WATER USE/CONSUMPTIVE USE PERMITS
WETLANDS/ SURFACE WATERS MONITORING PLAN GUIDELINES

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These wetlands/ surface waters monitoring plan guidelines are intended to provide a general standardized methodology for wetlands/ surface waters monitoring data collection and reports presentation submitted to the South Florida Water Management District (SFWMD), St. Johns River Water Management District (SJRWMD) and Southwest Florida Water Management District (SWFWMD). These guidelines may be modified by an applicant as necessary, based upon the specific components of the proposed water use and the site-specific conditions, with agreement by District staff, to collect specific field data which will provide a scientifically defensible determination as to whether an applicant's water use withdrawals are, or are not, resulting in wetland harm.

Where necessary, a final wetlands/ surface waters monitoring plan (from here on referred to as "monitoring plan") must be provided to and approved by District staff prior to the District deeming a Water Use Permit/Consumptive Use Permit (from here on referred to as a Water Use Permit) application complete for issuance of a permit.

Additionally, for instances where a monitoring plan is required, implementation of a final, approved monitoring plan will be required as a limiting condition of a Water Use Permit, and will be included as an exhibit in a Water Use Permit.

The applicant should coordinate with and obtain concurrence from District staff on the site-specific information and the different components of the monitoring plan, throughout its development and prior to finalization.

SFWMD

For the SFWMD, these monitoring plan guidelines are provided in accordance with Rule 4.5 of the Basis of Review (BOR) for Water Use Permit Applications, where referred to as a wetland hydrobiologic monitoring program.

Specifically, Rule 4.5, BOR, states that:

> ***"Wetland monitoring shall be required to ensure that harm to wetland and other surface waters does not occur. Monitoring shall consist of various types of data collection, such as ground water and surface water levels, surface water quality, biological parameters, ground and aerial photography, rainfall, pumpage, and land cover assessments. Guidelines for establishing a wetland hydrobiologic monitoring program are available from the District. The Applicant shall submit a wetland hydrobiologic monitoring program to the District for review and approval when: The impacts of the proposed use, either individually or cumulatively with other permitted users, produces drawdowns approaching the applicable drawdown criteria in Section 3.3 of the BOR."***

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BASIS FOR THE MONITORING PLAN

Along with topographic and soil features, the hydropattern of wetlands/ surface waters (also known as the water regime) includes three interdependent components of surficial hydrology:

1. The frequency of flooding/saturation;
2. The depth of flooding/saturation; and
3. The duration of flooded/saturated soil conditions.

The hydropattern also provides for physical landscape markers expressed by the parameters of vegetation, hydric soils and hydrologic indicators.

Different types of wetlands/ surface waters respond differently to decreased frequency, depth, and/or duration of inundation/saturation. Topography determines how much area will be affected by a given drawdown. Drawdowns of equal magnitude may therefore have dramatically different effects, depending on the type, size, and configuration of the wetlands/ surface waters.

Therefore, whenever Water Use Permit (WUP) application information (e.g. modeling) indicates that a proposed water use may reduce the frequency, depth, or duration of inundation/saturation in wetlands/ surface waters, the applicant may be required to develop and implement a long-term monitoring plan. The monitoring plan must be designed to provide the District reasonable assurance, in accordance with the appropriate Water Management District's criteria,that the proposed water use will not result in adverse harm.

The monitoring plan should be designed by the applicant, through coordination with the District, to detect wetlands/ surface waters harm through any one or all of the following:

1. A reduction from documented baseline conditions in the spatial extent of the wetlands/ surface waters pursuant to Chapter 62-340, F.A.C., which can be attributable to the water use;
2. A change in the hydrologic conditions from documented baseline that resluts results in adverse harm to wetlands/ surface waters in accordance with the appropriate Water Management District's criteria, which can be measured and attributable to the water use. This may include -
    - Water level elevations below baseline water level elevations
    - Hydrologic indicators elevations below baseline hydrologic indicators elevations
    - Reduction in the number of or lack of hydrologic indicators
    - Hydric soil indicator elevations below baseline hydric soil indicator elevations
    - Hydric soil indicators absent
    - Soil changes from baseline soil conditions
    - Fissuring of hydric soil
    - Loss of hydric soil
    - Wetland soil subsidence from baseline ground elevations
    - Exposed tree roots; and
3. A change in vegetative conditions from documented baseline conditions (plant species composition and relative abundance with a trend toward or change in community type) that results in adverse harm to wetlands/ surface waters in accordance with the appropriate Water Management District's criteria, which can be attributable to the water use. This may include:
    - Absence of previously identified or characteristic plant species from baseline
    - Change or shift in plant communities from the baseline

- Change of distinctive plant communities zonation (along the topographic gradient)
- Reduction or absence of baseline vegetative regeneration
- Diseased, infected or stressed vegetation
- Death of wetland trees or other vegetation
- Leaning trees
- Invasion by upland plant species
- Absence of appropriate habitat for listed or characteristic faunal species from baseline.

