Brandon T. Overstreet

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Research Interests

I am a fluvial geomorphologist with a specialty in remote sensing and hydrologic field data collection. I use a variety of tools including remote sensing and boat-deployed instruments to map riverscapes and monitor and interpret geomorphic change of river systems. My current research is focused on developing new methods for measuring river currents and water surface roughness from remote sensing imagery. My previous research has investigated ecological links between river-bed sediment size and salmons' ability to move sediment during redd construction. Through this work I developed new methods for quantifying salmon spawning habitat in the field.

Education

Ph.D. Hydrologic Science **University of Wyoming, Laramie** **Expected: September, 2016**

Thesis: Advancing remote sensing science to support geomorphic river assessment and management
Advisor: Carl J. Legleiter
GPA: 3.91 / 4.00
Selected Relevant Coursework:

- Advanced Spatial Analysis
- Western Water Issues
- Mechanics of Sediment Transport
- Applied Differential Equations

M.S. Geology **University of Wyoming, Laramie** **2011**

Thesis: Gauging the capacity of salmon spawning substrates
Advisor: Clifford S. Riebe
GPA: 4.00 / 4.00
Selected Relevant Coursework:

- Fluvial Geomorphology
- Remote Sensing of Rivers
- Open Channel Hydraulics
- Data Management Techniques
- Geomorphology

B.S. Geology **University of Idaho, Moscow** **2007**

Advisor: Simon Kattenhorn
GPA: 3.60 / 4.00
Selected Relevant Coursework:

- Geomorphology
- Ground-water Hydrology
- Techniques of Ground-water study
- Stratigraphy and Sedimentology
- Engineering Physics (2 semesters)
- Technical Writing
- Intro to Geographic Information Systems (GIS)
- Field Geology

Undergraduate Coursework **Montana State University, Bozeman** **Fall 2002 - Fall 2003**

GPA: 3.28 / 4.00
Selected Relevant Coursework:

- Calculus 1,2
- Physical Geology

Professional Experience

Research Assistant Department of Geography, University of Wyoming 2012 - Present

- Developed an extensive working knowledge of principles and theories of geology, geomorphology and hydrology and established field measurement protocols.
- Planned, conducted and reported on hydrologic interpretive studies and supervised field personnel.
- Designed and constructed new hydrologic instruments and instrument deployment systems to meet unique study needs.
- Designed, constructed, operated and maintained a fleet of research boats and a suite of geomorphic and hydrologic mapping equipment.
- Measured stream discharge and bathymetry using Acoustic Doppler Current Profilers (ADCPs), Acoustic Doppler Velocimeters (ADVs) in a wide range of stream conditions.
- Conducted topographic and bathymetric surveys using RTK GPS and Robotic Total Stations.
- Measured water quality parameters in the field including suspended sediment, temperature and turbidity.
- Developed automated MATLAB algorithms to efficiently process vast amounts of field data and perform hydrologic computations.
- Prepared reports, peer reviewed journal articles, and GIS datasets which summarized results of hydrologic investigation.
- Developed project proposals which generated over $66,000 in research funds.
- Collected, processed, and interpreted remote sensing data including hyperspectral imagery, NIR LiDAR, and Bathymetric LiDAR.
- Used remote sensing imagery and Random Forest classification techniques to create classified geomorphic maps of fluvial settings.
- Used digital cameras, image processing software and photogrammetry software to document geomorphic change and create digital elevation models of fluvial environments.

Research Assistant Department of Geology, University of Wyoming 2009 - 2011

- Completed multidisciplinary coursework specializing in fluvial geomorphology.
- Investigated geomorphic controls on salmon spawning habitat
- Coordinated and implemented fieldwork throughout the Northwestern United States and Canada.
- Conducted sediment sampling, hydrologic measurements, GPS surveys, aquatic habitat and salmon spawning surveys.
- Organized field data into an easily accessible tabular database.
- Prepared scientific presentations, posters, and manuscripts of research findings.
- Recruited and supervised undergraduate field assistants.
- Used digital photos and imaging software to map salmon redds

Owner/Instructor Current Experiences Whitewater Kayak School 2008 - 2010

- Trained clients on all aspects of river safety and kayak operation.
- Performed risk analysis, developed safety protocols and emergency action plans.
- Purchased and maintained a fleet of vehicles, kayaks, rafts, and associated equipment.

Forest Protection Officer / Wildland Fire Fighter United States Forest Service 2008

- Followed established safety protocols and procedures while working in potentially dangerous environments.
- Worked independently and as part of a team in remote locations.

