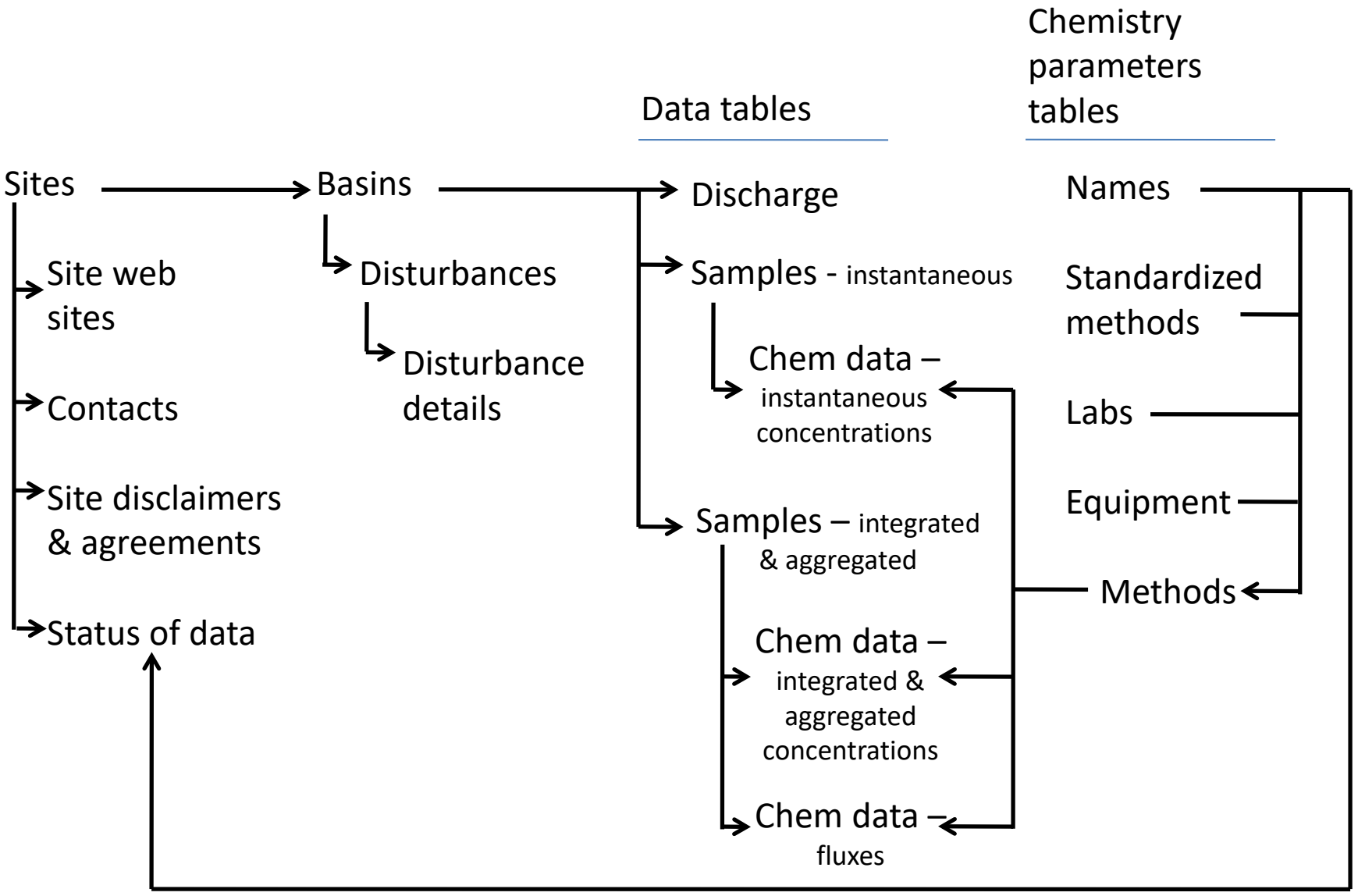
Current EFR synthesis database design



