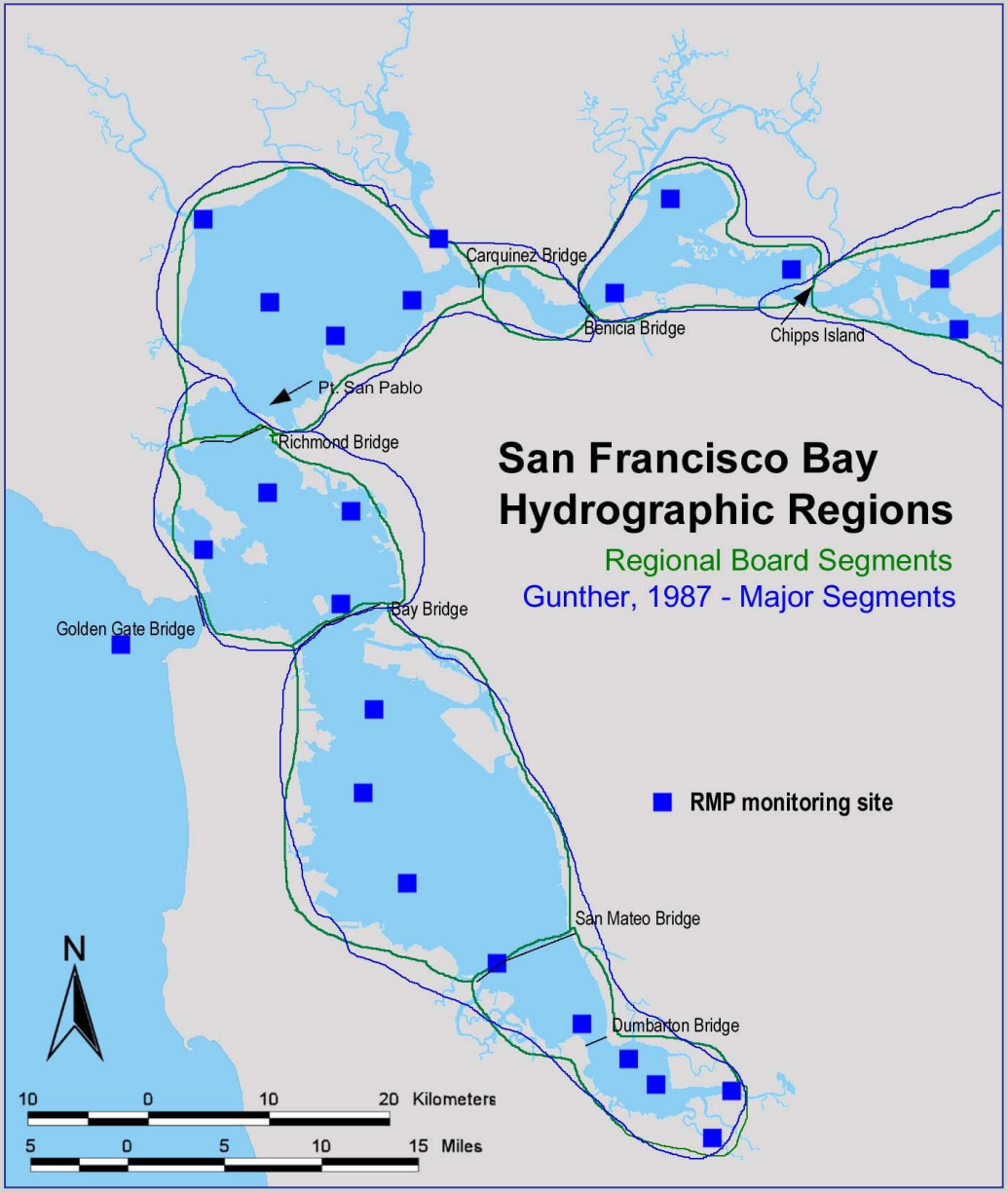
Existing Segmentation

Regional Water Quality Control Board (RWQCB):

Major bridges define segments for regulatory purposes.

Andrew Gunther, 1987:

Major segments are shown.
Further segmentation was proposed.



