Appendix 4: Monitoring coverage of aquatic habitat in the Delta (Supplementary Materials)

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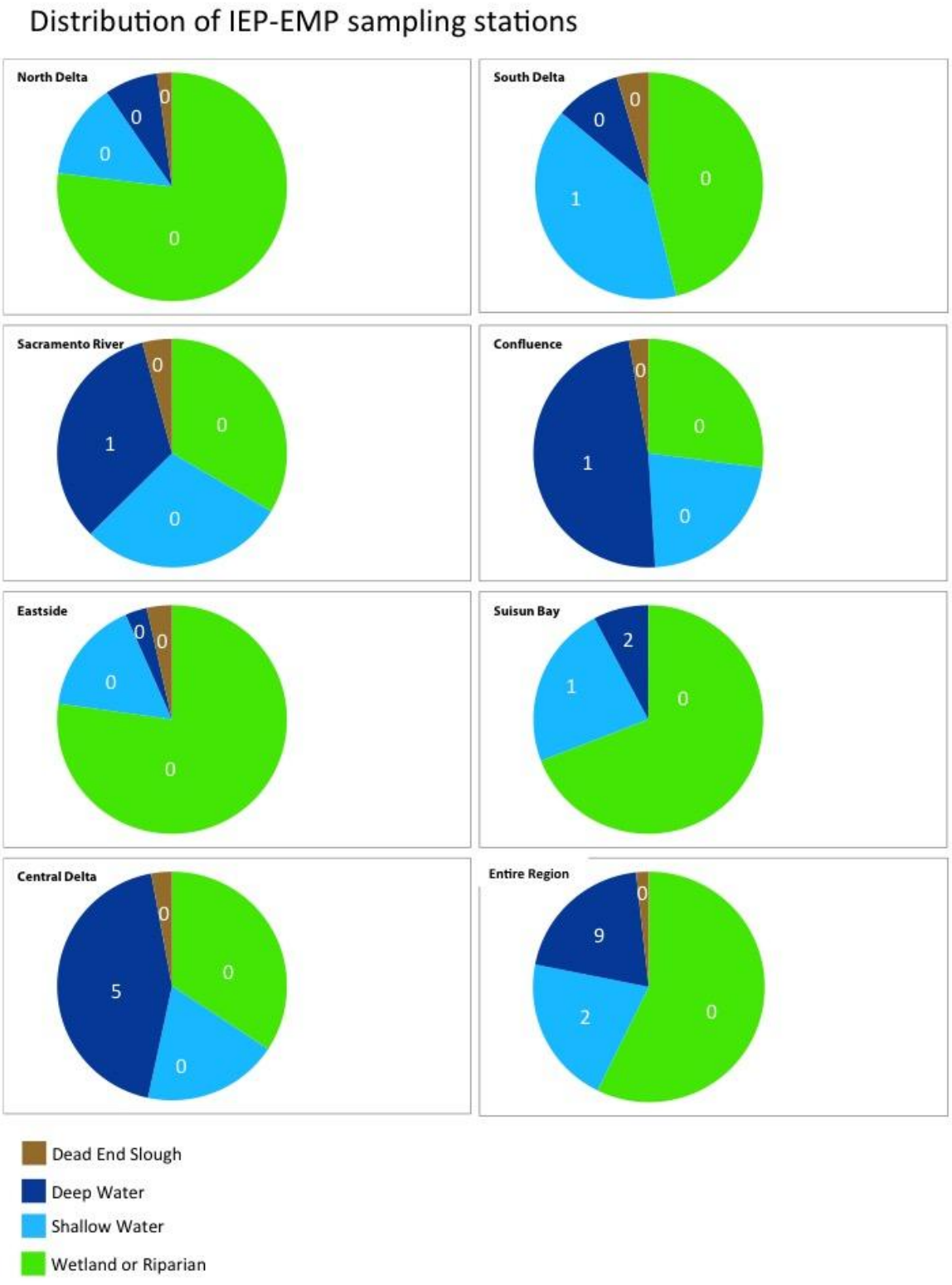


Figure A4.1. Distribution of IEP-EMP monitoring stations by subregion and aquatic habitat type.

