

## Christopher D. Smith

Geology (B.S.), Indiana University Northwest — Expected December 2026

**Research Focus:** Coastal wetland geomorphology and geobiology, GIS-based historical landscape reconstruction, biogeomorphic and hydrologic landscape change.

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## Education

### **Bachelor of Science in Geology**

**GPA: 3.97**

Indiana University – Northwest — Expected December 2026

Chancellor's List, Spring 2026

### **Associate of Science in Chemistry (Ivy Honors Program)**

**GPA: 3.84**

Ivy Tech Community College – Lake County — 2021

Dean's List (multiple semesters), *Magna Cum Laude*

### **Associate of Science in Biology (Ivy Honors Program)**

**GPA: 3.84**

Ivy Tech Community College – Valparaiso — 2020

Dean's List (multiple semesters), *Magna Cum Laude*

### **Associate of Science, Liberal Arts (Ivy Honors Program)**

**GPA: 3.84**

Ivy Tech Community College – Valparaiso — 2020

Dean's List (multiple semesters), *Magna Cum Laude*

### **Bachelor of Science in Business Administration**

Concentration in Environmental Sustainability

University of Phoenix – Honolulu — 2014

## Selected Coursework

Geology & Earth Systems: Structural Geology, Sedimentology & Stratigraphy, Field Methods in Geology, History of the Earth, Petrology, Climate Change, Oceanography, Mineralogy (Fall 2026)  
GIS & Quantitative Methods: Advanced GIS, Environmental GIS, Python for GIS (Fall 2026), Calculus I–II, Statistics, Calculus-Based Physics I (Mechanics), Physics II (Heat, Electricity, and Optics)  
Supporting Sciences: Organic Chemistry I–II, Analytical Chemistry (Quantitative Chemical Analysis), Genetics, Molecular Biology, Microbiology

## Research Experience

### **GIS Landscape Change Analysis — I-80/94 Corridor (Frank Borman Expressway)**

Indiana University Northwest | 2025–present

Georeferencing historic aerial imagery (1938–1967) and integrating 2023 mosaics in ArcGIS Pro to reconstruct landscape change and evaluate infrastructure-driven geomorphic change, floodplain modification, and residential displacement across the Calumet region using multi-temporal spatial analysis and deep-learning building detection.

## Research Intern

Lake Michigan Ecological Research Station, Great Lakes Science Center

U.S. Geological Survey — Indiana Dunes National Park, Indiana

Summer 2025

- Conducted demographic census monitoring of federally threatened dune thistle (*Cirsium pitcheri*) across Lake Michigan coastal dune systems
- Surveyed permanent marker-based transects using quadrat sampling protocols supporting long-term recovery datasets
- Recorded life-stage transitions (seedling → flowering adult) for regional metapopulation monitoring
- Evaluated environmental stressors, including erosion, invasive species encroachment, and seed predation
- Collected floral tissue and seed-head samples supporting genetic diversity assessment workflows
- Identified native dune flora and monitored invasive seed-predation insects (*Larinus* spp.) affecting reproductive success of *Cirsium pitcheri* populations.
- Participated in native pollinator monitoring through the Bumble Bee Rapid Monitoring Network (BRMN)
- Performed standardized database entry, validation, and QA/QC for threatened-species recovery datasets

### **Research Trainee**

Summer 2021

Great Lakes Innovative Stewardship Through Education Network (GLISTEN)

Indiana University Northwest / Valparaiso University Collaborative Program

### **Meadowbrook Forestry Project** — Shirley Heinze Land Trust

- Established permanent vegetation inventory plots supporting long-term forest monitoring
- Conducted tree and understory vegetation surveys assessing species composition and diversity
- Compared historical aerial imagery with 2021 vegetation inventories to evaluate landscape change
- Produced GIS datasets documenting monitoring plot locations for future conservation assessment
- Delivered technical PowerPoint presentation summarizing vegetation inventory and aerial-photo analysis to conservation scientists and partner land-management staff

### **Gary Green Link Corridor Site Assessments** — The Nature Conservancy

- Conducted vegetation surveys evaluating canopy structure, understory composition, and land-cover condition across brownfield restoration parcels
- Completed conservation site assessments supporting corridor revitalization planning
- Used GIS to establish parcel ownership boundaries and spatial relationships across restoration target areas
- Supported ecological baseline documentation for long-term landscape connectivity planning
- Delivered technical PowerPoint presentation summarizing vegetation and GIS assessment findings to conservation scientists and restoration practitioners