Existing Segmentation

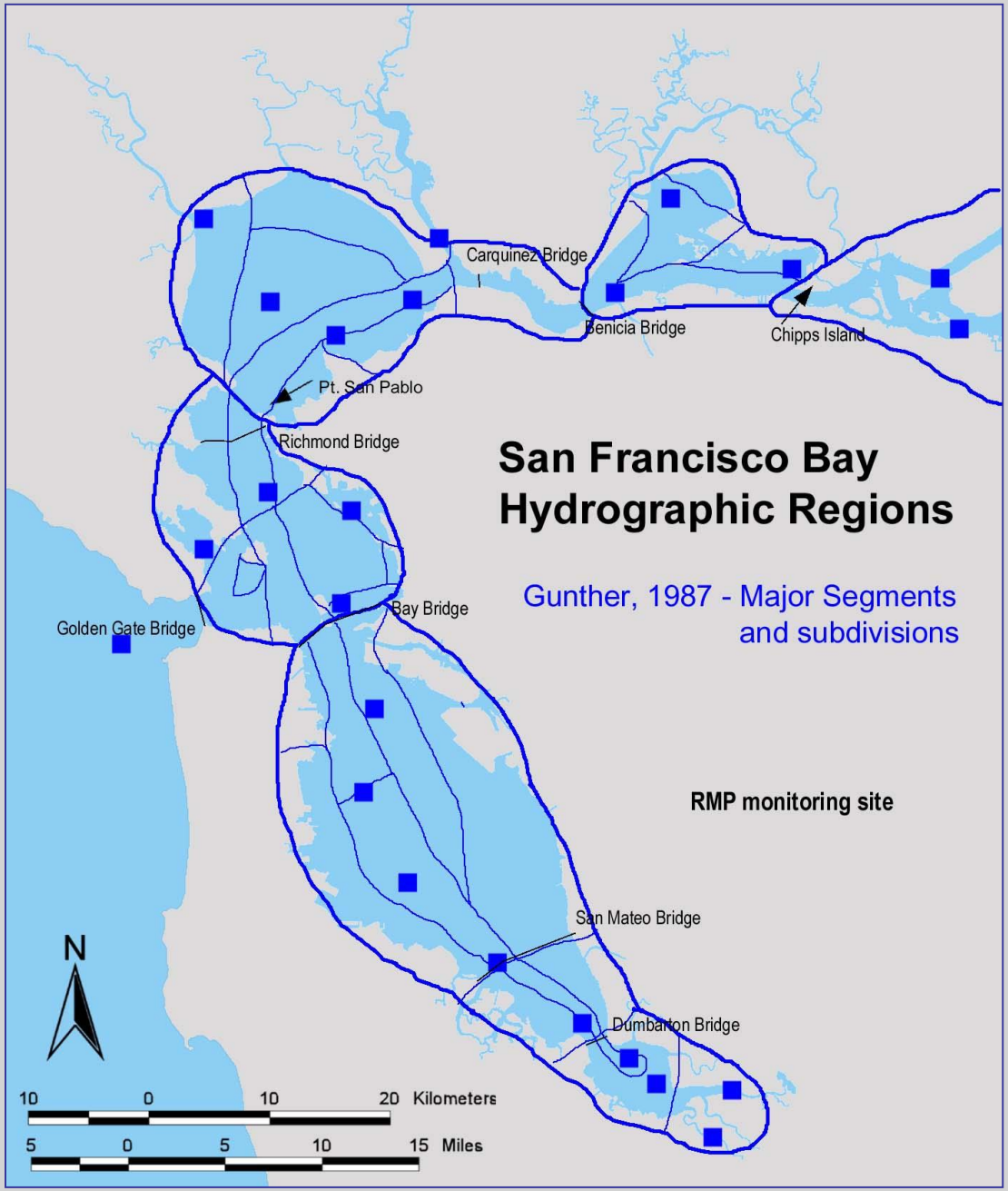
Andrew Gunther, 1987:

Further segmentation of each section was proposed based on depth, salinity, ecology, and anthropogenic discharges.

Number of subdivisions	
Lower/South Bay	12
Central Bay	11
San Pablo Bay	10
Suisun Bay	4

Important when considering how to allocate samples.

May be more important for sediment than for water



Professional Judgement

Dr. Wim Kimmerer:

San Francisco State University:

Zooplankton studies and general, long-term knowledge of the Bay.

Dr. Jon Burau:

USGS

Water circulation studies. Identified density driven circulation "cells" bounded by geographic sills or shoals.

Dr. Dave Schoelhamer:

USGS

Water circulation studies. Geographical constrictions effecting water flow and also discussed the importance of depth considerations, temporal variability, and tidal action.

