WebGIS Application for Visualizing Historical Reclamation Research Sites Using a Modified QGIS2Web Framework

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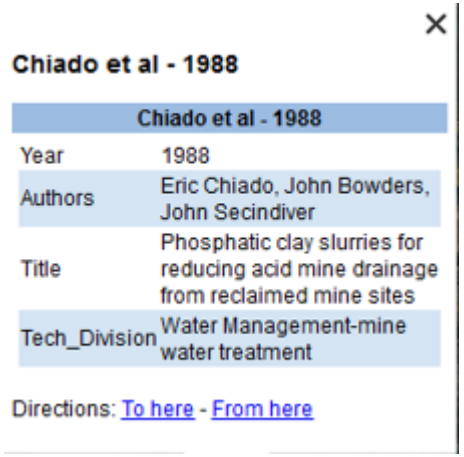
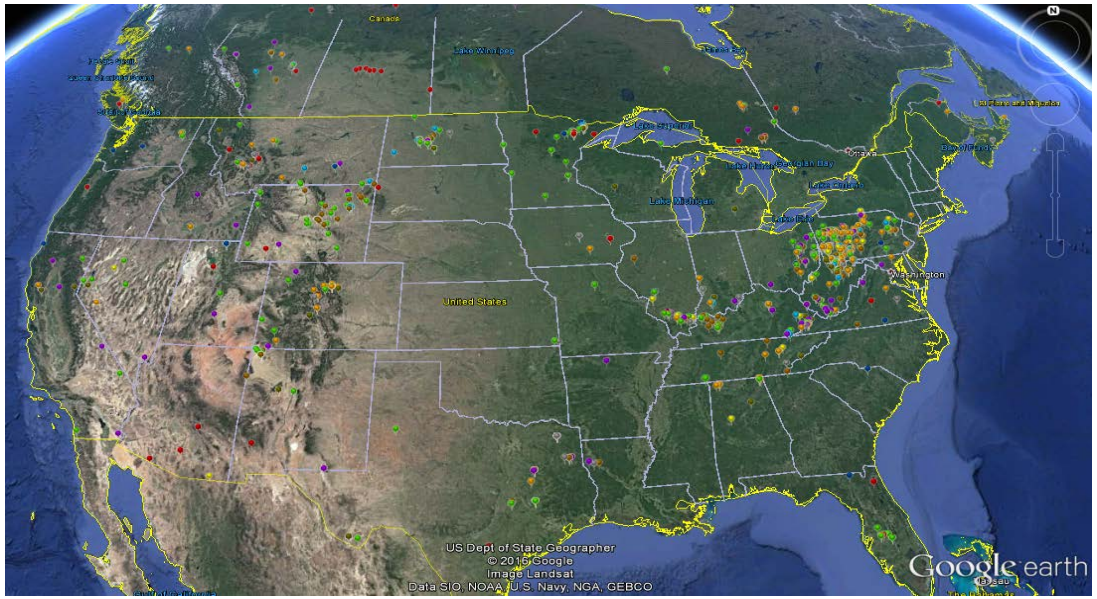
Introduction

- Previous research geocoded locations of ASMR reclamation research sites using Google Earth
- This work was based on contextual information found in ten years of published conference proceedings and ASMR journal articles
- However, these placemarkers do not provide direct access to the publications

