The South & East Delta Fish Collapse

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IEP Workshop
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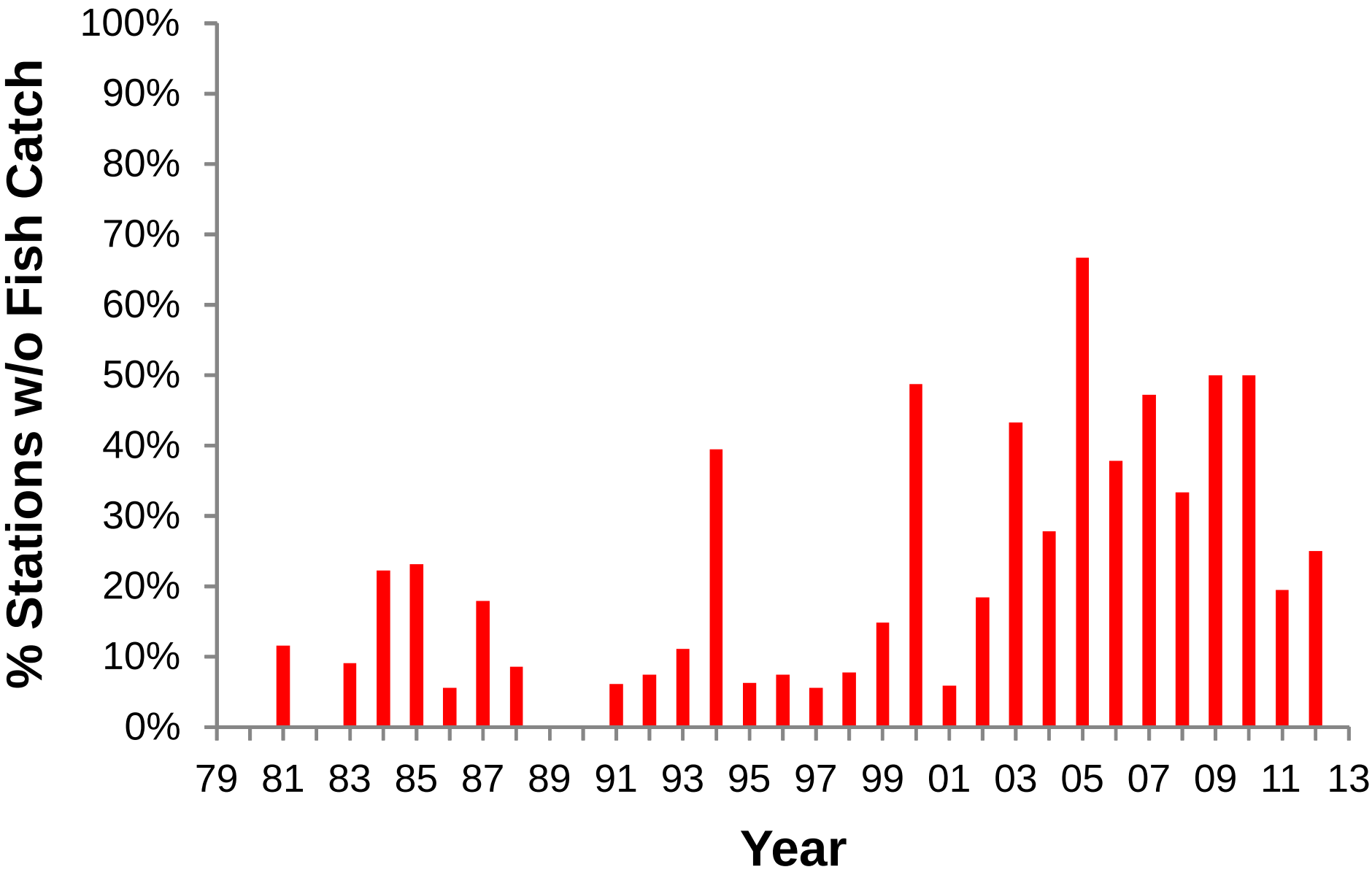
Zero Catch Increases in Frequency