Dr. Alan Jassby:

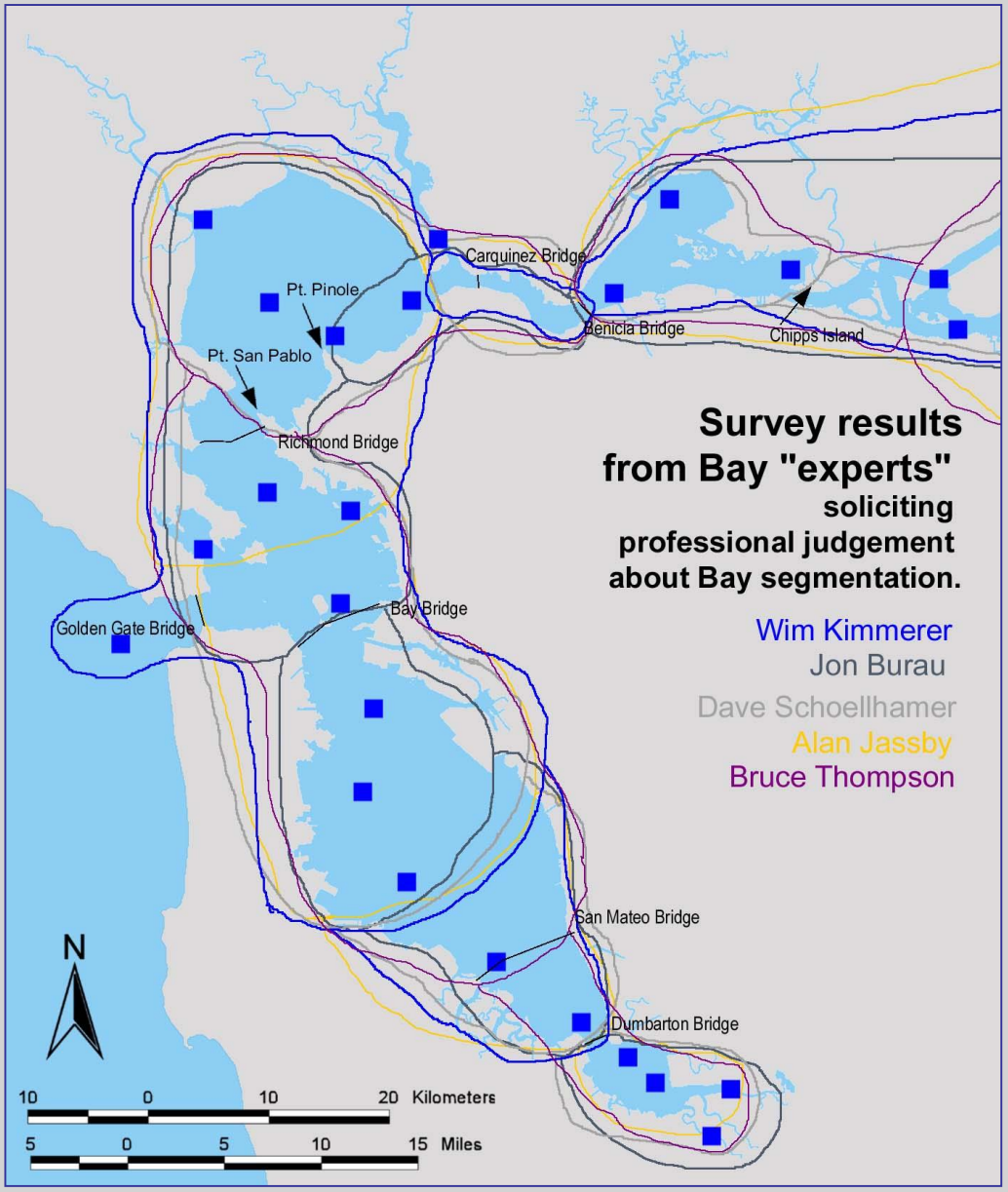
University of California - Davis

Estuarine Sampling Design – Statistical analysis using water quality attributes from sampling transects.

Dr. Bruce Thompson:

SFEI

Benthic assemblage distributions. Boundaries move in seasonal patterns.



Professional Judgement

Important considerations:

- **Tidal influences**
- **Temporal variation**
- **Is the data representative of the Bay?**
- **Shallow vs. Deep**
- **Influence of sediments on water quality (TSS)**
- **Random Allocation to the entire Bay?**
- **Anthropogenic sources**
- **?**

Professional Judgement (notes)

Important considerations:

Tidal influences

Temporal variation: seasonal and tidal

Is the data representative of the Bay? Mostly have deep data for water

Shallow vs. Deep Sediment is an important player in WQ: suspended solids are very different in the shallows vs. the channels.

