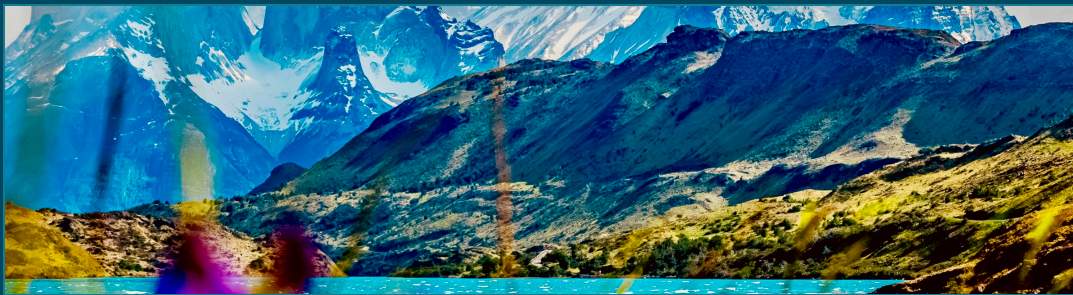


THE SCHOOL FOR FIELD STUDIES

DIRECTED RESEARCH CHILE

Center for Climate Studies · Puerto Natales. A complete record of student research projects from the four most recent semesters.



SPRING 2026

11 projects · 30 student authors

FALL 2025

11 projects · 28 student authors

SPRING 2025

12 projects · 26 student authors

FALL 2024

10 projects · 26 student authors

44

RESEARCH PROJECTS

110

STUDENT AUTHORS

5

FACULTY ADVISORS

4

SEMESTERS

FALL 2024 – SPRING 2026

ABOUT THIS GUIDE

Directed Research is the capstone of every SFS semester: students work in small teams with resident faculty on questions set by the needs of the host community and its ecosystems. This guide collects the Directed Research projects completed at the Center for Climate Studies in Puerto Natales, Chile, over the four most recent semesters.

Projects are listed newest first. Each entry gives the project title, its faculty advisor or advisors, and the student authors with their home institutions. Each entry closes with a research summary drawn from the Center’s semester final report for that project. Where a project’s final paper carries a formal author abstract, that abstract replaces the summary and is labelled as such.

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FACULTY ADVISORS

Directed Research at the Center for Climate Studies was advised by 5 faculty and researchers across these semesters.

ADVISOR	PROJECTS	SEMESTERS
Dr. Francisco Aguirre	17	All four semesters
Dr. Florencia Sánchez	16	All four semesters
Dr. Glenda Denise Hevia	8	Fall 2024, Spring 2025, Fall 2025
Dr. Carla Gimpel	3	Spring 2026
Paola A. Goich	1	Fall 2025

Center for Climate Studies · Puerto Natales, Chile

01 Investigation of the Geomorphology and Geological History of Pali Aike National Park: Linking Past Processes to Current Landscapes

Faculty advisor: Dr. Florencia Sánchez

Sadye Cheever¹, Cole Conviser², Ryan Poulsen³

¹ Bates College, ² Hamilton College, ³ University of Richmond

RESEARCH SUMMARY

Pali Aike National Park sits on a volcanic field at the edge of the Patagonian steppe. This project mapped its geomorphology and reconstructed the geological history that produced the landscape visible today, linking past processes to current landforms through detailed applied geology. The advisor rates the final product as exceptional and intends it to serve both as a baseline for future semesters and, with minor adaptation, as a practical resource for the national park's administration.

02 San Gregorio's Context and Territorial Belonging in Relationship to Parque Nacional Pali Aike

Faculty advisor: Dr. Florencia Sánchez

Sara Jacobi¹, Ava Malin²

¹ DePauw University, ² University of Michigan/Ann Arbor

RESEARCH SUMMARY

San Gregorio lies beside Pali Aike National Park, and this project examined how the community understands its own territory and its relationship to the park. Interviews and community engagement produced conclusive results and, equally important, a standardised methodology that can be extended to other communities with characteristics similar to San Gregorio. The advisor plans to adapt the method slightly to reduce subjectivity, but regards the project as a strong foundation for continued research and community engagement in the area.

03 History and Geology of Pali Aike: Addressing Knowledge Gaps Through Scientific Tourist and Community Education

Faculty advisor: Dr. Florencia Sánchez

Sophia Gaetano¹, Jazmin Morenzi²

¹ College of the Holy Cross, ² Williams College

RESEARCH SUMMARY

Visitors and residents alike encounter Pali Aike with little to explain what they are seeing. This project identified the gaps in available knowledge of the park's history and geology and addressed them through materials aimed at both tourists and the local community. It shares its interview and community-engagement methods with the San Gregorio study and fed directly into the park audio guide developed alongside it. The advisor notes the guide needs further refinement, but the project established the foundations for implementation.