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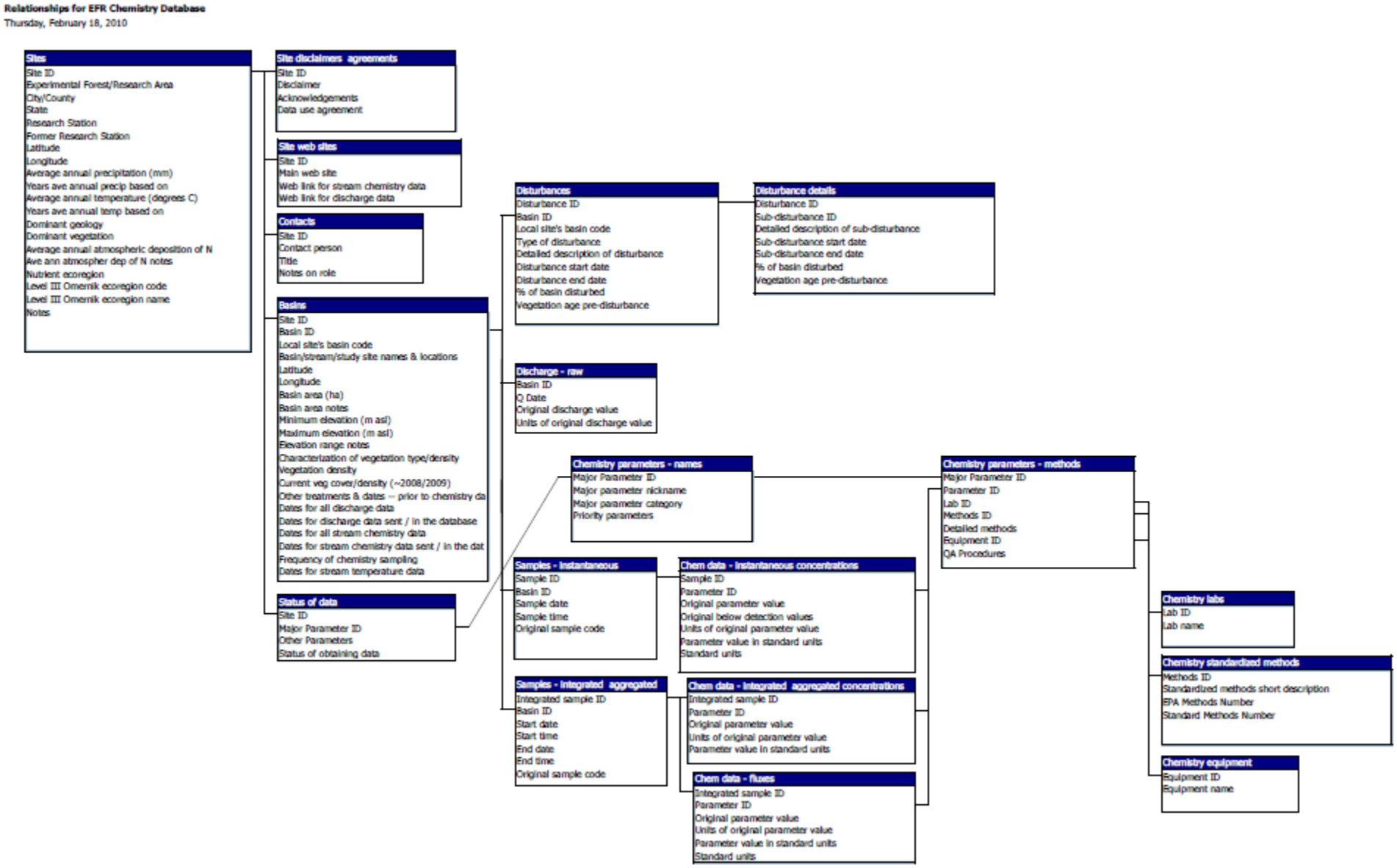