Influence of sediments on water quality (Schoelhammer TSS**)**

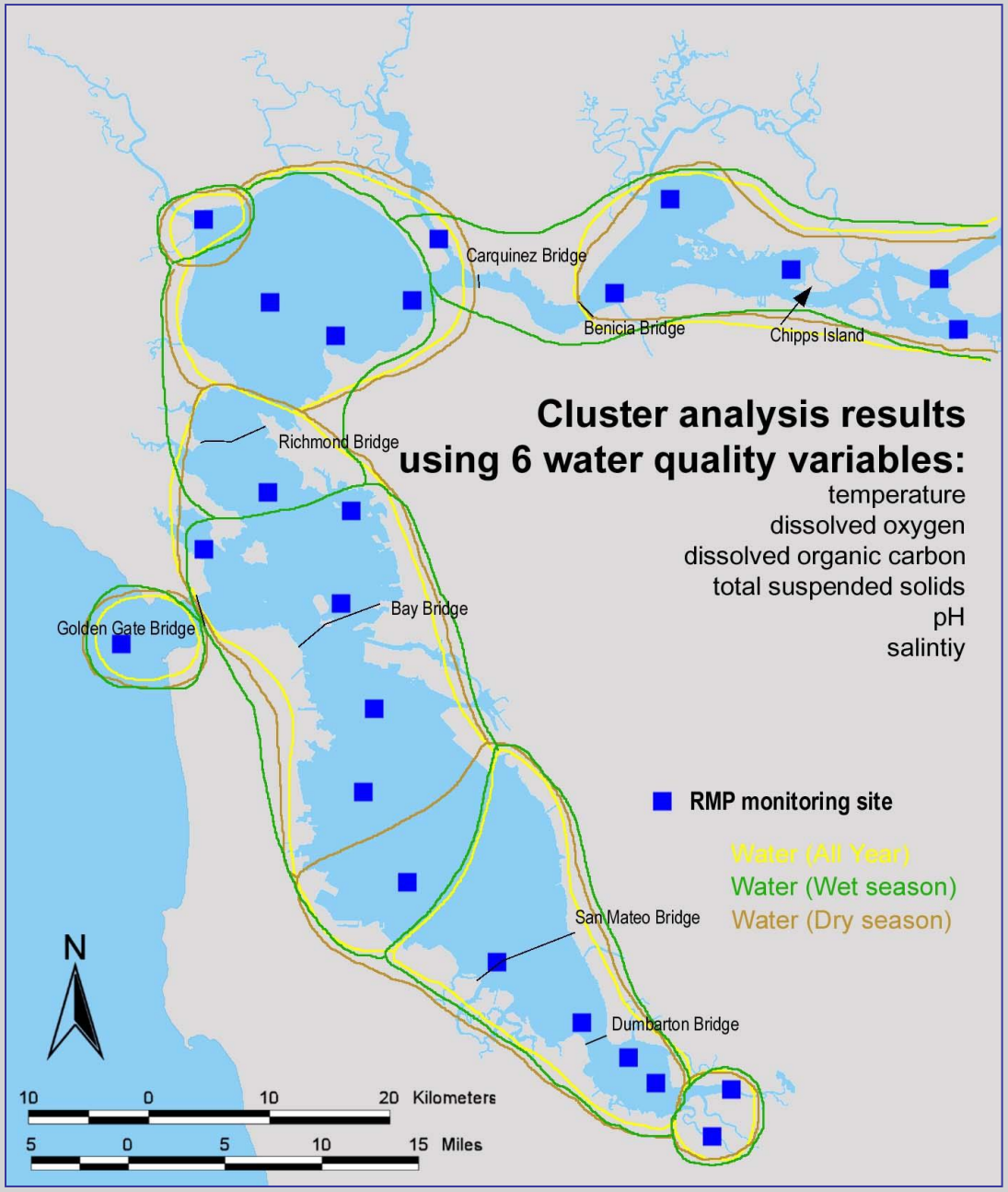
Random Allocation to the entire Bay? (Jassby (BT explain?)

Anthropogenic sources (Gunther careful to identify potential sources such as outfalls and storm drains).