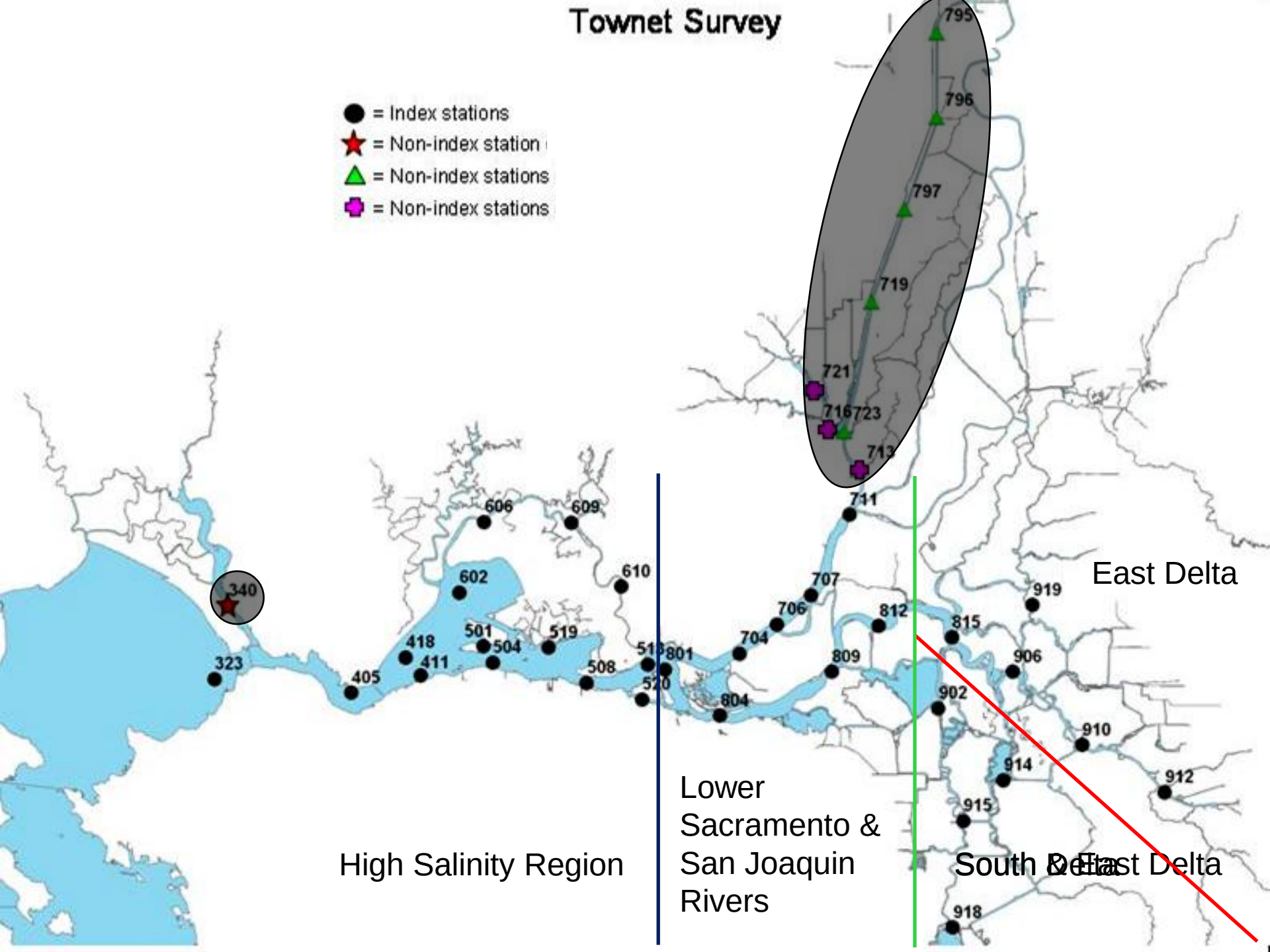


Overview

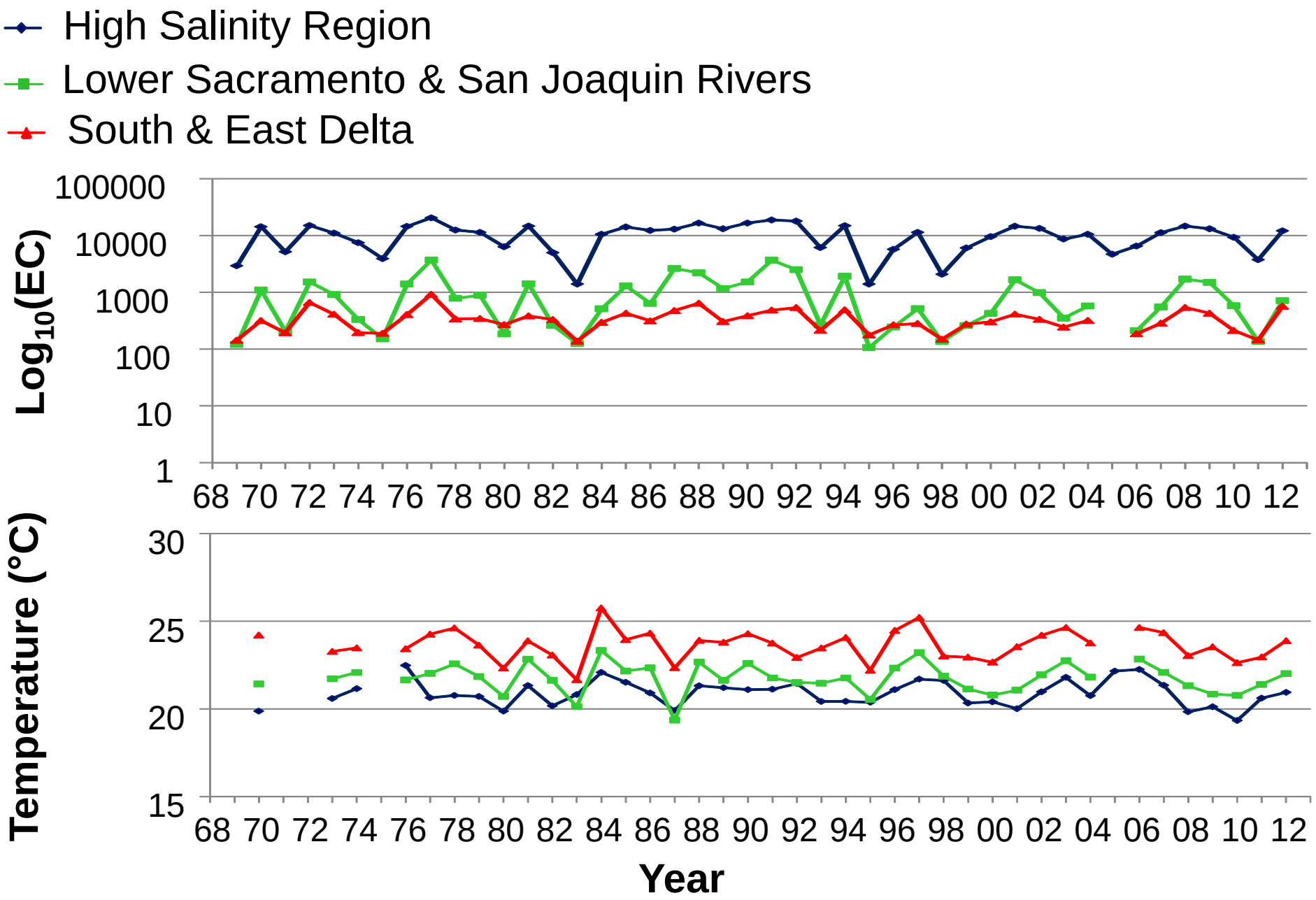
- Specific conductivity, temperature, and Secchi
- Compared raw catch across 3 regions
- All fish catch and catch of fishes grouped by habitat and species origin
- Broke up region of interest into south delta and east delta