In order to meet the objectives of the monitoring plan, hydrologic, soils, and vegetative data collection is necessary to provide a scientifically defensible approach. The approach must document quantifiable parameters that reflect the response of wetland/ surface water systems to the water use by direct measurement of water levels in wetlands/ surface waters and ground water, their relationship to the water withdrawals, and the associated ecological effects in the wetlands/ surface waters. These quantifiable parameters and the measured water use occur on significantly different temporal scales, with ground water drawdown in response to water use withdrawals being measurable on a time-scale of days, while the observable spatial reductions of and the ecological effects in wetlands/ surface waters are measured on a time scale of years.

The WUP wetlands/ surface waters monitoring differs from that which is typically required in Environmental Resource Permits (ERPs). Although landscape level monitoring data collection for ERP compliance provides an overall assessment of wetland conditions given all external factors, it is short-term and is designed to monitor for specific success criteria related to the ERP. Additionally, the ERP monitoring does not provide a sufficient level of detail to identify the effects that may be directly related to variations in ground water levels associated with water use withdrawals and its resulting effects on wetland hydrology and vegetation. The ERP monitoring is typically more of a qualitative data collection and is not well suited to the quantitative requirements of the WUP monitoring, although some newer ERPs may now include a ground water monitoring component.

The purpose of the WUP monitoring plan is to collect the necessary data to determine whether there is a causal link between the water use withdrawals, ground water drawdown, rainfall, and observed wetlands/ surface waters conditions. Specifically, the monitoring plan must be purposefully designed to detect whether drawdown attributable to the water use results in adverse impacts to selected representative wetlands/ surface waters, in accordance with the appropriate Water Management District's criteria, located throughout the water use area of influence. Therefore, it is necessary to develop a means of measuring and identifying trends relating water use operations to hydrologic, vegetative, and soil parameters in wetlands/ surface waters, and whether those trends indicate the potential for harm to occur, or that harm is occurring.

The measurement of wetlands/ surface waters water levels and associated ground water levels provides an "instantaneous" indicator of the hydrologic conditions which are the primary driving force in the existence, persistence, and function of the wetlands/ surface waters. The vegetative and soil conditions provide long-term indicators of the prevailing (rather than "instantaneous") hydrologic conditions.

Therefore, in order to identify and address harm to wetlands surface waters that may result from water use withdrawals, it is necessary to determine the response time between identifiable data

points and the occurrence of harm. As discussed earlier, ground water levels and wetland surface water levels can be measured and changes identified on a daily time scale. Subtle thresholds or changes to associated wetlands/ surface waters effects may also be identifiable (e.g. no standing water within wetlands during the wet season). Water level fluctuation and drying out is a natural occurrence of many wetland systems that can and often does have beneficial effects on wetland ecology, simple application of dry-down or a fixed-ground water elevation does not provide a direct indicator of harm. Specifically, any harm evaluation approach cannot typically rely solely on a wetland water level or ground water elevation criterion (unless an obvious direct correlation is detected between the water use and water level drawdowns in wetlands/ surface waters). Given that hydroperiod is defined as the combination of frequency, depth, and duration of inundation/saturation within a wetland/ surface water, any water level criterion would require a specific duration and/or recurrence frequency for such conditions to be included in order to provide a predictive measure of potential wetland/ surface water harm.

The time scale for identifying change in vegetative conditions that would indicate harm is governed by growing season factors. Measurable change that may provide an indication of harm can be expected to occur in a time scale of a year or more. The identification of trends on this time scale is further “masked” by the strong seasonality of rainfall distribution along with random variables such as tropical storms, single and multi-year droughts and occasional freeze events, which can result in major shifts in vegetative coverage on time scales of days or weeks. Given this time scale and other potential complex factors, documented year after year changes in vegetative coverage may only be observable after harm has occurred in the wetland/ surface water.

