| **Project Plan** | 2/2/2021 |
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# Google Earth Engine Soils and Ecology Training

**Geospatial Technology and Applications Center**

125 S. State Street, Suite 7105

Salt Lake City, Utah 84138

GTAC Intranet website: <https://apps.fs.usda.gov/gtac>

Lila Leatherman

Project Lead

Remote Sensing Specialist

RedCastle Resources, onsite contractor

[lila.leatherman@usda.gov](mailto:lila.leatherman@usda.gov)

Claire Simpson

Remote Sensing Specialist

RedCastle Resources, onsite contractor

[claire.simpson@usda.gov](mailto:claire.simpson@usda.gov)

Rob Vaughan

Contract Manager

RedCastle Resources contractor

[robert.vaughan@usda.gov](mailto:robert.vaughan@usda.gov)

Nathan Pugh

Program Assistant

Resource Mapping, Inventory, and Monitoring (RMIM)

[nathan.pugh@usda.gov](mailto:nathan.pugh@usda.gov)

Brenna Schwert

Remote Sensing Project Manager

RedCastle Resources, onsite contractor

[Brenna.schwert@usda.gov](mailto:Brenna.schwert@usda.gov)

**National Resource and Conservation Service**

**NRCS Soils**

Federal Building  
10 E. Babcock Street, Room 443

Bozeman, MT 59715

Suzann Kienast

Soil Scientist

[suzann.kienast@usda.gov](mailto:suzann.kienast@usda.gov)

## **Version History**

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| Person | Revision Comments | Revision Date |
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## **Overview**

GTAC will develop a three-day training for USFS and NRCS soils and ecology staff to introduce them to basic concepts and applications of enterprise Google Earth Engine (GEE) software for soil mapping and classification. GEE is a powerful, low-cost, and open source platform for geospatial analysis, and as such, is increasingly used by USFS and NRCS staff. GEE provides enhanced computational power and data access through Google’s cloud servers and petabyte-scale data catalog of remote sensing imagery and other land cover data.

## **Scope**

The purpose of this project is to develop and deliver a three-day training for USFS and NRCS employees on using GEE for soil mapping and classification. The training will consist of lectures, exercises, examples of applications, and a structured application of workflows to participants’ original datasets. This project will require developing two days of instructional lectures with 4-5 accompanying exercises, focusing on 1) an introduction to GEE and scripting, and 2) modeling and classification in GEE. This project will also require collecting examples of soil mapping applications, which is planned to include additional guest speakers from GTAC who have used and developed these applications. Lecture and exercise content will be adapted from existing GTAC trainings where available (e.g., Overview of Remote Sensing, Geospatial Scripting in JavaScript, Intro to Change Detection, Advanced Change Detection, Intro to Random Forests, Landsat Image Acquisition in GEE). All training development will be conducted remotely while GTAC staff telework following local COVID-19 guidelines.

The training will be fully remote and conducted over Microsoft Teams. The tentative timing for delivery of the training is May 11-13 2021, from 10am-4pm each day. Following the training, GTAC staff will administer a survey to participants to gauge learning and effectiveness of instruction, and we will share the survey results with interested parties. In addition to planning and delivering the training, GTAC staff will create and distribute advertising materials, manage course registrations, host and distribute course content (lecture slides, exercises, supporting data) and any pre- or post-course correspondence with participants. We plan to accommodate ~30 participants, with half of the audience coming from USFS and half from NRCS.

## **Objectives**

The main objectives of this project support developing, delivering, and providing administration for the NRCS GEE training, ensuring that the training provides a) a comprehensive introduction to the GEE platform and fundamental techniques that is b) specific and relevant to soil mapping and classification. The objectives listed below support the course structure, which follows.

