

Brendan C. Ward

Software Engineer

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WORK EXPERIENCE

2019—present: Owner | Lead Software Engineer, Astute Spruce, LLC Corvallis, OR

I work collaboratively with science-based organizations to develop highly-customized software solutions for real-world problems. I leverage my unique talents and background at the fusion point between science and software engineering to amplify the impact of these organizations, empower their stakeholders with higher-quality data through intuitive and compelling applications, and increase engagement within the science and conservation communities.

- Develop highly-intuitive, highly-performant user-oriented applications using full-stack software engineering including - but not limited to - Python, modern Javascript, and Go.
- Provide consulting and software architecture guidance.

2007—2019: Chief Software Engineer, Conservation Biology Institute Corvallis, OR

I led CBI's software development team to create tools and platforms that empower the conservation community to share, visualize, interpret, and apply geospatial data.

- Worked closely with scientists and clients to co-design highly effective, intuitive, and innovative data visualization and communication applications that allowed them to deliver high value information. Used full-stack software engineering across a broad range of applications and technologies to make these applications a reality.
- Led [Data Basin](#), a multi-million dollar, groundbreaking geospatial data sharing and collaboration platform used by over 28k registered users.
- Wrote successful proposals and managed multi-disciplinary projects (won projects totalling over \$500K; led projects totalling over \$1.5M).
- Recruited and supervised staff, managed team operations, and oversaw staff development. Contributed to CBI strategic direction and business development.

2004—2007: Biological Scientist / GIS Specialist, U.S. Forest Service Missoula, MT

I led the historical fire regime mapping and modeling team within the LANDFIRE project, a highly-ambitious project to quantify current vegetation cover, potential vegetation, fire risk and behavior, and departure from historical conditions across the U.S.

- Added value across the entire project by contributing major improvements to data acquisition, processing, and products; these improvements saved thousands of dollars in computing and labor costs and expanded the diversity and value of project products.
- Directly applied software engineering skills to improve simulation models, resulting in major decreases in processing time, and created new tools using machine learning to classify and map vegetation types using remotely sensed imagery at landscape scales.
- Developed new methods for mapping invasive vegetation and potential fire impacts.

EDUCATION

2004: M.Sc. Forest Ecology

University of Wisconsin
Madison, WI

2002: B.Sc. Envr. Science

Western Washington
University, Bellingham, WA

HIGHLIGHTED PROJECT EXPERIENCE

U.S. Fish and Wildlife Service (USFWS): Enhanced User Engagement with Conservation Blueprints in the Southeastern U.S. (2019-2021):

- Currently developing significant performance improvements and functionality for the South Atlantic Conservation Blueprint Simple Viewer (below).
- We will develop a Southeast Conservation Blueprint Explorer based on this framework, which will enable users to better engage with conservation blueprints developed across the region.

Southeast Aquatic Resources Partnership (SARP): [Southeast Aquatic Barrier Prioritization Tool](#) (2018 - 2019):

- This application empowers members of the aquatic conservation community to better identify and prioritize aquatic barriers for removal and restoration, which will improve aquatic connectivity and support healthier aquatic ecosystems.
- Developed a highly-performant yet cost-effective map-oriented visualization framework that allows users to interactively explore and query millions of potential aquatic barriers in the Southeastern U.S. Created icons, graphics, and content to effectively communicate the purpose and functionality of this application to a diverse audience.
- Developed a highly-performant data processing pipeline for calculating aquatic network characteristics of >140,000 aquatic barriers and >7 million river and stream segments, as a replacement for data processing tools developed by prior partners that could not scale to this quantity of aquatic network data.

Pacific States Marine Fisheries Commission / Pacific Marine & Estuarine Fish Habitat Partnership / North Pacific Landscape Conservation Cooperative: [West Coast Estuaries Explorer](#) (2017 - present):

- This application provides an intuitive yet sophisticated approach to visualizing and exploring information on estuaries along the U.S. West Coast. Targeted at the estuary science and conservation community, it enables users to quickly identify which estuaries meet different criteria, provides detailed information for individual estuaries, and highlights the importance of estuaries for a range of species of conservation interest.
- Developed a performant map-based data visualization application that combines interactive filtering with a broad range of available data for each of 444 estuaries along the coast, and developed a data processing pipeline to collate estuary data from multiple sources.

New Zealand Department of Conservation (DOC): Pilot Budget Allocation Application (2019):

- This application will aid DOC during long-term budget planning. It is targeted at decision-makers and support staff within DOC.
- Developed a lightweight, intuitive, web-based application that allows users to visually explore the outcomes of current and projected budgets on staffing, species, ecosystems, visitor engagement, and other department objectives.

