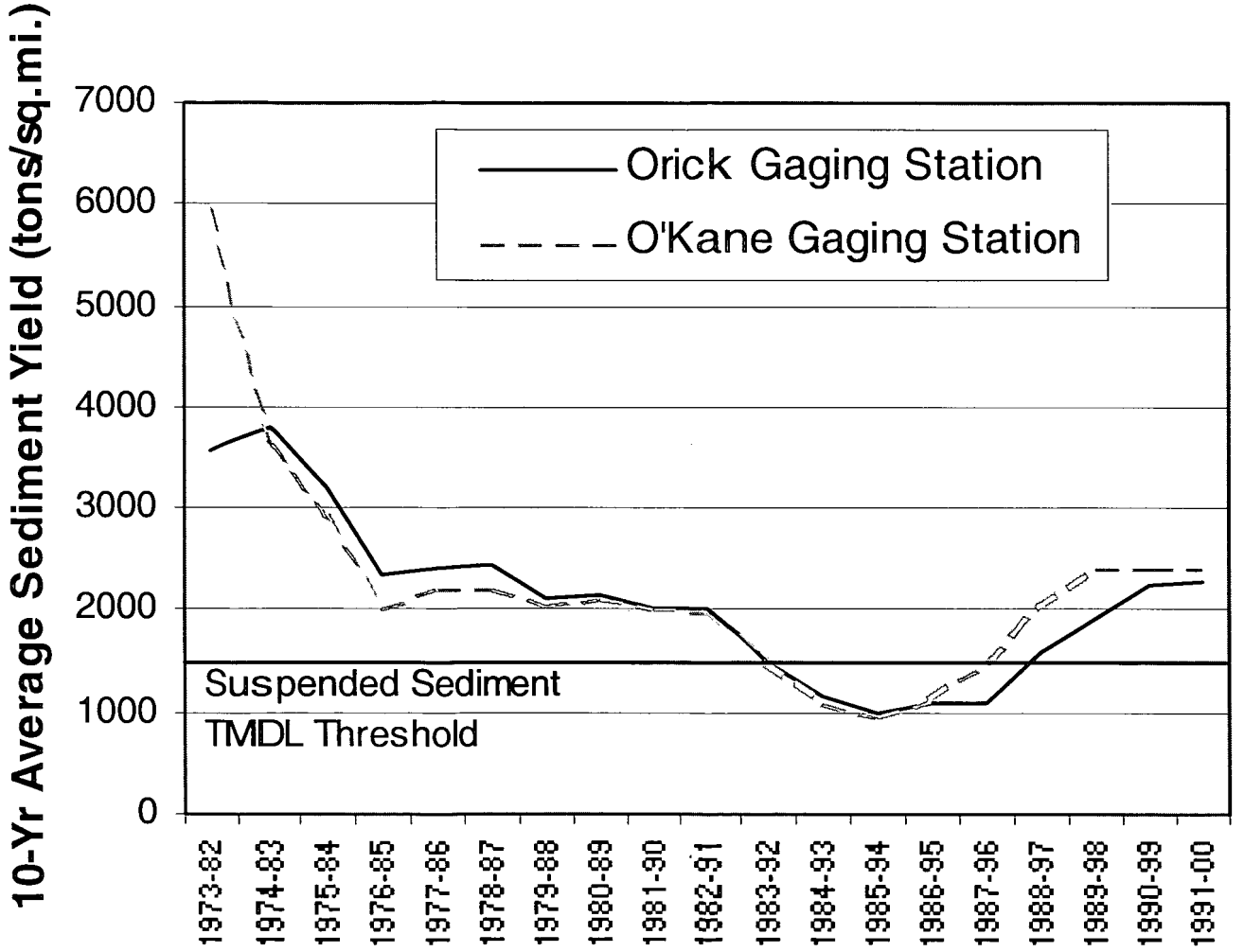
Source: USGS

Number of Days SSC Above 27 mg/l for Five Northcoast Streams, WY99

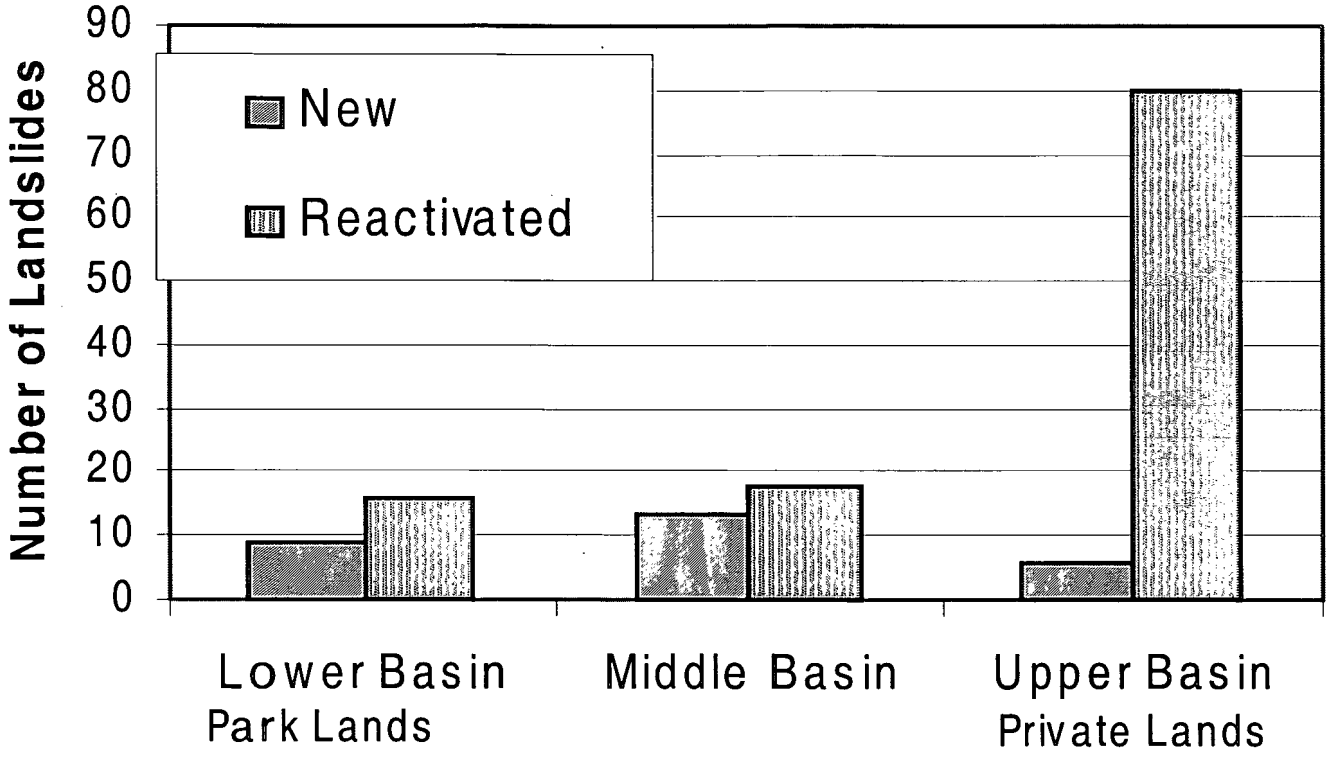


Source: RNP

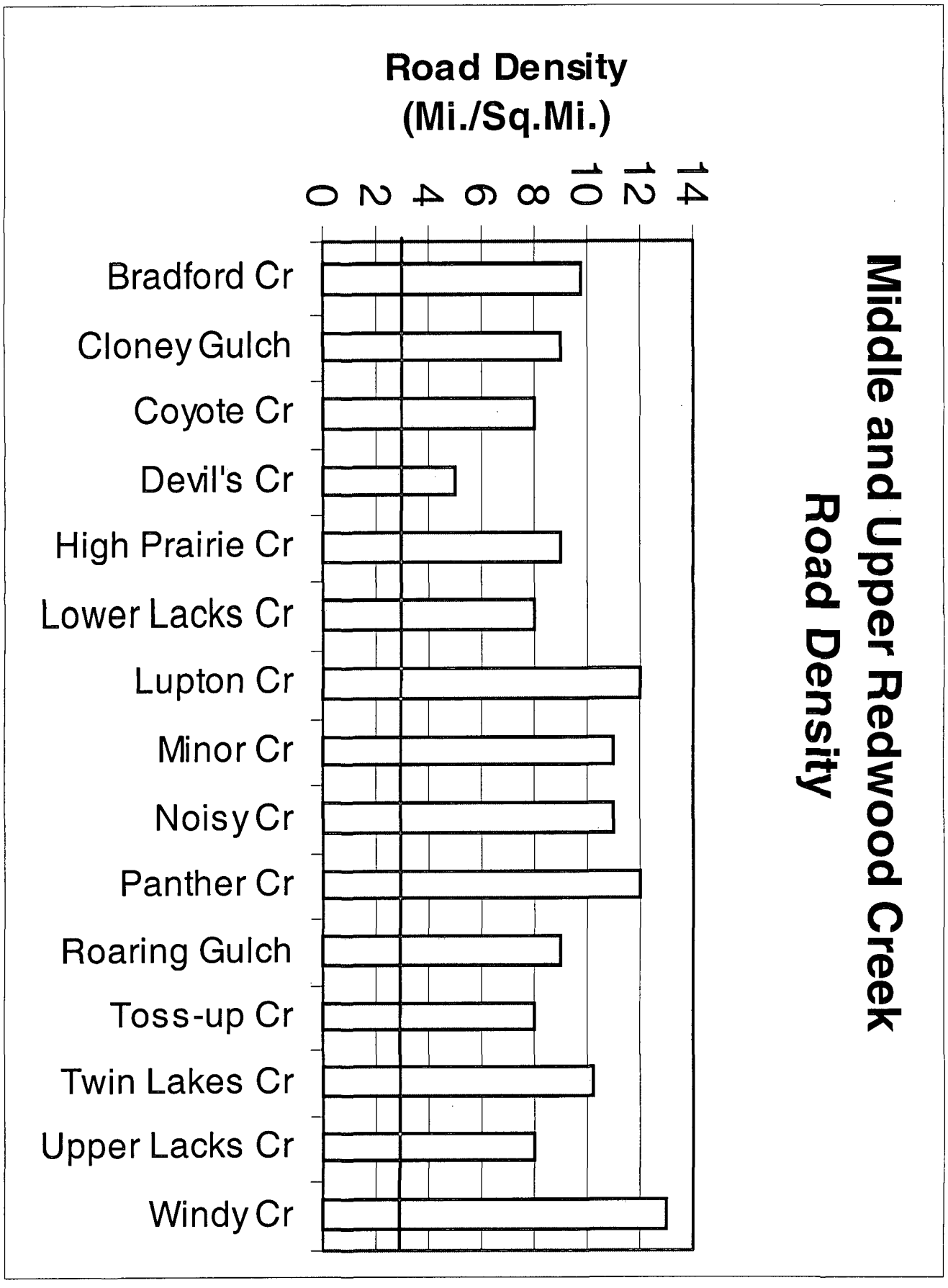
Ten-Year Rolling Average for Suspended Sediment Yield Redwood Creek



Redwood Creek Mainstem Landslides, 1997



Source: USGS


Middle and Upper Redwood Creek
Road Density
Road Density
(Mi./Sq.Mi.)
0
2
4
6
8
10
12
14
Bradford Cr
Cloney Gulch
Coyote Cr
Devil's Cr
High Prairie Cr
Lower Lacks Cr
Lupton Cr
Minor Cr
Noisy Cr
Panther Cr
Roaring Gulch
Toss-up Cr
Twin Lakes Cr
Upper Lacks Cr
Windy Cr

Status of Roads Within Redwood Creek

Miles	Redwood Ntl. Park	Private Land
Total	436	1200
Assessed	436	1039
Upgraded	73	27
Decommissioned	222	20

Source: Redwood Ntl. Park

Redwood Creek Landowners Assoc. Downstream Migrant Fish Trap Studies

- 2000 and 2001 studies have been completed
- The studies will be discussed in more detail at the February Board meeting
- Regional Water Board staff has reviewed 2000 data
- The 2000 results are encouraging for juvenile chinook
- One years worth of data on a single life stage is not sufficient information to warrant de-listing

Redwood Creek - Conclusions

- TMDL thresholds for fine sediment, channel morphology, and suspended sediment load are not being met
- Channel morphology is vulnerable to sediment supply
- Upslope conditions in upper watershed present threat of sedimentation
- Beneficial uses are impaired by sediment
- Continued listing of Redwood Creek for Sediment is warranted

Jacoby Creek

- Anecdotal information from long-time residents of watershed:

  - Creek runs brown during small/short storms, when it did not do so in past

  - Creek runs brown well after rainfall stops

  - Increased frequency of flooding

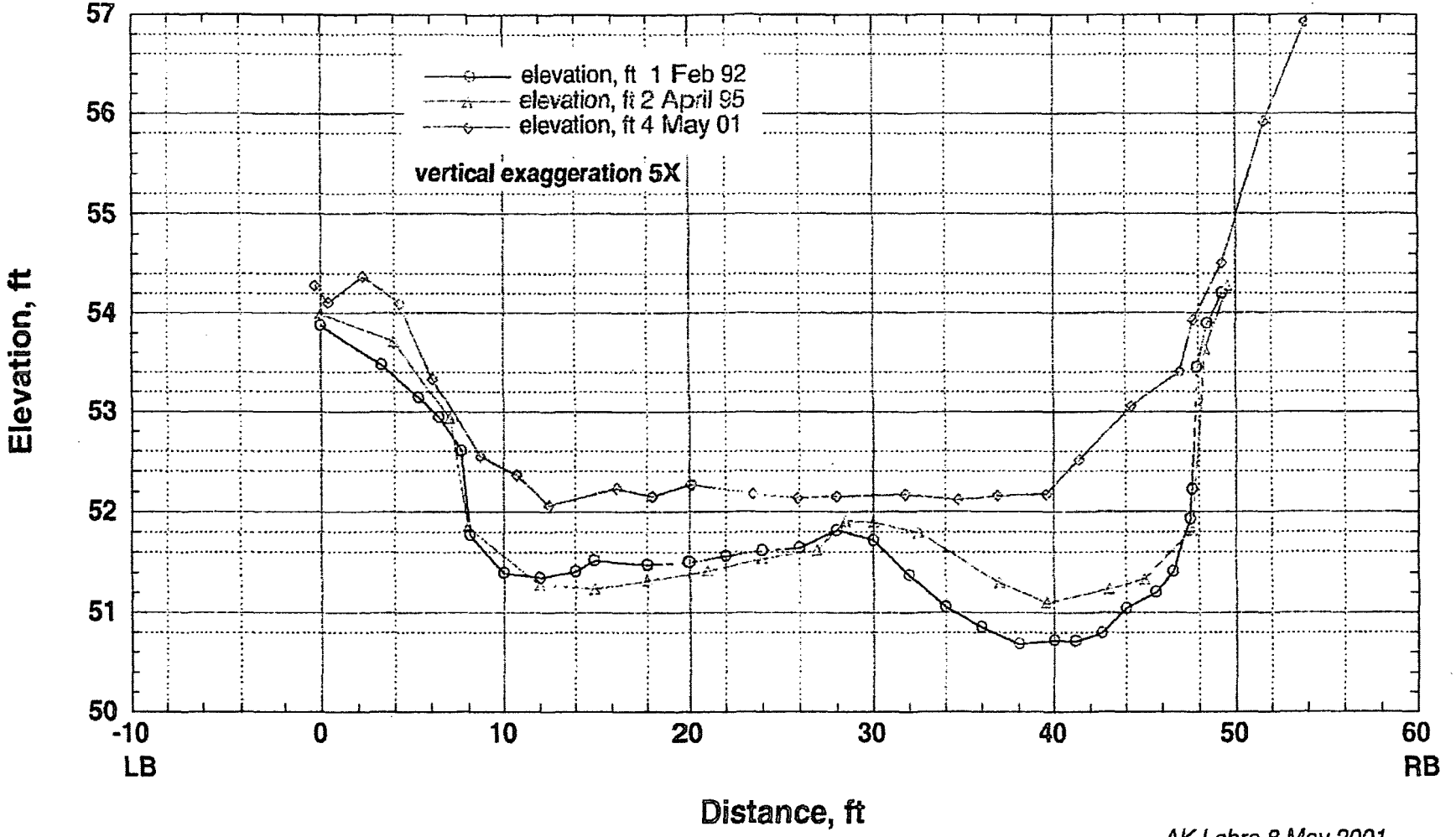
  - Pools have been filled in by sediment

  - Incidence of debris slides doubled between 1941 and 1978 (aerial photo review)