Notes

-This is a draft designed with one-time synthesis/analysis in mind – thus, this is a starting point for HydrochemDB, not an end point

-This is a draft for the underlying data storage only – this does not include any design elements for the format in which users would retrieve data from a public web site

-We are reviewing several other aquatic chemistry databases for design ideas and potential compatibility (e.g., using the same parameter names or codes):

- **-USGS NWIS & USGS WATSTORE**
- **-NADP**
- **-Watershed Monitoring & Analysis Database (Carlton et al. 2004)**
- **-NWQMC data elements guidelines**

Standardizing data & issues of comparability

Converting to standard units

-clear labeling of original units

-nitrate as nitrogen, NO_3-N (mg N/L) vs nitrate as nitrate, NO_3 (mg NO_3/L)

NO_3 (mg/L) is ambiguous

-pre-population vs. stored procedures

Methods

-documenting lab & field methods

-standard & distinct parameter names

preliminary list

Nitrate	Calcium
Ammonium	Potassium
	Magnesium
Dissolved Kjeldahl Nitrogen	Sodium
Total Kjeldahl Nitrogen (unfiltered)	Sulfate
Total Dissolved Nitrogen	Chloride
Total Nitrogen (unfiltered)	
	Silica
Soluble Reactive Phosphorus	
Orthophosphate measured by IC	Bicarbonate
	Carbonate
Total Dissolved Phosphorus	ANC/alkalinity
Total Phosphorus (unfiltered)	pH
	Hardness
Dissolved Organic Carbon	Conductivity
Total Organic Carbon	
Dissolved Inorganic Carbon	Total Aluminum

Time steps / aggregation methods

Detection limits

Detection limits

Excerpt from current database design – ideal example (not real data)

Site	Sample	Parameter	Value	Below detection value
Luquillo	1	Nitrate	0.3	
Luquillo	1	Ammonium	0.02	
Luquillo	2	Nitrate		<0.005
Luquillo	2	Ammonium	0.01	
Coweeta	3	Nitrate	0.2	
Coweeta	3	Ammonium	0.01	
Coweeta	4	Nitrate		<0.005
Coweeta	4	Ammonium	0.02	
Coweeta	5	Nitrate		<0.001
Coweeta	5	Ammonium		<0.002

Detection limits

The reality

Bonanza/ Caribou-Poker	Didn't send	File contains zeros	
Coweeta	Sent current detection limits?	File contains zeros and values below these limits; yet aggregated data	Do the detection limits sent apply to historic data?
Fernow	Sent current detection limits?	Ammonium data, which is consistently below their detection limit, was not sent	Do the detection limits sent apply to historic data?
Fraser	Sent detailed file of lab's detection limits since 1987	File contains zeros, "-0-" and values below those limits	Detection limits prior to 1987?
H.J. Andrews	Below detection flagged since 1991	File doesn't say what those detection limits are; file contains flagged zeros and numbers above zero	Detection limits prior to 1991?
Hubbard Brook	No detection limits sent/given	File does flag null values; aggregated data – detection limits may be moot	
Luquillo	Detailed clarification of detection limit treatment over email	File gives below detection values as ½ the detection limit	Site chemist has gone through a thorough process of estimating historic unknown detection limits
Marcell	Deleted below detection values from data sent – re-doing data file		
San Dimas	Detection limit for nitrate always well exceeded?		
Santee	Sent detailed detection limit information	Historic data includes zeros; recent below detection data characterized with <detection limit coding	Listed dates of unknown detection limits & dates which they are looking for documentation
Tenderfoot	Data is characterized with <detection limit coding (e.g., <0.02, <0.005)		

Database design & data standardization summary

- Prototype database & details on metadata and detection limits to jumpstart discussion

- Level of standardization necessary for EFR synthesis depends on goals/analyses

- Issues with metadata and common formats become bigger with a ChemDB