Cluster Analysis of Water

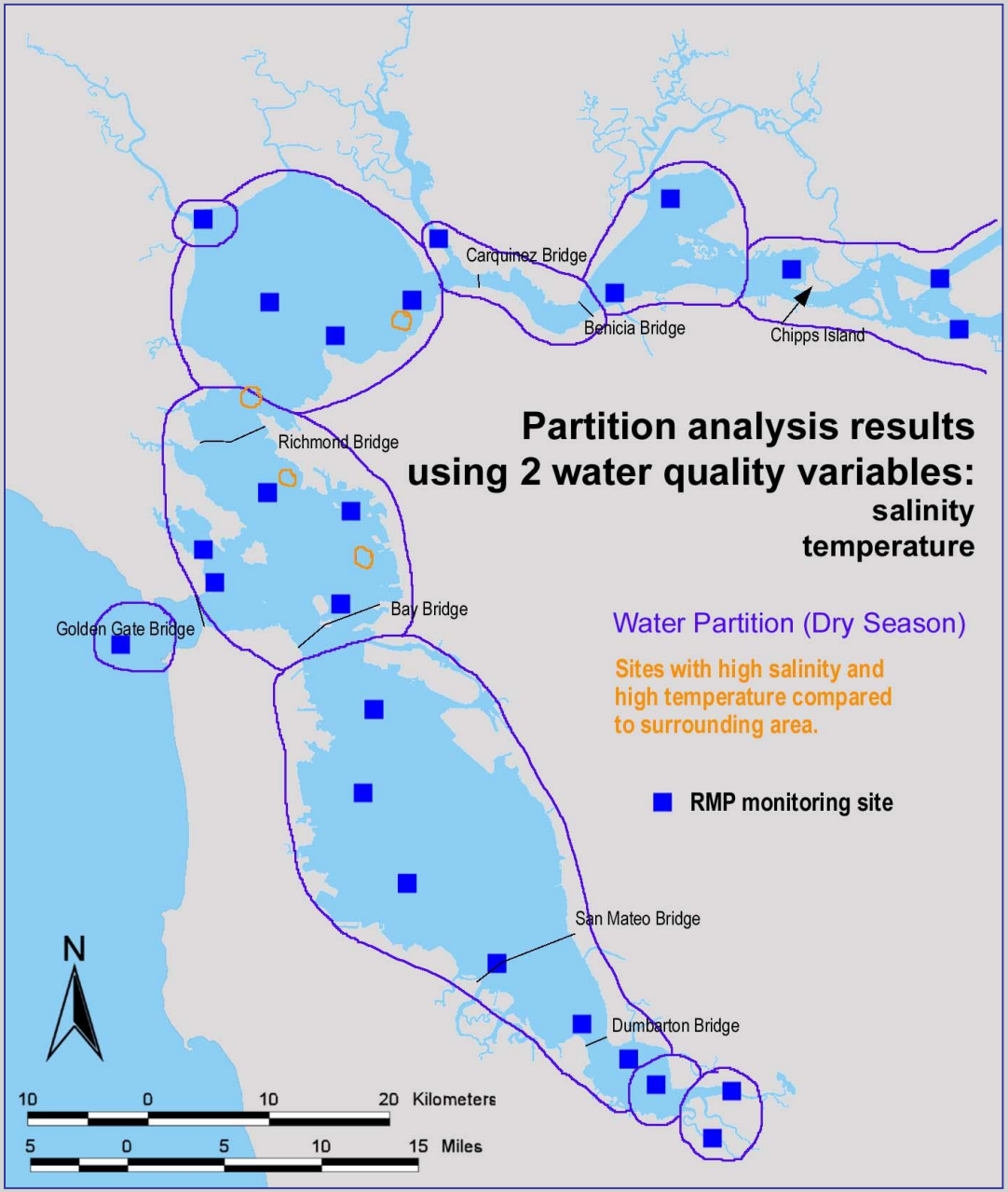
Six water quality attributes were used in a cluster analysis.

RMP and BPTCP data (1989-1998)



Partition Analysis of Water

Dry weather water samples were grouped based on similar salinity and temperature regimes.