04 Promoting Sustainable Tourism in Pali Aike National Park: A Comprehensive Audio Guide of Resident Flora and Fauna

Faculty advisor: Dr. Florencia Sánchez

Mairi Sessions¹, Hayley Ponn², Giles Kinsella³, Kate Wisnudel⁴

¹ Whitman College, ² Hollins University, ³ Bowdoin College, ⁴ Brandeis University

RESEARCH SUMMARY

This project produced a comprehensive audio guide to the flora and fauna of Pali Aike National Park as a sustainable tourism initiative. It is among the first and only studies focused on the park's plants and animals, making it valuable to CONAF — the agency responsible for Chile's protected areas — as well as to SFS's own ecological inventory. The result provides a baseline for future biodiversity work and strengthens the environmental information available for the park.

05 Drought Resilience in Chilean Patagonia: Characterizing the Impact of Elevation on Wetland Drought Vulnerability

Faculty advisor: Dr. Francisco Aguirre

Ellis Bedsworth¹, Sofia DeFanti², Charlie Melamede³

¹ Tufts University, ² Whitman College, ³ Colorado College

RESEARCH SUMMARY

This study characterised how Southern Patagonian wetlands at different elevations respond to extreme precipitation. Satellite imagery, precipitation records, and tree core samples were combined to track responses to precipitation variability and drought, with the Standardised Precipitation Index as the reference. More variability in both lake extent and tree growth was observed at the lower-elevation site, Estancia Vega Castillo, though this could equally reflect land use, vegetation, or differing precipitation patterns. Because SPI captures precipitation alone, the advisor recommends more localised indices and measures such as soil moisture variability for future work.

06 Assessing Río Rincón Watershed's Sensitivity to Climatic Conditions Using Snowmelt Dynamics and Black Carbon Analysis

Faculty advisor: Dr. Francisco Aguirre

Cameron Collister¹, Savannah Peischl²

¹ Whitman College, ² University of San Francisco

RESEARCH SUMMARY

This study evaluated the sensitivity of the Río Rincón watershed in the Magallanes Region to climatic variability through snowpack properties, degree-day melt modelling, and black carbon concentrations at two field sites. Snowpack was near-isothermal at about 0 °C, with moderate density variability and grain size differences linked to terrain and wind. Modelled melt rates were significantly higher in spring (about 5–6 mm/°C·day) than in autumn (2–4 mm/°C·day), and black carbon concentrations were extremely low at around 1.8 ng/g. The watershed appears relatively stable and little affected by black carbon, making the valley a useful control for comparison with more exposed basins.

07 Validation of Spectral Unmixing for Subpixel MODIS Snow and Land-Cover Fraction Retrieval in the Río Rincón Watershed, Southwestern Patagonia

Faculty advisor: Dr. Francisco Aguirre

Alex Seager¹, Ethan Hatcher²

¹ Harvey Mudd College, ² Bowdoin College

RESEARCH SUMMARY

This project evaluated Spectral Mixture Analysis and Multiple Endmember Spectral Mixture Analysis for retrieving subpixel land-cover fractions from MODIS imagery in the Río Rincón watershed, validating against artificial mixtures with known proportions and against Sentinel-2 reference data aggregated to the MODIS scale. Both methods performed similarly across mixture complexities, with accuracy falling sharply under spectral variability and noise. Substantial error appeared in separating spectrally similar classes such as peat and forest, and in low-reflectance water and shadowed terrain. The study covered the autumn season only; seasonal spectral signatures are needed to improve the temporal resolution of snow cover.

08 Phenological Spectral Signal Analysis of a *Nothofagus pumilio* Forest in the Chacabuco Valley of Southern Patagonia

Faculty advisor: Dr. Francisco Aguirre

Jonas Kaplin¹, Abbey Wolfe², Micah Denslow³

¹ Brandeis University, ² Colby College, ³ Colorado College

RESEARCH SUMMARY

This study analysed satellite imagery from 2000 to 2026 alongside historical climate data and time-lapse camera images from November 2025 to April 2026 to track NDVI and red, green, and blue chromatic coordinates in a *Nothofagus pumilio* forest in the remote Chacabuco Valley. Results indicate increasing contrast between seasons and possible increasing forest productivity, with productivity positively correlated to temperature but uncorrelated with precipitation — the signature of a cold-limited system that may initially grow faster as temperatures rise. Camera images resolved phenology at higher spatial and temporal resolution than satellites and were less affected by cloud. Data availability is the principal limit: no weather station lies within the region, and the study area covers only 1.9 km².

