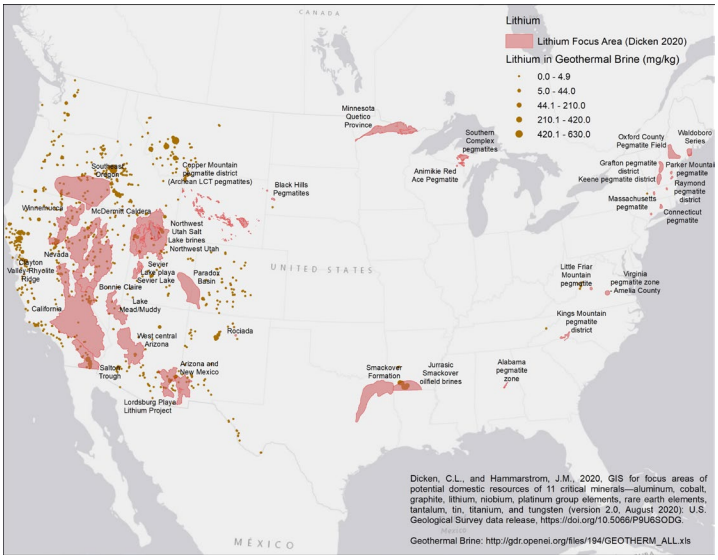
Lithium: a key element in the clean energy transition

Without a massive reduction in carbon emissions, climate change will cause severe social and environmental upheaval for years to come. **To reduce emissions**, the energy and transportation sectors are transitioning away from fossil fuels. Lithium, a material used in rechargeable batteries for vehicles and power grid storage, is playing a key role in the transition.

Currently, lithium is extracted primarily in Australia, Chile, China, and Argentina. While less than 1% of lithium production occurs in the U.S., **there are large deposits of lithium** scattered across the country. Industry interest in lithium-containing rocks, clays and brines falls within nine states: Arizona, Arkansas, California, New Mexico, Nevada, North Carolina, Oregon, Utah, and Wyoming.

There are **two major kinds of lithium extraction**. Lithium in rocks and clays is extracted through surface mining. Brines containing lithium are pumped to the Earth's surface, where lithium is concentrated through evaporation or direct extraction. While all extraction methods have the potential for some environmental impact, **direct lithium extraction from brine would likely have a smaller environmental impact** that either surface mining or evaporative concentration.

Lithium extraction from brines can involve the use of large evaporative ponds.



Lithium is found in rocks and clays (pink), and brines (brown) across the United States.

TNC has released a new science-led report entitled, **Potential Lithium Extraction in the United States: Environmental, Economic, and Policy Implications**. It includes:

1. an overview of potential environmental impacts associated with different extraction methods
2. a detailed analysis of potential environmental impacts at 72 proposed extraction sites
3. an analysis of economic impacts of potential future lithium extraction
4. a policy analysis based on stakeholder input from Salton Sea, California, and Thacker Pass, Nevada.

Cultural heritage and tribal considerations, and environmental justice and safety, are of the utmost importance in land use decision-making. **We advise against using the results of this assessment without further inquiry into the potential impacts of lithium extraction in these areas**. The full results of our assessment are freely available, enabling those with expertise in these topics to conduct more complete impact assessments.

Hundreds of species have been recorded within the 72 proposed lithium extraction sites, including **248 rare and/or special status species**. Wetland habitats occur within extraction sites in all nine states. Given that many of the species recorded at proposed extraction

