

**Directions** (Part II): Select only one of the following two questions. Your responses should be well-organized, well-formulated, and comprehensive in depth. Where necessary, describe a possible data dictionary to use, data sets to be imported, extensions to be used within ArcView, etc.[40]

13. A report in the *San José Mercury News* (August 3, 1999) focused on the shrinking habitat of the bay checkerspot butterfly within Santa Clara County. The butterfly's main food sources are the following plants: dwarf plantain, purple owl's clover, desert parsley, and California goldfields. Surprisingly, these species grow on (otherwise inhospitable, magnesium-rich) serpentine-derived soils. Both the butterfly and its food sources prefer to live in the cooler, higher elevations of the East Bay and Santa Teresa Hills, and the Santa Cruz Mountains, however, a range of temperature zones is important due to seasonal vegetation limits.

Your job is to produce a map of possible bay checkerspot butterfly habitat. Your tools are: a real-time DGPS receiver (with lots of batteries!), a computer (with ArcView, Trimble Pathfinder, and Internet access). What will you do

1. to prepare for your mapping project? [15]
2. while in the field? [15]
3. after field work? [10]

In preparation: I would look for available data sets (from Internet sources). Some useful GIS layers would be the local geology (to locate serpentinite localities), DEMs (so that elevations may be added), a few DRGs would be useful for driving directions, or if I didn't know where the Santa Teresa Hills, etc. were located. By overlaying the DRGs over the geology layer, you could see where the pockets of serpentine are, in relation to roads. I would create a data dictionary of feature polygons; these polygons would have an attribute field with a menu of choices: plantain, clover, parsley, goldfields, multiple indicators. I would charge up my batteries!

While in the field: I would travel to areas of suspected serpentine-rich soils, as shown by the geology/DRG composite. I would use the GPS receiver to collect the areas where any of the indicators were present (i.e., there could be serpentine "barrens," where no vegetation exists; these would not be hospitable habitats).

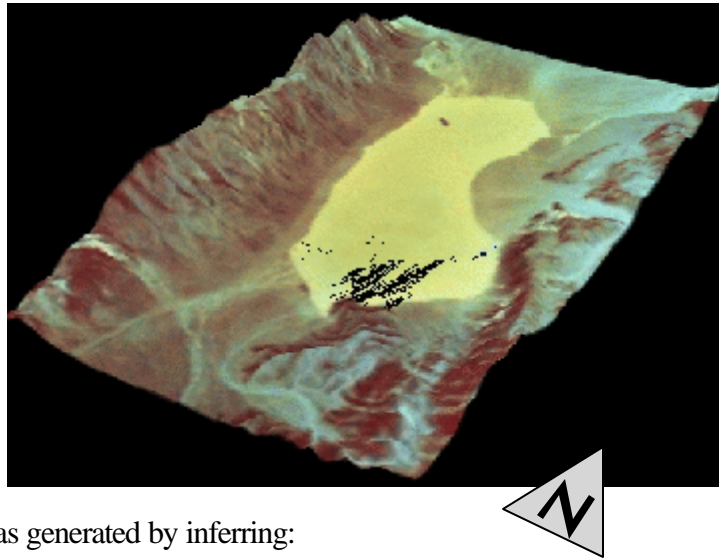
After field work: I would download the data. I would *correct it* (if I didn't have real-time differential corrections via Coast Guard Beacon or commercial satellite service while in the field). I would import the feature files as shape files into ArcView. I would activate Spatial Analyst. I would convert my polygons to grids. I would conduct a map query to find areas that contain the indicator plants *and* are above a certain elevation. (The program is vague in this respect; you would need to know the elevation below which the butterflies don't survive.) Then I would make a map!

14. Below is an oblique view of the Racetrack Playa, as mapped by your professor.

The image depicts the Racetrack Playa in Death Valley National Park. The black lines at the south end of the dry lake bed represent the trails of the Racetrack's "sliding rocks."

Her only tools were: a Trimble GPS receiver, a laptop computer (with ArcView, Trimble Pathfinder, and Internet access), and a good pair of hiking boots. Describe how this image was generated by inferring:

4. what was done prior to and during field mapping of the sliding rock trails? [15]
5. what was done after the field mapping was complete? [10]
6. how was this image produced within a GIS environment? [15]



**If you chose this question, you are not responsible to know what I actually did. A reasonable mapping plan is what I'd like to see...**

*Don't ask* what I did before the project (although I could tell you there was a great deal of panic involved!). Actually, I rented a GPS receiver in Sacramento; I learned how to use it by paying a certified trainer \$700 for a two-hour lesson; I drove like mad down to Death Valley (it cost over \$800 per week for the equipment rental!) composing the data dictionary in my head. When I got to Death Valley, I used my laptop to create a data dictionary, with rocks (point features) and trails (line features). Each feature had an attribute field that corresponded to the rock number (numeric). I charged my batteries!

I mapped every trail by logging points every two seconds while walking along it. I logged the position of every rock (collecting point features).

I downloaded the data. I post-processed the data by obtaining base station files (they were not yet available over the Internet) on floppy disks! I corrected the data using Pathfinder software, and exported the DGPS data as shape files.

ArcView opened the shape files. I made Spatial and 3D Analyst active. I downloaded the DEMs from the USGS. I converted them to grids. I scanned an aerial photo of the Racetrack, and warped it for georeferencing purposes. I draped the georegistered aerial photo over the DEM. I added the GPS data. I pasted these themes into a 3-D View.