I. SUBSTANTIAL EVIDENCE

'Substantial' evidence is not synonymous with 'any' evidence. To constitute sufficient substantiality to support the verdict, the evidence must be 'reasonable in nature, credible, and of solid value; it must actually be "substantial" proof of the essentials which the law requires in a particular case.' (Estate of Teed (1952) 112 Cal.App.2d 638, 644; [citations].) "'It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.' " (Edison Co. v. Labor Board (1938) 305 U.S. 197, 229 [83 L.Ed. 126, 140, 59 S.Ct. 206].) "'Improbable conclusions drawn in favor of a party litigant through the sanction of a jury's verdict will not be sustained where testimony is at variance with physical facts and repugnance is material and self evident.'" (Estate of Teed (1952) 112 Cal.App.2d 638, 644, quoting from an Arkansas case.)

"While substantial evidence may consist of inferences, such inferences must be 'a product of logic and reason' and 'must rest on the evidence'; inferences that are the result of mere speculation or conjecture cannot support a finding." (Kuhn v. Department of General Services (1994) 22 Cal.App.4th 1627, 1633.)
2.a Wind at LOXWS (1-8C)

Rain+Wind 2005-09-12.xls
### 2.b Relevant stage relationships - Distances

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>From \ To</th>
<th>1-7</th>
<th>1-8C</th>
<th>1-8T</th>
<th>1-9</th>
<th>North</th>
<th>South</th>
<th>Canal</th>
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<tbody>
<tr>
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<td>9.6</td>
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<tr>
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<td>14.6</td>
<td>14.1</td>
<td>2.0</td>
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<tr>
<td>1-9</td>
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<td>8.1</td>
<td>7.3</td>
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<td>16.1</td>
<td>6.9</td>
<td>6.5</td>
<td></td>
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<tr>
<td>North</td>
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<td>16.8</td>
<td>14.6</td>
<td>16.1</td>
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<tr>
<td>South</td>
<td>11.2</td>
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<td>14.1</td>
<td>6.9</td>
<td>19.1</td>
<td>0.0</td>
<td>5.0</td>
<td></td>
</tr>
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</table>

Distance between gages + slopes.xls

### 2.b Daily average stage in Refuge

#### 2005 Stage (ft)

![Graph showing daily average stage in Refuge for 2005 stage (ft)](Recent Stage 2005-06.xls)
2.b Adjusted Daily average stage in Refuge

2005 Adjusted Stage (ft)

2.c Refuge inflow and sampling dates

Average Daily Refuge inflow.
2.e Cumulative CY 2005 TP load to Refuge

CY 2005 Cumulative TP Load

2.e Average Daily Inflow CY 2005 (STA1W = G-310+G-251, Bypass = G-300+G-301)

Average Daily Refuge Inflow, 2005
2.e Cumulative Load Over Florida Water Years Beginning May 1, 1999
Florida WY Cumulative TP Load

2.e Cumulative Load Over Florida Water Year 2006 (Beginning May 1, 2005)
Florida WY 2006 Cumulative TP Load
2.f ENRWET Chloride

CHLORIDE (mg/L)

ENRWET

2.f ENRWET Sulfate

SO4 (mg/L)

ENRWET
3.b How unusual were the LOX May and June TP data?

![Graph showing geometric mean TP vs median TP with linear trendline](image)

- Through 04-2005
- 05 & 06 2005
- Linear (Through 04-2005)

3.c How unusual were the LOX May and June TSS data?

<table>
<thead>
<tr>
<th>Station</th>
<th>Date</th>
<th>Depth</th>
<th>TURB</th>
<th>T.SUS.SD</th>
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<td>0.9</td>
<td>6</td>
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<td>2.4</td>
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</tbody>
</table>

![Graph showing TSS data distribution](image)

water_quality_data_CrossTab.xls
3. c How unusual were the LOX May and June TSS data?

3. d What other anomalies are there in the May & June data?

Conductivity values were flagged because of post-calibration failure and, in one case, a mass balance anomaly.

**Conductivity**

Missing values in DBHYDRO (as of 6/14/2005)

<table>
<thead>
<tr>
<th>Location</th>
<th>May-05</th>
<th>Jun-05</th>
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</thead>
<tbody>
<tr>
<td>LOX8</td>
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<td>LOX12</td>
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<tr>
<td>LOX12</td>
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</tr>
<tr>
<td>LOX16</td>
<td>162</td>
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</tbody>
</table>

**Anomalous TDS values**

<table>
<thead>
<tr>
<th>Location</th>
<th>COND</th>
<th>TDS</th>
<th>TDS/COND</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOX4</td>
<td>305</td>
<td>124</td>
<td>0.41</td>
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<tr>
<td>LOX14</td>
<td>275</td>
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<tr>
<td>LOX16</td>
<td>162</td>
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<td>&lt;0.14</td>
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</tbody>
</table>

Note: Typical historic value for TDS/COND is 0.69. Standard Methods (20th ed., sect. 1030E.5, 1998) suggests ratio should not fall below 0.55 and not exceed 0.7 to 0.8.
3.d Chloride and TDS, May 2005

3.d Chloride and TDS, June 2005
4. Sampling Site Maps (K. Weaver and G. Payne, 2005 SPER)

4.a Enhanced (LOXA) sampling sites
4.4 Related Enhanced (LOXA) Observations: TP West Central Transect

4.4 Related Enhanced (LOXA) Observations: TP Southwest Transect
4.a Related Enhanced (LOXA) Observations: Conductivity West Central Transect

4.a Related Enhanced (LOXA) Observations: Conductivity Southwest Transect
4.a Related Enhanced (LOXA) Observations: TSS West Central Transect