The Summer Townet Survey

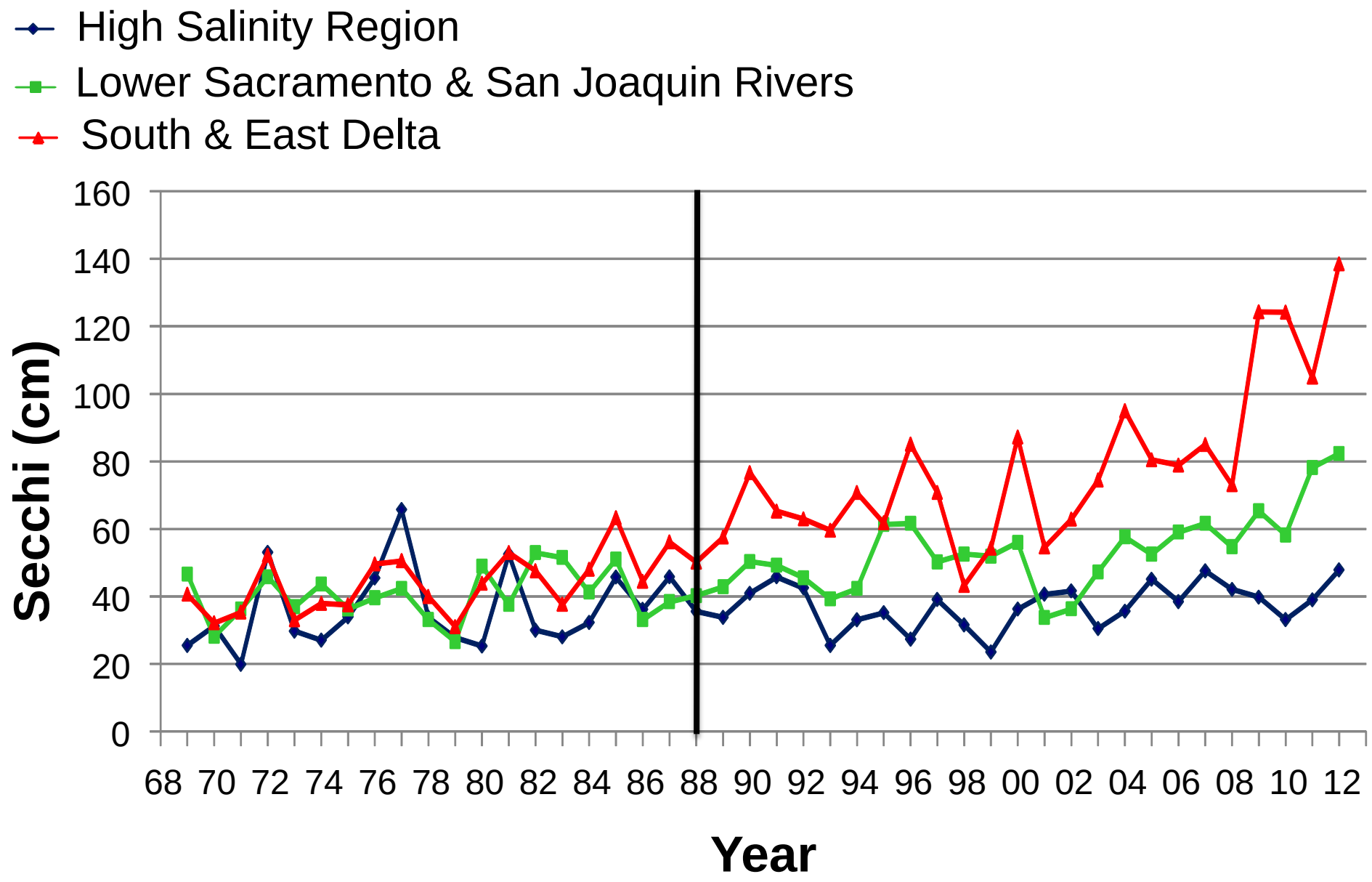
Photo Credit: Dave Contreras


Townet Survey
= Index stations
= Non-index station
= Non-index stations
= Non-index stations
795
796
797
719
721
716
723
713
711
606
609
610
602
340
707
706
704
812
919
815
501
504
519
418
411
323
405
508
801
809
906
902
804
910
914
912
915
918
East Delta
Lower
Sacramento &
San Joaquin
Rivers
High Salinity Region
South Delta
& East Delta

