

Water Quality Impacts Due To Marijuana Cultivation

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Problem Statement

- Uncontrolled marijuana cultivation poses significant environmental threats.
 - Pollution of groundwater, streams, and rivers.
 - Illicit water diversions magnify the pollution problems.
 - Water quality conditions resulting from grows adversely affect federally-listed fish species.
 - Grows on public and private land can both cause serious water quality problems.
- Grows on public land are typically located in the “recharge zone”.
 - Rely on highly soluble and very powerful synthetic fertilizers.
 - Likely inject large quantities of nutrients into groundwater

150+ Years of Cumulative Impacts

- Surface soil compaction from grazing and tractor logging
- Water diversions
- Road cuts
- Stream channelization & entrenchment
- Draining wetlands
- Construction of impervious surfaces
- Erosion and soil degradation
- Removal of natural fire processes from the landscape
- Overstocked forests
- Changes to forest species composition
- Conversion of grass lands
- Climate change

Private vs Public Land Grows

- Both imperil fish populations.
- Mountaintop removal and illegal grading has proliferated on private land.
- Cartel grows have persisted on public land after decades of eradication effort.
- Enforcement has been challenging because of a lack proven environmental harm.
- Similar suite of pollutants as CAFUs (CPFU?).

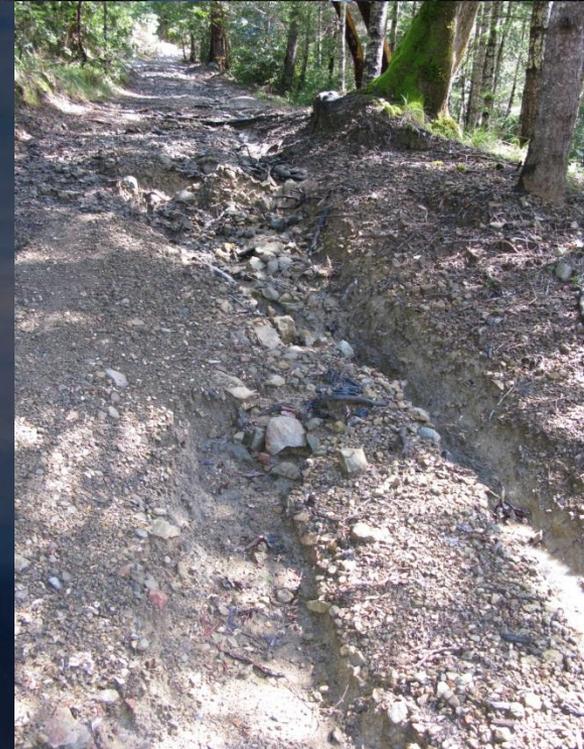
Private grows

- Large clearings and excavations.
- Often rely on illegal water diversions.
- Diesel grows often have substandard fuel storage.
- Spills widely and adversely affect public resource values.
- Ag chemical use runs the gamut from highly concentrated chemical fertilizers and biocides to organic-like operations.
- Sometimes divert water from or trespass on public land

Illegal Grading and Excavation



Really Bad
Grow Roads



Illegal Water Diversions



Diesel Dope





Grows on Public Land, National Forests, and Parks

- Always illegal, no 215 gray zone.
- Harder to detect.
- Always rely on illicit diversions.
- Perpetrators can reoccupy the same site for years.
- Divert streams and springs for miles into hand-dug cisterns.



Grows on Public Land, National Forests, and Parks

- Chemical costs small relative to crop value.
- Fertilizers, rodenticides, fungicides, and insecticides
 - Liberally applied with no training or certification.
 - Damages “wilderness character”.
- “Fertigation” methods likely result in direct discharge of nutrients into groundwater.