Cluster Analysis of Sediment

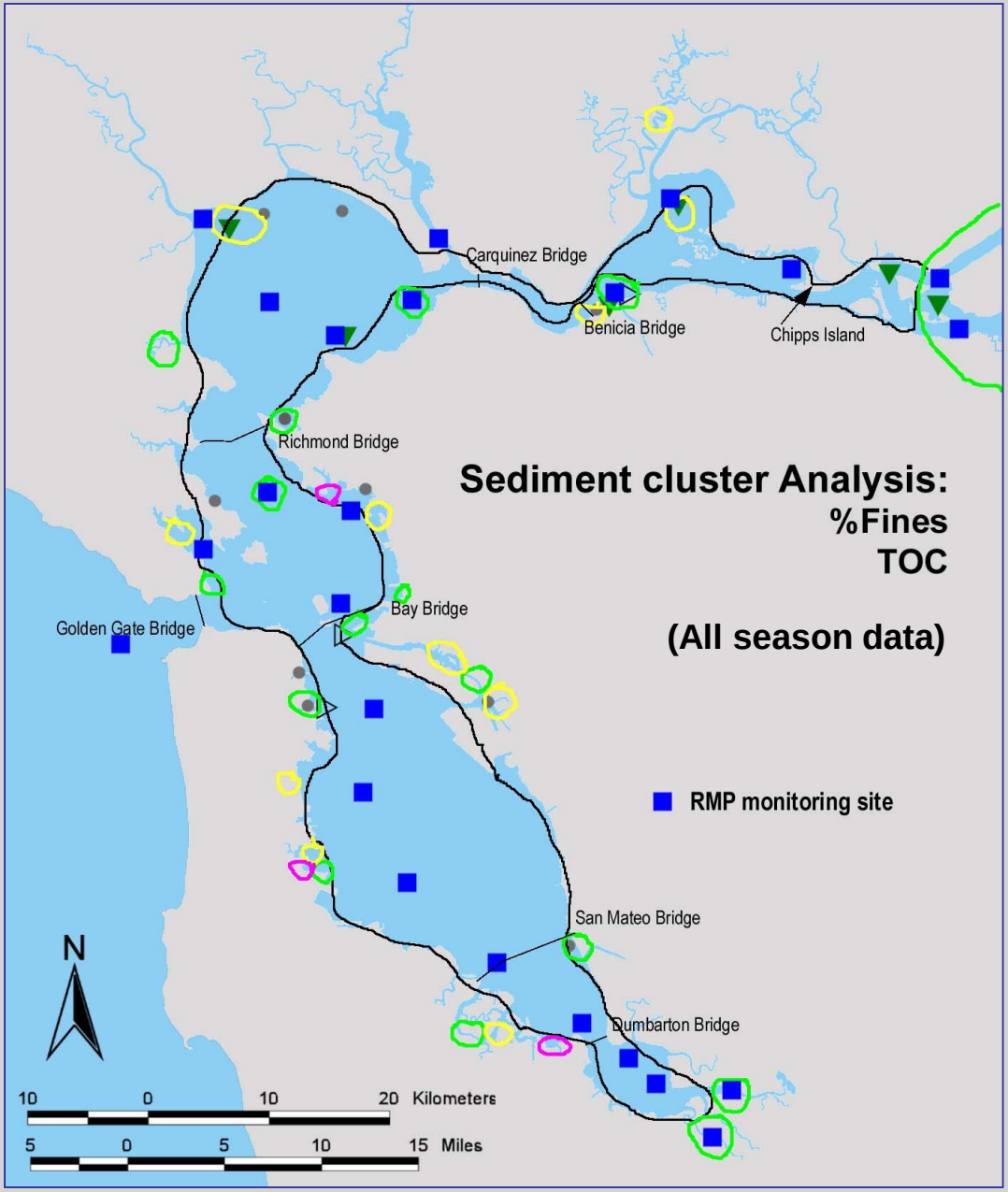
% Fines and TOC were used in a Sediment cluster analysis.

Results indicated that large sections of the Bay (proper) consist of:

< 60 % Fines & > 4 % TOC

Bay (margins) however are more variable.

Data: RMP, BPTCP & DWR (1991-1998).

