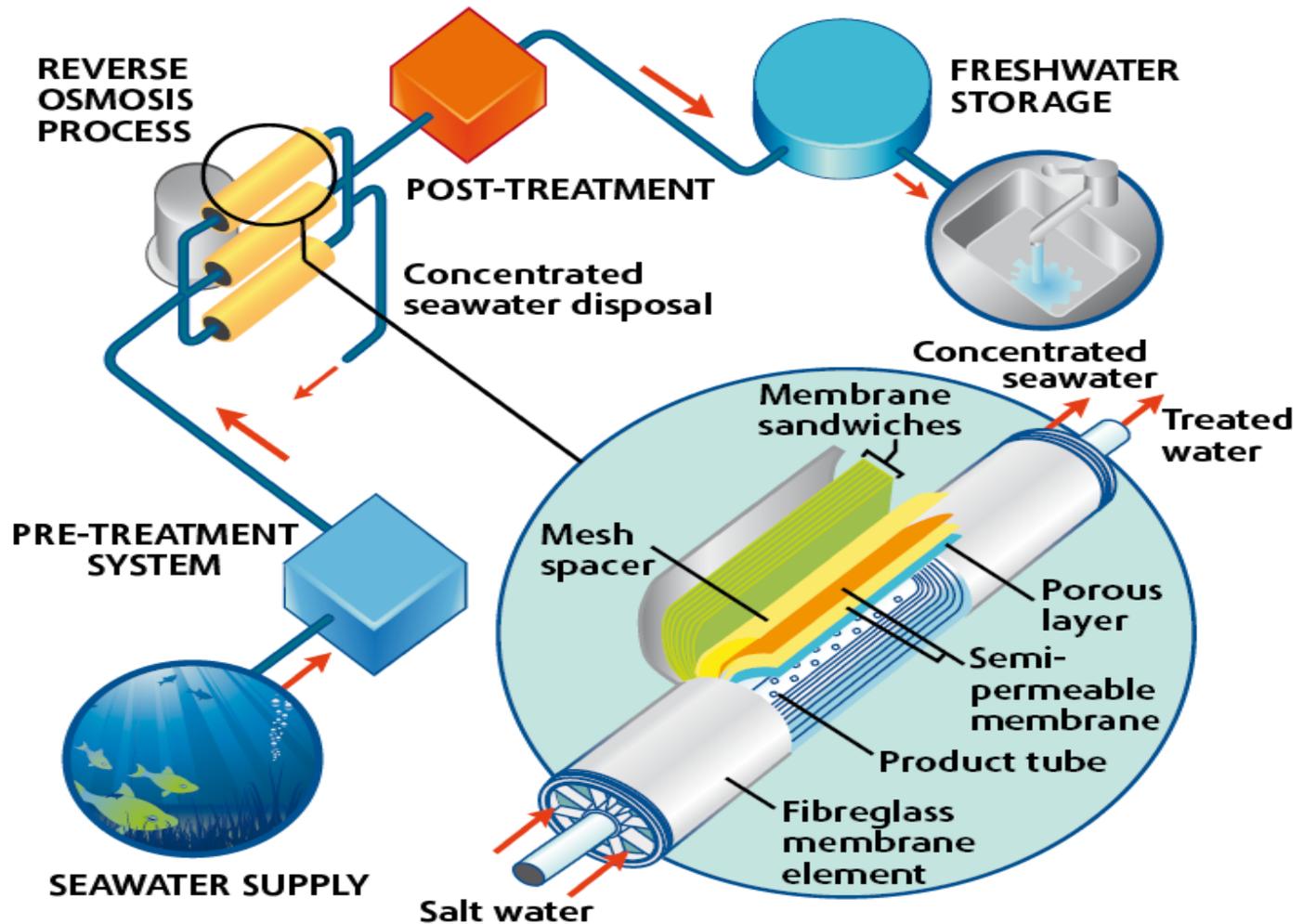


Seawater Desalination in California

MBNMS Advisory Council

December 12, 2013

Seawater Desalination Process



Stages of the desalination process

Existing and Proposed Desal Facilities

From Associated Press, September 2012

Calif. looks to sea for drinking water

Proposed plants for removing salt from ocean water have been stymied by high building and operating costs, regulatory delays and environmental concerns.



SOURCE: Pacific Institute and Calif. Department of Water Resources AP

Key Coastal Act Policies:

- **Marine Biology/Water Quality:** avoid/mitigate effects of intake and discharge.
- **Growth-Inducement:** will a project induce growth beyond coastal resource capacity?
- **“Least environmentally harmful feasible alternative”.**
- **Public access:** to and along the shoreline.
- Is a project **“coastal-dependent”**?
- **Energy use / Greenhouse Gas emissions**
- **Protect coastal scenic and visual qualities.**

Coastal Act Marine Biology Policies

- Maintain, enhance, and where feasible, restore marine biology and water quality.
- Sustain biological productivity.
- Minimize effects of entrainment.