Field Geologist i-minerals, Inc. 2007

- Monitored exploratory drilling observations in the field.
- Independently made critical field observations and decisions, and reported field observations to exploration manager.
- Monitored ground-water levels during drilling operations.
- Logged and organized core samples and prepared samples for geochemical analysis.

Field Experience

Graduate Researcher, Geomorphology of the Snake River, Grand Teton National Park, WY. 2011 - 2015

Principal Investigator: Carl Legleiter, University of Wyoming.

- Planned and implemented 4 remote sensing data collection missions from fixed wing aircraft.
- Planned and implement 8 hydrologic and geomorphic surveys of the Snake River in Grand Teton National Park.
- Followed established hydrologic data collection protocols and used hydrologic expertise to developed new methods and protocols.
- Conducted sediment sampling using traditional and image-based techniques.
- Collected hydrologic measurements using boat-deployed single-beam sonar and acoustic Doppler current profilers.
- Designed and constructed new hydrologic instruments and field-deployment systems.
- Diagnosed and repaired instrumentation in the field.
- Conducted topographic and bathymetric surveys using RTK GPS and Robotic Total Stations.
- Measured water quality parameters in the field including suspended sediment, temperature and turbidity.
- Supervised field personnel.
- Collected and analyzed data, generated figures and reports of finding.

Lead Field Hydrologist and Mountaineer, Drainage efficiency of the Greenland supraglacial river network. 2012, 2015

Principal Investigators: Laurence Smith, UCLA, and Asa Rennermalm, Rutgers University.

- Designed and constructed a cableway system for deploying acoustic Doppler current profilers on supraglacial rivers to collect stream discharge.
- Pioneered methods for hydrologic measurements on supraglacial streams based on a working knowledge of hydrologic theories and principles.
- Safely collected a 72 hour time series of stream discharge using an acoustic Doppler current profiler in an extreme arctic river environment.
- Trained a team of researchers on safety and measurement protocols.
- Diagnosed and repaired instrumentation in the field.
- Collected a time series of water level stage using pressure transducers and ultrasonic proximity sensors.
- Supervised construction and installation of a cableway system and collected a time series of acoustic Doppler current profiler measurements on a 180 meter wide proglacial river.

Field Manager, Willamette River fieldwork in support of NASA SWOT and AirSWOT missions. 2015

Principal Investigators: Michael Durand, Ohio State University, and Mark Fonstad, University of Oregon.

- Supervised a large scale hydrologic survey including stage, discharge, and bathymetry measurements along a 40 mile reach of the Willamette River in Oregon.

- Coordinated with multiple agencies (USGS, NASA, academic) to ensure that data collections methods and data reporting formats were consistent.
- Instrumented, operated and maintained a fleet of 4 research boats and a suite of geomorphic and hydrologic mapping equipment.
- Troubleshot, diagnosed and repaired instrumentation in the field.
- Recruited and supervised field personnel.
- Collected stage and bathymetry data using a remotely operated bathymetric survey boat.

Graduate Researcher and Boatman, Geomorphic controls on salmon spawning habitat selection on the Merced River, CA. 2014.

Principal Investigator: Lee Harrison, NOAA NW Fisheries Science Center.

- Conducted a hydrologic and geomorphic survey of a 20 mile reach of the Lower Merced River in California.
- Instrumented and operated two research boats.
- Mapped river bathymetry using a GPS-integrated, single-beam sonar.
- Used salmon spawning habitat expertise to design a sampling strategy for aquatic habitat characterization.
- Measured stream discharge using an acoustic Doppler current profiler.
- Compiled hydrologic data and checked for quality and accuracy.

Graduate Researcher, Geomorphic surveying and remote sensing image acquisition of the Niobrara River, Nebraska. 2012.

Principal Investigators: Carl Legleiter, **Brandon Overstreet**, University of Wyoming and Jason Alexander, US Geological Survey.

- Coordinated field campaign with remote sensing data collection.
- Installed pressure transducers and water quality probes to record river stage and water quality parameters during remote sensing data collections flights.
- Surveyed river channel using RTK GPS rovers and a kayak-borne acoustic Doppler current profiler.
- Collected suspended sediment samples using a bridge-deployed DH-95 sampler following established USGS protocol.

Visiting Researcher, Retrieving river attributes from remotely sensed data: An experimental evaluation based on field spectroscopy at the National Center for Earth Surface Dynamics Outdoor Stream Lab. 2012.

Principal Investigator: Carl Legleiter, University of Wyoming.

