

# UDWQ HAB Advisory Process

## Monitoring

**Routine**  
DWQ and partners monitor prioritized lakes on a monthly basis



**Response**  
DWQ and partners monitor lakes on advisory on a weekly basis

**Data Collected**  
Microcystin and Anatoxin-a  
Cell Count (Taxonomy)



## Detection

### Inform LHD

Present data collected along with DWQ recommendation. Assist in answering site specific questions

### Communication

Phone call with all stakeholders (i.e. DNR, USFS, etc.) for site specific context

## Advisory

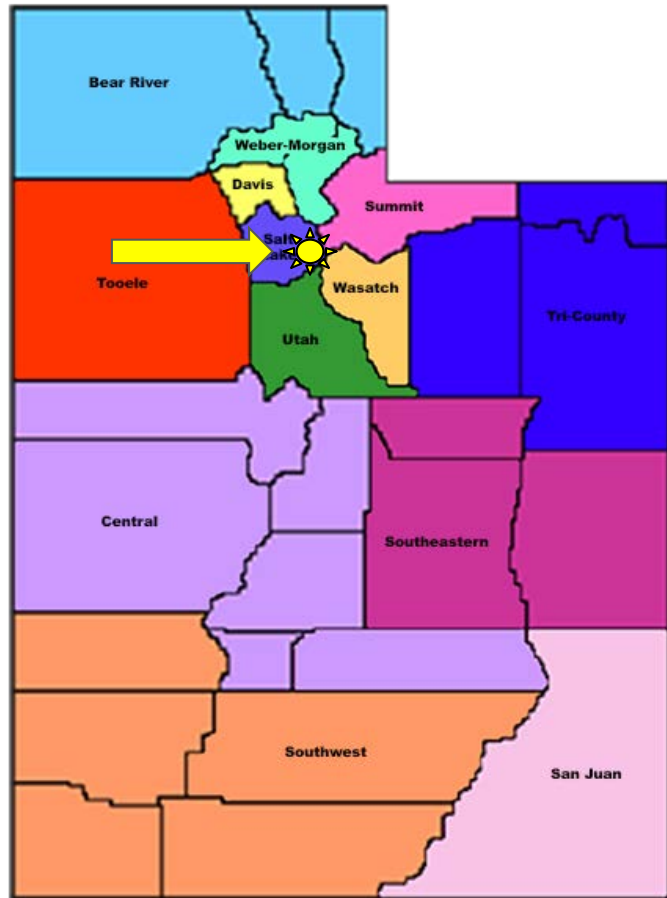
### Signs

Work with LHD and partners to post signs, make sure signs get posted

### Communication

Alert stakeholders to advisory decision. Post information, maps, and narrative about advisory on [habs.utah.gov](http://habs.utah.gov)





## Software used for initial extraction:

- **Python**
- **PyCharm** (Python IDE)
- **ArcPy** (ArcGIS Python site package)