By implementing a detailed quantitative monitoring plan concurrently with the water use withdrawals, trends in hydrologic and vegetative conditions of the subject wetlands/ surface waters can be measured against the baseline conditions prior to the water use withdrawals. The baseline wetlands/ surface waters hydrologic and vegetative conditions would account for the effects of surrounding drainage, surface water management systems, and other external effects, as well as seasonal and climatic (rainfall) conditions under the current existing conditions.

The following monitoring plan guidelines are intended to provide a general standardized methodology for wetlands/ surface waters monitoring data collection and presentation in reports submitted to the District. These guidelines may be modified by an applicant as necessary, based upon the specific components of the proposed water use and the site-specific conditions, and approval by District staff, to collect specific field data which will provide a scientifically defensible determination as to whether an applicant’s water use withdrawals are, or are not, resulting in wetland harm.

The following information should be assembled and organized by the applicant into a detailed, comprehensive document, which describes and depicts the existing wetlands/ surface waters conditions and the proposed monitoring and reporting activities.

BASELINE (PART 1) DATA COLLECTION & DOCUMENTATION

To develop a monitoring plan, the applicant should first obtain and document some detailed site-specific, field verified, baseline (Part 1) wetlands/ surface waters information, as follows. This information also establishes some (but not all of) the baseline wetlands/ surface waters conditions against which future conditions will be measured. (See the *"Data Collection"* section below for the Baseline (Part 2 information). However, as indicated previously, prior to finalization and implementation of a monitoring plan, the applicant will need to coordinate with District staff regarding field and office review and concurrence of the information.

1. **Selection of on-site and/or off-site state wetlands/ surface waters to be monitored, which are located within the water use area of influence.** These sites should be the most appropriate for monitoring any ground water drawdowns from the proposed water use withdrawals which may reduce the existing hydropattern.. The following should be considered:
    - Whether or not the wetlands/ surface waters are heavily influenced or drained by adjacent or nearby surface water management system features, or by other observed/known surficial or ground water hydrologic influences.
    - The total number of wetlands/ surface waters monitored will depend on the size of the project, and the number and types of wetlands/ surface waters which may be affected by the proposed water use;
    - The location(s) of the wetlands/ surface waters relative to the proposed water use area of influence individual and cumulative modeled drawdown contours;
    - Different wetlands/ surface waters natural community types present (e.g. deep marsh, shallow marsh, wet prairie);
    - Different wetlands/ surface waters hydrology (shortest hydroperiod wetlands are preferred, when drawdown influences are similar among different wetlands);
    - Wetlands/ surface waters with the most representative conditions;
    - Whether or not the wetlands/surface waters are isolated;
    - No/little influence or adverse impacts from existing surrounding areas and anthropogenic activities that could affect collected data. Examples of such influences include drainage, surface water management systems, location is within a regional water utility well-field, drained by ditch, impounded by surrounding berm, located adjacent to a primary canal with a lower control elevation, etc.;
    - Equilibration of existing hydrologic and vegetative conditions within the wetlands/ surface waters to the existing surrounding conditions/external effects; and
    - Ease of accessibility for conducting monitoring activities.

    Note: If wetlands/ surface waters are located on off-site lands which are not controlled by the applicant, the applicant should attempt to obtain authorization from the off-site owner through an executed access agreement. If access is not possible, the applicant would need to modify the proposed plan to avoid adverse impacts to off-site wetlands/surface waters.

2. **Identification of the boundaries of the wetlands/ surface waters to be monitored in accordance with the *Delineation of the Landward Extent of Wetlands and Surface Waters*, Chapter 62-340, Florida Administrative Code.** The applicant must conduct/provide the following:
    - Stake out/flag a minimum of 3 points that represent the landward extent of the wetlands/ surface waters in the field for District staff verificationCertified survey of the 3 points of the wetlands/ surface waters;
    - Provide a scaled plan view sketch depicting the locations of the 3 points; and

- Provide a scaled figure depicting the 3 points overlaid onto an updated (recent) legible, rectified aerial photograph.
- Future boundary points for the landward extent of wetlands/surface waters will be compared directly to the boundary points established during the baseline period.

3. **Identification of the wetlands/ surface waters community type (what type of natural wetlands/ surface waters the assessment areas currently most closely resemble) within the wetlands/ surface waters to be monitored, based upon the existing hydrologic and vegetation conditions.** Provide photo documentation.