Coastal Act review includes:

- Reducing intake effects: impingement & entrainment.
- Reducing discharge effects.
- Locating structures away from sensitive areas.

Why The Concerns Over Intakes?

Adverse Effects of Open Intakes Are Spatially and Biologically Extensive:

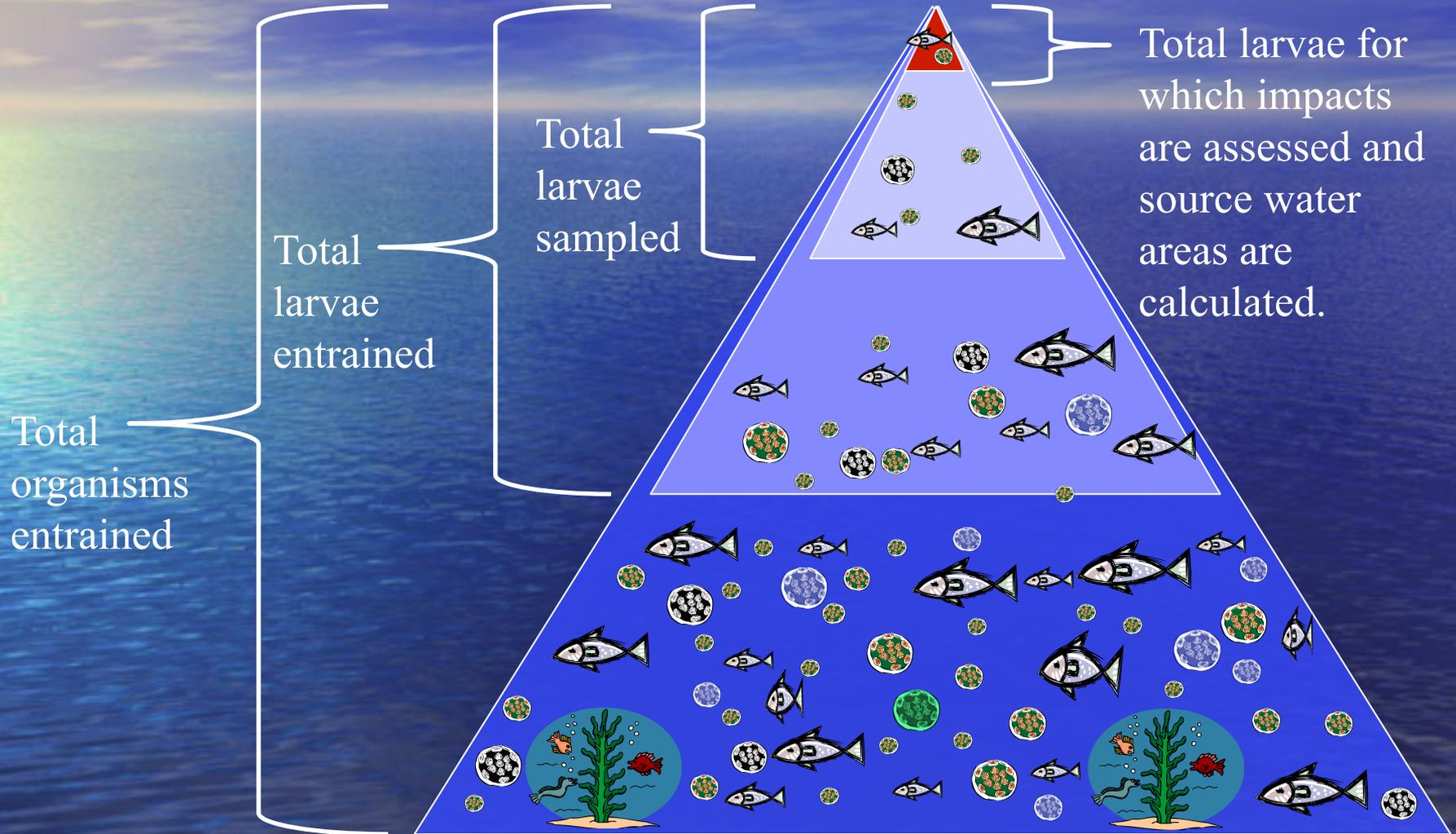
- Can extend along dozens of miles of nearshore waters.
- Can affect hundreds of species.

However...