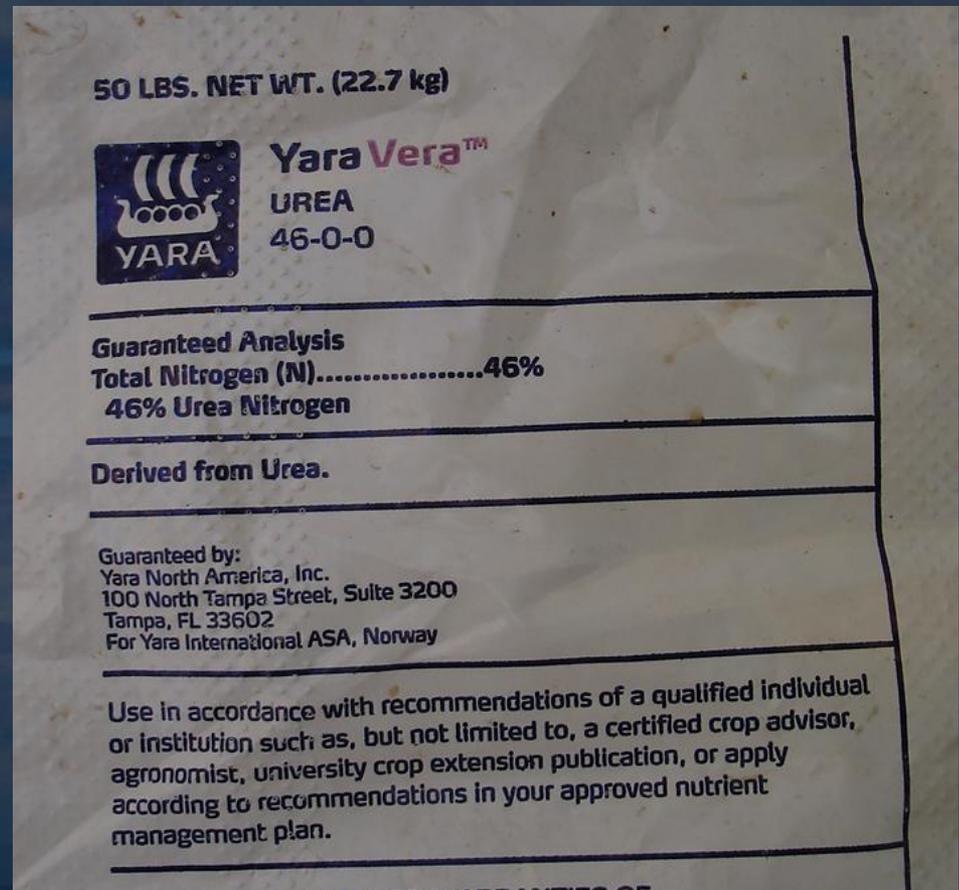
Public Land Grows





Nitrogen Fertilizers

- Chemical fertilizers are typically very soluble in water.
- N is a common groundwater pollutant in agricultural areas.
- Urea breaks down into ammonia, which can be acutely toxic to fish.
- Human health concern at high concentrations.