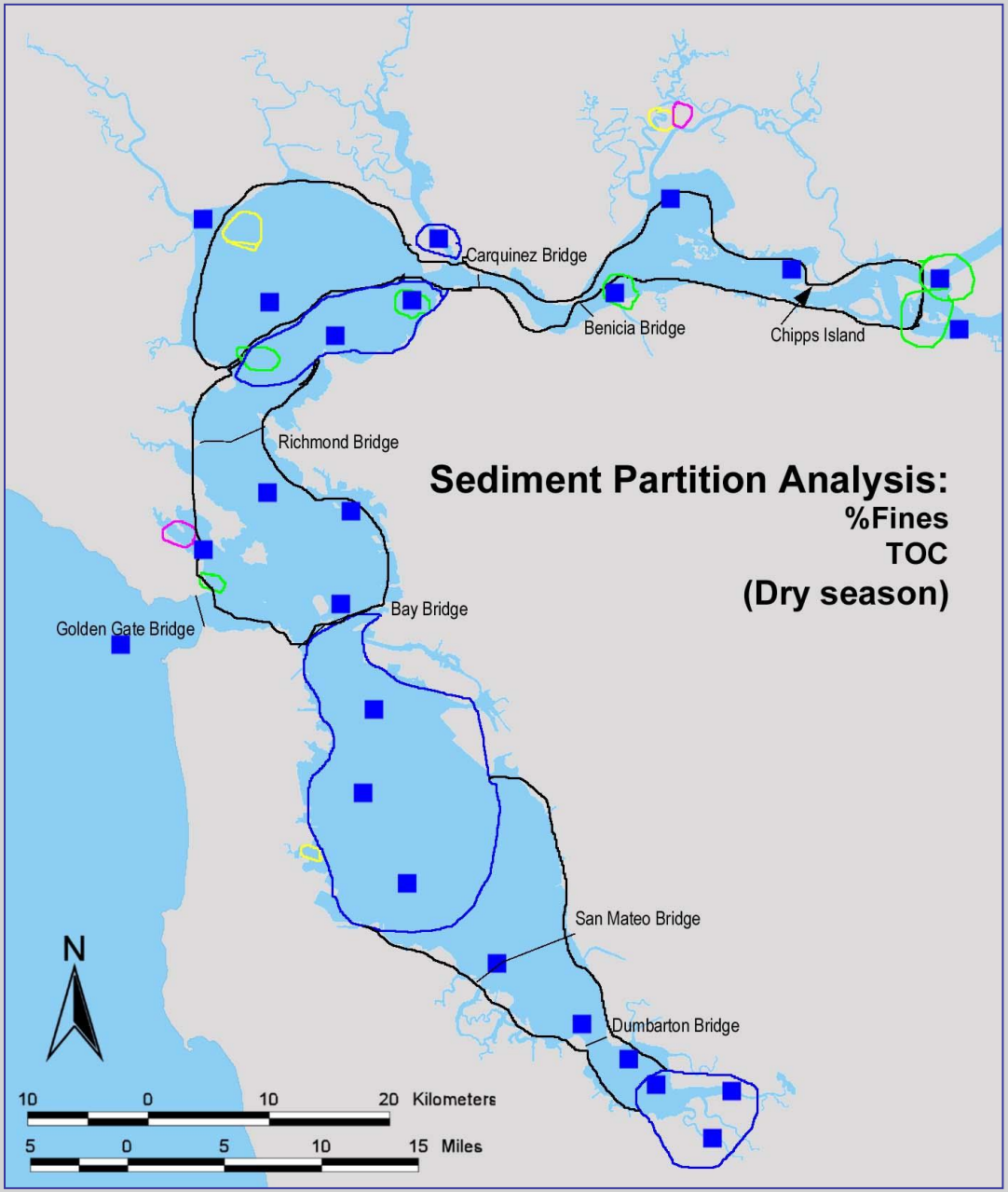


Partition Analysis of Sediment

Dry weather sediment samples showed more distinct segmentation:

	% Fines	%TOC
Black	75-100	< 4
Blue	50 – 75	< 2
Green	0 – 50	< 2
Yellow	70 –100	4 – 7
Pink	50 – 70	2 – 4

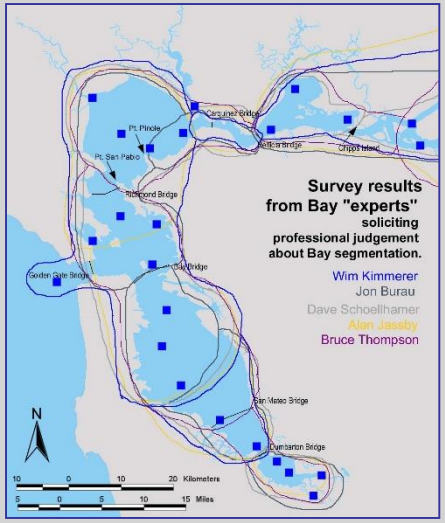
Note: Bay margins have higher organic material than the Bay proper.



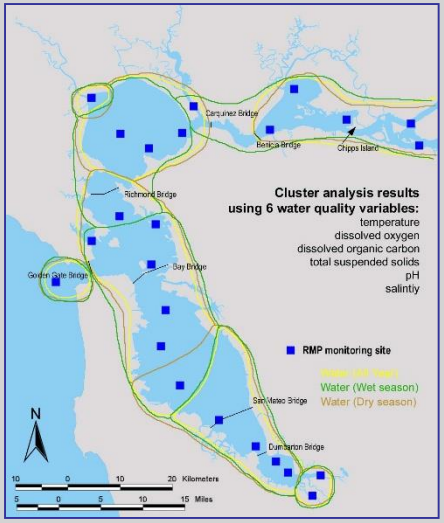
Summary

Existing*

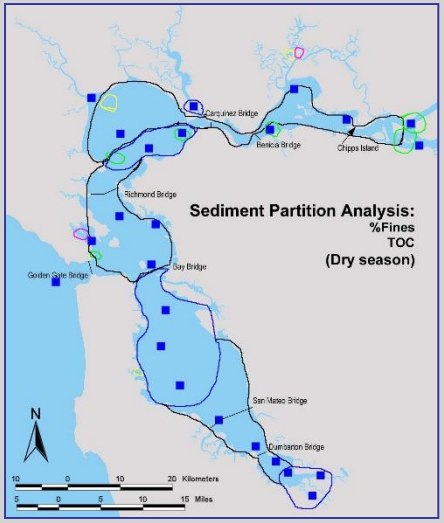
Expert Opinions



Water Cluster



Sediment Partition



Segment Boundary	Expert Opinion	Water Cluster	Water Partition(d)	Sediment Partition(d)	Total	
Number of possible hits	**5**	**3**	**1**	**1**	**10**	
Chipps Island *	1	0	1	0	**2**	
Benicia Bridge*	5	2	1	0	**8**	×
Carquinez Bridge*	0	2	0	0	**2**	
Carquinez Straight (west end)	3	1	1	1	**6**	×
Pt. Pinole	1	0	0	1	**2**	
Pt. San Pablo	2	2	1	0	**5**	×
Richmond Bridge*	0	0	0	0	**0**	
Angel Island	1	1	0	0	**2**	
Bay Bridge*	1	0	1	1	**3**	
San Bruno Shoal	4	2	0	1	**7**	×
San Mateo Bridge*	1	0	0	0	**1**	
Dumbarton Bridge	4	0	0	0	**4**	×
Sloughs	0	3	1	1	**5**	×