- Designed and conducted hydrologic experiments in outdoor flume.
- Operated a robotic measurement cart with an array of hydrologic and optical instruments.
- Measured water quality parameters including turbidity and suspended sediment concentration.
- Recorded and interpreted experiment observations.

Field Assistant, Geomorphic surveying and remote sensing image acquisition of the Colorado River near Kremmling, CO. 2011 – 2012.

Principal Investigators: Carl Legleiter, University of Wyoming, and Paul Kinzel, US Geological Survey, Geomorphology and Sediment Transport Laboratory, Golden, CO.

- Collected hydrologic data using an acoustic Doppler current profiler following established USGS protocols.
- Surveyed river morphology using a robotic total station and RTK GPS receivers.

- Conducted field measurements of in-stream optical properties and water quality using instrumentation and a DH-48 suspended sediment sampler.

Field Assistant, Geomorphic surveying and remote sensing image acquisition of Soda Butte Creek, Yellowstone National Park, WY. 2010 - 2012.

Principal Investigator: Carl Legleiter, University of Wyoming.

- Conducted a topographic and bathymetric survey using a robotic total station and RTK GPS receivers.
- Conducted in-stream hydraulic measurements using an acoustic Doppler velocimeter.
- Conducted field measurements of in-stream optical properties using a spectroradiometer

Field Assistant, Geomorphic surveying and remote sensing image acquisition of the Platte River near Kearney, NE. 2010 – 2011.

Principal Investigator: Paul Kinzel, US Geological Survey, Geomorphology and Sediment Transport Laboratory, Golden, CO.

- Collected hydrologic data using an acoustic Doppler current profiler following established USGS protocols.
- Administered surveys of river morphology using a robotic total station and RTK GPS receivers.
- Conducted field measurements of in-stream optical properties and water quality using instrumentation and DH-48 suspended sediment sampler.

Graduate Researcher, Assessment of the geomorphic controls on salmon spawning in gravel-bed rivers. Scotch Creek, British Columbia; Trinity River, CA; Shasta River, CA; South Prairie Creek, WA. 2009 - 2010.

Principal Investigators: **Brandon Overstreet** and Cliff Riebe, University of Wyoming.

- Developed field protocols based on established techniques and the unique study objectives.
- Conducted substrate sampling, hydraulic measurements, GPS surveys, and salmon spawning surveys.
- Collected hydrologic data using an electromagnetic velocity sensor and and acoustic Doppler Velocimeter.
- Supervised field assistants.

Recreation Technician, Mapping dispersed camping sites and access roads on the Bridger-Teton National Forest. 2008.

Project Supervisor: Chad Hudson, US Forest Service, Bridger-Teton National Forest, Jackson, WY.

- Designed a mapping project to identify location, use, size, and impact of dispersed camping sites on national forest lands.
- Created a data-dictionary for efficient field data collection using a Trimble field computer and GPS receiver.
- Developed and implemented a systematic sampling strategy.
- Imported and analyzed collected data using ArcGIS.

Field Geologist, Exploratory drilling of the Thatuna Granodiorite for mineral exploration. Boville, Idaho. 2007.

Project Supervisor: Lamar Long, i-minerals, Inc., Moscow, ID.

- Monitored exploratory drilling observations.
- Determined maximum drilling depth, made critical field analysis and decisions, and reported field observations to exploration manager.
- Logged and organized core samples and prepared samples for geochemical analysis.
- Used geologic and stratigraphic information from core samples to compile geologic maps.

Student Participant, Techniques of Ground-water Study Field Course. Moscow, Idaho. 2007.

Instructor: Jerry Fairly, University of Idaho.

- Collected and analyzed hydrologic ground-water data.
- Planned and conducted a 24 hour pump test to determine the ground-water aquifer characteristics.
- Continuously and simultaneously monitored water level in an array of ground-water wells and recorded detailed field notes of observations.
- Collected water samples and prepared samples for geochemical testing.
- Analyzed data, performed hydrologic calculations and generated tables, figures and report documenting study results.