   Some common examples of wetlands and surface waters community types are as follows:

NATURAL WETLANDS COMMUNITY TYPES	***NATURAL SURFACE WATERS COMMUNITY TYPES***
baygall	*creek*
seepage slope	*stream*
hydric hammock	*river*
bayhead	*pond*
hydric flatwoods	*lake*
wet prairie	
marl prairie	
shallow depression marsh	
cypress strand	
cypress dome	
hardwood swamp	
deep depression marsh	
floodplain marsh	
floodplain swamp	
bottomland forest	
floodplain forest	
slough	

4. **Identification of existing vegetative conditions, at each of the boundary points collected in item 2 above, of the wetlands/ surface waters to be monitored (including dominant native canopy/shrub/groundcover/aquatic species, presence of invasive/exotic species, condition/health of plants and recruitment).**
   - Provide photo documentation.
   - Future photos will be compared directly to photos taken during the baseline period, at the exact same locations.

5. **Identification of the soil type(s) of the different vegetation zones/ecological communities within the wetlands/ surface waters to be monitored.**
   - Provide a map of the wetlands/ surface waters showing the locations of sampled, described soils.
   - Provide certified survey of all soil sampling locations and elevations.
   - Provide soil sampling data. Complete a detailed soil profile description at each sampling location. (Reference: *Field Indicators of Hydric Soils in the United States*, *A Guide for Identifying and Delineating Hydric Soils;* U.S. Department of Agriculture, Natural resources Conservation Service)

- Provide a complete soil profile description for the boundary points of the landward extent of wetlands/surface waters.
- Identify and delineate the landward extent of where hydric indicators are expressed at the soil surface, if not at the jurisdictional wetland boundary. Provide a complete soil profile description.
- Identify and delineate the landward extent of where muck soil indicator (if present) occurs at soil surface, if not at the jurisdictional wetland boundary. Provide a complete soil profile description.
- Provide a narrative description and summary of the soils present.
- Provide photo documentation.
- Future data collection and analysis will be compared directly to the conditions established during the baseline period.

6. **Identification of the existing hydrology of the wetlands/ surface waters to be monitored.**
    - Surrounding hydrologic influences (i.e. upstream flows, downstream flows, impediments to flows, etc.);
    - Descriptions of observed hydrologic indicators; and
    - Certified survey elevations of hydrologic indicators (a minimum of 3 data points for each wetland/surface water boundary points)..
    - Provide photo documentation.
    - Future data collection and analysis will be compared directly to the conditions established during the baseline period.

7. **Supporting wetlands/ surface waters information for potential use by District staff in the application of the Uniform Mitigation Assessment Method, Rule 62-345, Florida Administrative Code, to determine the amount of mitigation necessary to offset any adverse impacts from the permitted water use, if necessary.**

BASELINE (PART 2) DATA & ONGOING DATA COLLECTION & DOCUMENTATION

Once the site-specific baseline (Part 1) wetlands/ surface waters conditions have been collected, documented and accepted by District staff, the applicant should develop and document a scientifically defensible, and quantitative methodology for collecting baseline (Part 2) data and ongoing data, which can detect whether changes in ground water levels and wetlands/ surface water levels result from water use withdrawals. The methodology should also reflect the response of the wetlands/ surface waters to recorded water levels by direct measurement of water levels in the wetlands/ surface waters and the ground water, the relationship to proposed pumpage, and the associated ecological effects, including measurable harm, in the wetlands/ surface waters. Monitoring should be conducted every 5 years, during the middle of the wet season (July through September), at the same time each year, except for hydrologic and rainfall data collection which should be completed annually.

1. **Vegetative data collection to establish and track ecological conditions in a repeatable fashion within each of the wetlands/ surface waters to be monitored.**
    - Data collection and analysis will be compared directly to the conditions established during the baseline period. Statistical tools/methods will be identified and applied in order to determine whether there are measurable trends in vegetation effects that can be attributed to the measured drawdown documented through water levels monitoring and water use withdrawals;
    - A permanent vegetative monitoring station (transect, quadrat, etc.), and quantitative sampling stations/quadrats/plots at the station, through each wetland/ surface water to be monitored. (see Figure(s) – NEED TO BE DEVELOPED)
        - Depending on the size of the wetland/ surface water, multiple stations may be necessary, though there will be a minimum of three per wetlands to be monitored.
        - The number of sampling stations/quadrats/plots will vary depending upon the number and width of the different vegetative community types/vegetative zones/ecotones.
        - The size of the sampling stations/quadrats/plots may vary based on the type of vegetation and strata (i.e. canopy, shrub layer and groundcover);
        - Quantitative data collection within the stations/quadrats/plots should include identifying a cover class hierarchy. The cover classes evaluated should be based on Chapter 62-340, Florida Administrative Code, wetland indicator plant species (obligate, facultative wetland, facultative, and non-wetland). A statistical analysis of the relative proportions of each vegetative cover class should be conducted in order to develop trends on a seasonal (semi-annual) and annual (year to year) basis. These statistical analyses of quantitative vegetative cover class data should be coupled with water levels data and water use withdrawals, in order to determine whether, and if so to what degree, there is a causal link between water level changes related to pumpage and vegetative cover.
        - Vegetation data will include quantitative plant cover in each of the station/quadrat/plot locations for each data collection event. In addition to reporting genus and species percent coverage, wetland indicator status and native/non-native species designation will be recorded.
        - Statistical analysis of trends within years, as well as over the multiple years of data collection, along with anecdotal notations of observed external factors such as disturbance or habitat management activities that may skew observations.