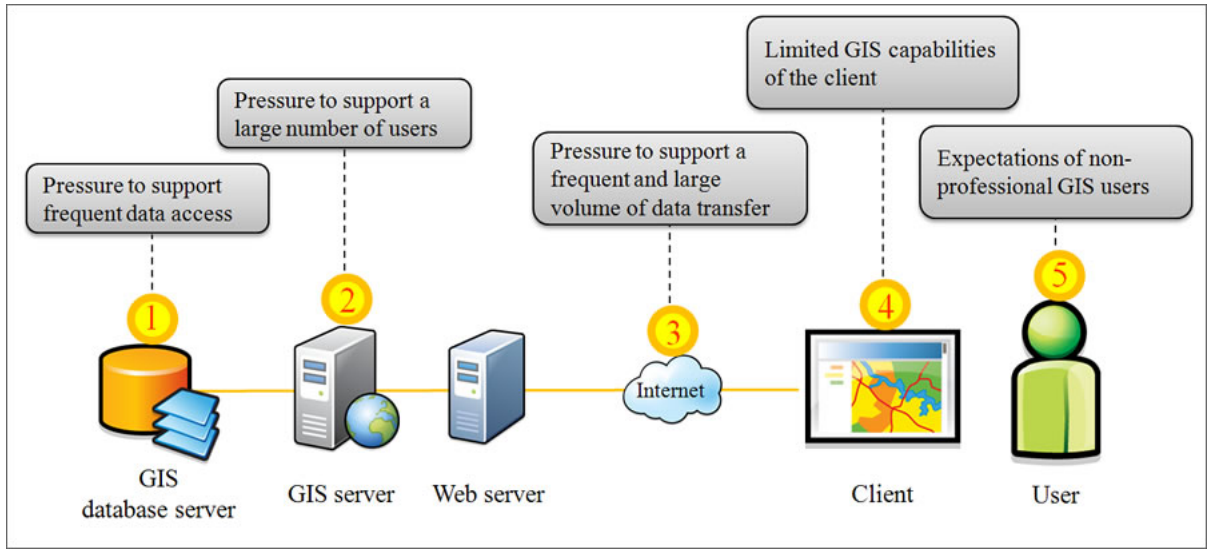
ASMR
American Society of Mining & Reclamation





Introduction

- Difficulties arise in effectively interpreting the information in terms of its geographic context
  - No concurrent access to PDFs
- Ideal to have visualization tools for both mapping and PDF access