Distribution of USGS nutrient sensors

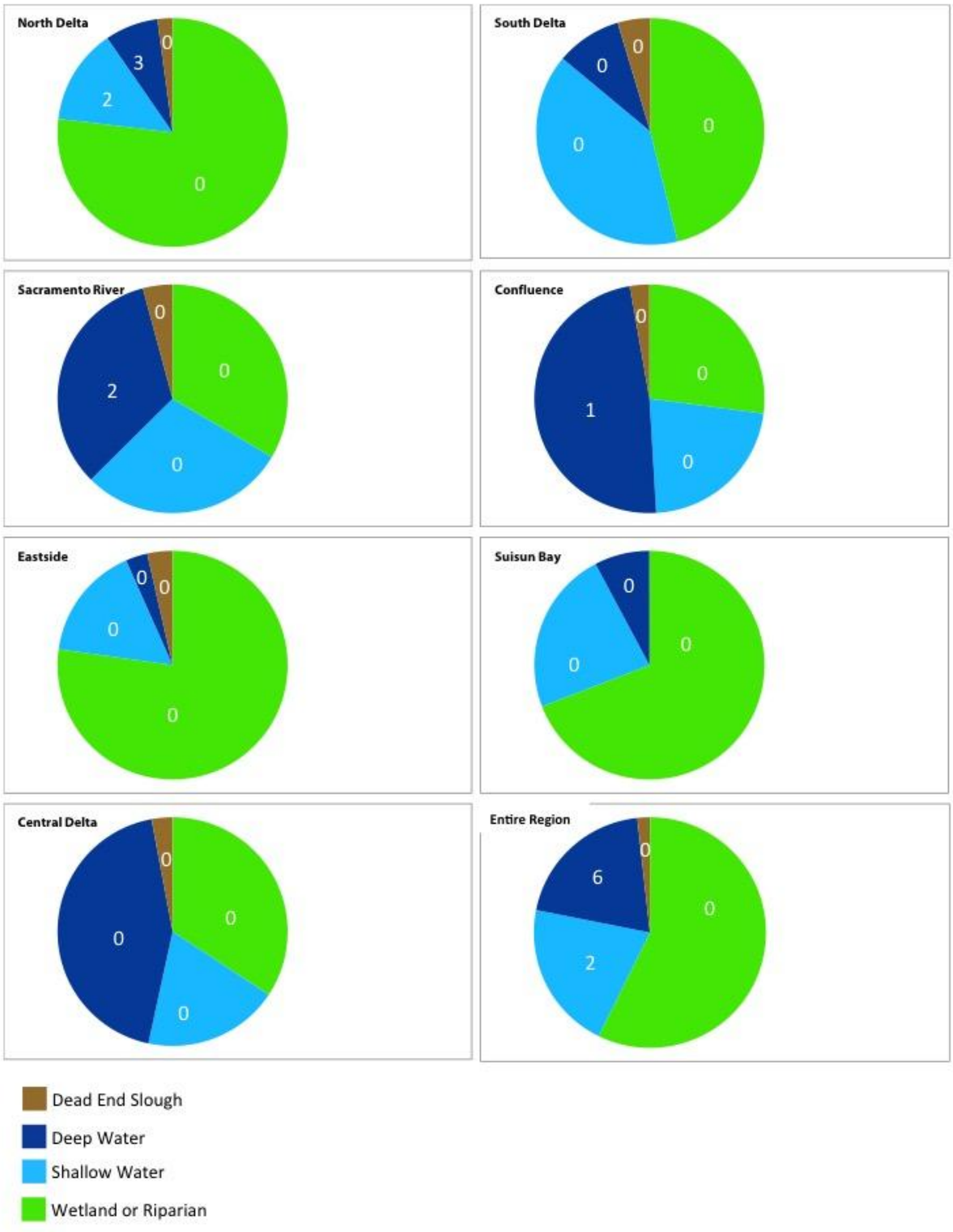


Figure A4.2. Distribution of USGS nutrient sensors by subregion and aquatic habitat type.