09 Río Rubens: A Summary of the Water Table, Water Filtration, and Carbon Storage Characteristics in a Chilean Peatland

Faculty advisor: Dr. Carla Gimpel

Sydney Haddad¹, Katrina Nelson², Laila Woods³

¹ Oberlin College, ² Hamilton College, ³ Yale University

RESEARCH SUMMARY

The Río Rubens peatland is privately held and managed by the Rubens Conservancy, and this project extended a study begun the previous year. Additional piezometers were installed to monitor water table depth, and the students calculated the peatland's true area at 250 hectares — roughly double the figure carried in the last national census — then used published values to estimate the carbon held in the mire. A model predicting water table position along the peatland was developed from the results. High organic content in the water defeated colorimetric assays, which were replaced with water quality strips. The work stands as a baseline for long-term monitoring of one of the largest peatlands in Magallanes.

10 Evaluating the Lakes of Magallanes: Exploring the Qualities of Lakes Within the Torres del Paine Biosphere Reserve and Tierra del Fuego

Faculty advisor: Dr. Carla Gimpel

Karina Chavaree¹, Eleanor Craver², Nicholas Piagentini³, Gretchen Reynolds⁴

¹ Barnard College, ² Franklin & Marshall College, ³ Colorado State University/Fort Collins, ⁴ Saint Michael's College

RESEARCH SUMMARY

This was the Center's first study of lakes and lagoons in the region, focused on the buffer zone of the Torres del Paine Biosphere Reserve. Sites ranged from freshwater through brackish to high salinity, the last accessible through authorisation from local government and a long-standing collaboration with Estancia Leona Amarga. The project was designed to explore and improve water quality protocols; a water filtration system supported collection of chlorophyll-containing microbes, and diatoms were identified that helped explain the systems observed. Satellite data show significant change in lake area, particularly during summer. Existing literature is badly outdated, and the advisor recommends that future work focus in depth on a single lake type.

11

Artemia persimilis: Proxy for Hypersaline Patagonian Ecosystems

Faculty advisor: Dr. Carla Gimpel

Gustav Sabina¹, Owen Fortner²

¹ University of San Diego, ² College of William and Mary

RESEARCH SUMMARY

Artemia in Magallanes are endemic and heavily understudied, yet they are the food source that colours the region's flamingos. This project characterised *Artemia persimilis* at two iconic lagoons: Laguna Amarga, privately held and within the Torres del Paine Biosphere Reserve buffer zone, and Laguna de los Cisnes, a protected hotspot for migratory birds. Both hold living and fossilised stromatolites — fewer than a dozen sites worldwide have living stromatolites — and both are vulnerable, at Laguna Amarga to tourists and animals that trespass the fences and damage the fragile mats. The students produced an in-depth characterisation of Laguna Amarga and a conservation action plan, with infographics to be prepared for the landowning family.

01 Field Protocol for Microplastic Sampling from Feces and Nest Material of Upland Geese (*Chloëphaga picta*) in Private Lands: A Case Study in Estancia Vega Castillo and Villa Río Serrano, Torres del Paine, Chile

Faculty advisor: Dr. Glenda Denise Hevia

Ashley Martinez¹

¹ Kenyon College

RESEARCH SUMMARY

This project developed and tested a non-invasive field protocol for detecting microplastics in the faeces and nest material of Upland Geese (*Chloëphaga picta*) on private land at Estancia Vega Castillo and Villa Río Serrano. It establishes both the promise and the present limits of the approach: without an on-site laboratory, reagents such as KOH and NaCl, or access to FTIR, samples could not be fully processed or microplastics confidently identified. Supplies at this latitude must be ordered from Santiago or abroad weeks in advance, so the advisor points to an urgent need for formal collaborations with regional laboratories. Future work should widen the range of sites — private against public land, urban against rural, high against low tourist activity — to trace spatial patterns and ingestion pathways.