- So, what is the cost-effective option?



Introduction

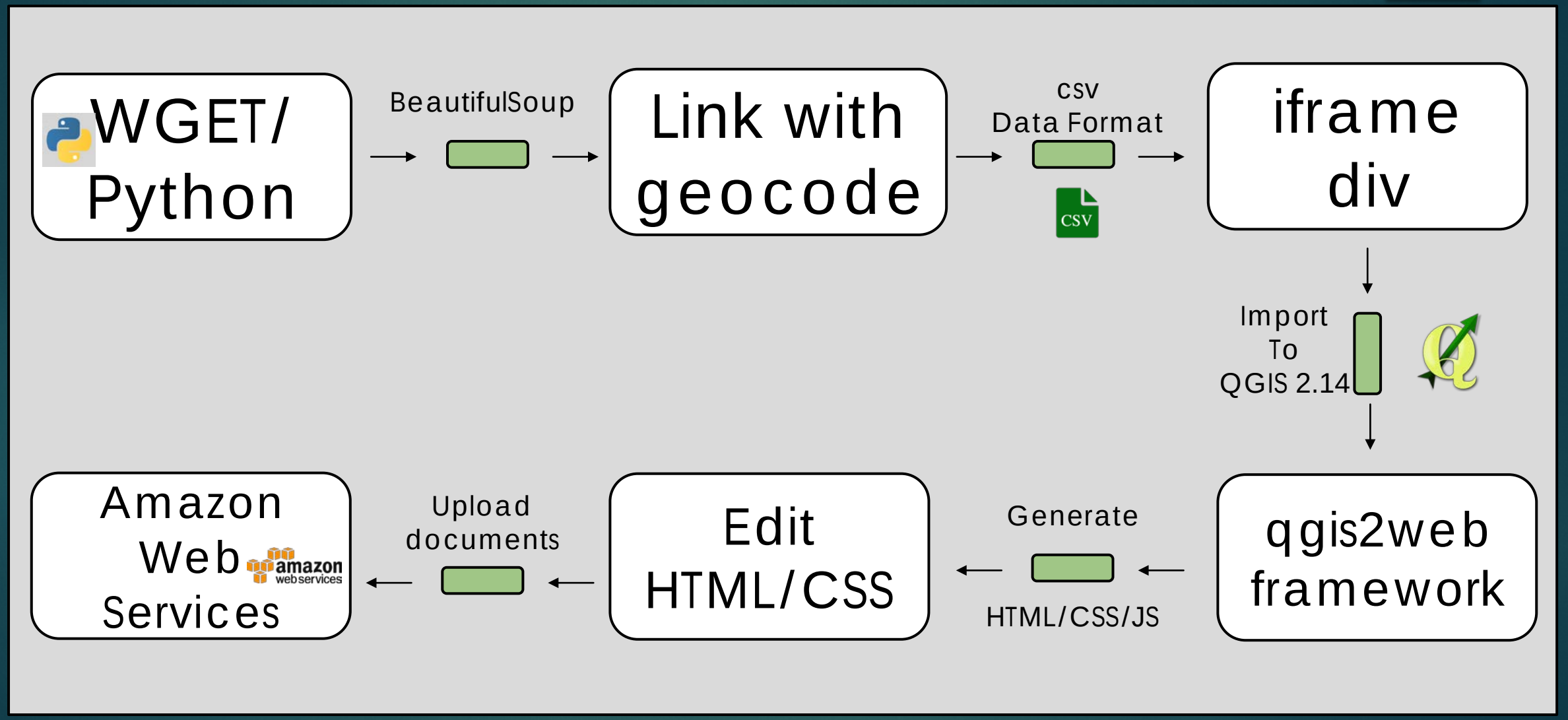
- Proprietary web GIS options such as ArcGIS Online are costly
- Open Source Geospatial Foundation opens the source code and is free to use
- Open Geospatial Consortium (OGC) provides voluntary standards for software