Suggested Segmentation

Chipps Island

Benicia Bridge

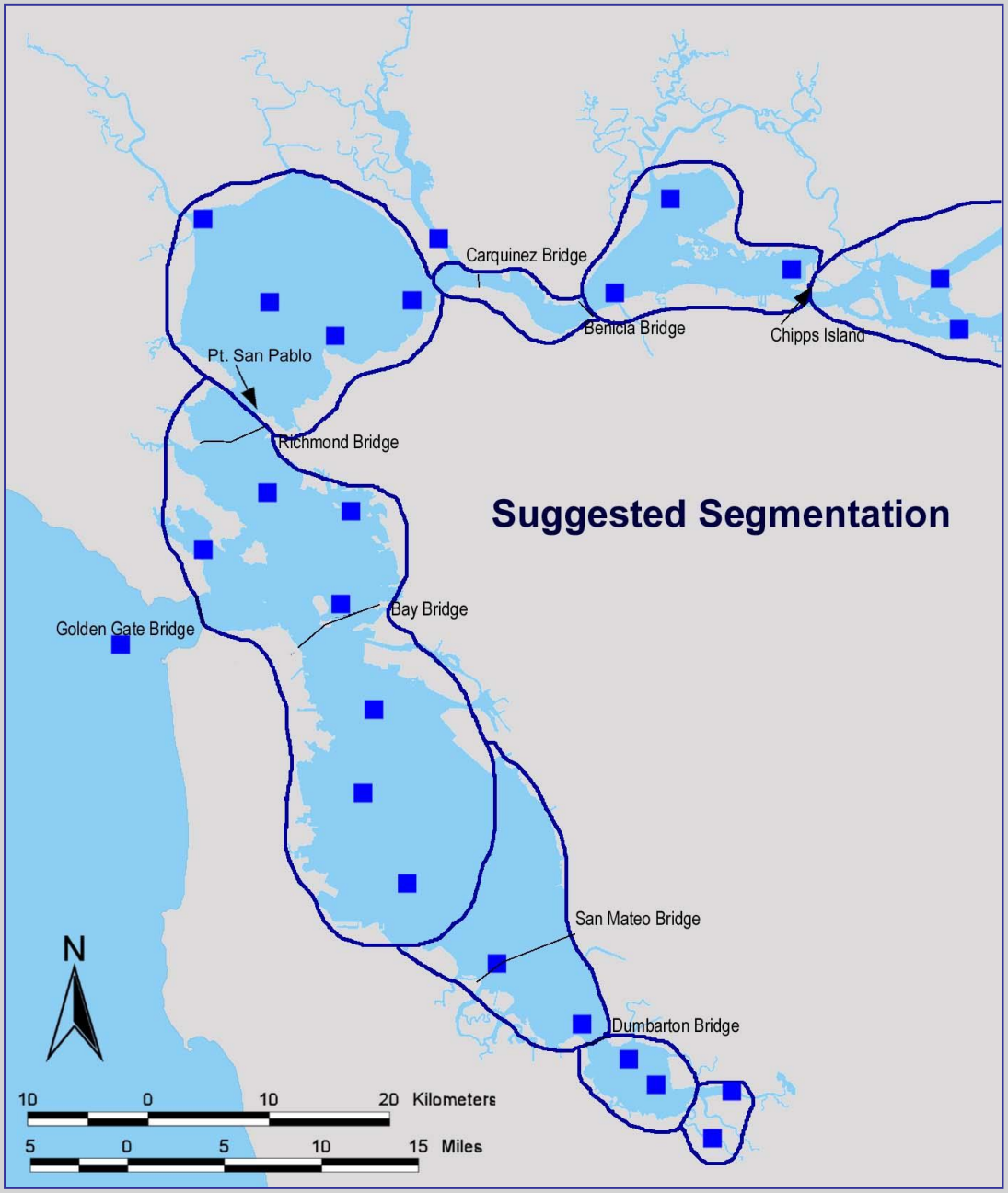
Carquinez Str. – west

Pt. San Pablo

San Bruno Shoal

Dumbarton Bridge

Southern Sloughs



Further Considerations

Shallows vs. channels

Different sediment types

Mouths of rivers

Sloughs

Margins

Seasonality