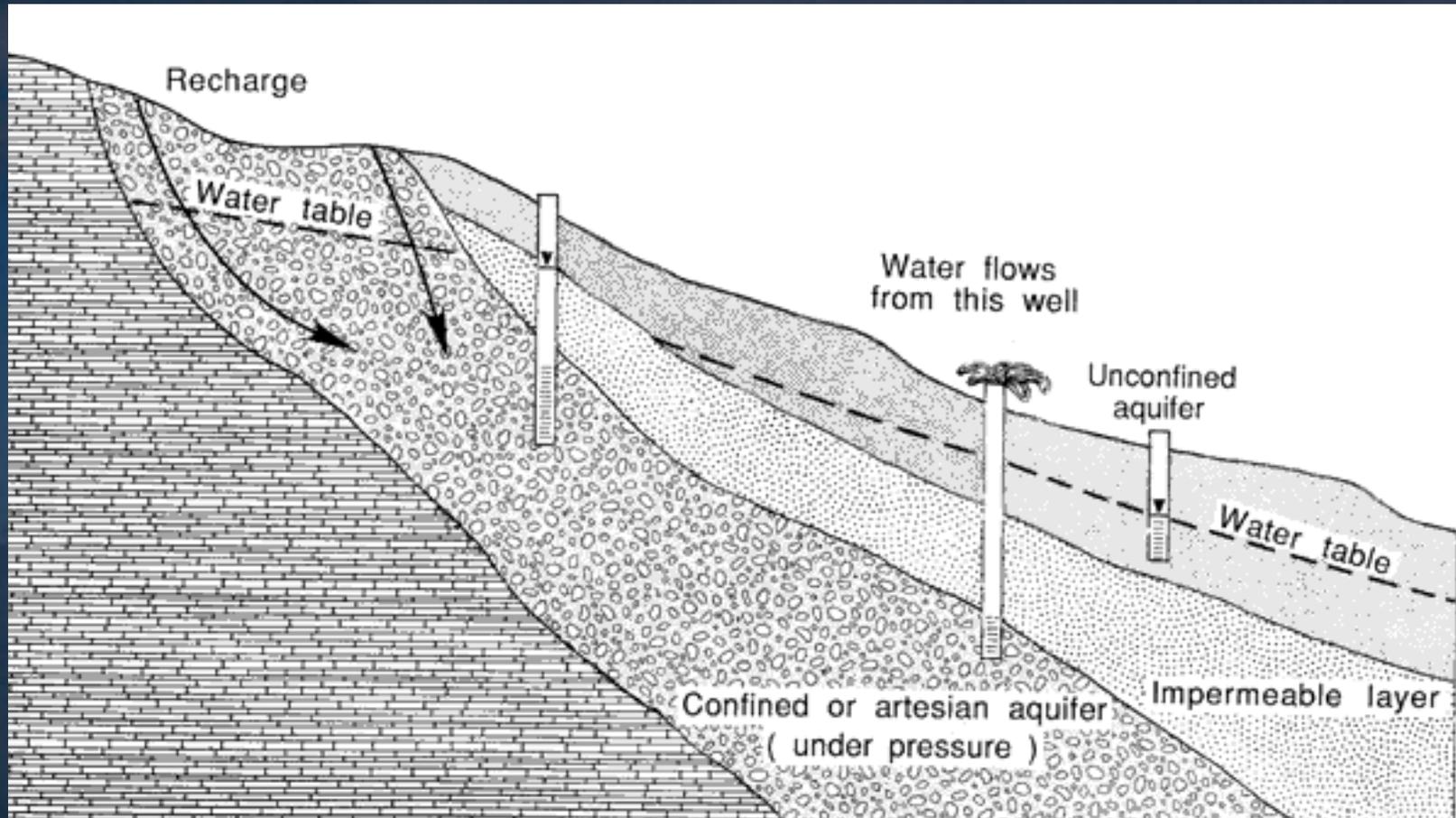
Phosphorous



Nutrient Mismanagement



Groundwater Pollution



Source: USEPA

Fertigation = Groundwater Pollution



Phosphorous Loading

- Phosphorous (P) is the second most important plant nutrient.
- P is especially important for marijuana plants in their flowering phase.
- Most blue-green algae (cyanobacteria) can fix N, so abundance is often limited by the availability of P.
- Blue-green algae contain a neurotoxin that can be lethal if exposure is high enough.

Eel River Blue-Green Algae Blooms

- Blue-green algae (BG) blooms are P limited
- Emerged in 2002 in the Eel River
- Resulted in the documented deaths of numerous dog fatalities and reports of human health concerns.

Eel River Blue-Green Algae Blooms

- Geologic constraints on groundwater result in numerous dwellings that rely on surface water for their sole source of drinking water.
- Unknown BG chronic effects, the WHO daily limit for microcystin-LR toxin is 0.04 mg/kg body weight.
- Unknown exposure to upper trophic levels.
- Counties do routine but limited monitoring.

Other Environmental Damage Mechanisms

- Pathogens from improperly managed human waste.
- Organophosphate pesticides
 - Sevin
 - Methamidophos
 - Carbofuran
- Rodenticides
 - Second-generation rodenticide (brodifacoum) and effects on non-target species.
- Fungicides
 - Copper sulfate
- Increased risk of catastrophic wildfire due to grow encampments.
- Total dissolved carbon increases THM's in public water supplies

