APPENDIX F

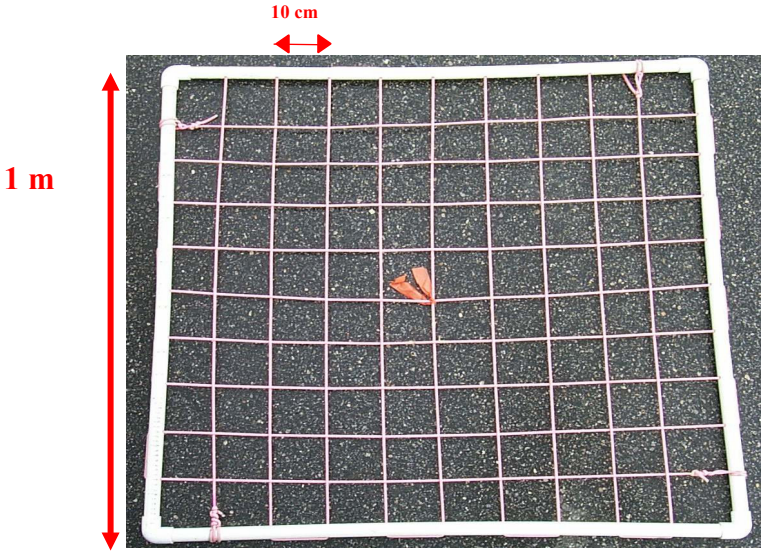
SEAGRASS TRANSECT PROTOCOL

MONITORING FIXED SEAGRASS TRANSECTS IN THE INDIAN RIVER LAGOON

St. Johns River Water Management District
Lori Morris (lmorris@sjrwmd.com)
Lauren Hall (lhall@sjrwmd.com)

Transects were established and first monitored Lagoon-wide in the summer of 1994. All transects are monitored at least twice a year, summer and winter, corresponding roughly to times of maximum and minimum seagrass abundance, respectively. The intent of the design of this methodology is to sample (1) repeatedly at the same location along the same line, (2) quantitatively, (3) non-destructively, and (4) rapidly.

For routine monitoring of transects, a standardized, non-destructive, quantitative technique has been adopted. Each transect consists of a marked line, roughly perpendicular to shore, extending from shore out to the deep edge of the grass bed. The transect line is marked with a series of flags marking every 10m along a 100m line. To exactly locate the deep edge of the grass bed, a measured line is tautly strung between fixed PVC poles located perpendicular to the shore. Every 10 m along the line, seagrass parameters are measured within a 1-m^2 quadrat, centered on the line. The quadrat is divided by strings into 100 squares, each 10 cm by 10 cm, to simplify quantitative estimates of cover.



Monitoring includes parameters related to species composition, epiphytes, coverage, and abundance.

In order to continue with standardizing the protocol, the following definition for the deep "edge" of a grass bed has been adopted:

1. If the seagrass coverage (counted percent cover) abruptly drops off (% cover = 1% or less) record this distance as the edge or
2. If the "bed" continues at a sparse density (less than 1% visual or less than approximately 30 shoots/m^2) for more than 30 m, monitor those 30 m, at 10 m intervals, and record the distance of the grid before the 30m sparse bed begins as the edge. For example, if you have a visual of

10% at 80m, 1% at 90m, 0.5% at 100m, 0.25% at 110m and 0.5% at 120m, record 90m as the edge of the grass bed.

(CAUTION: Don't get caught up in looking in a wide area for the "edge." Remember, all other data are taken from a 1-m^2 grid along the line. Continue to look along the line in a 1-m wide area.)

Seagrass zone of occurrence is being established at every site. The zone of occurrence is the distance where the grass completely stops. If the grass continues for several hundred meters, spot checks from the boat are sufficient, but record the distance and the visual percent of grass at every spot. Spot checks should be done every 50m from the boat ? until grass is no longer present.

The parameters measured are:

- **Water depth** – in centimeters, to establish a bottom profile of seagrass versus depth.

- **Drift Algae** – both percent cover estimate and a biomass estimate are as follows:
  1. Percent cover – present or absent within each of the 10 cm by 10 cm cells.

  2. Biomass estimate – based on the following scale from 0 to 5. Also see Drift field guide for more details and examples.
     - 0 - no algae
     - 1 - <10% cover of only single strands
     - 2 - >10% cover of only single strands
     - 3 - "tumble weed" clumps <50% cover
     - 4 - "tumble weed" clumps >50% cover but can still see the bottom
     - 5 - "tumble weed" clumps 100% cover, cannot see the bottom.

- **Caulerpa percent cover** – Caulerpa species are counted as being either present or absent within each of the 10-cm by 10-cm cells.

- **Caulerpa visual percent** – is an estimate (from 0-100%) of the Caulerpa cover within the 1-m^2 quadrat, not an exact count. A good way to visualize this estimate is to mentally picture a dense coverage, then try to visually "push" all the Caulerpa in the 1-m^2 quadrat to one side until it resembles a dense coverage.

