Protocols for WIMS Alternate Gateway

Objective: Provide pathway for observations from non-fire agency weather networks into WIMS to generate NFDRS outputs.

Summary.

Weather Station Descriptions

Station Information. Stations must be type 6 (RAWS (non-SAT NFDRS) and accurately populated with metadata. The NESDIS ID should be the same as the WIMS/NWS ID. The correct NWS Forecast Office should be specified to receive NFDRS forecasts through WIMS. Wind height sensor should be documented in comment field if different from the NFDR 20-foot standard. Below is an example of Station Information for a Florida Mesonet station.
**NFDRS Parameters.** Parameters (fuel models, staffing information, etc.) are the same as any other NFDRS station.

**Extra Sensors.** At this time Solar Radiation is the only “extra” sensor field that can be read in from the FW9 formatted data file. If included in the data field it should be on channel 9 using SHEF code RD (Radiation, Direct Beam).

Oracle SQL scripts may be run by WIMS administrators to create stations using the Alternate Gateway. (See Appendix A.)
Data Requirements.

Standard Fire Weather Format. The agreed data transfer format will the WXOBS98 data layout as described on the next page and illustrated below.

The transfer file may contain observations for any number of stations, typically for the same observation date and time. This is example for 5 stations for “R” type observations (0900 LT), including solar radiation.

W98089939200803070900R6 67 90178 9 0 76 57 90 34 7 128N 212 12
W98089933200803070900R6 67 93177 5 0 76 59 93 33 4 159N 212 7
W98089934200803070900R6 67 90178 9 0 76 57 90 34 7 128N 212 12
W98089956200803070900R6 79 72176 14 0 81 70 97 72 3 691N 212 509
W98089918200803070900R6 62 94171 2 0 72 56 97 37 6 276N 212 142

The next example illustrates only “O” observations for five stations which would be converted into NFDRS records of type “O.”

W9808990620080307090003 73 84170 10 0 75 60 93 28 5 137N 212 212
W9808991420080307090002 60 96140 9 0 71 57 96 33 6 609N 212 61
W9808991520080307090000 64 88 0 0 71 51 93 28 7 331N 212 150
W9808991620080307090005 64 89140 8 0 69 57 93 39 6 326N 212 127
W9808990120080307090006 75 83160 18 0 75 64 93 99 8 144N 212 256
<table>
<thead>
<tr>
<th>Item</th>
<th>Cols</th>
<th>Type</th>
<th>Description</th>
<th>wims.observation column</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01-03</td>
<td>3A</td>
<td>Record type (W98). All records begin with this identifier.</td>
<td>Required</td>
</tr>
<tr>
<td>2</td>
<td>04-09</td>
<td>6N</td>
<td>Station Number.</td>
<td>Required</td>
</tr>
<tr>
<td>3</td>
<td>10-17</td>
<td>8N</td>
<td>Observation date (YYYYMMDD).</td>
<td>Required</td>
</tr>
<tr>
<td>4</td>
<td>18-21</td>
<td>4N</td>
<td>Observation time (0000-2359).</td>
<td>Required</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>1A</td>
<td>Observation type (O=NFDRS, R=RAWS other than at the standard NFDRS observation time).</td>
<td>(O/R) Required</td>
</tr>
<tr>
<td>6</td>
<td>23</td>
<td>1N</td>
<td>State of weather code.</td>
<td>(0-9) Required if Obs type = &quot;O&quot;</td>
</tr>
<tr>
<td>7</td>
<td>24-26</td>
<td>3N</td>
<td>Dry bulb temperature (deg F).</td>
<td>(-40 to 120) Required</td>
</tr>
<tr>
<td>8</td>
<td>27-29</td>
<td>3N</td>
<td>Atmospheric moisture (wet bulb temperature, relative humidity (percent), or dewpoint temperature based on Moisture Type code [col. 62]).</td>
<td>(1 – 100) Required</td>
</tr>
<tr>
<td>9</td>
<td>30-32</td>
<td>3N</td>
<td>Wind direction azimuth measured from true north. 0 (zero) means no wind direction, 360 is north.</td>
<td>Required</td>
</tr>
<tr>
<td>10</td>
<td>33-35</td>
<td>3N</td>
<td>Average windspeed over a 10-minute period (miles per hour).</td>
<td>(0-100) Required</td>
</tr>
<tr>
<td>11</td>
<td>36-37</td>
<td>2N</td>
<td>Measured 10-hour time lag fuel moisture.</td>
<td>(1-60) Optional</td>
</tr>
<tr>
<td>12</td>
<td>38-40</td>
<td>3N</td>
<td>Maximum Temperature (deg F).</td>
<td>(-40 to 120 &amp; &gt;= DRY_BULB_TEMP) Optional</td>
</tr>
<tr>
<td>13</td>
<td>41-43</td>
<td>3N</td>
<td>Minimum Temperature (deg F)</td>
<td>(-40 to 120 &amp; &lt;= DRY_BULB_TEMP) Optional</td>
</tr>
<tr>
<td>14</td>
<td>44-46</td>
<td>3N</td>
<td>Maximum relative humidity (percent).</td>
<td>(1 to 100 &amp; &gt;= RELATIVE_HUMIDITY) Optional</td>
</tr>
<tr>
<td>15</td>
<td>47-49</td>
<td>3N</td>
<td>Minimum relative humidity (percent).</td>
<td>(1 to 100 &amp; &gt;= RELATIVE_HUMIDITY) Optional</td>
</tr>
<tr>
<td>16</td>
<td>50-51</td>
<td>2N</td>
<td>Precipitation duration (hours).</td>
<td>(0 to 24) Required</td>
</tr>
<tr>
<td>17</td>
<td>52-56</td>
<td>5N</td>
<td>Precipitation amount based on Measurement Type code [col. 63]. Blanks= no precipitation. U.S. measurement: inches with implied decimal nn.nnn format; trace shown as 00005.</td>
<td>(0 to 25) -- 00000 to 25000 Required</td>
</tr>
</tbody>
</table>
18 57 1A Wet flag (Y/N). (Y or N) Default is “Y” for State of Weather 5, 6, and 7. **Required**