1. Develop two days (~6 hours total) of lecture content
2. Develop two days (4-5 exercises, ~6 active participant hours total) of exercise content, supporting applications to soil mapping
3. Develop ½ day (~ 3 hours total) walkthrough of guided application of concepts
4. Develop ½ day (~3 hours total) of lecture content giving examples of additional applications, potentially supported by guest speakers from GTAC staff

The structure of the proposed training is as follows:

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| Day | Focus | Lecture content | Exercise content |
| 1 | Intro to GEE, scripting, and remote sensing principles | >Review of GEE  >Brief overview of remote sensing   * Bands * Indices | Exercise 1: Image acquisition and Image pre-processing  Exercise 2: Band math and creating basic vegetation indices |
| 2 | Classification and modeling | >Overview of supervised and unsupervised classification  >Background on Random Forests  >Using tabular data and training data in modeling | Exercise 3: Managing assets for training data-- Import + organize tabular data; potentially collect new tabular data  Exercise 4/5: Random forests (may be 2 exercises)   * Classification * Regression (tentative/dependent on applicability) |
| 3 | Examples of applications + personal data | > Examples of soil mapping applications   * Guest speakers from GTAC | Guide participants through applying Exercises 1-4/5 to their own content   * Edit/update GEE scripts already provided * Produce a simple classification |

## **Assumptions**

Assumptions include:

* Example data sources and applications will be readily available via Claire Simpson, Rob Vaughan, and/or other GTAC staff
* No significant changes to USFS / GTAC use of GEE occur that may slow development of exercises—frequent and/or significant changes may slow progress. This is a concern because of the abbreviated project timeline
* Existing GTAC trainings can be easily adapted to refer to soils, rather than vegetation

## **Deliverables**

1. 3 days (18 workshop hours) of training
   1. Lecture slides and delivery, in the form of Powerpoint slides accompanied by Teams chat, to total ~6 hours of active workshop time
   2. 4-5 exercises, distributed as 508-compliant PDFs. Exercises will be supported by trainers being available and on call for questions. Will total ~6 hours of exercise content
   3. Diverse examples of applications, and guidance of participant application to novel areas, to total ~6 hours of active time

## **Project Phases & Schedule**

Below is an anticipated schedule for this project.

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| --- | --- | --- | --- | --- | --- |
|  | Phase # | Action | Description | Estimated Time (in hours) | Anticipated Completion Date  Completed Date |
| Training Development, Admin, and Delivery | 1 | Coordination with soil technique experts | Get example content, data, guidance from Claire Simpson | 48 | March 24, 2021 |
| 2 | Day 1 planning | Develop lectures and exercises, heavily supported by existing GTAC content | 44 | March 31, 2021 |
| 3 | Day 2 planning | Develop lectures and exercises, moderately supported by existing GTAC content | 88 | April 14, 2021 |
| 4 | Day 3 planning – application guidance | Develop framework for application of course content to personal data | 48 | April 28, 2021 |
| 5 | Day 3 planning – coordinate with guest speakers | Identify, communicate, and plan guest speaker content and timing for examples on Day 3 | 28 | May 5, 2021 |
| 6 | Advertisement and signups | Administration to develop course offerings, create and distribute ad materials, manage registration | 16 | May 11, 2021 |
| 7 | Workshop prep | Review course content, coordinate responsibilities, adjust flow | 32 | May 10, 2021 |
| 8 | Workshop delivery | 2 GTAC staff conduct training | 48 | May 11-May 13, 2021 |
| 9 | Follow-up | Distribute course materials and training summary | 8 | May 20, 2021 |
| Total hours: | |  |  | 360 |  |

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| **RASCI Matrix** | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Activity** | **Lila Leatherman** | **Juliette Bateman** | **Brenna Schwert** | **Nathan Pugh** | **Claire Simpson** | **Rob Vaughan** | **Suzann Kienast** |
| Project Planning | R | I | A | A | C | A | A |
| Coordination with soil subject matter experts | R | I | A | I | R | S | S |
| Day 1 planning | S | R | A | I | C | C | C |
| Day 2 planning | S | R | A | I | C | C | C |
| Day 3 planning | S | R | A | I | R | C | C |
| Advertisements and Signups | R | S | A | I | I | C | C |
| Workshop Prep | R | R | A | I | R | C | C |
| Workshop Delivery | R | R | A | I | R | I | I |
| Workshop follow-up | R | S | A | A | I | I | I |

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| **R – Responsible**:Who does the work? |
| **A – Accountable**: Who signs off on the work? |
| **S – Support**: Who supports the person doing the work? |
| **C - Consult**:Who provides opinions/input about the work? |
| **I – Informed**: Who needs to be informed about the outcomes from the work? |