Instrumentation Experience

- Trimble RTK GPS system (Radio-linked base station and network base station)
- Trimble Robotic Total Station
- Sequoia Scientific LISST 100x suspended sediment sampler
- SonTek FlowTracker acoustic Doppler velocimeter
- SonTek RiverSurveyor acoustic Doppler current profiler (S5 and M9; 1st and 2nd generation PCMs)
- HOBO Pressure Transducers
- OceanScience Z-Boat remotely operated survey boat
- Seafloor systems SonarMite singlebeam echosounder (Integrated with Trimble RTK GPS)
- Campbell Scientific programmable data loggers
- Acoustic proximity sensors for measuring water surface stage
- Nortec Vectrino II acoustic Doppler velocimeter
- Marsh McBirney Flo-Mate electromagnetic velocity sensor
- Wetlabs ECO Triplet water quality multiprobe
- Eureka Environmental Manta series water quality multiprobes
- ASD FieldSpec spectroradiometer
- CASI 1500H Hyperspectral Imager
- WetLabs ac-s In-Situ Spectrophotometer

Software Experience

- MATLAB
- IDL
- ENVI image processing software
- ArcGIS
- Program R
- AgiSoft photogrammetry and image processing software
- ENVI LiDAR

- ADOBE Illustrator / Photoshop

Publications

Refereed Journal Articles

Overstreet B.T., Riebe C.S., Wooster, J.K., Sklar, L.S., Bellugi D. 2016. Tools for gauging the capacity of salmon spawning substrates. Earth Surface Processes and Landforms, 41(1), 130–142, doi:10.1002/esp.3831

Legleiter C.J., **Overstreet B.T.**, Glennie C.L., Pan Z, Fernandez-Diaz J.C., Singhania A. 2015. Evaluating the capabilities of the CASI hyperspectral imaging system and Aquarius bathymetric LiDAR for measuring channel morphology in two distinct river environments. Earth Surface Processes and Landforms, DOI: 10.1002/esp.3794

Smith, L.C., Chu, V.W., Yang, K., Gleason, C.J., Pitcher, L.H., Rennermalm, A.K., Legleiter, C.J., Behar, A.E., **Overstreet, B.T.**, Moustafa, S.E., Tedesco, M., Forster, R.R., LeWinter, A.L., Finnegan, D.C., Sheng, W., and Balog, J. 2015. Efficient meltwater drainage through supraglacial streams and rivers on the southwest Greenland Ice Sheet. Proceedings of the National Academy of Sciences, 112(4): 1001-1006.

Pan, Z., Glennie, C. L., Hartzell, P. J., Fernandez-Diaz, J. C., Legleiter, C. J., and **Overstreet, B. T.** 2015. Performance Assessment of High Resolution Airborne Full Waveform LiDAR for Shallow River Bathymetry. Remote Sensing, 7(5): 5133-5159.

Legleiter, C.J., and **Overstreet, B.T.** 2014. Retrieving river attributes from remotely sensed data: an experimental evaluation based on field spectroscopy at the Outdoor Stream Lab. River Research and Applications, 30(6): 671-68

Riebe C.S., Sklar L.S., **Overstreet B.T.**, and Wooster J.K. 2014. Optimal reproduction in salmon spawning substrates linked to grain size and fish length. Water Resources Research 50 : 1–21. DOI: 10.1002/2013WR014231

Legleiter, C.J., Tedesco, M., Smith, L.C., Behar, A., and **Overstreet, B.T**. 2014. Mapping the bathymetry of supraglacial lakes and streams on the Greenland Ice Sheet using field measurements and high resolution satellite images. The Cryosphere, 8: 215-228.

Fernandez-Diaz, J.C., Glennie, C.L., Carter, W.E., Shrestha, R.L, Sartori, M.P., Singhania, A., Legleiter, C.J., and **Overstreet, B.T.** 2014. Early Results from a Simultaneous Airborne Terrain and Shallow Water Bathymetry Mapping LiDAR Sensor. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS), 7(2): 623-635.

Legleiter, C.J., and **Overstreet, B.T.** 2012. Mapping gravel-bed river bathymetry from space. Journal of Geophysical Research - Earth Surface, 117, F04024, doi:10.1029/2012JF002539.

Legleiter C.J., Kinzel P.J., and **Overstreet B.T.** 2011. Evaluating the potential for remote bathymetric mapping of a turbid, sand-bed river: 1. Field spectroscopy and radiative transfer modeling. Water Resources Research, 47(W09531): doi: 10.1029/2011wr010591.

Legleiter C.J., Kinzel P.J., and **Overstreet B.T.** 2011. Evaluating the potential for remote bathymetric mapping of a turbid, sand-bed river: 2. Application to hyperspectral image data from the Platte River. Water Resources Research, 47(W09532): doi: 10.1029/2011wr010592.