02 An Analysis of Potential Threats to Waterfowl Nesting Behavior in a Rural Patagonian Wetland

Faculty advisor: Dr. Glenda Denise Hevia

Norah Goldbecker¹, Isabel Goldstein², Summer Saifee³, Shreya Shah⁴, Elanora Smith⁵

¹ Davidson College, ² Bucknell University, ³ Skidmore College, ⁴ Scripps College, ⁵ Wesleyan University

RESEARCH SUMMARY

This project assessed the threats facing waterfowl nesting in a rural Patagonian wetland, monitoring nests with cameras and dataloggers to relate disturbance and temperature to incubation behaviour. A field period of roughly ten days and a sample of only seven nests limited the study, compounded by cameras displaced by wind and livestock, damaged SD cards, and dataloggers that failed to record. The advisor draws a general lesson: inference about wild populations needs enough field time to follow individuals across key stages and troubleshoot equipment in situ, and argues that the Directed Research window should be reconsidered for projects on wild populations in remote areas.

03 Benthic Macroinvertebrate Community Responses to Invasive Salmonids in the Southern Magellanic Region, Chile

Faculty advisors: Dr. Glenda Denise Hevia and Paola A. Goich

Cassia Post¹, Froney Dreher², John Middleton³

¹ Reed College, ² Bates College, ³ Wheaton College

RESEARCH SUMMARY

Invasive salmonids are established in the rivers of the southern Magellanic region, and this project compared benthic macroinvertebrate communities across a gradient of salmonid abundance. The intended design was left incomplete: a second high-abundance river could not be included for reasons of time and access, reducing both sample size and the symmetry of the comparison, and discharge and flow were not measured. Access and safety constraints on the

Ventisquero River restricted sampling to reaches below the waterfall, and channel morphology meant some sites could only be partially surveyed. The advisor notes that fish studies depend on long field windows, since short campaigns underestimate true variability and bias detection across species and size classes.

04 **Evaluating Techniques for In-Situ Black Carbon Monitoring on Snowpack in Southern Patagonia and Identifying Potential Sources of Contamination**

Faculty advisor: Dr. Francisco Aguirre

Helen Stone¹, Eleanor Herbert²

¹ Carleton College, ² Skidmore College

RESEARCH SUMMARY

Black carbon deposited on snow darkens the surface and accelerates melt. This project tested in-situ techniques for monitoring it on southern Patagonian snowpack while identifying potential sources of contamination. Conditions were excellent — heavy snow — for a protocol that had been through several semesters of methodological and site review. The method was tested successfully and concentrations obtained, limited only by the number of filters available. The Center now holds the instrument and has the basis for collaborations with the University of Magallanes and with Carl Schmitt at the University of Alaska Fairbanks.

05 **Saxicolous Lichens of the High Andean Region in Southern Patagonia**

Faculty advisor: Dr. Francisco Aguirre

Ingrid Noren¹, Molly Hunt²

¹ Whitman College, ² Kenyon College

RESEARCH SUMMARY

This project surveyed saxicolous lichens — those growing on rock — in the high Andean zone of southern Patagonia, an innovation on the Center's climate studies work on terrestrial phenology. Glaciated areas proved too remote to reach, and the area that could be surveyed did not show the variability expected from its climatic conditions. Clear species identification is the other constraint; support came from lichenologist Christian Printzen of the Cape Horn International Center, though his feedback arrived after the project closed. The periglacial environment of the Serrano Glacier is proposed as a site for improving the method.

06 **An Exploration of Hydrologic and Geological Characterization in Río Rincón and Río Nutria Watersheds and Laguna Sofía Area as a Baseline for Future Climate and Hydrological Modeling in the Última Esperanza Region, Southern Patagonia**

Faculty advisor: Dr. Francisco Aguirre

Grace Gordon¹, Olivia Mohel¹, Natalie Hood²

¹ Oberlin College, ² Bowdoin College

RESEARCH SUMMARY

This project built a combined hydrologic and geological characterisation of the Río Rincón and Río Nutria watersheds and the Laguna Sofía area, to serve as a baseline for future climate and hydrological modelling in Última Esperanza. The upper basin proved inaccessible and the students adapted their objectives accordingly. The advisor notes that the project's distinction is joining a detailed geological study to one of mountain hydrology. A continuation would measure further properties of the wetlands in the upper Rincón basin alongside a hydrological model, with stable isotope measurement of water residence times under discussion as a further collaboration.

07 **Snowmelt Dynamics Across Two Different Watersheds in Southern Patagonia**

Faculty advisor: Dr. Francisco Aguirre

Zoe Posner¹, Stella Vranes², Sawyer Linehan²

¹ Colorado College, ² Whitman College

RESEARCH SUMMARY

Snowmelt is the dominant control on water availability in these catchments, and this project compared snowmelt dynamics across two different southern Patagonian watersheds. The students linked terrain measurements to a simple melt model and met the objectives set for them. This line of research runs every semester, adapted each time to the background the students bring. Next steps are to add complexity to the model and to compare field results against satellite products as ground-truth calibration.