- The purpose of the vegetation quantification stations is to provide specific determinations of quantitative changes in vegetative composition (plot scale), rather than the "qualitative" evaluations (landscape scale) typically provided in ERP wetland monitoring reports. The plot selection, data collection, and statistical analysis design should be identified. For example, "cover" would be utilized in the sample design and data collection. Vegetative cover data would be collected in pre-determined plot locations along a transect established to measure cover in various hydroperiod regimes in the wetland/ surface water. The sampling design would include establishment of plot sampling locations from which quadrat measures of vegetative cover would be collected.

2. **Permanent photographic stations at each wetland/ surface water to be monitored.** (see Figure(s) – NEED TO BE DEVELOPED)
   - Stations must be strategically located to sufficiently provide a visual representation of the observable hydrology (if possible) and the vegetation of the wetland/ surface water to be monitored;
   - Photographs of each transect should be taken at fixed stations, at the 4 cardinal directions (north, east, south, west);
   - Photographs of each station/quadrat/plot along each transect should be taken;
   - For larger wetlands/ surface waters, panoramic photographs should also be taken;
   - Stations should be permanently marked and GPS located in the field, and easily relocated by GPS;
   - Photographs should be date-stamped and of sufficient size, quality, and clarity to identify major vegetative communities;
   - The direction and view of the photographs should remain consistent for each monitoring report.

3. **Additional photographs should be included,as necessary, to identify any recent perturbations** that could be affecting the hydrology or vegetation of the wetland/ surface water (e.g. new adjacent or nearby ditching or drainage features, exotic and nuisance vegetation, etc.).

4. **Installation of monitor wells**:
   The following water levels monitoring components are in addition to/conjunction with any surface water or ground water monitoring required by the District for other resource impact evaluations purposes.

   A. A shallow monitor well or staff gauge in the deepest portion, of the wetland/ surface water to be monitored, as appropriate. The well should be capable of continuously recording surface water and sub-surface water levels elevations (e.g. piezometer, data logger) to a maximum depth of 1.5 feet higher than seasonal high water levels and a minimum depth of 1.5 feet below the bottom elevation of the wetland/ surface water, or just to the underlying confining layer (if present) without penetrating it.

      The standard recommended method for installing a shallow monitor well involves the use of a bucket auger. Well installation by driving may also be acceptable, and is recommended when site conditions prevent augering (e.g. non-cohesive sandy soils, soils with many coarse fragments, saturated organic soils). In addition, driven wells are acceptable whenever their performance can be shown to be equivalent to that of

an augered well. Plans to use driven wells should be agreed upon in advance with District staff.

B. A deeper ground water monitor well at the landward edge of the wetland/ surface water. The well should be capable of continuously recording ground water elevations (data logger), and recording ground water levels to a minimum depth of the natural ground surface elevation and to a maximum depth which would be determined based upon project and site specific conditions. However, the well depth should be of sufficient depth to allow ground water level readings to be collected during periods of severe drought conditions. This well should be installed along the vegetative transect across the wetland/ surface water-upland boundary, with the shallower well in the deepest portion of the wetland/ surface water and the deeper well in the upland.