These Adverse Effects Are Largely Avoidable:

- By selecting the best site, design, and technology.
- By using subsurface methods where feasible.

Biological Extent of Impacts



From Raimondi, *Variation in Entrainment Impact Estimations Based on Different Measures of Acceptable Uncertainty*, 2011.

Example: Proportional mortality for Queenfish (average) = 0.60%

1. Calculate area of Source water Population (SWP)
2. Then the habitat required to compensate (HPF) for larval losses =

$$\text{SWP} \times 0.006$$

SWP = 89,920 acres (140.5 sq. miles)

$89,920 \times 0.006 = 539$ **acres** (0.84 sq. miles) of new bay habitat would be needed to produce larvae equivalent to losses



Extent of marine life impacts



Extent of marine life impacts



Base map from Ocean Conservancy, 2010

Extent of marine life impacts



Base map from Ocean Conservancy, 2010

Extent of marine life impacts



Base map from Ocean Conservancy, 2010

Extent of marine life impacts



Two Main Intake Types:

Subsurface –

Pros:

- Few marine life impacts.
- Little, if any, mitigation needed.
- Often reduces desal operating costs.

Cons:

- Requires geotechnical analysis.
- Not feasible at all locations.

Open Water –

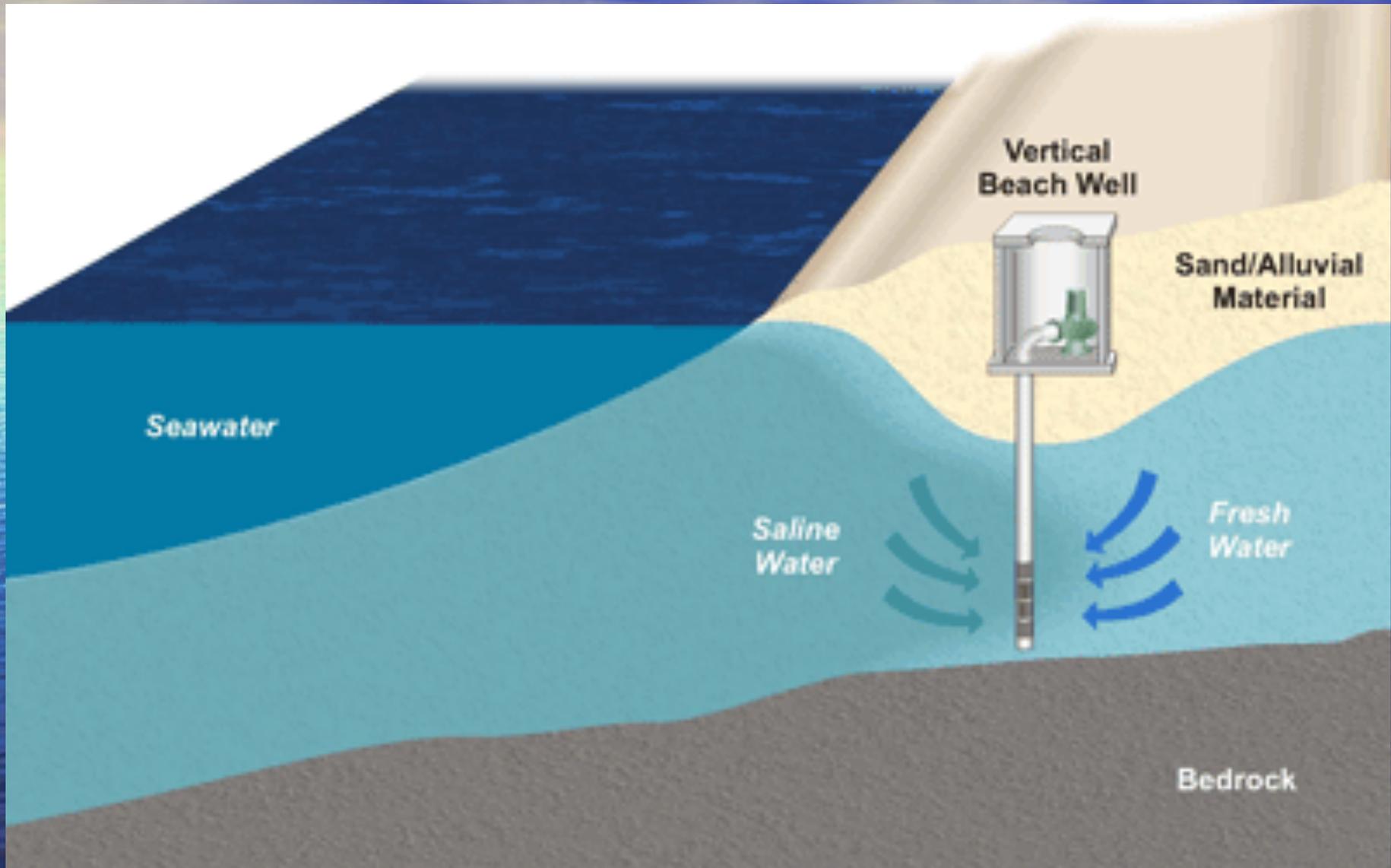
Pros:

- Uses existing structures.
- Can be screened to reduce entrainment rate.