LOXA112
LOXA111
LOXA113
LOXA114
LOXA128

4.a Related Enhanced (LOXA) Observations: TSS Southwest Transect

LOXA117
LOXA118
LOXA119
LOXA120
4.b XYZ Transect in the Refuge – X4 had an unusually high value of 130 on 3/10/2005
TP at X4

Note: May & June 2005 data were not yet available

4.c Outflow structure TP

Gate/WQ.xls
4.c Outflow structure TSS

4.d WCA2A F-Transect TP Data
4.d WCA2A F-Transect TP Data CY 2005

4.d WCA2A F-Transect TSS Data
4.e STA-1E & STA-1W Diagrams

R. Meeker, SFWMD, 2002

4.e STA-1E Outflow TP

S-362 TP (mg/L)

Grab  7-Day Composite

S-362 WQ data 2005-06-12.xls
5.2 Summary Observations

2. What were the conditions before and during May and June sampling? Were they exceptional?

- **Rain & wind (2.a)** were not exceptional. There was little rain prior to May EVPA, and some rain prior to June EVPA sampling.

- **Stage (2.b)** was not conducive to canal water intrusion in May. In May, stages were dropping and the canal was below interior elevation. In June, stages rose prior to sampling and canal stage was perhaps 0.2 ft above the southern and central marsh interior.

- **Inflows and loads (2.c-2.e)** – In May there was little inflow or load prior to EVPA sampling. In June there was very large inflow and load prior to EVPA.

- **Inflow concentrations (2.d)** have been very high during CY 2005 with very significant bypass of STA-1E.

- **Aerial deposition (2.f)** - There was no apparent increase in rainfall concentrations during CY 2005.

- **Fire (2.g)** – There is no information that any fires in or around the Refuge impacted water quality.
5.3 Summary Observations

3. What anomalies and exceptional values are present in the May and June data?

- **May TP (3.b)** - Of 10 samples, 4 were higher than any value observed at that site over the period 1/94 to 4/05. If these 4 values are excluded, the geometric mean drops from 27 to 15, and is below the calculated 17.7 interim-level.

- **June TP (3.b)** - Of 14 samples, 2 were higher than any value observed at that site over the period 1/94 to 4/05. If these 2 values are excluded, the geometric mean drops from 18 to 16.8, and is still above the calculated 13.9 interim-level. Replacing all observations above the 98 percentile by the site 90 percentile would reduce the geometric mean to 13.0.

- **Median and geometric mean TP (3.b)** are usually nearly equal. Deviation from this historic pattern could indicate that one or more high TP samples had skewed the TP distribution and raised the geometric mean. This was not the case in May and June: in both months the median exceeded geometric mean. Absence of low values more than presence of high values appears to have occurred.

- **TSS (3.c)** values in May and June were elevated above the 90 percentile level at some sites, but were below detection at others.

- **TSS (3.c)** was consistently high or low at sites in May and June. LOX 12 and 15 had TSS < detection in both months. LOX 11, 7, and 8 had elevated TSS values (greater than 10). This suggests site dependence rather than random sampling contamination was involved in high TSS observations.

- **Conductivity, chloride, and TDS (3.d)** were not extremely elevated at any sites.

- **TDS values (3.d)** at 4 sites in May are anomalously low indicating likely lab or transcription error.

5.4 Summary Observations

4. Were contemporaneous observations consistent with the May and June data?

- **LOXA observations (4.a)** in March-June 2005 often exhibited elevated concentrations of TP and TSS at more interior, less impacted sites relative to sites closer to the perimeter canal. This is opposite of the typical trend of higher values near the canal.

- **LOXA conductivity (4.a)** patterns were as expected, with higher values nearer the canal. There is no indication of significant canal water intrusion at the west central transect, and no indication of penetration beyond LOXA118 at the southwest transect.

- **The X-transect (4.b)** had a historic high TP value, 130 ppb, in March 2005. This is consistent with the pattern seen in the LOXA transects.

- **Perimeter canal (4.c)** TP concentrations were low in May, and peaked in June 2005 at G94B and S10D to over 200 ppb.

- **TP and TSS in WCA2A (4.d)** values along the E-transect have been high but not atypical.

- **STA-1E (4.e)** outflow canal TP spiked in late June to July to a peak of nearly 140 ppb from values between 20-40 ppb. At this time inflow to STA-1E was primarily rain and seepage.

- **STA-1W (4.e)** has exhibited elevated TSS over 100 ppb since September 2005. TP in cell 5 spiked to over 700 in April 2005, and then declined to near 100 ppb in July 2005. TSS spiked to over 50 mg/L in March 2005, and has declined to near 10 mg/L in July.
6. Evidence for and against error – sources

- Outlier analysis for samples – There is considerable evidence that some values are outliers. Samples values are very unusual/exceptional.
- Lab QA (blanks etc.) – One blank for LOXA sampling failed. It appeared to be a mislabeled bottle.
- Contamination – There is little evidence beyond speculation based on outlier analysis. Consistency of TSS values between May and June sampling suggests site-related causation.

7. Evidence for and against natural and anthropogenic phenomena

- Loading – There was very high loading, but no evidence that it played a direct role in these excursions.
- Meteorological – No evidence that rain or wind near the time of sampling played a role.
- Aerial deposition – No evidence of causation.
- Planktonic algae – No evidence. DO values were not elevated in May and June.
- Fire – No evidence.
- Canal water intrusion – Appears to not have occurred in May, and to be minimal in June.
- Other? – There is some evidence of a regional event of as-yet undetermined cause.