08 **Land Cover Mapping and Analysis of the Predictive Power of Temperature on Organic Land Cover Types**

Faculty advisor: Dr. Francisco Aguirre

Yonatan Grossman¹

¹ University of California/Santa Barbara

RESEARCH SUMMARY

This project mapped land cover in the study region and tested how far temperature predicts the distribution of organic land cover types. It was the only individual project of the semester, and it arrived at both the product the student had set out to build and a novel methodology. The advisor recommends a further iteration of the selected products, and linking future work to the sequential camera records so that products can be validated and change characterised over time.

09 **Perceiving Socioecological Change: Stakeholder Narratives of Tourism, Aquaculture, and Environmental Governance in Última Esperanza, Chile**

Faculty advisor: Dr. Florencia Sánchez

Diana Borrison¹, Kjellen MacBain², Alexa Terry³, Sarah Van Lonkhuyzen³

¹ Wellesley College, ² Williams College, ³ Bates College

RESEARCH SUMMARY

Tourism, salmon aquaculture, and environmental governance pull in different directions in Última Esperanza, and this project gathered stakeholder narratives to understand how people there perceive that socioecological change. The advisor was initially hesitant about the topic, interview work being difficult to keep objective, but describes the resulting report as excellent — particularly the depth of analysis on environmental governance. It is regarded as a strong baseline for later projects that might focus on a single problem or industry in detail.

10 **Microplastics in the Última Esperanza Fjords: Environmental and Community Impacts in Puerto Natales**

Faculty advisor: Dr. Florencia Sánchez

Sam Benjamin¹, Dalia Luckhardt², Bernie Townsend³

¹ University of Richmond, ² Mount Holyoke College, ³ Franklin & Marshall College

RESEARCH SUMMARY

This project examined microplastics in the fjords of Última Esperanza and their environmental and community consequences for Puerto Natales. Filters for microplastic analysis were unavailable, so the group changed the final output: working with a local school, they produced a children's book explaining why the fjord and its fauna matter and how to protect them. The book was well received both among their classmates and at the SFS open house, and the advisor hopes to see it published locally so that more children in Puerto Natales encounter it.

11 **Monitoring Didymo in Spring-Fed and Glacial Rivers of Magallanes: Educational Awareness for Didymo Control in Puerto Natales**

Faculty advisor: Dr. Florencia Sánchez

Nathan Havens Spiegel¹

¹ Wake Forest University

RESEARCH SUMMARY

Didymo is an invasive alga that smothers riverbeds, and this project monitored its presence across spring-fed and glacial rivers of Magallanes. Carried out by a single student, the work paired river survey with the question of how best to communicate control measures to the public. The output was a brochure the advisor describes as didactic and easy to read, chosen from among several possible formats as the one most likely to reach the people who need it.

Center for Climate Studies · Puerto Natales, Chile

01 Preliminary Analytical Methods for Assessing Environmental Impact Near Salmon Aquaculture Sites in the Channels and Fjords of Southern Chile

Faculty advisor: Dr. Florencia Sánchez

Natalie Dziuban¹, Ry Emmert², Olivia Germain³, Liz Joncas³

¹ University of Michigan/Ann Arbor, ² Williams College, ³ University of Colorado/Boulder

RESEARCH SUMMARY

This project developed and trialled preliminary analytical methods for assessing environmental impact near salmon aquaculture sites in the channels and fjords of southern Chile. Salmon farming is the region's dominant marine industry and its effects on surrounding waters are contested; establishing workable field and analytical protocols is the first step toward measuring them. The work was presented as both a water quality poster and a final report.

02 Water Quality Testing in Southern Patagonian Fjords: Informing Policy to Remediate Dead Zones in Chile's Salmon Farming Industry

Faculty advisor: Dr. Florencia Sánchez

Rebecca Rolling¹

¹ University of Michigan/Ann Arbor

RESEARCH SUMMARY

Salmon farming in Chile has been associated with oxygen-depleted "dead zones" beneath and around production sites. This individual project tested water quality in southern Patagonian fjords with the aim of informing policy to remediate them. It ran alongside the group study of analytical methods for aquaculture impact carried out the same semester.