Methods

- QGIS desktop has a tool called qgis2web
- Easy to use: load the .csv data and convert it as Javascript
- Provides a framework of files in HTML/CSS/JS
- Uses Leaflet.js for the backend data framework
- **OpenStreetMap** for the base map

OpenStreetMap
The Free Wiki World Map

Methods (workflow)



Methods

- We first needed to scrape the PDF links and merge with the existing geocoded data
- Python and the library Beautiful Soup and requests was used to handle HTML parsing
- Since there was no OID/FID, manually link each paper with the appropriate metadata

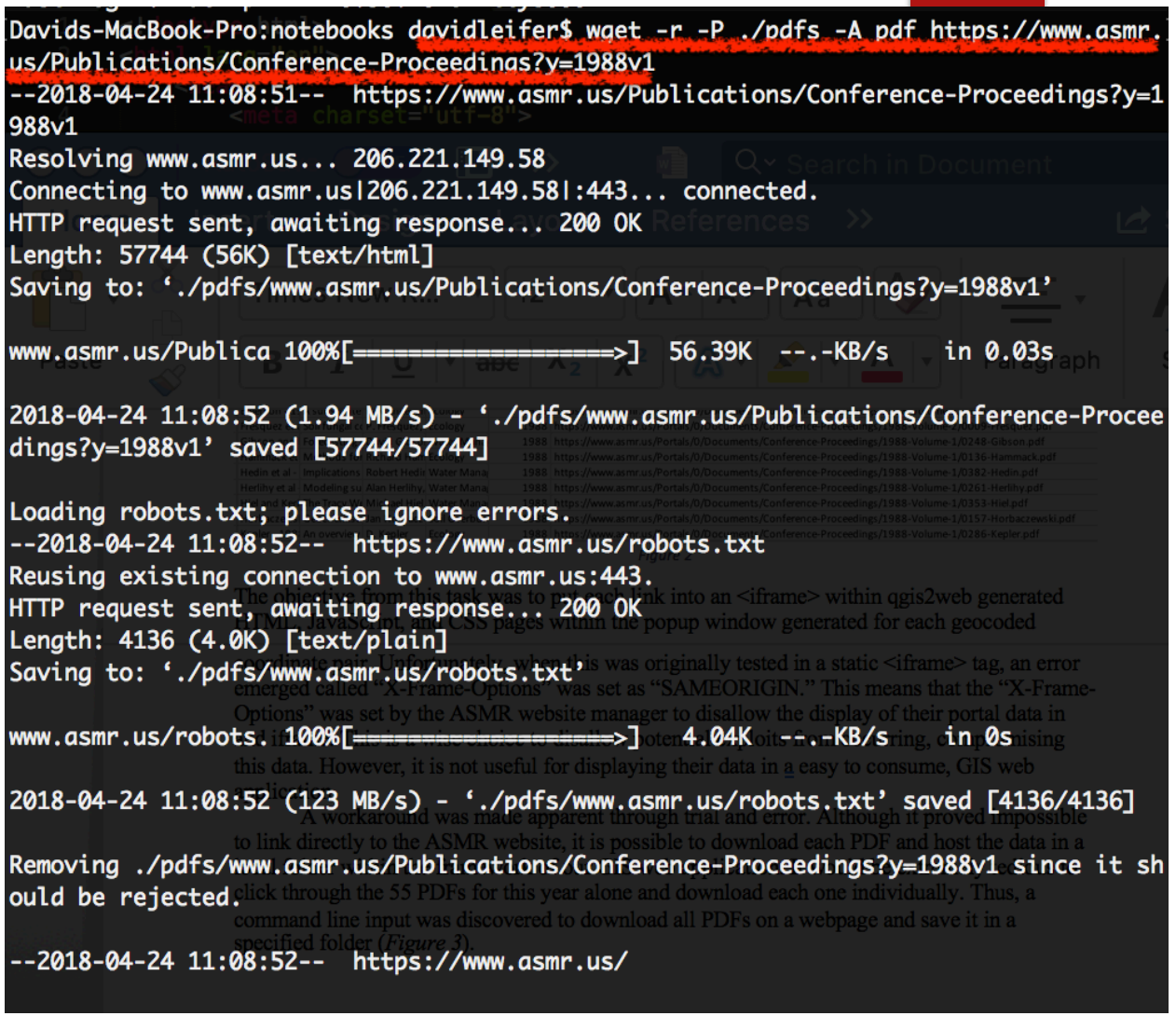
```
In [1]: from bs4 import BeautifulSoup

        import requests
        r  = requests.get("https://www.asmr.us/Publications/Conference-Proceedings?y=1989")
        data = r.text
        soup = BeautifulSoup(data)

        for link in soup.find_all('a'):
            print(link.get('href'))
```

```
/Portals/0/Documents/Conference-Proceedings/1989/0661-Kalin.pdf
/Portals/0/Documents/Conference-Proceedings/1989/0673-Hammack.pdf
/Portals/0/Documents/Conference-Proceedings/1989/0681-McCready.pdf
/Portals/0/Documents/Conference-Proceedings/1989/0687-Johnson.pdf
/Portals/0/Documents/Conference-Proceedings/1989/0695-Peters.pdf
/Portals/0/Documents/Conference-Proceedings/1989/0707-Ziemkiewicz.pdf
```

