We weren’t going to talk about it, but hey – it’s the last short talk for class and the summer camping season is about to begin: Camping 101

What happens when we go to the bathroom in the wilderness, and where is the best place to go?
What happens when we pee in the woods?

• Urine rarely contains bacteria, so it poses little health risk, but it does contain nutrients and organic matter.

• Peeing into streams or lakes can increase nutrient loadings leading to algal blooms and $O_2$ depletion.

• When you pee on land you provide nutrients for local flora and fauna.
A major component of urine is **Urea**

- \( \text{H}_2\text{N-C-N-H}_2 \) \( \mid \) \( \text{O} \)

Each mole of urea degrades to produce 2 moles of \( \text{NH}_3 \), which exerts an oxygen demand when nitrifying bacteria oxidize it to \( \text{NO}_3^- \) (two moles of \( \text{O}_2 \) per mole of \( \text{NH}_3 \)). The oxidation number of the carbon in urea is +IV, so there will **not** be a carbonaceous oxygen demand since the oxidation number of carbon in \( \text{CO}_2 \) is also +IV.
What happens when we poop in the woods?

- Fecal matter contains many microorganisms and can be a carrier of harmful diseases...
  - If you go near water, diseases can be spread to anyone who uses the water downstream.
  - If you go on land, but do not bury it deep enough, insects can come in contact with diseases and spread them to anyone they meet.
What else happens?

- If you bury fecal matter between 4 and 6 inches deep the resident microorganisms will degrade it within a few weeks.
- If you bury it deeper than six inches it might stick around for a long time because the conditions are not as favorable for bacterial growth.
- Like urine, fecal matter is full of nutrients. Wherever you go you will be feeding the local plants.
Different organic components will degrade at different rates.

- Fecal material consists mostly of enteric bacteria and organic material and degrades rapidly.
- Toilet paper, on the other hand, is made up of wood fiber.
  - Lignocellulosic materials degrade very slowly (check out how long it takes for a fallen tree to disappear).
What should we do in the wilderness?

• Find out the regulations for the area in which you will be camping. The more popular areas have stricter rules.

• Commonly you are advised to...
  – “Go” at least 200 ft. from water bodies, avoiding areas that may be campsites, or seasonal streams.
  – Bury poop between 4 and 6 inches deep. (use a trowel!)
What else?

• Don’t bury or burn toilet paper. If you pack it in, pack it out!
• In the most popular areas you are not allowed to bury poop, you have to take that with you, too.

One of the most popular, and space limited camping areas in the U.S. is Grand Canyon National Park.

The river trip of a lifetime is a chance to float through the Grand Canyon on the Colorado River.
Interesting Colorado River factoids:

• The water that inters the Grand Canyon comes out of the bottom of the Glen Canyon Dam and is **COLD**!

• The Dam dampens the normal river flow fluctuations. High flows that redistribute sediments no longer happen. This is slowly changing the ecology of the Grand Canyon.
The Grand Canyon would have been dammed to generate hydro-power and would be full of water (like the Glen Canyon is with Lake Powell) if it wasn’t for John Muir, founder of the Sierra Club.
US rapids are ranked on a scale of 1 to 4 (big); however rapids in the Grand Canyon are extreme and have their own scale with a max of 5!
The Grand Canyon is in a desert. Peeing on the land destroys arid habitat so you are advised to pee in the Colorado River.
Poop gets packed out in the Grand Canyon

• If you travel with a river guided tour (most common option), your guides will use a water tight container for storage.

• The original containers used for this purpose were used military ammunition cans.

“Groover”

Groover contents: the “Goodness”
• Murphy’s law of the wilderness.
• A Collection of Horrifyingly True Wilderness Toilet Misadventures