19 58-59 2N Herbaceous greenness factor (0-20). 0 to 20 **Optional**

20 60-61 2N Shrub greenness factor (0-20). 0 to 20 **Optional**

21 62 1N Moisture Type code (1=Wet bulb, 2=Relative Humidity, 3=Dewpoint). **Required**

22 63 1N Measurement Type code: 1=U.S. **Required**

23 64 1N Season code (1=Winter, 2=Spring, 3=Summer, 4=Fall). 1 to 4 **Optional**

24 65-68 4N Solar radiation (watts per square meter). 0 to 2000 **Optional**

There may be hourly observations or once daily. If hourly observations are being entered the observation type shall be “R” except for the 1300 (LST) observation, which shall be type “O” to indicate it is the Standard NFDRS observation for the day.

All 24 hour maximum and minimum values are ‘running 24-hour values’ not for the calendar day.

Data must be formatted exactly to the documented FW9 format. Observation types may be both “R” and “O” (hourly data with 1 NFDRS observation/day) or “O” only (1 NFDRS observation/day).

The “O” observation should have a valid State of Weather Code and Wet Flag. If a 1988 Fuel Model is used, the record should also include a valid Season Code and greenness factors for the Herbaceous and Woody fuel moistures.

1. **NFDR “O/R”**. The FW9 format allows for “O” and “R” type observations. The FW9 “O” observation should also have a valid state of the weather code. WRCC Data Lister files may have the “O” designation at 1300 local time but will not have a valid state of the weather code (it is blank). FireFamilyPlus will interpret the blank to be zero (0). Non “O” type records are typed “R” (for Raws) and are not processed as NFDRS records in FireFamily.

2. **State of the weather (SOW)**. This is an assessment of the sky conditions at the observing station used to indicate the amount of cloud cover and kind of precipitation at the fire weather station at observation time. Within the NFDRS processor, the SOW is used to establish the ground/fuel level temperature and relative humidity at the weather station. These values are used in the dead fuel moisture calculations. It also established some “values by rule” as noted in the table below.

| State of Weather (SOW) Codes |
3. **Wet Flag and Snow Cover.** This entry is used in the operational NFDRS (WIMS) to indicate when the fuels are wet at observation time. The Wet Flag is automatically set to "Y" by the danger-rating processor if SOW code "5", "6", or "7" is entered. *Only in FW9 Format from KCFAST and from 1993 on.*

Both year round and seasonal stations should consider snow covered fuels. With the wet flag set to Y, but the SOW is not 5, 6, or 7, the NFDRS processor interprets the wet flag =Y to indicate snow-covered fuels. In this case, the NFDRS processor:

- Internally sets the fuel interface maximum and minimum relative humidity at 100 percent regardless of the ambient relative humidity.
- Invokes the “values by rule” of the wet flag setting.
- Internally estimates hours of snowmelt (precipitation duration) to add moisture to the 100- and 1000-hour fuels based on observation time temperature.

<table>
<thead>
<tr>
<th>Observation Time Temperature</th>
<th>Hours Fuels Wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 35</td>
<td>0</td>
</tr>
<tr>
<td>36 to 40</td>
<td>2</td>
</tr>
<tr>
<td>41 to 50</td>
<td>4</td>
</tr>
<tr>
<td>51 to 60</td>
<td>6</td>
</tr>
<tr>
<td>&gt; 61</td>
<td>8</td>
</tr>
</tbody>
</table>

NOTE - 5, 6, and 7 cause an internal wet flag to be set to “Y.” In this case, 1 and 10 hour fuel moistures are set to 35% and indices (BI, SC, IC) are set to zero because generalized precipitation over the protection unit is assumed. The ERC is computed as normal. Values 8 and 9 assume localized precipitation and the wet flag is **not** set to “Y.”
Station and observation management is done with ENFDR, DRAWS, DOBS/EOBS, DIDX, etc.
**Data Archive:** Both the ‘O’ and ‘R’ type observations will automatically be archived in the WIMS archive and the FAMWEB Data Warehouse.