## Basic Steps:

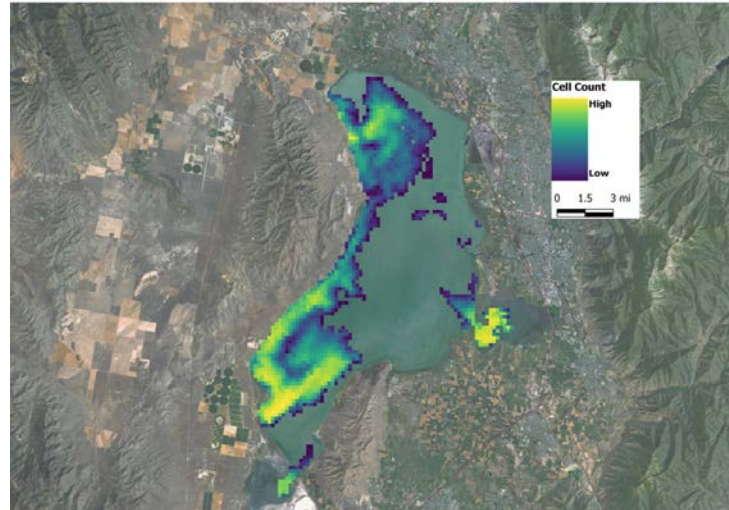
1. Extract and unzip raw Tarball from CyAN directory
2. Extract Utah specific tiles (4 of them for UT)
3. Build tile mosaic for UT
4. Extract pixels that have a hit for cyanobacteria detection
5. Using shapefile of Utah Lakes (contains name, designation, ect.), extract pixel information and merge them into Lakes shapefile

```
CYAN_WorkFlow_DailyInform_CSV.py <
13
14 day_num = '343'
15 year = 2019
16 days = int(day_num)
17
18 formDate = str(datetime.datetime(year, 1, 1) + datetime.timedelta(days - 1))
19
20
21 ##Download and unzip daily data##
22
23 #https://oceancolor.gsfc.nasa.gov/CYAN/OLCI/2019/156/L2019156.L3m_DAY_S3A_CYAN_CI_cyano_CYAN_CONUS_300m.tgz
24
25 import wget
26 url = "https://oceancolor.gsfc.nasa.gov/CYAN/OLCI/2019/%s/L2019%s.L3m_DAY_S3A_CYAN_CI_cyano_CYAN_CONUS_300m.tgz" % (day_num, day_num)
27 dl_path = r"D:\Kate\NASA\CYAN\Daily\2019\Raw_Images\L2019%s.L3m_DAY_S3A_CYAN_CI_cyano_CYAN_CONUS_300m.tgz" % (day_num)
28 wget.download(url, dl_path)
29
30 fname = r"D:\Kate\NASA\CYAN\Daily\2019\Raw_Images\L2019%s.L3m_DAY_S3A_CYAN_CI_cyano_CYAN_CONUS_300m.tgz" % (day_num)
31 os.chdir(r"D:\Kate\NASA\CYAN\Daily\2019\Raw_Images")
32
33 def extract_file(path, to_directory='.'):
34     if path.endswith('.zip'):
35         opener, mode = zipfile.ZipFile, 'r'
36     elif path.endswith('.tar.gz') or path.endswith('.tgz'):
37         opener, mode = tarfile.open, 'r:gz'
38     elif path.endswith('.tar.bz2') or path.endswith('.tbz'):
39         opener, mode = tarfile.open, 'r:bz2'
40     else:
41         raise ValueError, "Could not extract '%s' as no appropriate extractor is found" % path
42
43     cwd = os.getcwd()
44     os.chdir(to_directory)
45
46     try:
47         file = opener(path, mode)
48         try:
49             file.extractall()
50         finally:
51             file.close()
52     finally:
53         os.chdir(cwd)
54
55     extract_file(dl_path)
56
57     print 'Raw TAR Data Downloaded'
58
59
```

Information output in shapefile and CSV format:

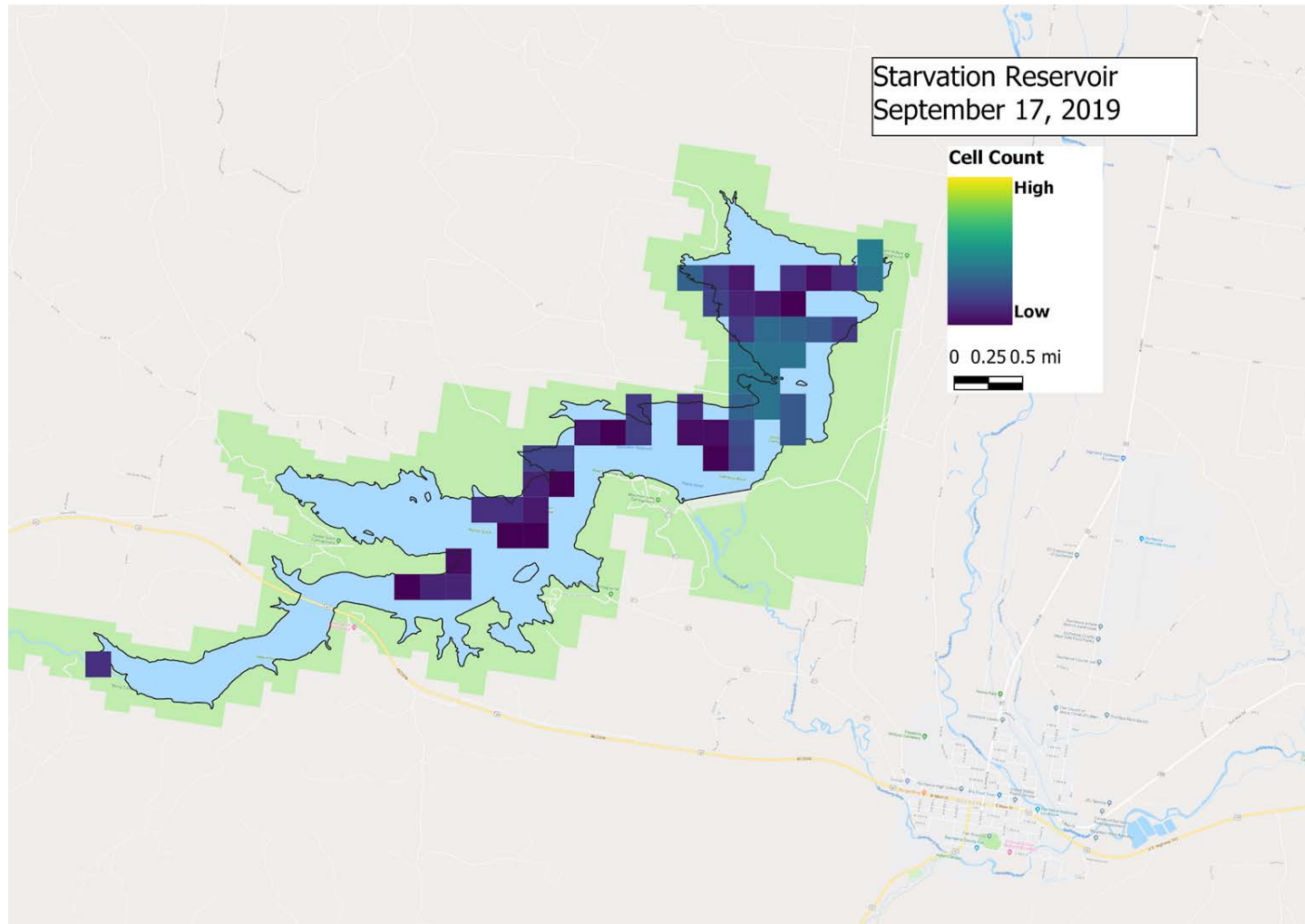
1. Maximum, minimum, mean estimated cell counts for a given lake
2. How many cyan pixels in a lake
3. HAB area in square miles
4. Optional: designated use (high recreation, drinking water, impaired, etc)

B	C	D	E	F	G
AU_NAME	MAX_Cyan_A	MEAN_Cyan_	MIN_Cyan_A	COUNT_Cyan	HAB_Area
Bear Lake	28840.30078	20376.35059	11912.40039	2	0.0694984
Bear River-1	2208000	659932.2075	7046.930176	137	4.7606401
Bear River-3	2535130	2092163.333	1870680	3	0.104248
Bear River Bay	2535130	977257.6521	11272	46	1.59846
Beaver River-2	2333460	1089412.9	270396	30	1.04248
Chalk Creek1-Coalville	135519	54705.51465	9289.660156	4	0.138997
Colorado River-2	346737	149992.3327	16143.59961	3	0.104248
Cottonwood Creek Lower	199526	199526	199526	1	0.0347492
Currant Creek Lower	366438	340542.75	301995	4	0.138997



Information emailed out to local health departments and other partners depending on their map preference. Some prefer satellite baselayer, some prefer roads.