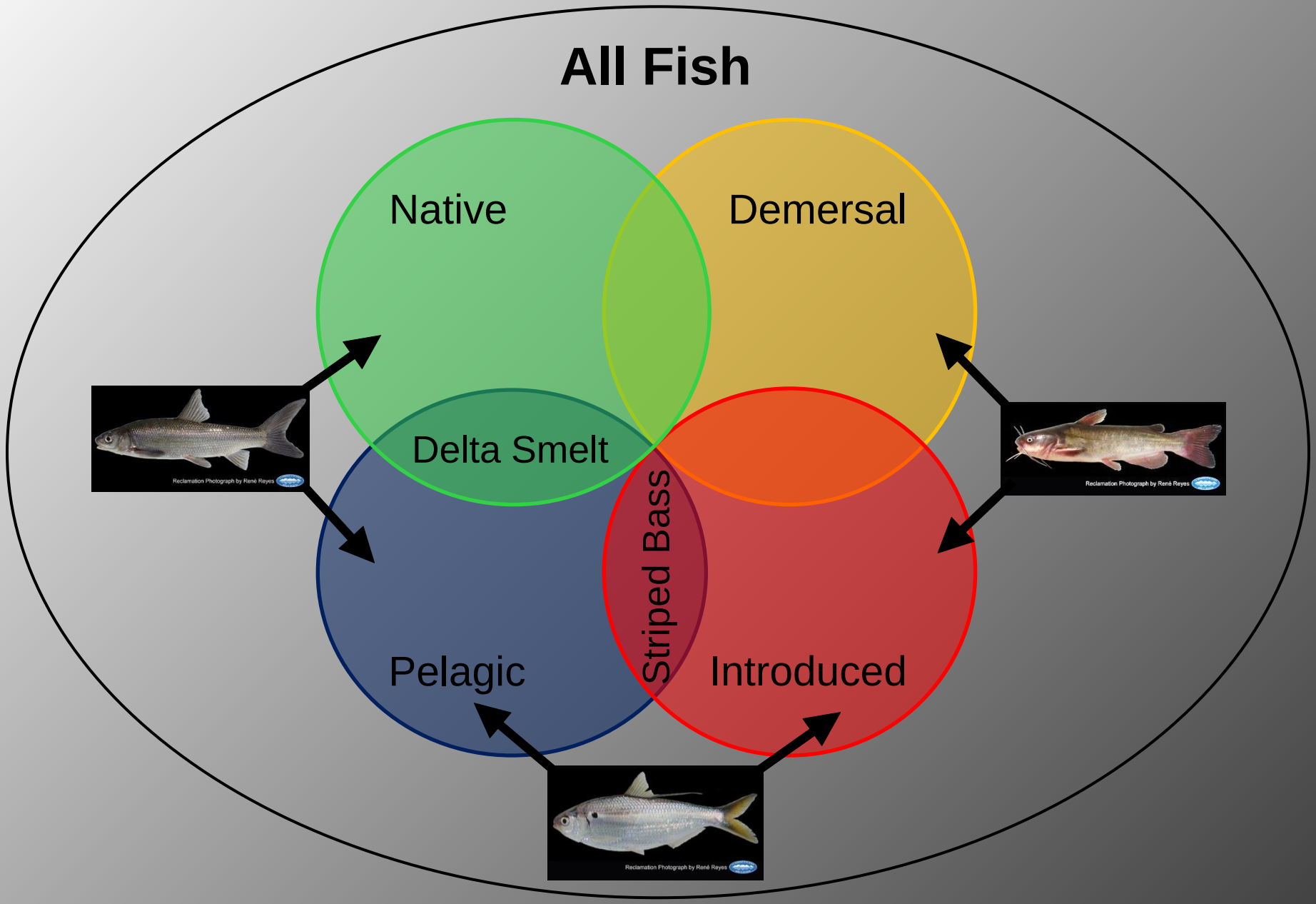
EC & Temperature Typify Regions



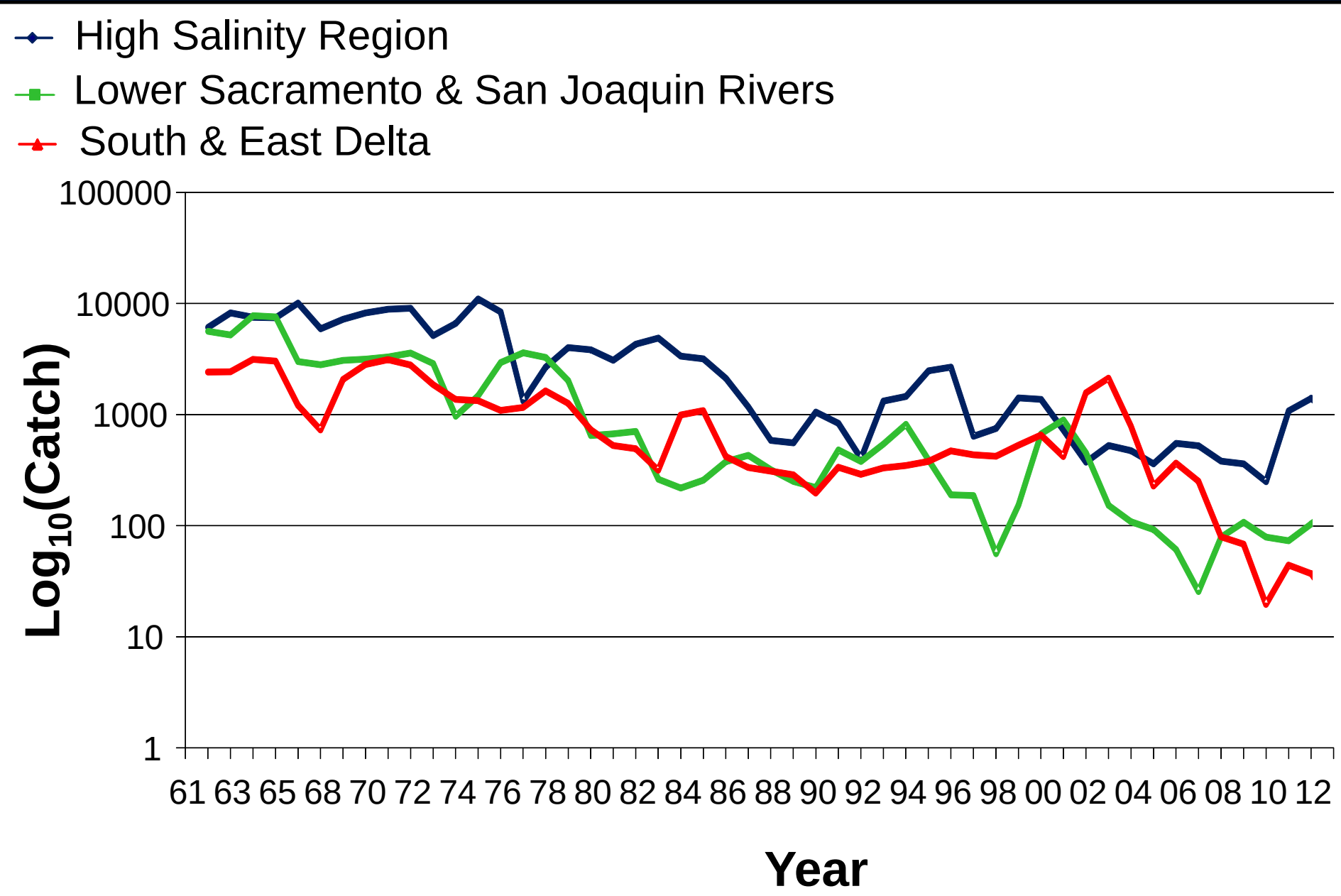
Water Clarity Increases



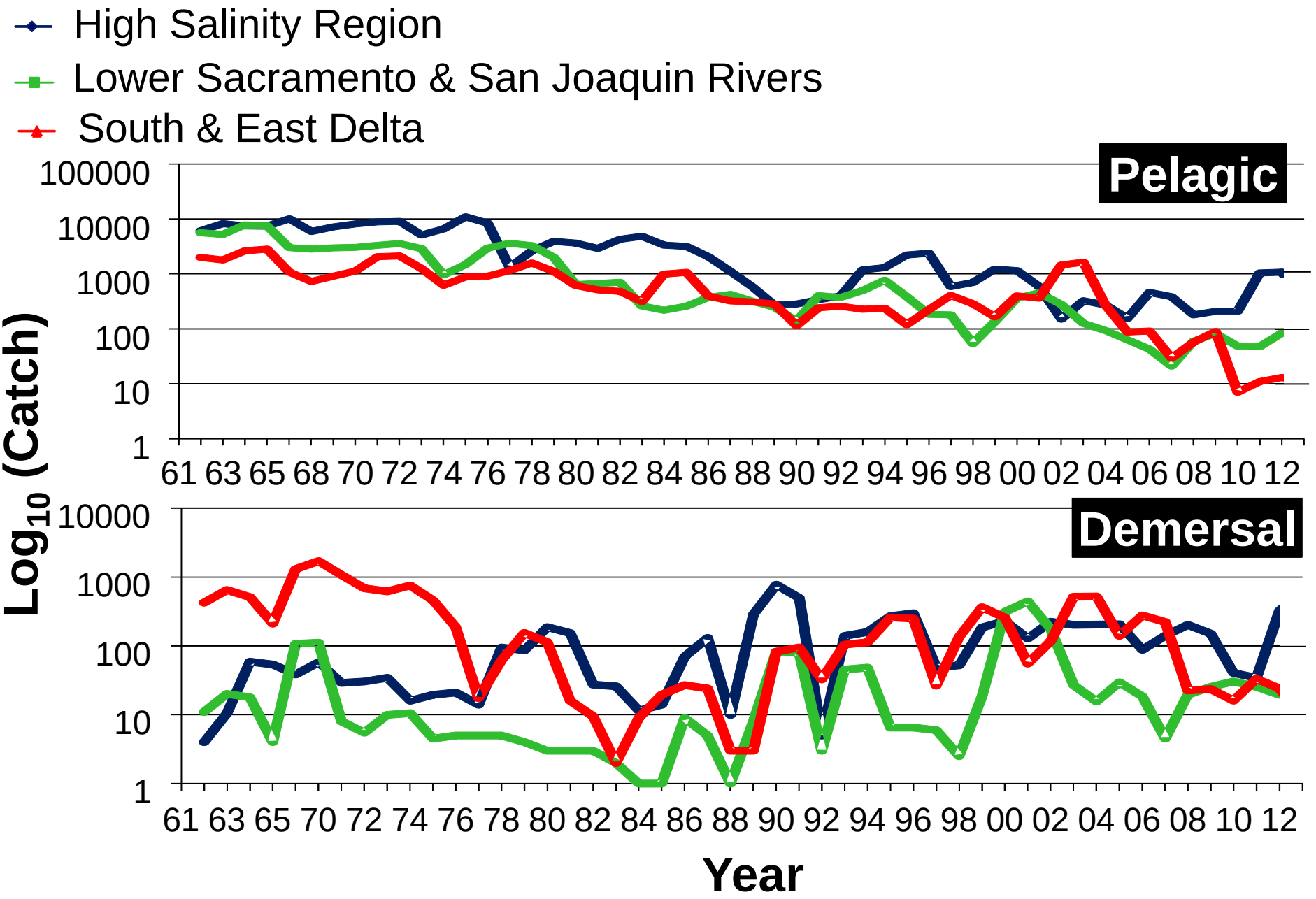