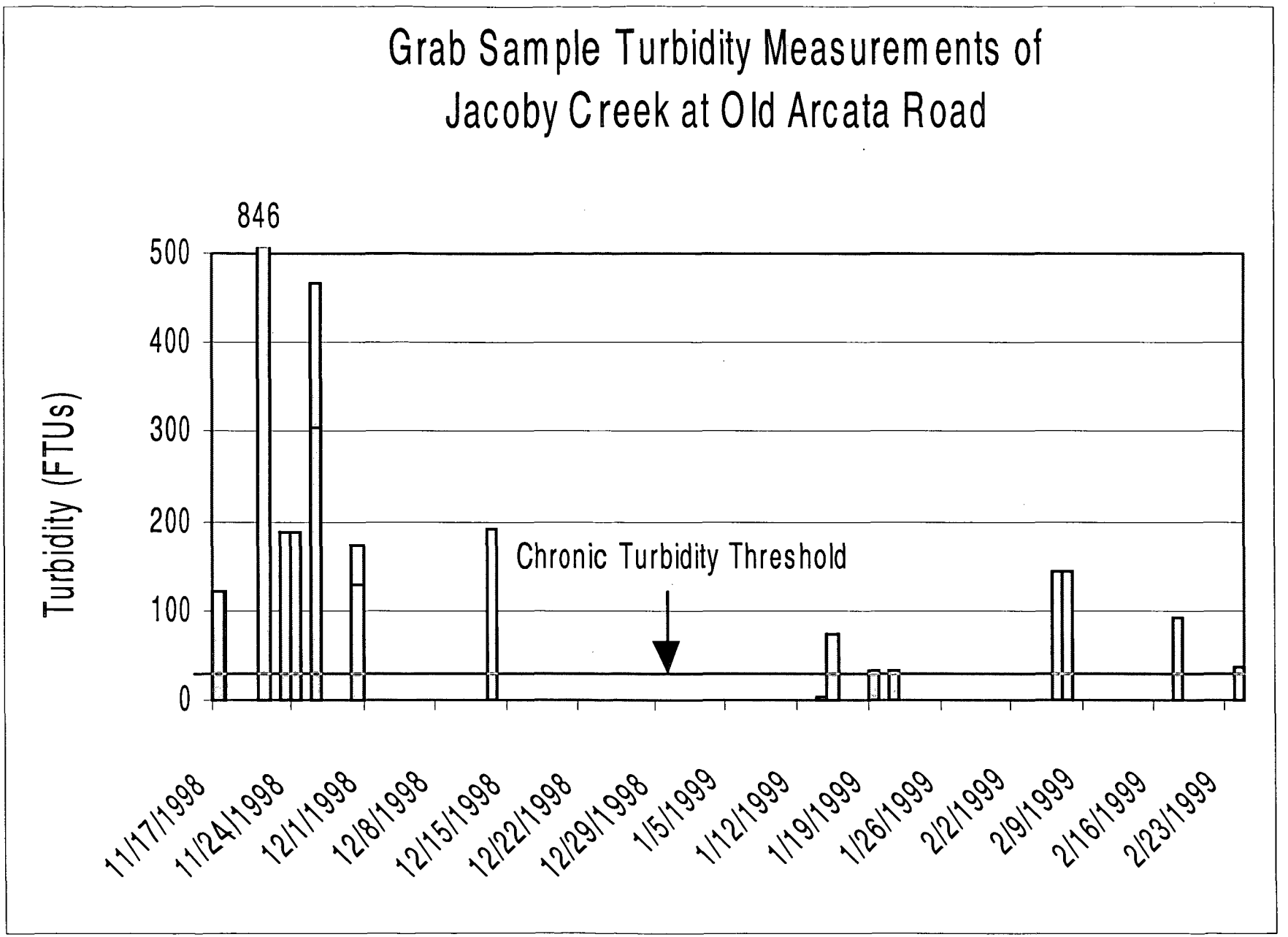
  - Sedimentation at mouth of creek causing loss of brackish marsh habitat

  - Water supply effected by turbidity levels

Jacoby Cr XS1
(approximately 75 ft upstream from covered bridge)
1992 - 2001



AK Lehre 8 May 2001


Grab Sample Turbidity Measurements of
Jacoby Creek at Old Arcata Road
846
500
400
300
200
100
0
Turbidity (FTUs)
Chronic Turbidity Threshold
11/17/1998
11/24/1998
12/1/1998
12/8/1998
12/15/1998
12/22/1998
12/29/1998
1/5/1999
1/12/1999
1/19/1999
1/26/1999
2/2/1999
2/9/1999
2/16/1999
2/23/1999

Stemple Creek/Estero de San Antonio

- Proposed for listing in 1990

  - Identified sedimentation, low DO, and high ammonia as cause of impairment
- 1996 specific stressors included on 303(d) List

  - Listed for Nutrients
- 1997 TMDL approved

  - Addressed nutrient and sediment impairment
- 2002: Amend List to include Sediment, to be consistent with original intent of listing

Laguna de Santa Rosa

- Listed in 1990 for Ammonia and Dissolved Oxygen
- US EPA approved TMDL in 1995
- Laguna de Santa Rosa removed form 303(d) List for Ammonia and Dissolved Oxygen by US EPA in 1998
- TMDL goals for unionized ammonia are being met
- TMDL goals for DO are consistently not being met
- Low DO attributed to organic matter and nutrients
- Staff recommends adding Laguna de Santa Rosa to 303(d) List for DO and Nutrients

Tule Lake and Lower Klamath Lake

- Attempt to make listings consistent with Oregon
- pH WQO exceedance 1992-1996
- Recommend adding to List for pH