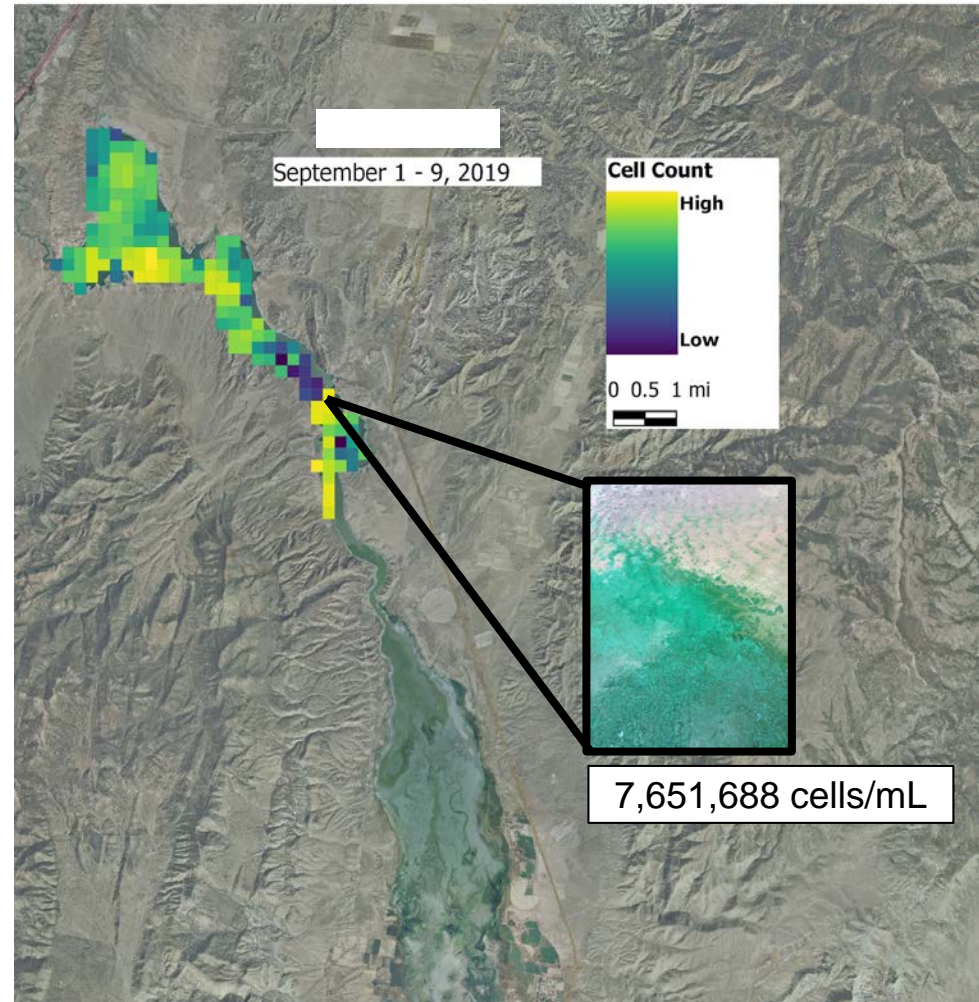
- Imagery alone is not used for making recreational health advisory decisions.
- Allows UDWQ staff and partners to target sampling areas and signage and communicate scale of bloom





## Example 1: Yuba Lake Sept. 2019

- High recreation State Park with no history of past HAB advisories
- Week long composite of imagery helped Park managers visually see that there was a significant bloom occurring in the northern end
  - Bloom was prone to dispersing through the water column during the day -- rangers and managers were missing peak bloom and thought advisory was initially not necessary (despite toxins and cell counts)



# Example 2: Deer Creek Reservoir, Sept. 2019

- Caught on satellite before in-situ
- Drone flight and field visit confirmed
- Advisory issued quickly



## WARNING

### Harmful Algae Present

- Do not swim or water ski in this area.  
*No nadar o haga esquí acuático en esta área.*
- Avoid areas of algae scum when boating.  
*Evite las áreas de escuma de algas cuando navegue en bote.*
- Keep animals away.  
*Mantenga alejados a los animales.*
- Do not ingest the water.  
*No ingiera el agua.*
- Clean fish well and discard guts.  
*Limpie bien el pescado y deséchale las tripas.*

\*Algae may move or disperse depending on temperature, wind, and weather.