First Author Conference Presentations and Invited Lectures

Overstreet, B.T., Legleiter, C.J., Harrison, L., Pitcher, L., Ryan, J., Rennermalm, A., and Smith, L. 2015. Multiscale controls on water surface roughness and implications for remote sensing of rivers. American Geophysical Union Fall Meeting, San Francisco, San Francisco, CA.

Overstreet, B.T., and Legleiter, C.J. 2014. Mapping water surface roughness in a shallow, gravel-bed river using hyperspectral imagery. American Geophysical Union Fall Meeting, San Francisco, San Francisco, CA.

Overstreet, B.T. 2013. Remote sensing of rivers starts on the ground. University of Wyoming WyGISC Geospatial Forum Series, Laramie, WY.

Overstreet, B.T. and Legleiter, C.J. 2012. Characterizing channel change along a multithread gravel-bed river using random forest image classification. American Geophysical Union Fall Meeting, San Francisco, CA. Session: H31E – Remote Sensing of Riverscape Topography.

Overstreet, B.T., Riebe, C.S., and Wooster, J.K. 2011. Gauging the reproductive potential of salmon spawning substrates. American Geophysical Union Fall Meeting, San Francisco, CA. Session: EP43B – Earth and Planetary Surface Processes: Rivers, Sediment, Hydraulics.

Overstreet, B.T., Riebe, C.S., Wooster, J.K, and Ligon, F.K. 2010. Limits on salmon spawning in coarse-bedded rivers, Ecological Society of America Annual Meeting, Pittsburg, PA. Session: COS 48 – Aquatic Ecology Streams and Rivers.

Thesis

Overstreet, B.T., 2011. Gauging the capacity of salmon spawning substrates. M.S. Geology Thesis, University of Wyoming.

Grants Awarded

- Safeguarding streams from the sky: Advancing remote sensing science to support river management, 2015. Wyoming NASA Space Grant Consortium Graduate Research Fellowship, **$20,000.**

- The role of bank erosion in the sediment budget of the Snake River in Grand Teton National Park, 2013. University of Wyoming-National Park Service Research Center Research Grant, **$4,995.**

- A new method for collecting hydrologic data in fluvial environments, 2012. University of Wyoming PhD Program in Hydrology, Hydrology-Related Equipment Grant, **$1,380.**

- Quantifying the influence of active tectonics and flow regulation on the morphodynamics of the Snake River in Grand Teton National Park, 2011. National Science Foundation, National Center for Airborne Laser Mapping Graduate Student Seed Grant. Acquisition of 40 square kilometers of LiDAR data (commercial value of approximately **$40,000**).

Teaching Experience

"Historical Geology" Lab Instructor	University of Wyoming	**2010**
"Earth Surface Processes" Teaching Assistant	University of Wyoming	**2009**
"Introduction to Geology" Lab Instructor	University of Idaho	**2007 – 2008**

Honors and Awards

- Outstanding Graduate Student Award, Department of Geology and Geophysics, University of Wyoming. **2010**
  Awarded to the top UW Geology and Geophysics graduate student.
- Dean's Award, University of Idaho College of Science, **2007**.
  Awarded to top undergraduate student from each department.
- University of Idaho Alumni Achievement Award, Department of Geology, University of Idaho, **2007**
  Awarded to top UI undergraduate in Geology
- Dean's List, University of Idaho, **2004 – 2007**.

Professional Affiliations

- American Geophysical Union: Hydrology and Earth Surface Processes sections.
- Geology Club, University of Wyoming
- Geology Club, University of Idaho

Training and Certifications

- Wilderness First Responder. Wilderness Medicine Institute. Current thru April 2017.
- Adult/Child CPR, AED and Airway Management. Wilderness Medicine Institute. Current thru April 2017.
- Valid Oregon Driver's License with safe driving record
- Extracting Information from LiDAR Data. Exelis Visual Information Solutions, Boulder, CO. 2013.
- Introduction to IDL. Exelis Visual Information Solutions, Boulder, CO. 2013.
- ITRES CASI 1500 H Sensor Operation and Image Processing Training. Itres Research Limited. 2012.
- Arctic Field Training. United States National Science Foundation. 2012.
- Lab Safety / Hazardous Material Safety. University of Wyoming. 2009
- Defensive Driving. University of Wyoming. 2009

Volunteer Experience

- USGS Volunteer for Science, US Geological Survey, Geomorphology and Sediment Transport Laboratory, Golden, CO. **2010 – 2012.**
- Raft Guide, Gear Boat Captain, and Trip Leader. Sisters High School Environmental Education Program Annual Deschutes River Trip. Sisters, OR. **2003 – 2015.**