D	E	F	G	H	I
Name	Title	Authors	Tech_Divis	Year	Link
Ackman and	Stream sealir	T. Ackman, C	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0404-Ackman-Rymer.pdf
Amrani and S	Habitat use b	Cheryl Amrar	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0125-Amrani.pdf
Ashby et al -	Establishmer	Clark Ashby,	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0048-Ashby.pdf
Bennet et al -	Rehabiliatior	John Bennet	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0104-Bennett.pdf
Rhumbla et a	Selenium up	Devinder Rhu	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0015-Bhumbla.pdf
Boyle - 1988	A program to	James Boyle	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0139-Boyle.pdf
Brady et al -	A study of m	Keith Brady,	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0033-Brady.pdf
Brenner and	First year eva	Fred Brenner	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0133-Brenner.pdf
Brodie et al -	An evaluatio	Gregory Broc	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0389-Brodie.pdf
Buck and Ho	Direct Reveg	John Buck, R	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0236-Buck.pdf
Burley et al -	Big Stone Gr	J. Burley, S. J	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0161-Burley.pdf
Chaiken and	Burnout con	Robert Chaik	Others	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0337-Chaiken.pdf
Chiado et al -	Phosphatic c	Eric Chiado,	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0044-Chiado.pdf
Coleman and	Partial reclan	John Colema	Soil Overbur	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0296-Coleman.pdf
Dalverny - 19	Heat removal	Louis Dalver	Others	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0343-Dalverny.pdf
Davidson et	Progressive c	Walter David	Soil Overbur	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0089-Davidson.pdf
Dietz and Ur	Effects of Sp	Jonathan Die	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0310-Dietz.pdf
Diodoto and	Unsaturated	David Diodo	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0240-Diodato.pdf
Eger and Lap	Nickel and co	Paul Eger, Kir	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0301-Eger.pdf
Emerick et al	Treatement c	J. Emerick, W	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0345-Emerick.pdf
Emerson - 19	A substitute	Lawrence Em	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0274-Emerson.pdf
Fresquez et a	Soil fungal co	P. Fresquez,	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-2/0009-Fresquez.pdf
Gibson and	Forecasting t	David Gibsor	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0248-Gibson.pdf
Hammack et	Methods for	Richard Ham	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0136-Hammack.pdf
Hedin et al -	Implications	Robert Hedir	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0382-Hedin.pdf
Herlihy et al -	Modeling su	Alan Herlihy,	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0261-Herlihy.pdf
Hiel and Keri	The Tracy We	Michael Hiel,	Water Mana	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0353-Hiel.pdf
Horbaczews	Geochemistr	Jan Horbacz	Soil Overbur	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0157-Horbaczewski.pdf
Kepler - 198	An overview	D. Kepler	Ecology	1988	https://www.asmr.us/Portals/0/Documents/Conference-Proceedings/1988-Volume-1/0286-Kepler.pdf