03 Spatial Distribution and Composition of Marine Municipal Solid Waste along the Recreational Coastline of Puerto Natales, Chile: A Study of Anthropogenic and Environmental Influences on Coastal Pollution

Faculty advisor: Dr. Florencia Sánchez

Harper Title¹

¹ University of Minnesota/Twin Cities

RESEARCH SUMMARY

This project mapped the spatial distribution and composition of marine municipal solid waste along the recreational coastline of Puerto Natales, and examined the anthropogenic and environmental influences that shape where it accumulates. Whether debris concentrates through patterns of human use or through wind and current determines where clean-up and prevention effort belongs.

04 Geoconservación con Paneles Interpretativos en la Patagonia Austral

Faculty advisor: Dr. Florencia Sánchez

Ishaan Swami¹

¹ Whitman College

RESEARCH SUMMARY

Completed in Spanish, this project addressed geoconservation in southern Patagonia through interpretive panels — the signage that explains a landscape's geological significance to the people standing in front of it. Where access to a site cannot be restricted, interpretation is the main tool available for protecting geological heritage.

05 Impact of Tourism in the Biosphere Reserve Torres del Paine; Answers for Conservation

Faculty advisor: Dr. Florencia Sánchez

Victoria Lieberman¹

¹ Hamilton College

RESEARCH SUMMARY

Torres del Paine is among the most visited protected areas in Chilean Patagonia, and this project examined the impact of that tourism on the Biosphere Reserve and what it means for conservation. It continues a line of work at the Center on visitor pressure and management effectiveness within the reserve.

06 Comparing Ecological Indicators Between Early and Late Succession *Nothofagus pumilio* Forests at Torres del Paine Biosphere Reserve

Faculty advisor: Dr. Glenda Denise Hevia

Maria Cecconello Lucas¹, Audrey Langhenry²

¹ Sarah Lawrence College, ² University of Illinois/Urbana-Champaign

RESEARCH SUMMARY

This project compared ecological indicators between early- and late-succession *Nothofagus pumilio* forests in the Torres del Paine Biosphere Reserve, testing which measures track recovery as a stand matures. The advisor considered the final manuscript strong enough to lead a journal submission to *Polar Biology* or *Austral Ecology*, with the students as primary authors and two further colleagues contributing as co-authors.

07 Characterization of Fauna Diversity within Reserva Explora, a Conservation Reserve in Torres del Paine

Faculty advisor: Dr. Glenda Denise Hevia

Roganna Crown¹, Kaylee Hedrick², Madeleine Campbell³

¹ University of Colorado/Boulder, ² Brandeis University, ³ Kenyon College

RESEARCH SUMMARY

This project characterised the diversity of fauna within Reserva Explora, a private conservation reserve in Torres del Paine, producing a systematic account of the species the reserve holds. A field report in Spanish is planned for delivery to the reserve's managers, setting out the key findings and recommendations for future management.

08 A Pilot Study Implementing Artificial Perches on Degraded *Nothofagus antarctica* Forests in a Private Conservation Reserve (Torres del Paine), Patagonia, Chile

Faculty advisor: Dr. Glenda Denise Hevia

Peter Landis¹, Nikolai Olsen²

¹ Graduate Student, ² Oberlin College

RESEARCH SUMMARY

Degraded *Nothofagus antarctica* forest recovers slowly in part because seed-dispersing birds have nowhere to perch. This pilot study installed artificial perches in degraded stands within a private conservation reserve in Torres del Paine to test whether they draw birds in and increase seed arrival. As with the fauna survey run alongside it, a Spanish-language field report with recommendations is planned for the reserve's managers.

09 **Estimating Black Carbon Deposition on Glaciers from the 2011–2012 Forest Fire in Parque Nacional Torres del Paine and Modeling Atmospheric Transport of Particulates via the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) Model**

Faculty advisor: Dr. Francisco Aguirre

Luke De Carlo-McCann¹

¹ Oberlin College

RESEARCH SUMMARY

The 2011–2012 forest fire in Parque Nacional Torres del Paine burned for weeks. This project estimated the black carbon it deposited on nearby glaciers and modelled the atmospheric transport of those particulates using the HYSPLIT trajectory model. Representative snow accumulation sites could not be reached during the session, but the dispersion model gives a basis for planning where to collect. Next steps are to identify regional and national black carbon sources and determine which glaciers and mountain environments are most exposed.