Date Posted: \_\_\_\_\_

Contact the Utah the Utah Poison Control Center if you or your animals have unexplained sickness or signs of poisoning. (800) 222-1222

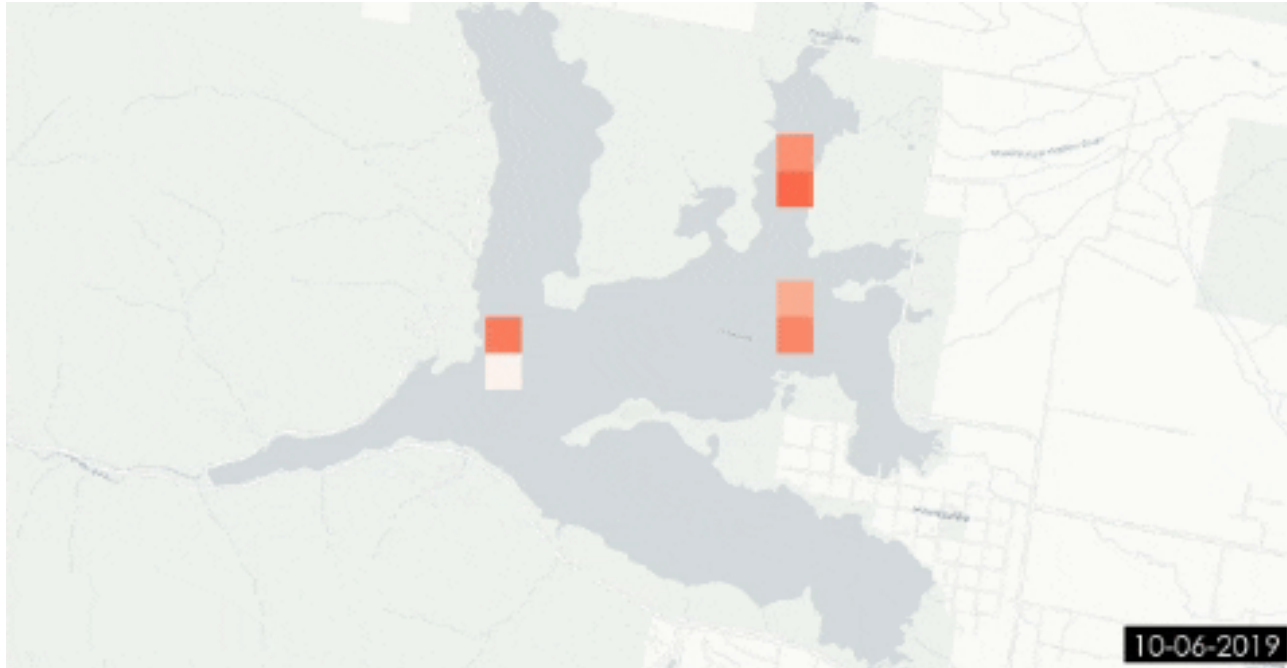


Visit [habs.utah.gov](https://habs.utah.gov) for more info.  
Report an algae bloom: (801) 536-4125

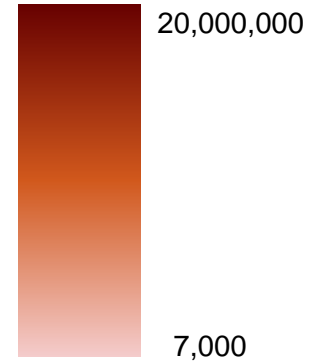


### Example 3: Pineview Reservoir, October 2019

- 3000 acres
- High recreation in all areas of reservoir
- LHD reported bloom was isolated in specific beach areas
- Imagery helped LHD target sampling and advisory signs as the bloom moved around the reservoir



Cyanobacteria Cells/ml





# UDWQ HAB Advisory Process