- **Visual estimate** – is an estimate (from 0-100%) of the overall seagrass cover and for each species present within the 1-m^2 quadrat, not an exact count. A good way to visualize this estimate is to mentally picture a dense coverage, then try to visually "push" all the seagrass in the 1-m^2 quadrat to one side until it resembles that dense coverage. The total count of seagrass "coverage" in the 100 cells is then the visual estimate. **Helpful hint: a dense *Halodule wrightii* grass bed has approximately 30-35 shoots/10 cm cell, so a 1% visual = approx. 30 shoots total.**

- **Seagrass percent cover** – for all seagrass and for each individual species. Each seagrass species is counted as being either present or absent within each of the 10-cm by 10-cm cells. This procedure allows for an objective direct count of percent cover.

- **Epiphyte loading –** from visual estimates compared to the Epiphyte Photo Index (EPI) on a scale of 0-5. The scale is a photographic reference of different "levels" of epiphyte loading (epiphyte biomass per seagrass biomass). See Epiphyte field guide for further details on epiphyte loadings.
  - Three shoots of *Halodule wrightii* are collected from around the quadrat by pinching off near the sediment surface.
  - These shoots are examined by floating in your hand.
  - By comparing to the EPI, the general category (1-5) should be picked first (check that both higher and lower alternatives have been eliminated).
  - Again comparing to the EPI, select a sub-category (a-e), if appropriate.
  - Considerations:
    - Length and width of seagrass blades (affects seagrass biomass)
    - Entire distribution, not just fuzz on tip
    - Type of epiphyte (a fine film over the entire blade may be a heavy loading).

- **Canopy height** – in centimeters, for each species present. Blades are "combed" with fingers vertically up along the quadrat. A composite measure of the blades is made to the nearest cm. Most blades tend to reach a similar maximum length; those few extra-long blades (<5%) are excluded.

- **Shoot counts** – from 8 fixed, pre-selected cells, of the 100 10-cm by 10-cm cells, direct counts of individual shoots are made. These are for each species present, made at mid-bed, 10 m from the deep edge, and at the deep edge of the transect (last quadrat sampled). The 100 cells have been numbered as:

Instead of using 10 random numbers (as used from 1994-2000), we now use a fixed, 8-square sampling scheme for shoot counts.

9	19	29	39	49	59	69	79	89	99
8	18	28	38	48	58	68	78	88	98
7	17	27	37	47	57	67	77	87	97
6	16	26	36	46	56	66	76	86	96
5	15	25	35	45	55	65	75	85	95
4	14	24	34	44	54	64	74	84	94
3	13	23	33	43	53	63	73	83	93
2	12	22	32	42	52	62	72	82	92
1	11	21	31	41	51	61	71	81	91
0	10	20	30	40	50	60	70	80	90

If the Total Visual % is less than 3%, count the total number of shoots present in the 100 10-cm by 10-cm cells. If two species are present and one of the species has a visual of 3% or less and the other species has a visual of 4% or higher, count the total shoot counts for the species with less than 3% and count the 8 fixed cells for the other species.

- **If *Halophila johnsonii* is present within a m^2 quadrat, then:**
  - Determine the % cover using the method described above.
  - Determine the patch size by:
    - Going backwards and forward along the line to find first and last occurrences. Record the actual distances to get the length of the patch.
    - Looking out laterally from both sides of the line, to a maximum of approximately 5 m each way, for a total of 10 m. Record the lateral extent as the width of the patch (noting if greater than 10 m total).
    - Keeping all notes on the *Halophila johnsonii* field sheet.

- **Photosynthetically Active Radiation (PAR)** – is taken at the deep edge of each transect. Using a LiCor 4Π (spherical) quantum sensor, three PAR readings are taken simultaneously at 20 cm, 50 cm below the surface, and canopy height (30 cm up from the sediment surface).

- **Underwater video** – is taken along the entire length of the transect during the summer sampling. A wide-angle, high resolution, Hi-8 color video camera is mounted at a 45° angle and approximately at average canopy height on a "sled." The sled, known as MUViT (Mobile Underwater Video Transporter), is pushed along the measured transect line which is marked with colored flags at each meter interval for easy reference. Image analysis and interpretation of archived video is a goal for the future. Video taken from 1994 – 2000 is being converted to digital format through the use of Adobe Premier software. A truncated recording shows a sample from each 10 m monitoring location along the transect line. Starting in 2001, all video will be recorded in a digital format.

- **Transparent Field Sheet Overlay** – as a final check, before leaving the site, overlay the transparent field check sheet. Use this sheet to ensure that all parameters have been measured, and nothing has been missed, especially those parameters dependent on one another. For example, if there is a visual estimate for *Halodule*, there should also be a percent cover, an epiphyte biomass, and a canopy height.

- **Water Quality** – is taken at the deep edge of each transect. The water quality parameters should be collected at 0.5m deep. If the depth is shallower than 0.6m, collect the parameters at approximately half of the total water depth. For example, if the total depth is 0.5m, collect the water quality parameters at 0.25m.

  Water Quality Parameters:
  1. Water Temperature
  2. Dissolved Oxygen
  3. pH
  4. Conductivity
  5. Salinity
  6. Secchi – completed on the sunny side of the boat and without sunglasses
  7. Collection depth of water quality parameters
  8. Total water depth at sampling location
  9. Air Temperature
  10. Cloud cover – what percentage of the entire sky is covered with cloud cover. This number can range from 0 –100
  11. Wind Direction
  12. Wind Velocity
  13. Time - collection time of the parameters

Constituents 1-5 are collected using a Hydrolab (?).

If you have the ability to collect any of the water quality parameters listed above, it would be greatly appreciated.