Overlapping Fish Groupings



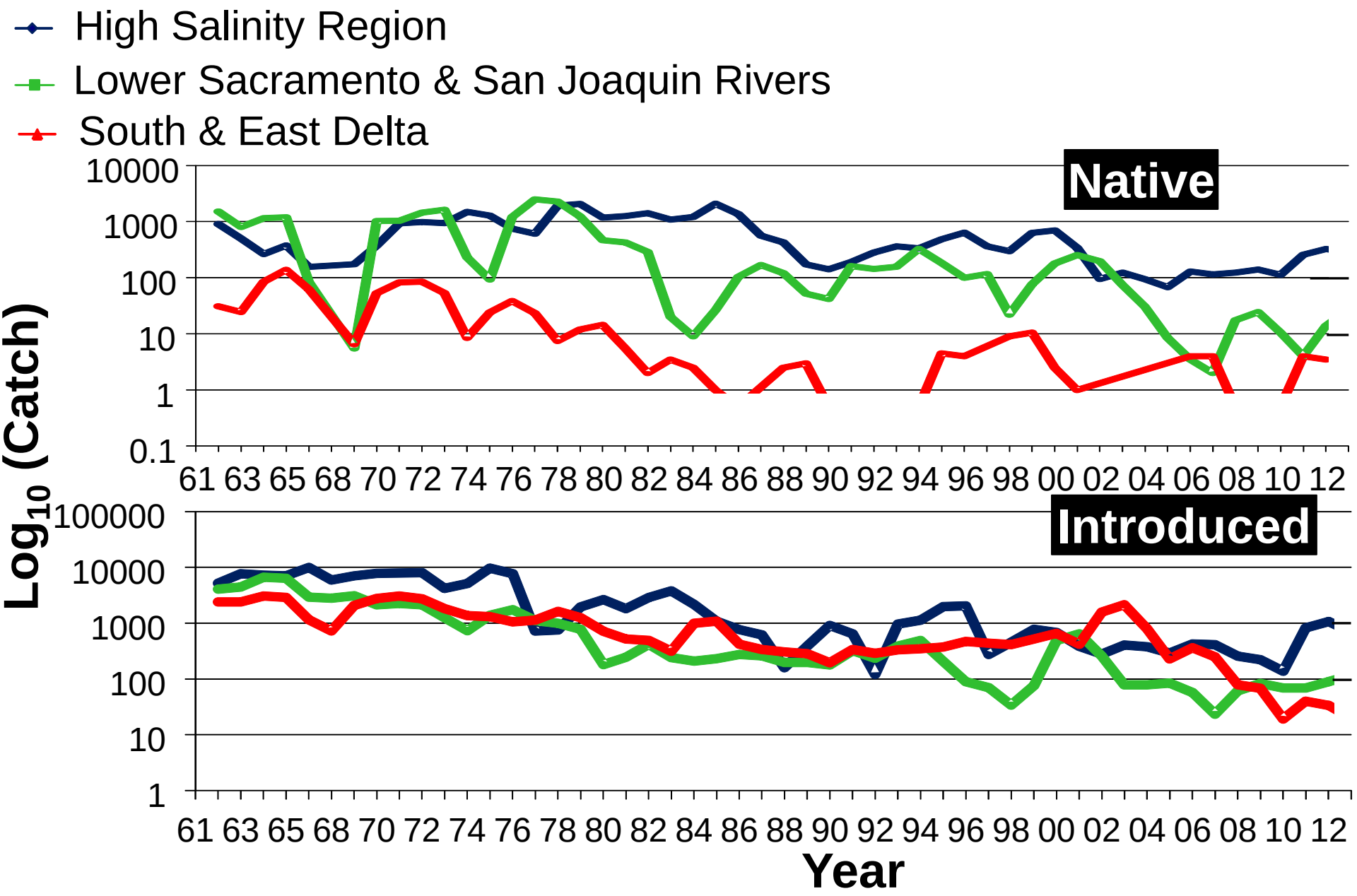
All Species Decline



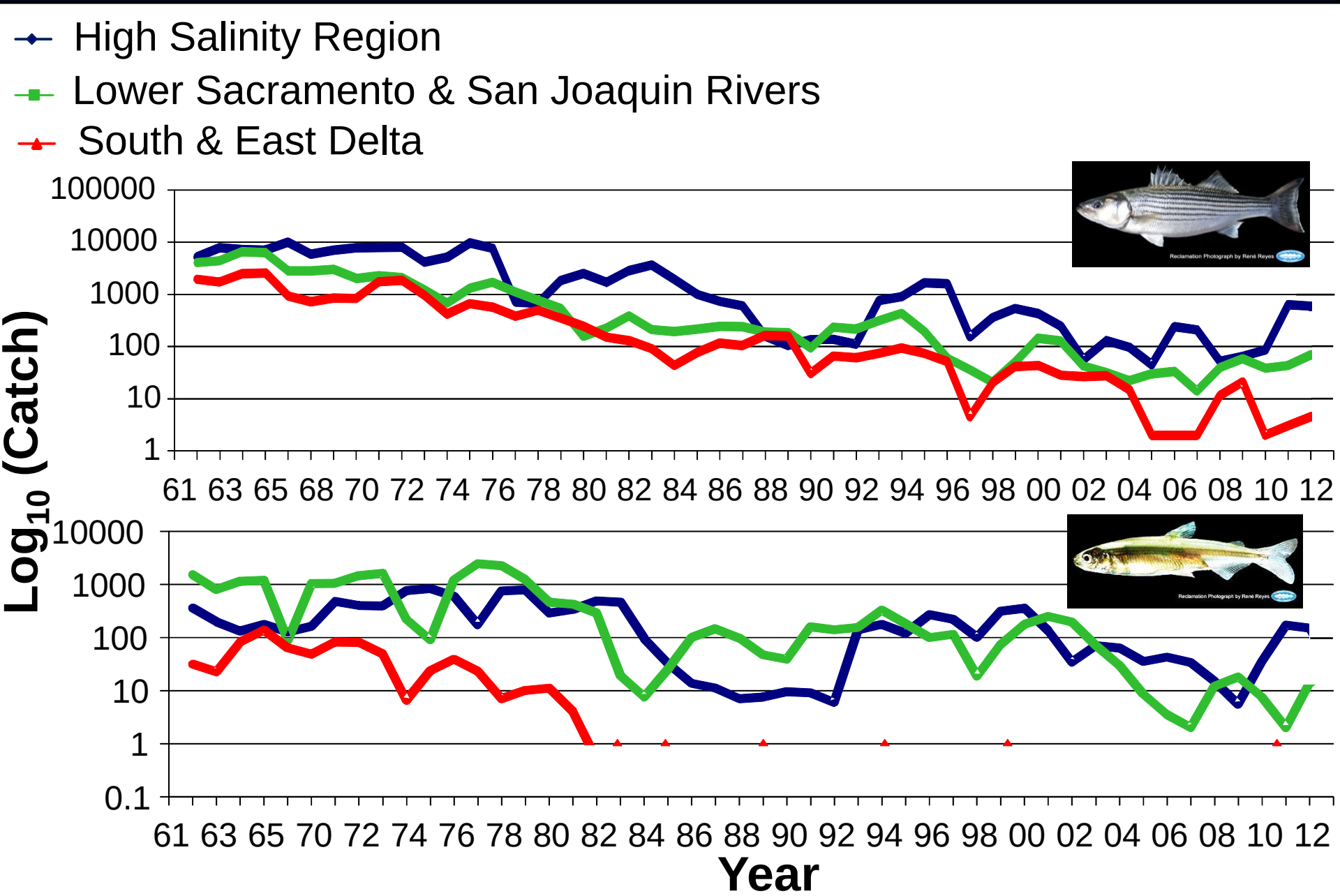
POD Follows 70's Demersal Decline



Natives Decline Before Introduced Spp.



Striped Bass & Delta Smelt Leave S&E Delta



Collapse in South, Then East

- Decline in South and East Delta
- South delta catch declines first
- Coincident with increased clarity
- Native fishes disappeared first
- Introduced pelagic fishes persisted longest

THANK YOU

Questions?

