GPSD – Results, Salinity Reduction, and Salt Recovery Notes

1. Target Filtration Outcome

GPSD is designed as a **pre-treatment step** in water purification workflows. It is not a standalone potability system, but it significantly reduces particulate content and moderates salinity.

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2. Salinity Reduction Expectations

Water Source Type	Typical Input Salinity	Expected Output Range	Notes
Coastal Seawater	30–35 ppt	18–25 ppt	Sand retains some salts through surface crystallization and diffusion blockage
Brackish Groundwater	5–15 ppt	2–8 ppt	Especially effective with slow trickle rate and fine layering
Floodwater / Contaminated Freshwater	Variable (0.5–10 ppt)	0.2–3 ppt	Dependent on suspended solids and organic load

> Note: Values depend on sand type, grain size, flow rate, and pit structure.

⚙ 3. Key Reduction Mechanisms

- **Capillary drag and pore retention:** traps salt-rich particles in fine grains
- **Surface crystallization:** visible salt crust formation at the top layers
- **Diffusion lag through packed media:** slows ion movement under low pressure

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4. Salt Recovery Process (Optional)

Users may opt to **harvest surface salt** for controlled reuse or disposal.

A. Methods

1. **Top-layer skimming:** Remove the top 3–5 cm dry sand layer weekly (visible salt will be embedded).
2. **Evaporative crystallization basin (optional):** Divert partial flow to a shallow tank post-filtration for passive salt drying.

3. **Solar drying trays:** Spread high-salinity runoff on black tarp under sunlight to speed up crystallization.

B. Recovery Estimate

System Scale	Weekly Salt Yield Estimate
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5m extended trench	2.5–4 kg salt		20m deep array	10+ kg salt (depending on feed)

> Yield is affected by brine strength and replacement cycle frequency.

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5. Reuse Potential

- Non-potable cleaning or livestock-grade reuse
- Brine concentration for alternative saltworks
- Disposal into controlled waste pits or reentry zones
- Community-level salt trade or barter (experimental use only)

⚠ 6. Final Notes

- Always pair GPSD with a **final purification method** (RO, UV, boiling, etc.)
- Do not use recovered salt for food unless verified through laboratory-grade decontamination
- Sand contaminated with biologicals or pollutants must be fully replaced, not recycled

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Version: 1.0
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Last Updated: May 2025