### **Astrobiology Research Assistant**

Valparaiso University — Department of Chemistry

Indiana Space Grant Consortium | 2019

- Designed and executed experimental protocols investigating the stability of aromatic amino acids (tyrosine, tryptophan, phenylalanine) in Mars regolith simulant containing perchlorate salts
- Prepared all experimental solutions, regolith simulant mixtures, and concentration calculations for controlled degradation studies

- Calibrated and operated ultra-high-performance liquid chromatography–mass spectrometry (UHPLC–MS) instrumentation and managed autosampler sequences
- Collected chromatographic datasets and integrated peaks to quantify amino acid persistence following environmental exposure
- Interpreted mass spectra to confirm compound identity and assess oxidative degradation pathways relevant to biosignature preservation
- Produced and presented research poster: *The Stability of Amino Acids within Mars Regolith Simulant*

### **Computational Catalysis Research Assistant**

Valparaiso University — Department of Physics & Astronomy  
Indiana Space Grant Consortium | Fall 2018 – Spring 2019

- Modeled propane dehydrogenation reaction pathways on graphene-supported Ni<sub>4</sub> catalysts using VASP
- Applied density functional theory (PBE functional; PAW pseudopotentials) to evaluate binding energies and activation barriers
- Calculated minimum-energy reaction paths using climbing-image nudged elastic band (CI-NEB) methods
- Executed simulations in a Linux-based high-performance computing environment using multi-core and multi-node parallel processing
- Managed distributed simulation workflows across multiple processors and compute nodes
- Visualized and interpreted catalyst–surface interaction structures using Chemcraft

### **Field & Restoration Experience**

#### **Biological Technician Intern (AmeriCorps State & National / SCA)**

U.S. Fish and Wildlife Service — Aransas National Wildlife Refuge  
Sept 2015 – Sept 2016

- Reclaimed ~3,700 acres of refuge land supporting landscape-scale habitat management objectives
- Restored and developed six wetland units totaling ~1,300 acres through hydrologic infrastructure installation and modification
- Maintained levee gating systems and pump-supported water-control structures for wetland restoration and freshwater retention
- Supported salinity management operations across coastal marsh units to improve habitat suitability for migratory bird and alligator populations
- Implemented restoration treatments aligned with NRCS wetland conservation practice standards
- Assisted prescribed-burn unit preparation supporting coastal prairie and marsh habitat management
- Supported native vegetation establishment across restored wetland and upland units
- Supported *Falco femoralis* (Aplomado Falcon) banding operations in collaboration with The Peregrine Fund recovery program
- Developed GIS maps and maintained ecological and infrastructure datasets supporting refuge management planning
- Coordinated personnel, equipment allocation, and restoration logistics as SCA field team leader
- Operated heavy restoration equipment, including Marsh Master XL, D6 bulldozer, John Deere 8R tractor, skid steer, and FECON vegetation management systems
- Supported staging and transport of heavy equipment for refuge-scale restoration implementation

### **Biological Technician Intern (AmeriCorps State & National / SCA)**

U.S. Fish and Wildlife Service — Marais des Cygnes National Wildlife Refuge

Mar 2015 – Sept 2015

- Restored 548 acres of wetland habitat to improve hydrologic function and ecological resilience
- Restored and cataloged 104 acres of bottomland hardwood forest supporting floodplain habitat recovery
- Reestablished a 60-acre tallgrass prairie system through seed broadcasting and native vegetation establishment
- Implemented invasive species removal treatments using boom sprayers and backpack sprayers across restoration units
- Supported prescribed-burn unit preparation for prairie management and habitat maintenance
- Established monitoring plots and transects supporting restoration assessment and vegetation response tracking
- Planted native hardwood trees and milkweed species supporting pollinator habitat and ecosystem recovery
- Monitored populations of threatened Mead's milkweed (*Asclepias meadii*) within refuge management areas
- Operated agricultural restoration equipment, including tractors and spray systems, supporting habitat treatments

### **Wetland Biology Technician Intern (AmeriCorps State & National / SCA)**

National Park Service — Manassas National Battlefield Park

Sept 2016 – Mar 2017

- Restored wetland habitat functions following NRCS Wetland Conservation Practice Standards to approximate pre-disturbance hydrological conditions
- Established native wetland and pollinator grassland habitats supporting biodiversity and landscape connectivity
- Supported watershed-scale environmental education through the NOAA Bay Watershed Education and Training (B-WET) program
- Developed ecological interpretation maps and a mobile application supporting resource management and visitor engagement
- Designed standards-aligned instructional materials on coastal wetland and estuary ecology for watershed literacy initiatives
- Assisted development of interpretive materials linking hydrology, habitat restoration, and land-use history across the park landscape