U.S. Department of Agriculture - Forest Service (USFS): [Bat Acoustic Monitoring Visualization Tool](#) (2019):

- This first-of-kind application enables bat ecologists and members of the bat monitoring community to explore a growing dataset on bat detections (>28M bat detections and >6M individual species detections) across North America, which can be used to explore trends in species abundance throughout the year across the continent. This tool facilitates further data sharing with many partners and highlights individual data contributions.
- Developed a highly-performant map-oriented visualization tool for exploring large volumes of bat echolocation monitoring data and associated data pipeline to distill large volumes of echolocation data to ensure high-performance visualization.

Paulson Institute / Chinese Ministry of Environment and Ecology: Environmental Risk Screening Tool (2017 - 2019):

- This project enables Chinese agency staff to perform environmental risk screening during their evaluation of China's major investments in infrastructure development worldwide. If fully adopted, this tool will directly reduce the environmental and social impact of these infrastructure projects around the world.
- Managed the overall project and led the technical team to develop this extremely ambitious application, and contributed significantly to user interface design, system architecture, full-stack software engineering, and development of user guides and technical documentation.
- Directly engaged in-person and remotely with Chinese ministry officials to gather project requirements and technical specifications, use cases, and data.
- Provided several in-person trainings to Chinese agency staff in Beijing during 2018-2019.

Peninsular Florida Landscape Conservation Cooperative (PFLCC): [Florida Climate Adaptation Explorer](#), [Florida Conservation Planning Atlas](#), [Florida Conservation Actions Tracker](#), and [Florida Conservation Priorities Viewer](#) (2015 - 2019):

- This portfolio of applications helps PFLCC better communicate a broad array of data and information resources to their diverse audience.
- Served as technical lead, project manager, and primary software engineer on these projects, and was the sole developer of the Climate Adaptation Explorer.
- Led a highly-effective 2 day design sprint for the Climate Adaptation Explorer onsite with PFLCC staff, and then led a mini training session within CBI based on this workshop.

Data Basin: Geospatial data collaboration and visualization platform (2007 - 2018)

- This platform provides an unprecedented data sharing, visualization, and communication tool for the conservation community worldwide (>28k users and >30k user-uploaded geospatial datasets). Users are able to upload, share, visualize, and download geospatial data, as well as use group workspaces to review and refine data products.
- Architected and led the initial development of Data Basin as well as several major upgrades and special initiatives. Provided project management, technical leadership, and full-stack software engineering for 11 years.
- Worked closely with internal and external project stakeholders to develop use cases, data processing pipelines, and system help / documentation. Provided direct user support for clients and general users, many of whom were surprised by my rapid and effective response to issues.
- Contributed to user outreach and business development as well as overall product strategy.

U.S. Fish and Wildlife Service, South Atlantic Landscape Conservation Cooperative

(SALCC): [South Atlantic Conservation Blueprint Viewer](#) (2014 - 2018)

- This map-based application empowers decision-makers and members of the conservation community throughout the Southeast US to explore, summarize, and download reports on shared conservation priorities. This application facilitates coordination and collaboration within the conservation community, and directly supports the mission of the SALCC through more effective user engagement and data sharing.
- Served as project manager, technical lead, and full-stack software engineer through several major upgrades of the Blueprint data and application. Co-designed the application through close and very positive interaction with the SALCC.
- Developed a highly innovative approach to delivering pixel-based map data to provide realtime exploration of data for individual locations on the map with minimal technical complexity and cost.
- SALCC staff were so happy with my work that they led additional clients to CBI, resulting in hundreds of thousands of dollars in new work, and contributed significantly to CBI's reputation in the conservation community in the southeastern US.

HIGHLIGHTED OPEN-SOURCE SOFTWARE PROJECTS

- [mbtiles-server](#): very lightweight map tile server used in production by many CBI projects (Go); runs on the smallest virtual servers in Amazon Web Services for cost-effective geospatial projects.
- [mbgl-renderer](#): a tool to create static map images from Mapbox GL maps for use in downloadable reports and online applications (NodeJS).
- [nhdnet](#): a data processing and aquatic connectivity analysis library for the National Hydrography Dataset high resolution stream and river network (Python).
- [trefoil](#): multi-dimensional geospatial array processing and rendering library (Python).
- Core contributor to [rasterio](#): geospatial I/O and analysis library written in Python.
- See more at: <https://github.com/brendan-ward>