10 **Southern Patagonian Drought Conditions and the Correlation to Wildfires in Torres del Paine**

Faculty advisor: Dr. Francisco Aguirre

Benjamin Wedepohl¹, Anthony Ciallella², Julia Head³

¹ Denison University, ² Gonzaga University, ³ Clark University

RESEARCH SUMMARY

This project examined the relationship between drought conditions in southern Patagonia and the incidence of wildfire in Torres del Paine, building a statistical model from local data repositories and the work of previous semesters rather than from new field collection. The advisor sees strong potential in the approach, both for refinement and as a route to evaluating the fire alarm system CONAF currently uses.

11 **Geomorphological Analysis of Glaciar Tranquijökull and Surge-Type Cirque Glacier Implications, Cerro Ferrier, Torres del Paine National Park, Provincia de Última Esperanza, Región de Magallanes y la Antártica Chilena, Chile**

Faculty advisor: Dr. Francisco Aguirre

Oscar Bortz¹, Chloe Harvey², Ellery McQuilkin³

¹ Colorado College, ² Whitman College, ³ Williams College

RESEARCH SUMMARY

This project analysed the geomorphology of Glaciar Tranquijökull on Cerro Ferrier and what its landforms imply about surge-type cirque glacier behaviour. It was designed late in the semester, after an unexpected lack of snow made the originally planned project impossible, and it was the Center's first visit to the Ferrier Glacier. The advisor nonetheless

found the area rich in opportunity, with the detailed description of glacial landforms linking to the climatic processes the area has experienced.

12 **Classifying the Río Rubens Peatland**

Faculty advisor: Dr. Francisco Aguirre

Josie Hansen¹, Ian Hauver-Radloff², Betty Nelson², Kate Swann³

¹ Denison University, ² Colorado College, ³ Williams College

RESEARCH SUMMARY

This project classified the Río Rubens peatland, applying several data collection techniques to characterise the ecosystem. Some approaches worked well; others, remote sensing among them, have clear room for improvement. The advisor suggests that a continuation project reinforce the climatic and hydrological analysis alongside the classification.

01 Perception on the effectiveness of conservation management strategies in national parks: Case Study of Torres del Paine**Faculty advisor:** Dr. Florencia SánchezMara Jones¹¹ Wellesley College**RESEARCH SUMMARY**

This project examined how people perceive the effectiveness of conservation management strategies in national parks, taking Torres del Paine as its case study. Management measures depend on public acceptance as much as on ecological design, which makes perception itself a management variable. The advisor reports good reception and results, and hopes to see the study repeated so that changes in perception — and in the strategies themselves — can be tracked over time.

02 An investigation of Pali Aike: Methods and processes in relation to volcanic morphology**Faculty advisor:** Dr. Florencia SánchezWillow Craighead¹, Emmaline Derry¹, Emma Zuccotti¹¹ Colorado College**RESEARCH SUMMARY**

This project investigated the volcanic morphology of the Pali Aike field, describing the landforms present and the methods and processes that produced them. It is a foundational description of a landscape the Center has continued to study in subsequent semesters, and the advisor recommends it as a base on which more detailed future work can build.

03 Temporal implications of patterns of effusive and explosive volcanism in Pali Aike Volcanic Field**Faculty advisor:** Dr. Florencia SánchezAmy Burton¹, Patience Wagner²¹ College of the Holy Cross, ² Knox College**RESEARCH SUMMARY**

Pali Aike's volcanic field records both effusive eruptions, which produce lava flows, and explosive ones, which build cones and craters. This project examined the temporal patterns in that alternation across the field. The advisor recommends it as a reference for understanding Pali Aike as a whole, and as a model of systematic scientific writing.

04 How topography affects soil chemical properties in wetlands: Case study of Wetland Vega Castillo and Peatland Río Rubens**Faculty advisor:** Dr. Florencia SánchezCampbell Grizzel¹, Olivia O'Keefe-Sepich², Angela Kurdyla³¹ Oregon State University, ² University of Minnesota Twin Cities, ³ University of San Francisco

RESEARCH SUMMARY

This project tested how topography shapes the chemical properties of wetland soils, comparing the Vega Castillo wetland with the Río Rubens peatland. Slope position governs where water sits and what moves through it, so it should also govern soil chemistry — a relationship that bears directly on how each estancia manages its land. The advisor regards the data as crucial for those management decisions and the line of work as one to continue.