Acknowledgements

Interagency Ecological Program

Randy Baxter, Steve Slater & Dave Contreras

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South and East Delta Fish Collapse: Script

*animation cue

Introduction Slide: (photo credit: NOAA)

- Katie Osborn, project lead for the Summer Townet (STN) Survey with the California Department of Fish & Wildlife
- Drastic decline in catch over the last 50 years that's especially pronounced at south and east delta stations

Zero Catch:

- % of stations since 1980 in the south and east delta where no fish were caught
- Before 1980, at least 1 fish was caught at all stations in the south and east delta
- In the last 30 years, the number of stations with zero catch has been increasing
- This experience out in the field caused us to look back at the numbers

Overview:

- Discussing how abundance has changed over the last 50 years for three different regions within the Summer Townet sampling range
- Used EC and temp data to help define regions
- Also looked at clarity for these 3 regions
- Compared raw catch across these regions
- Found that the south and east delta have seen a greater decline in catch, as compared with other regions
- This decline was coincident with marked increase in secchi depths
- Catch drops off in the south delta first, followed by the east delta
- Native fishes disappeared first from catch
- Introduced, pelagic fishes have persisted longest, but even they have not been encountered in the region in recent
- The 2 target species for STN are almost never caught in the region anymore

STN Methods:

- Picture of the townet being brought in after a tow, like it's been done since 1959, when STN began
- At each station, we perform 2-3 ten minute oblique tows
- All fishes are identified, enumerated, and measured to the nearest mm
- Methods have remained largely constant since the inception of the survey, but due to some protocol changes, we made a few data exclusions.
- 1st exclusion: From 1959 through 1961, surface tows were conducted; these years were excluded.
- 2nd exclusion: Timing of the field season has varied over time. We restricted our study to the first two survey weeks in July
    - Two reasons: 1: sampling has occurred in July in all years, so July is a constant
    - 2: STN targets juvenile fishes from 25 to 5mm. By July, most fishes are fully recruited to the target range of the gear.

STN Station Map:

- The station map for the STN survey
- Survey 40 stations each survey week. Surveys are currently conducted M-F on alternate weeks. There are six surveys in the current field season.
- Excluded non-index stations* – the blacked out areas, as these have not been sampled in all years.
- Split the remaining 31 index stations into 3 regions
- The High Salinity Region*, going from the San Pablo Bay through Suisun Bay and Montezuma Slough
- The Lower Sacramento and San Joaquin Rivers*
- And the South and East Delta*
- This last region, as the region of interest, will sometimes be split into the sub-regions of South Delta and East Delta*, to further investigate how catch has changed over time within this part of the delta.

EC & Temperature:

- Regional groupings chosen according to environmental trends
- STN staff began collecting environmental data in 1969 and 1970 with secchi, surface specific conductivity and surface water temperature
- Stations were grouped into regions by trends in temperature and conductivity
- Found no remarkable trends in either of these two parameters
- This contrasts with clear trends in secchi values

Secchi:

- Began collecting secchi data in 1969
- Clarity was similar across regions through the 70's, but then regions diverge
- The more upstream we go, the more clarity increases
- An accelerating increase in clarity in upstream regions took off in the late 80's*
- C has remained largely stable in the High Salinity Region, which is the most tidally influenced area
- Average clarity in the Lower Sacramento and Sacramento Rivers increased by 75% from the 70's to the 2010's
- The South and East Delta saw twice that increase over the same time period; that's an 150% increase in clarity from the 1970's through the 2010's
- Secchi depths in the south and east delta now exceed 2 meters

Fish Groupings:

We summed raw catch by region for all fishes identified to species or genus. . Please note that all catch values have been graphed on a log axis, and that any breaks in the lines represent zero catch in that year for that region. Catch for all species has declined over the last fifty years, from the thousands to the hundreds in the high salinity region, and from the thousands to tens of fish in the upstream regions. The decline in overall catch for the South and East Delta is no more pronounced than it is for the Lower

Sacramento and San Joaquin Rivers, but the collapse in this region becomes more apparent as we look at aggregations of fish species.

Seventh Slide:
So, first fish were split by habitat preference into pelagic and demersal species groups. Our sampling targets open water habitat, so catch of demersal fishes has always been lower than that of pelagic fishes. Historically, the south and east delta saw lower catches of pelagic fishes and higher catches of demersal fishes, as compared with the other two regions. But in recent years, pelagic and demersal fishes alike have dropped off. Pelagic species have nearly disappeared from south and east delta catch, and the region lags, rather than leads, demersal fish catch.

Eighth Slide:
When we look at native and introduced species, the drop off becomes more dramatic. While native fishes have declined in catch overall, they have persisted in most years in the high salinity region and the lower Sacramento and San Joaquin Rivers. But since 1980, catch of native fishes in the South and East Delta has been sporadic and low. In fact, 1998 is the only year since 1980 where total July catch of native fish in the south and east delta entered the double digits. Introduced species, too, have been declining overall. In recent years, though, the South and East Delta region has gone from holding steady with the other two regions, to dropping below them.

Ninth Slide:
Looking at our two target species for the Summer Townet Survey, striped bass and delta smelt, we see that both have declines precipitously since the 1960's. We also see that striped bass catch dropped severely in the South and East Delta in the 1990's, before becoming sporadic in the region in the 2000's. Although this occurred during an overall decline in striped bass catch, no region has seen the drastic drop-off that we have witnessed in the South and East Delta. The trend with delta smelt has been that much more dramatic; since 1980, the STN survey has only rarely encountered delta smelt in the South and East Delta, while in other regions, delta smelt have declined but persisted. Although the south and east delta region does not appear to have provided the preferred habitat for striped bass and delta smelt, and had lower catch for these species throughout the study period, it is troubling that striped bass, once caught in this region by the thousands, are now only rarely captured. Delta smelt, meanwhile, had low catches in the region historically, but now are usually not ever caught in the area.

Closing Slide:
Thank you for your time and attention. Are there any questions?

<u>Note:</u> Additional slides after closing slide are to address specific questions regarding regional groupings and selected species of interest.