For all wells:

- Prior to drilling the monitor well, the soil profile at the well location must already have been described and the appropriate well depth determined based on the presence or absence of any underlying confining layers;
- A well construction permit is be required before a well is installed, in accordance with local governmental rules/regulation;
- Provide the well depth and diameter;
- Provide the elevation of natural ground surface at the monitor well, the top of the well pad (if present), and the top of the casing elevation;
- Provide soil boring logs and analysis to determine the permeability of the bottom/below the wetlands/ surface waters, and the depth and composition of any confining layers which are/may be present;
- Automated, high-frequency recording devices/dataloggers which record surface/sub-surface water levels (i.e. piezometers) should be used, with continuous/minimum readings of 2 times per day. Automated water-level recorders should be checked frequently for accuracy by comparison with manual readings;
- The water level monitoring stations will be visited, downloaded, and maintained a minimum of once per month (to ensure that monitoring equipment is functioning properly and collecting accurate data)
- Surface, sub-surface and ground water levels data should be compiled;
- Elevations should be surveyed to NAVD 88 (with a conversion faction for the NGVD vertical datum) to an accuracy of +/- 0.01 foot;
- The well(s) should be installed by a licensed water well contractor (as required in Regulation of Wells, Subsection 373.336(1)(b), Florida Statute); and
- Provide lithologic logs and well construction completion reports for each monitor well. The contractor must complete and sign, and the permittee must provide to the District, a Well Completion Report form (Form 0124) which is attached as Figure(s) – NEED TO BE DEVELOPED. (*Note: all monitor wells can be reported in one form*).

5. **Rainfall data collection.** Collect rainfall data by installation of an on-site rain gauge in a convenient and appropriate location on the site. Alternatively, an established, reliable and existing rain gauge/monitoring station which is located nearby may be appropriate.
    - Rainfall totals should be recorded on a daily basis, via an automated, high-frequency recording device, with data compiled semi-annually and submitted in the annual and semi-annual reports; and
    - If using an existing, reliable off-site rainfall monitoring station (e.g. a Water Management District rain gauge within close proximity of the subject site),

identify the location of the station, provide a map showing the location of the subject site relative to the location of the rain station, and identify the distance between the two sites.

6. **Baseline hydrologic and vegetative conditions within the wetlands/ surface waters to be monitored, prior to any water withdrawals**.
    - Collect hydrologic surface water and ground water data for a period which is most appropriate for the proposed water use (time of year, duration, etc.), using the same methodology used for the hydrologic monitoring components identified above; and
    - Collection of vegetation data, preferably once during the middle of the wet season (July through September), , using the same methodology used for the long-term vegetative monitoring identified above.

7. **A plan view sketch and a legible aerial photograph which depicts the locations of all proposed monitoring components** (see Figure(s) – NEED TO BE DEVELOPED):
    - Water use production wells (water withdrawal facilities);
    - Locations and boundary points of the landward extent of wetlands/ surface waters to be monitored;
    - Vegetative transects/stations/quadrats;
    - Photographic stations and direction(s) of photograph;
    - Surface water/sub-surface water monitor wells (also known as shallow monitor wells);
    - Ground water monitor wells (also known as deep monitor wells);
    - Rainfall station; and

    This view sketch and aerial photograph should be included in all monitoring reports.

8. **Narrative description which explains how the monitoring data and results will be analyzed**.

9. **A work schedule** identifying calendar dates or days from permit issuance, that monitoring work is anticipated to be conducted and completed, and that monitoring reports will be submitted.
    - Installation surface/sub-surface water (shallow) monitor wells;
    - Installation of ground water (deep) monitor wells;
    - Initiation of baseline surface water/ground water monitoring data collection;
    - Complete baseline vegetation monitoring;
    - Submittal of baseline vegetation monitoring;
    - Conduct first semi-annual vegetation monitoring;
    - Conduct continuous semi-annual vegetation monitoring (same dates annually);
    - Submit annual monitoring report; and
    - Submit semi-annual monitoring reports (same dates annually).

10. **Identification of the format(s) that the monitoring data and information will be provided**.

MONITORING DATA REPORTING

The monitoring plan reports should include clear, concise data for all components of the monitoring plan (e.g. documentation, narrative descriptions, photographs, figures, tables, etc.), and the results of the monitoring. Additionally, the surface/sub-surface water levels and ground water levels (short term) and vegetative conditions (long term) data will be used in their respective time scales to identify trends in wetland/ surface water conditions over time and their relationship to concurrent water use withdrawals.

Baseline Report(s) - Once the wetlands/ surface waters baseline monitoring data has been collected, a baseline report should be created and submitted which must include, but is not limited to, the following:

1. **Reporting frequency** –
   The baseline (Part 1) data collection described above should be completed and reported to the District one time prior to/in conjunction with developing the monitoring plan, and included with the baseline (Part 2) information for the overall one-time baseline monitoring report.