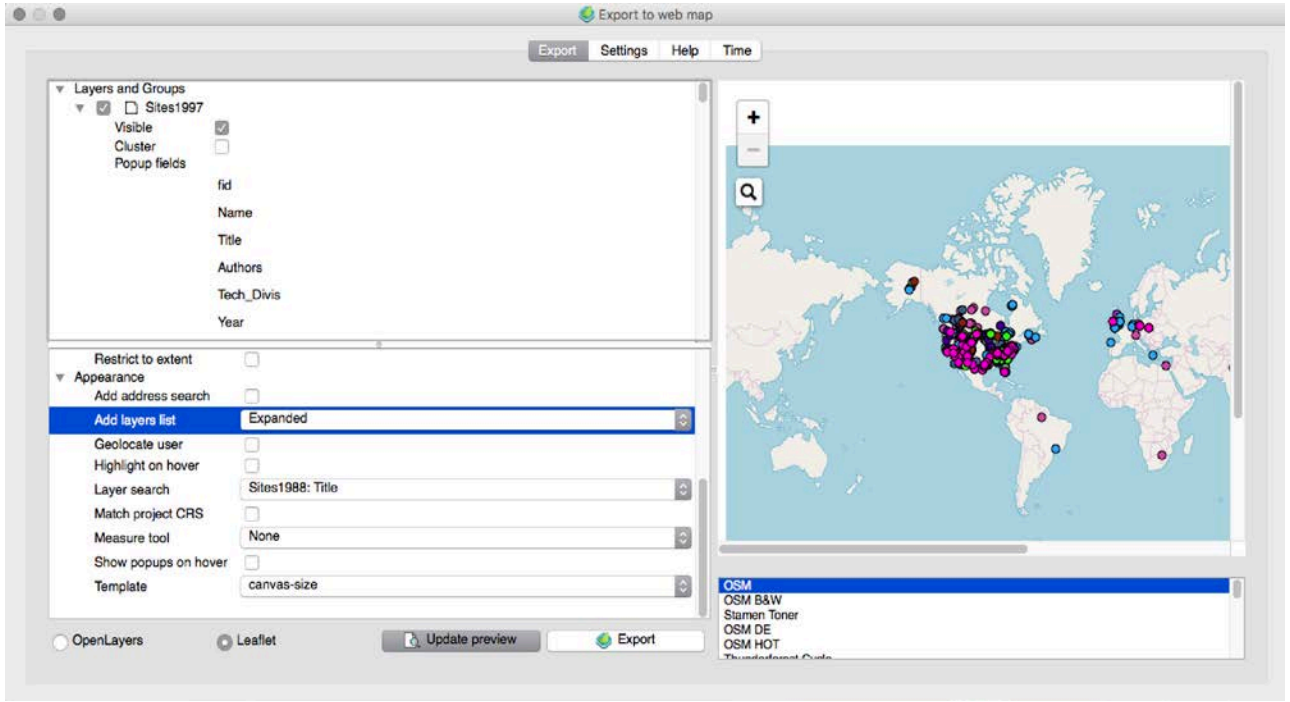
Methods

- Discovered that the iframe could not be modified directly in the HTML
- A workaround to download each PDF and link to the file locally
- PDFS were scraped from the ASMR website
- A workaround was found on GIS stack exchange about including a picture in the popup window
- This technique was applied to the iframe div in the csv file



Methods

- Ten years of place marker data was added to QGIS 2.14 for desktop
- Qgis2web plugin was installed and opened
- WebGIS mapping fields were reformatted to match the iframe
- A search function was included to find titles of the layer
- Leaflet and OpenStreetMap were selected for mapping