Read TNC's report on Lithium Extraction in the United States

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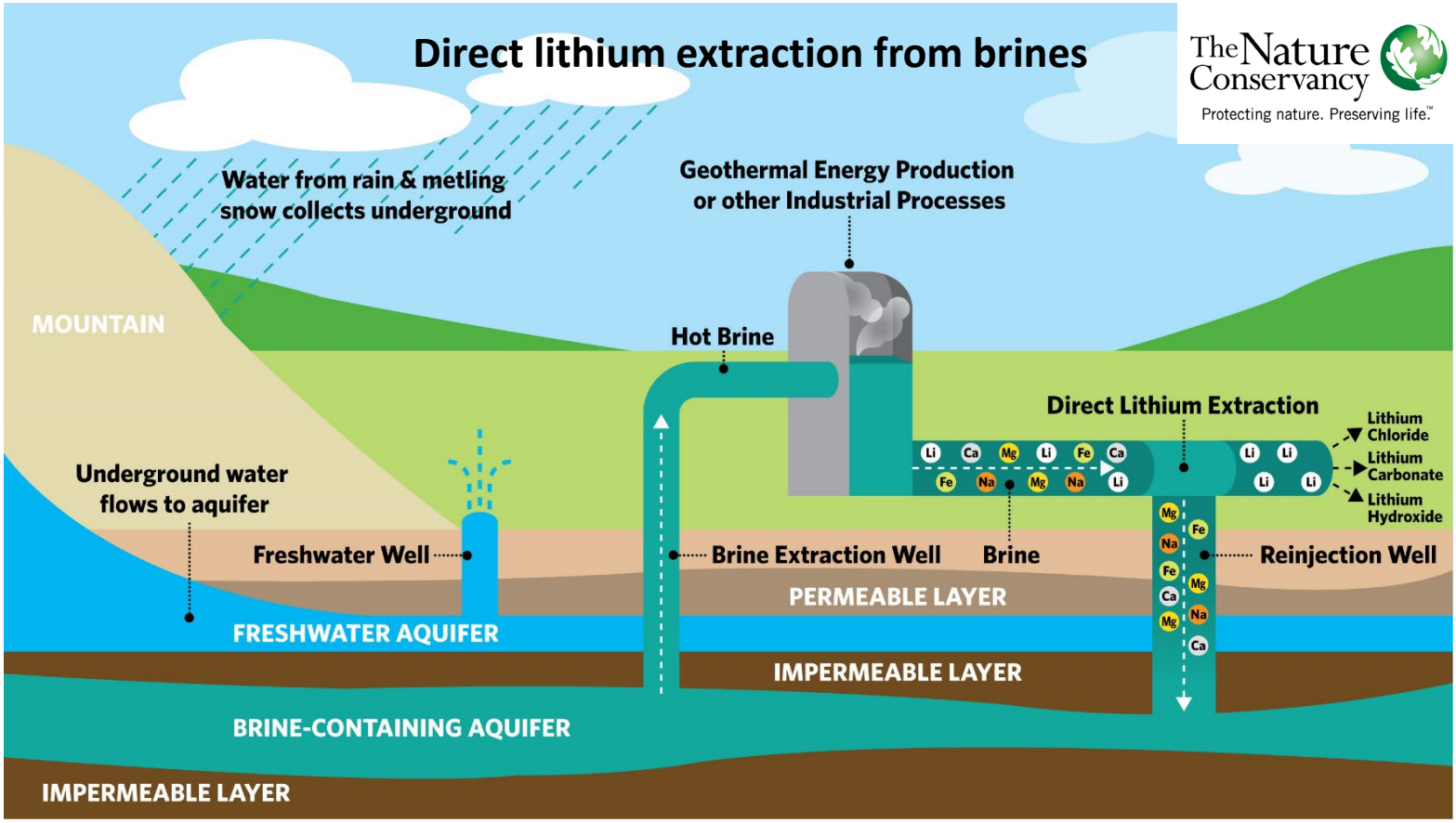

sites are wetland-dependent, a future analysis of cumulative impacts on wetland habitats and the species they support is needed to fully understand the impact of lithium extraction at a regional to continental scale. Additionally, site-specific analyses of lithium extraction impacts must include a hydrogeological assessment to reveal groundwater issues.

The United States has enough lithium to theoretically supply the world for over a century. However, extraction involves emerging technologies and novel processes, and the market is dynamic. Currently, demand is increasing more rapidly than supply.

Many lithium deposits occur in rural areas. Impacts to these economies and communities will be significant, and may generate benefits including increases in state GDP, tax revenue, and employment in the mining sector in some states. However, local economic benefits may lack impact if adequate policy guidelines and workforce development partnerships are not in place.

The technologies and impacts involved in lithium extraction must be communicated to communities in a manner that is understandable. Enhancing federal and state agency capacity may help address this challenge.

In addition to extracting lithium, we can also work to increase lithium supply by developing a domestic battery recycling industry. This approach could also reduce the use of fossil fuels, and help address climate change.

To reduce environmental impacts of lithium extraction:

1. Prioritize projects that **avoid or minimize impacts to species or ecosystems**.

2. **Prioritize projects that use direct lithium extraction from brine. Analyze connectivity between lithium-containing underground brines and other groundwater or surface waters**, and require environmental oversight based on findings.

3. Post extraction, **re-inject brine into the same aquifer from which it was removed**.

4. Post-extraction brine should be **contaminant-free** to minimize re-injection risks.

5. **Ensure that water use by all processes at the extraction site can be accommodated** without causing a drop in the water table that would impact species or habitats.

6. Ensure that all waste streams are properly managed and that waste does not pose a hazard for human health or wildlife, or result in contamination of air, water, or soils. **Ensure reclamation** over the long term through bonds or other measures.

7. **Prioritize projects where pre-existing infrastructure is present** at the site.