   The baseline (Part 2) data collection described above should typically be collected and reported to the District one time, along with the baseline (Part 2) information, after District approval of the monitoring plan and prior to withdrawal of the permitted water withdrawals.

   The baseline hydrologic monitoring data should typically be initiated after District approval of the monitoring plan and prior to withdrawal of the permitted water withdrawals, for a pre-determined amount of time (e.g. one year), recorded twice daily, and reported to the District annually. This information must also be included:

   a. All baseline (Part 1) information and data:
   - Boundary point of the landward extent of the wetlands/ surface waters to be monitored;
   - Identification of the wetlands/ surface waters community type;
   - Identification of existing vegetative conditions of the wetlands/ surface waters to be monitored;
   - Identification of the soil type(s) of the different vegetation zones/ecological communities; and
   - Identification of the existing hydrology.

   b. Vegetative monitoring data: (see Figure(s) – NEED TO BE DEVELOPED)
   - Transect data;
   - Transect stations data; and
   - Photographs.

   c. Vegetative existing conditions analysis and discussion:
   - An evaluation of the existing vegetative monitoring conditions;
   - A narrative summary of the overall hydrologic and vegetative condition compared to the baseline condition;
   - Summary of information depicted in the photographic documentation;
   - Data should be presented such that a future trend analysis over time can be conducted; and

- Percent coverage of dominant species in each sampling station should be presented.

d. Hydrologic monitoring data:

- Surface/sub-surface water levels data;
- Ground water levels data; and
- Rainfall data.

e. Comparative hydrograph of the monitoring data: (see Figure(s) – NEED TO BE DEVELOPED)

- Surface/sub-surface (shallow) water levels data;
- Ground (deep) water levels data; and
- Rainfall data,

Which shows the wetland/ surface water

- Bottom/natural grade elevations;
- Water elevation; and
- wetland/ surface water boundary elevation,

For each monitored wetland/ surface water area.

- A hydrograph should be provided for each individual surface water and ground water source; and
- A hydrograph showing cumulative water usage from all water sources should also be provided.

Example: The surface/sub-surface and ground water levels data, rainfall data, and water use withdrawals (daily time step) volume will be graphed on the vertical axis with the horizontal axis depicting time through the data collection period.

2. **A plan view sketch and a legible (recent) aerial photograph which depicts the locations of all proposed monitoring components** (see Figure(s) – NEED TO BE DEVELOPED).
    - Water use production wells (water withdrawal facilities);
    - Locations and surveyed monitoring points of wetlands/ surface waters;
    - Vegetative transects/stations/quadrats;
    - Photographic stations and direction(s) of photograph;
    - Surface water/sub-surface water monitor wells (also known as shallow monitor wells);
    - Ground water monitor wells (also known as deep monitor wells); and
    - Rainfall station.

Ongoing Reports – Ongoing monitoring reports should be created and submitted which must include, but is not limited to, the following:

1. **Reporting frequency** -
   The ongoing data collection conducted for the baseline (Part 1) described above should typically be completed and reported to the District every 5 years (at the same time of year as the baseline (Part 1) data collection was conducted) based upon site-specific conditions.

   The ongoing data collection conducted for the baseline (Part 2) described above should typically be completed and reported to the District every 5 years (at the same time of

year as the baseline (Part 2) data collection was conducted) based upon site-specific conditions.

The ongoing hydrologic monitoring data collection should typically be a continuation of the monitoring activities after a permittee has initiated permitted water withdrawals, recorded twice daily, and reported to the District annually.

2. **Hydrologic monitoring data**:
    - Surface/sub-surface water levels data;
    - Ground water levels data;
    - Rainfall data and
    - Production wells data (pumpage/withdrawals data).

3. **Hydrologic monitoring results discussion**
    - Trends
    - Deviations from the "normal" with possible explanations as to why they occurred

4. **Comparative hydrographs of the monitoring data**: (see Figure(s) – NEED TO BE DEVELOPED)
    - Surface/sub-surface water levels data;
    - Ground water levels data;
    - Rainfall data; and
    - Production wells data (pumpage/withdrawals data),

    Which shows the wetland/ surface water:
        - Bottom elevation;
        - Water elevation; and
        - wetland/ surface water boundary point elevations,

    For each monitored wetland/ surface water area, since the start of the monitoring.
        - Hydrographs and data for previous monitoring events and calendar years should be displayed consecutively for ease of comparison.

    Example: The surface/sub-surface and ground water levels data, rainfall data, and water use withdrawals (daily time step) volume will be graphed on the vertical axis with the horizontal axis depicting time through the data collection period.