Methods

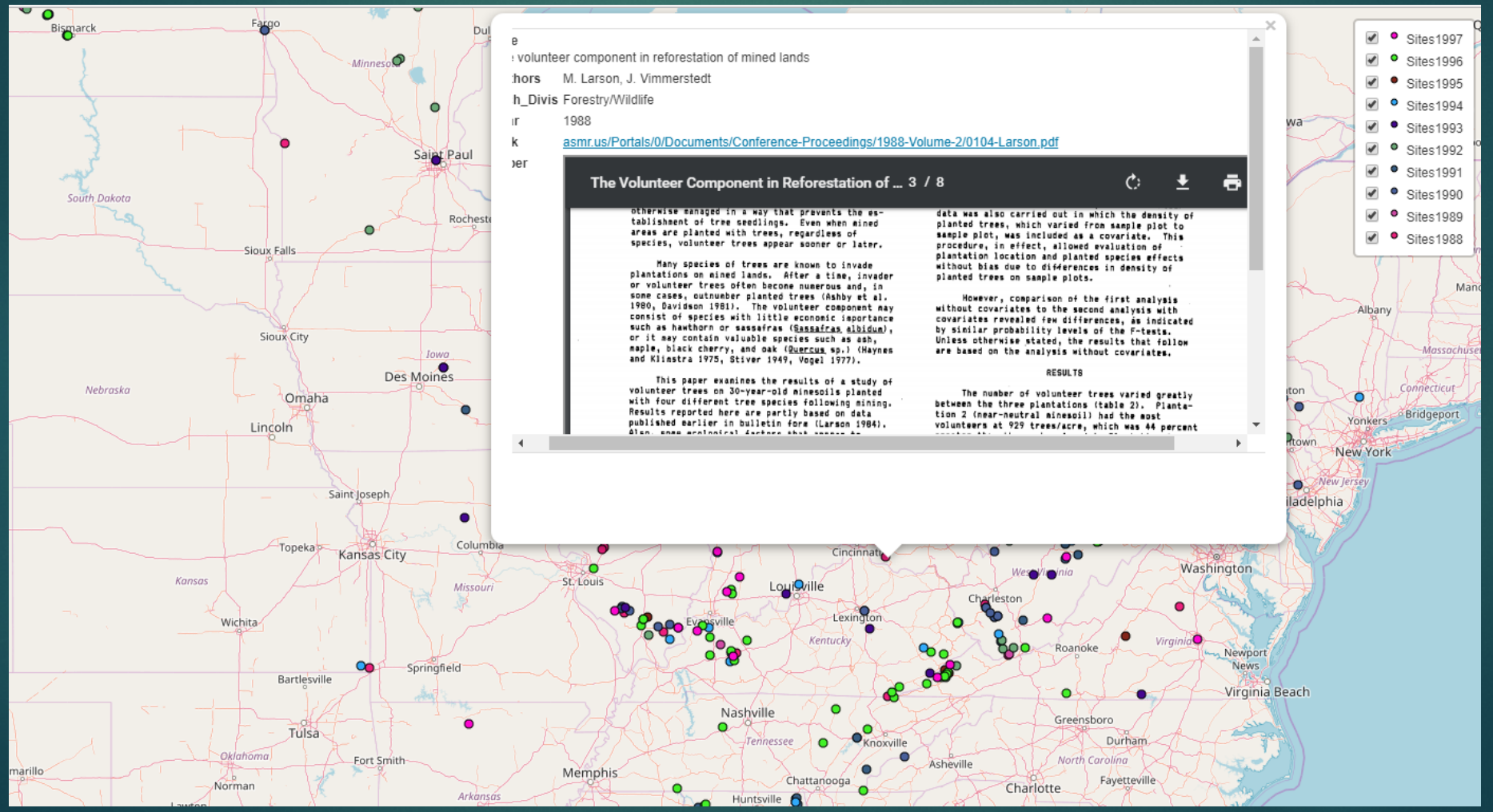
- This generated an HTML index file
- 5 CSS, 17 JS, and 10 JS files of vector data
- The height and width parameters of the map div were altered
- The height and width of the popup info window were altered
- Uploaded to Amazon Web Service as an online hosting option

```
<style>
html, body, #map {
    width: 100%;
    height: 100%;
    padding: 0;
    margin: 0;
}
</style>
```

```
456
457  .leaflet-popup {
458      position: absolute;
459      text-align: center;
460      margin-bottom: 20px;
461
462      height: 500px;
463      width: 750px;
464      }
465  .leaflet-popup-content-wrapper {
466      padding: 1px;
467      text-align: left;
468      border-radius: 12px;
469
470      height: 500px;
471      width: 750px;
472      }
```

Results

- http://letsplaywaves.org.s3-website-us-east-1.amazonaws.com/qgis2web_2018_04_24-17_15_53_000682/index.html#2/28.2/42.0

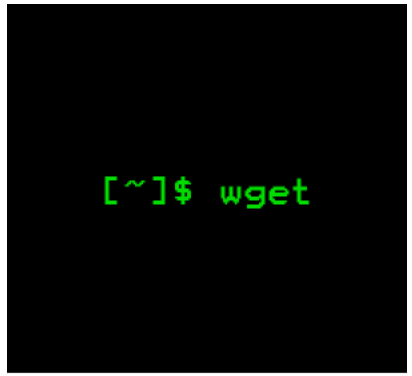


Discussion

- Successfully implemented an open source web GIS application
- The iframe only works for computer-based browsers so far
- Only harvested PDFs from one year
- Amazon Cloud is effective in hosting the service

Summary

- Created an easy to use web GIS application using QGIS, Leaflet and OpenStreetMap
- Used Python with Beautiful Soup and requests to harvest link information
- Used command line package WGET to download the PDFs
- **The proposed framework can be developed into a fully functional visualization tool**



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Questions?

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