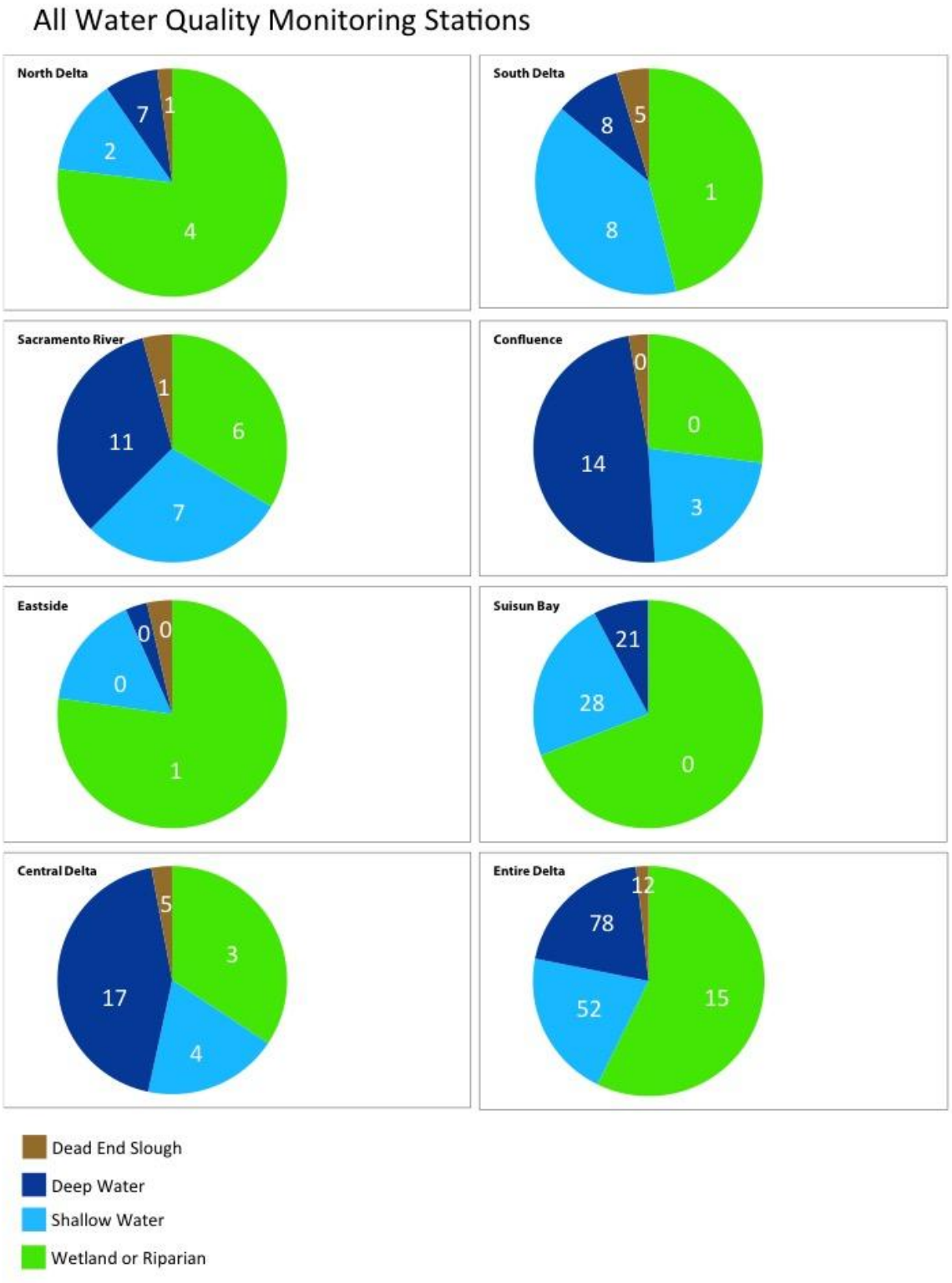


Figure A4.3. Distribution of inventoried monitoring locations by subregion and aquatic habitat type.