### **Laboratory Experience**

#### **Lead Physical & Life Science Laboratory Technician**

Ivy Tech Community College — Valparaiso Campus

2018–Present

- Prepared and supported instructional laboratories across biology, chemistry, physics, earth science, and alternative energy curricula
- Standardized preparation of organic and inorganic chemical solutions and maintained bacterial and fungal cultures using sterile technique
- Operated, calibrated, and maintained laboratory instrumentation, including compound, dissecting, and fluorescence microscopes, spectrophotometers, analytical balances, pH meters, incubators, autoclaves, and chemical fume hoods

- Supported molecular laboratory workflows, including PCR preparation, buffer preparation, and gel electrophoresis procedures
- Prepared buffers and electrophoresis gels and calibrated instrumentation to ensure experimental reliability and instructional readiness
- Trained students and teaching assistants in laboratory instrumentation, experimental procedures, and safety compliance
- Managed laboratory inventories and chemical storage systems in accordance with institutional safety protocols
- Coordinated hazardous materials handling and laboratory safety documentation with faculty and department leadership
- Provided interdisciplinary laboratory coordination supporting faculty instruction and student experimental training across multiple scientific disciplines

## Research Presentations

### Smith, C. D.

*Assessing the Environmental Impact of the Borman Expressway in the Calumet Region*

Poster presentation, Indiana University Northwest Student Research Conference, Indiana University Northwest, 2026

### Smith, C., Kovarik, C., Davidson, K., Rowe, L.

*The Stability of Amino Acids within Mars Regolith Simulant*

Poster presentation, Symposium on Undergraduate Research and Creative Expression (SOURCE), Valparaiso University, 2019

<https://scholar.valpo.edu/cus/829/>

### Smith, C., Kovarik, C., Davidson, K., Rowe, L.

*The Stability of Amino Acids within Mars Regolith Simulant*

Invited poster presentation, Indiana University Northwest, 2019

### Kovarik, C., Smith, C., Davidson, K., Rowe, L.

*The Stability of Unnatural Amino Acids within Mars Planetary Conditions*

Poster presentation, Symposium on Undergraduate Research and Creative Expression (SOURCE), Valparaiso University, 2019

<https://scholar.valpo.edu/cus/823/>

### Duensing, J., Allred, J., Smith, C., Zygmunt, S.

*Sub-Nanometer Catalyst Clusters for Propane Dehydrogenation*

Poster presentation, SOURCE Symposium, Valparaiso University, 2019

<https://scholar.valpo.edu/cus/782/>

### Allred, J., Smith, C., Zygmunt, S.

*Altering the Activity of a Ni<sub>4</sub> Catalyst for Propane Dehydrogenation Using a Nitrogen-Doped Graphene Support*

Poster presentation, SIRES Symposium, Valparaiso University, 2018

<https://scholar.valpo.edu/sires/40/>

## **Technical Skills**

GIS & Spatial Analysis: ArcGIS Pro, ArcGIS Online  
Computational & Analytical Tools: VASP (DFT modeling software), Chemcraft molecular visualization, Linux high-performance computing (HPC) environments  
Laboratory Instrumentation & Techniques: UHPLC–MS, PCR preparation, gel electrophoresis, sterile culture technique  
Restoration & Field Equipment: Marsh Master XL, D6 bulldozer, John Deere 8R tractor, skid steer, FECON vegetation management systems

## **Research Methods**

Historical aerial-photo georeferencing · GIS feature extraction · temporal landscape reconstruction · vegetation plot and quadrat sampling · threatened-species demographic monitoring · restoration-scale hydrologic and geomorphic interpretation · chromatographic analysis · density functional theory (DFT) modeling · reaction-path analysis (CI-NEB)

## **Professional Affiliations**

Sigma Gamma Epsilon Earth Science Honor Society, Inducted 2026  
Geological Society of America Member  
Association of Environmental & Engineering Geologists Member

## **Professional Service & Networks**

AmeriCorps Alums  
Student Conservation Association Alums

## **Honors & Awards**

Phi Theta Kappa Honor Society, Inducted 2018  
Chapter President (2018–2020)  
All - Indiana Academic Team (2019)  
Lakshmi Raman Award (2019)  
Sue Jackson Award (2020)  
Recipient, PTK Hallmark Awards - Power of Progress; Outstanding Officer Team; International Honors in Action; International 5-Star Award; Indiana Region Flag Bearer for the 102<sup>nd</sup> International Convention (2020)  
Calumet Gem & Mineral Society Scholarship (2025-2026)  
Outstanding Geology Senior, Indiana University Northwest College of Arts & Sciences (2026)  
Urban League of Northwest Indiana Scholarship (2026)