5. **Vegetative monitoring data**:
    - Transect data;
    - Transect stations data; and
    - Photographs.

6. **Vegetative monitoring results analysis and discussion**:
    - An evaluation of the vegetative monitoring data which compares the results of each semi-annual monitoring event to previous monitoring events, and to the baseline monitoring;
    - Summary of the overall ecological condition;
    - Summary of information depicted in the photographic documentation;
    - Data should be presented such that a trend analysis over time can be conducted.
    - Percent coverage of dominant species in each sampling station should be presented; and

- Hydrographs and data for previous monitoring events and calendar years should also be displayed consecutively for ease of comparison.

7. **Updated certified survey of the boundary points of the landward extent of the monitored wetlands/ surface waters**.

8. **The annual and semi-annual monitoring reports will be submitted to the appropriate Water Management District** as follows:
   - SFWMD – either by providing a hardcopy of the reports with CDs containing electronic data, or electronically via the District's ePermitting website at http://mysfwmd.gov/ePermitting. For first time users, an ePermitting account is required to be created. Reports can be submitted through eCompliance/Water Use/Submittal/New/Additional Documents. Larger files (greater than 50 MB) should be divided into smaller files and identified by number (i.e. Part 1, Part 2, etc.) Adobe® does have a reduced file option.
   - SJRWMD –
   - SWFWMD –

DATA COLLECTION & REPORTING SUMMARY

The following is a brief summary of the data collection and reporting identified above:

- The baseline (Part 1) data collection described above should be completed and reported to the District one time prior to/in conjunction with developing the monitoring plan, and included with the baseline (Part 2) information for the overall one-time baseline monitoring report. The ongoing data collection should typically be completed and reported to the District every 3-5 years (at the same time of year as the baseline (Part 1) data collection was conducted) based upon site-specific conditions;
- The baseline (Part 2) data collection described below should typically be collected and reported to the District one time, along with the baseline (Part 2) information, after District approval of the monitoring plan and prior to withdrawal of the permitted water withdrawals. The ongoing data collection should typically be completed and reported to the District every 3-5 years (at the same time of year as the baseline (Part 2) data collection was conducted) based upon site-specific conditions; and
- The baseline hydrologic monitoring data should typically be initiated after District approval of the monitoring plan and prior to withdrawal of the permitted water withdrawals, for a pre-determined amount of time (e.g. one year), recorded daily, collected monthly and reported to the District quarterly. The ongoing hydrologic monitoring data collection should typically be a continuation of the monitoring activities after a permittee has initiated permitted water withdrawals, recorded daily, collected monthly and reported to the District quarterly.

However, it may be necessary for an applicant to increase monitoring components frequencies based upon site-specific conditions and/or project-specific circumstances.

GLOSSARY

ecotone – A transition zone between two or more different ecosystem or community types. Such transition areas are typically species-rich

North American Vertical Datum of 1988 (NAVD 88) - The vertical control datum of orthometric height established for vertical control surveying in the United States of America based upon the General Adjustment of the North American Datum of 1988. It has replaced the National Geodetic Vertical Datum of 1929 (NGVD 29), previously known as the Sea Level Datum of 1929.

top of casing – The elevation at the top on the monitor well pipe, minus the cap measured in NAVD 88.

baseline condition – The hydrologic and vegetative condition (normal pool and seasonal high water elevations, species composition and distribution and hydrological indicators) of the wetland/ surface water prior to the implementation of any water withdrawals.

lithographic log - A record of the general physical characteristics of the rock and soil encountered in a borehole from the surface to the bottom. Also known as a well log.

quadrat – The basic sampling unit for vegetation surveys. The size of the quadrat (also called a plot) depends largely on the vegetation that is being surveyed. For purposes of these guidelines, meter square quadrats are typically used.

transect – Lines that are set out through vegetation for the purpose of collecting data. Measurements of species' presence or absence, cover, height, etc. are made at measured intervals (regular or random) along the transect, often using quadrats/plots.

normal pool elevation – The elevation of average or sustained water level in a wetland/ surface water within a wet season of a normal year. This elevation is lower than the seasonal high water elevation, which occurs after typical wet season storms. Indicators can include water stains on plants or fence posts, elevated lichen lines, bottom of moss collars, and adventitious rooting.

wetland/ surface water edge elevation – The elevation that is consistent with the wetland/ surface water delineation line as determined by Chapter 62-340, Florida Administrative Code, using hydric soil indicators, plant species composition and hydrologic indicators.