"Fate" maps

Water parcel "fate" modeling is a complementary approach to water parcel "age" modeling. This type of DSM2-based trace particle modeling visualizes the "fate" of water parcels, relative to a "kill line" representing flow exits from a subregion. A fate modeling experiment starts by distributing virtual tracer particles across the water bodies in a subregion. The colors in the map represent the percentage of tracer particles released in a location that has reached the flow exit at the end of the simulation. The simulations shown in Figures A4.4. to A4.6 are for 28 days (representing late summer/early fall conditions in a year with average flow) and are: North Delta with flow exit to the Confluence region (A4.4), Central Delta with flows exiting to the Confluence (b), and Central Delta with flows exiting to the Federal and State Water project pumps (c). Red indicates shorter residence and/or travel times. DSM2-based modeling can help identify stations where water masses are mixing as well as potential transformation "hot spots", i.e. potential transition zones with higher residence times where important nutrient processes would be expected to happen but that are currently not monitored. Candidates for "hot spot" locations, for example, would be those locations from where only few particles reach any of the flow exits during a simulation. Presumably, the ecological significance of the aquatic habitat at such a location would be a consideration in determining the need for monitoring.

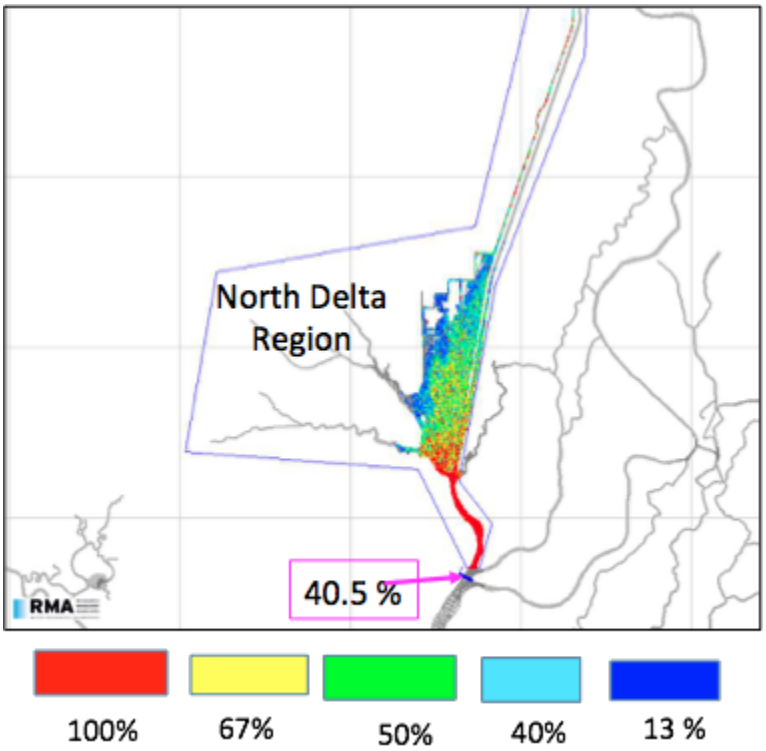
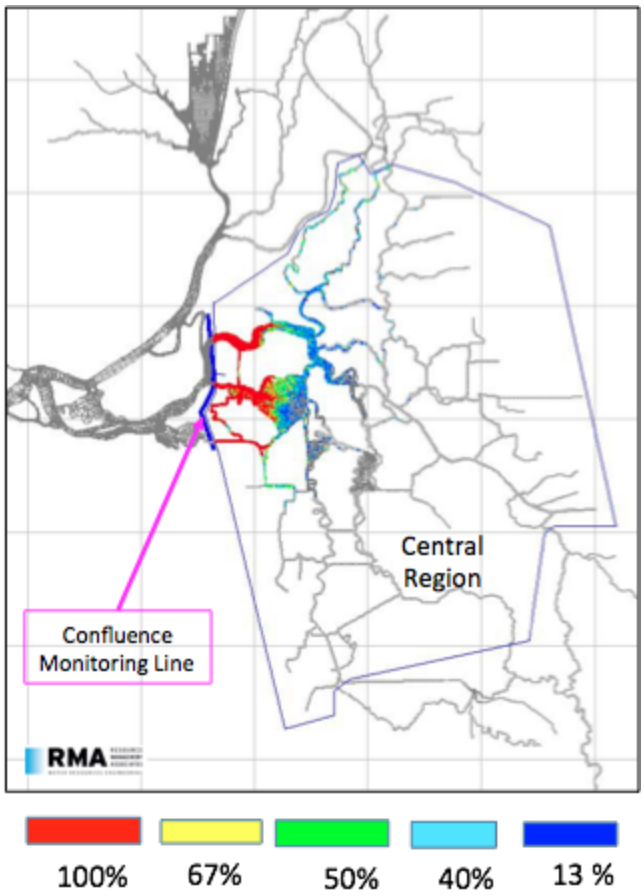
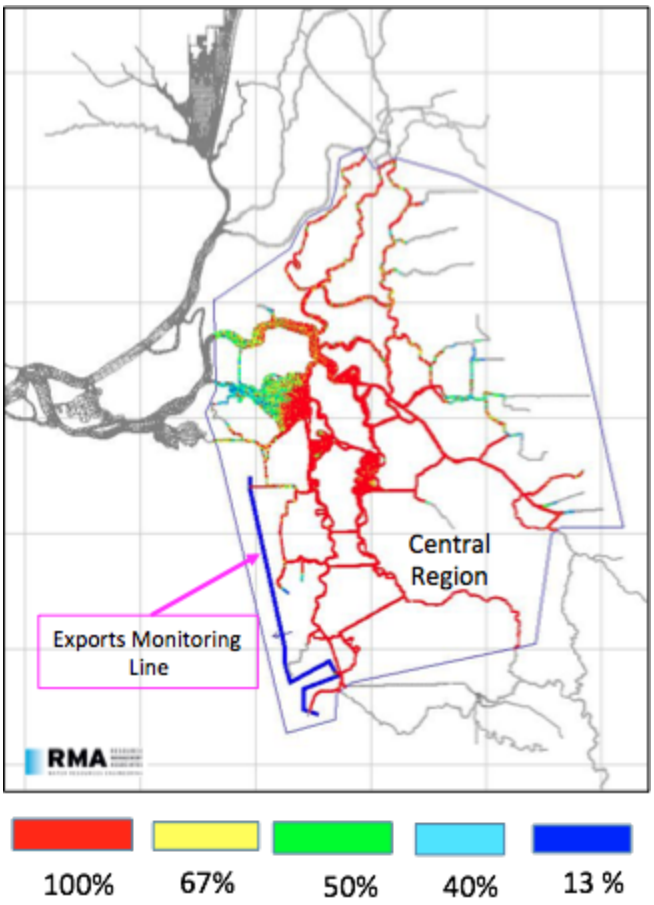


Figure A4.4. North Delta Region: 98,874 particles inserted; 40.5% exited the region at the Cache Slough Exit Monitoring/Kill line, at the confluence of Cache Slough and Sacramento River. The remainder of the particles remained in the region.Fate Map percentages and color codes give the % of particles locally that reach the defined Monitoring/Kill line by the end of the simulation. In this example: Sep. 28th (23:45), given insertion in the Region on Sep. 1st (00:15).



A4.5. Central Region: 148,897 particles inserted; 22.0% reached the Confluence Monitoring line. (Some particles that reached the Confluence monitoring line also reached the Exports monitoring line in the analysis visualized in Figure A4.6).



A4.6. Central Region: 148,897 particles inserted; 80.9% reached the Exports Monitoring line.