**Currently the hourly observations will not be sent to the Western Region Climate Center where hourly RAWS observations are stored.**

**Error and Process Logs:**

Error and processing information will be available under the WIMS fastpath LAWS (Log of Automated Weather Stations).

**Log Information A1206200 000001**

12062 00:35:02 Alternative Automated Weather Station - Automated Gateway
12062 00:35:02 WIMS-AWS Gateway is now available
12062 00:35:02 Version 1.0.0 - PRODUCTION
12062 00:35:02 AWS015D-WIMS: Duplicate deletion flag is TRUE
12062 00:35:07 AWS017N-WIMS: Commit point reached record count = 67
12062 00:35:07 SPECIAL: Valid AWS Obs: 67 ## Invalid: 0 ## Total Records: 67
12062 01:35:02 Alternative Automated Weather Station - Automated Gateway
12062 01:35:02 WIMS-AWS Gateway is now available
12062 01:35:02 Version 1.0.0 - PRODUCTION
12062 01:35:02 AWS015D-WIMS: Duplicate deletion flag is TRUE
12062 01:35:06 AWS017N-WIMS: Commit point reached record count = 67
12062 01:35:06 SPECIAL: Valid AWS Obs: 67 ## Invalid: 0 ## Total Records: 67
12062 02:35:03 Alternative Automated Weather Station - Automated Gateway
12062 02:35:03 WIMS-AWS Gateway is now available
12062 02:35:03 Version 1.0.0 - PRODUCTION
12062 02:35:03 AWS015D-WIMS: Duplicate deletion flag is TRUE
12062 02:35:08 AWS017N-WIMS: Commit point reached record count = 67
12062 02:35:08 SPECIAL: Valid AWS Obs: 67 ## Invalid: 0 ## Total Records: 67
Appendix A – Sample Script to Create a Type 6 Station via Script instead of the WIMS Application.

```
INSERT INTO station_information (station_id, aspect, assoc_manual_station, previous_station, access_list, default_woody_fm, elevation, fcst_zone, unit_name, fuel_stick_installation_date, humidity_code, latitude, latitude_deg, latitude_min, latitude_sec, lightning_scaling_factor, longitude, longitude_deg, longitude_min, longitude_sec, nesdis_id, observing_agency, fips_state, fips_cnty, avg_annual_precip, pressure_code, region_number, station_type, site, reg_scheduled_observation_time, station_create_mod_date, station_name, temperature_code, time_zone, nemonic, user_comments, user_id, wind_direction_code, wind_speed_code, init_kbdi, season_code, one_ten_flag, woody_fm_meas_date, state, grass_green_factor, shrub_green_factor, snow_flag, pcnt_clear, pcnt_scattered, pcnt_broken) VALUES (313441, '6', NULL, NULL, 'NC-CLIM', NULL, 6200, 'GSP', NULL, NULL, 2, 35.7585, 35, 45, 31, 1, -82.2712, -82, 16, 16, '313441', 5, 37, 199, 72.97, 1, 8, 6, 2, 13, '16-Apr-2012', 'MT MITCHELL ST PARK', 1, 'EST', 'MITC', 'NC ECONET', 'WINC058', 1, 1, NULL, NULL, NULL, NULL, 'NC', NULL, NULL, 'N', 85, 75, 50);COMMIT;

INSERT INTO raws_sensors (nesdis_id, sensor_id, short_desc, sensor_desc) VALUES ('313441', 9, 'RD', 'Radiation, Direct Beam Solar Radiation');COMMIT;

INSERT INTO fuel_models (station_id, fuel_model, model_priority, date_modified, percent_fm_rep, slopeclass, grasstype, shrub_type, greenup_date, herb_veg_date, herb_veg_stage_code, herb_veg_stage_number, grass_green_factor, shrub_green_factor, silo_value, sihi_value, silo_percent, sihi_percent, number_display_classes, climate_class, staffing_index) VALUES (313441, '7G', 1, '16-Apr-2012', 100, 1, 'P', 'D', '01-Jun-2012', '01-Jun-2012', 'P', 1, NULL, NULL, NULL, NULL, NULL, NULL, NULL, 3, NULL);COMMIT;

INSERT INTO station_sow_para (station_id, climate_class, one_hr_drizzle, one_hr_rain, one_hr_shower, three_hr_dur_wetflag, three_hr_amt_wetflag, twentyfour_hr_dur_wetflag, twentyfour_hr_amt_wetflag) VALUES (313441, 3, 0.05, 0.1, 0.25, 3, 0.5, 12, 1.0);COMMIT;
```