05 Behavioral responses of Magellanic penguins at their breeding colony on Magdalena Island, Strait of Magellan, Patagonia, Chile

Faculty advisor: Dr. Glenda Denise Hevia

Gabriella DeMaria¹, Charlie Dobson², Lukas Hanson³, Holly Hylton⁴, Finley Webb⁵

¹ Gonzaga University, ² Colorado College, ³ University of Colorado Boulder, ⁴ Hollins University, ⁵ Whitman College

RESEARCH SUMMARY

This is the first systematic behavioural study of Magellanic penguins (*Spheniscus magellanicus*) in their breeding colony at Los Pingüinos Natural Monument on Magdalena Island, a protected area managed by CONAF. The study assessed adult behaviour during the breeding season at a colony that is both a vital conservation site and the only one in the region open to tourists — a direct test of the balance between wildlife protection and public access. Access is the central constraint: the island is reachable only by tour operator from Punta Arenas, travel is weather-dependent, and visits last a few hours, which limits the scope and frequency of observation.

06 Proportions of bird species compared between eBird and point counts in the Magallanes Region of Chile

Faculty advisor: Dr. Glenda Denise Hevia

Audrey Mills¹

¹ Reed College

RESEARCH SUMMARY

eBird is a widely used citizen science platform, but its records are concentrated in North America and its coverage of southern South America is largely untested. This project compared species proportions from the eBird Basic Dataset against field point counts at Magdalena Island and Vega Castillo in the Magallanes Region. eBird data proved extremely limited at both sites, so no firm conclusion could be drawn about the accuracy of either source in representing species distribution. The result underlines how much the regional ornithological database depends on further citizen science contribution.

07 Determining recession trends in five Patagonian glaciers from satellite imagery

Faculty advisor: Dr. Francisco Aguirre

Marta Chojkiewicz¹, Burke MacLeay²

¹ Olin College of Engineering, ² Colorado College

RESEARCH SUMMARY

This project measured area change in five glaciers flowing from the Southern Patagonian Icefield — O'Higgins, Viedma, Upsala, Perito Moreno, and Grey — using satellite imagery to establish recession trends. Field data were available from a prior expedition to Grey Glacier, where a sequential camera installed by SFS was recovered and meteorological records

downloaded from the automatic weather station on the nunatak, but the students opted for a regional satellite study. CONAF permits allow the work to continue on Grey and extend to Dickson, and an agreement with Humboldt-Universität zu Berlin provides meteorological data for validating satellite reconstructions.

08 Remote sensing phenophase shifts in Patagonian *Nothofagus* forests

Faculty advisor: Dr. Francisco Aguirre

Cameron Callis¹, Marianna Tijerina², Rachel Yard³

¹ University of Massachusetts, ² Reed College, ³ University of Wisconsin–Madison

RESEARCH SUMMARY

This project analysed phenophase shifts in southern Patagonian *Nothofagus* forests using Google Earth Engine to build Landsat 8 NDVI time series. It continues a multi-semester effort to find the climatic signal in vegetation behaviour. The challenge is cross-validating remote reconstructions against field observation — vegetation type recorded directly on campaigns, plus imagery from the sequential cameras SFS has installed in earlier semesters. Two further cameras were installed, and agreements with several estancias allow vegetation change to be tracked at those sites.

09 Accuracy of satellite-derived snow fraction and albedo in Magallanes Region mountains

Faculty advisor: Dr. Francisco Aguirre

Elias Gradingier¹, Anabelle Hicks², Rosie Pelosky³, Madeleine Yao⁴

¹ Pitzer College, ² Kenyon College, ³ Williams College, ⁴ Barnard College

RESEARCH SUMMARY

This project tested and validated a new method for reconstructing snow cover in southern Patagonia, assessing the accuracy of satellite-derived snow fraction and albedo across mountains of the Magallanes Region. Building on the previous semester's work, the validation puts the method in a position to be applied on a long-term basis in following seasons.

10 Drought signals in southern Patagonia: Exploring proven indicators to create a predictive model

Faculty advisor: Dr. Francisco Aguirre

Alex Miller¹, Patrick Sullivan²

¹ Franklin & Marshall College, ² Bowdoin College

RESEARCH SUMMARY

This project explored established drought indicators and applied a machine-learning approach to building a predictive model for drought in southern Patagonia. The work produced a substantial bibliographic review of drought and of how its signal is detected. The advisor recommends that future iterations integrate more background knowledge before the project begins, and use data collected in the field to validate the model's products.

THE SCHOOL FOR FIELD STUDIES

Center for Climate Studies, Puerto Natales, Chile. Titles, faculty advisors, student authors, and home institutions compiled from the SFS Directed Research project lists for Fall 2024, Spring 2025, Fall 2025, and Spring 2026.