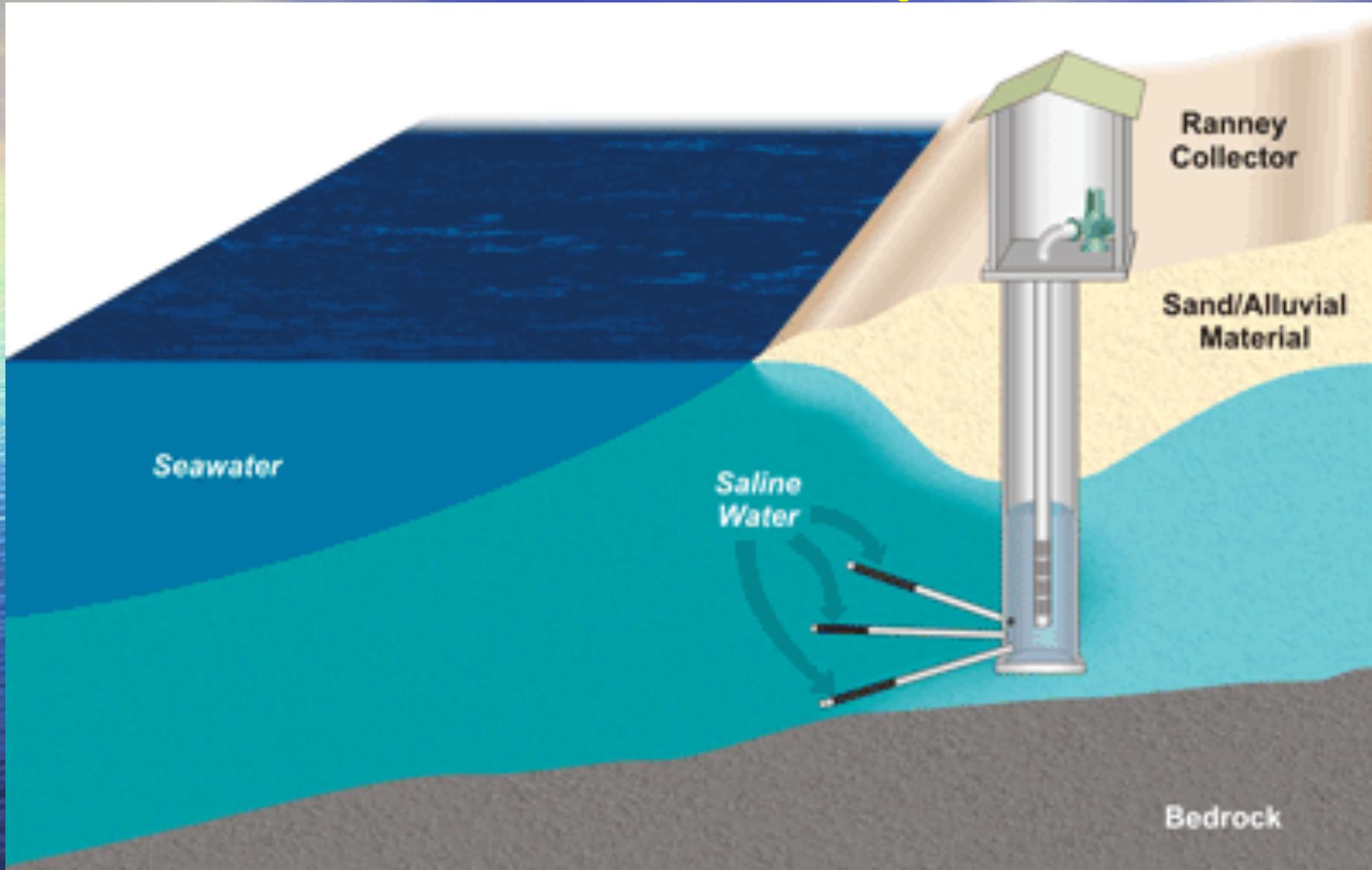
Cons:

- Requires extensive analysis of marine life effects.
- Requires extensive alternatives analysis.
- Often need modifications – screens, lower velocity, etc.
- Requires mitigation.

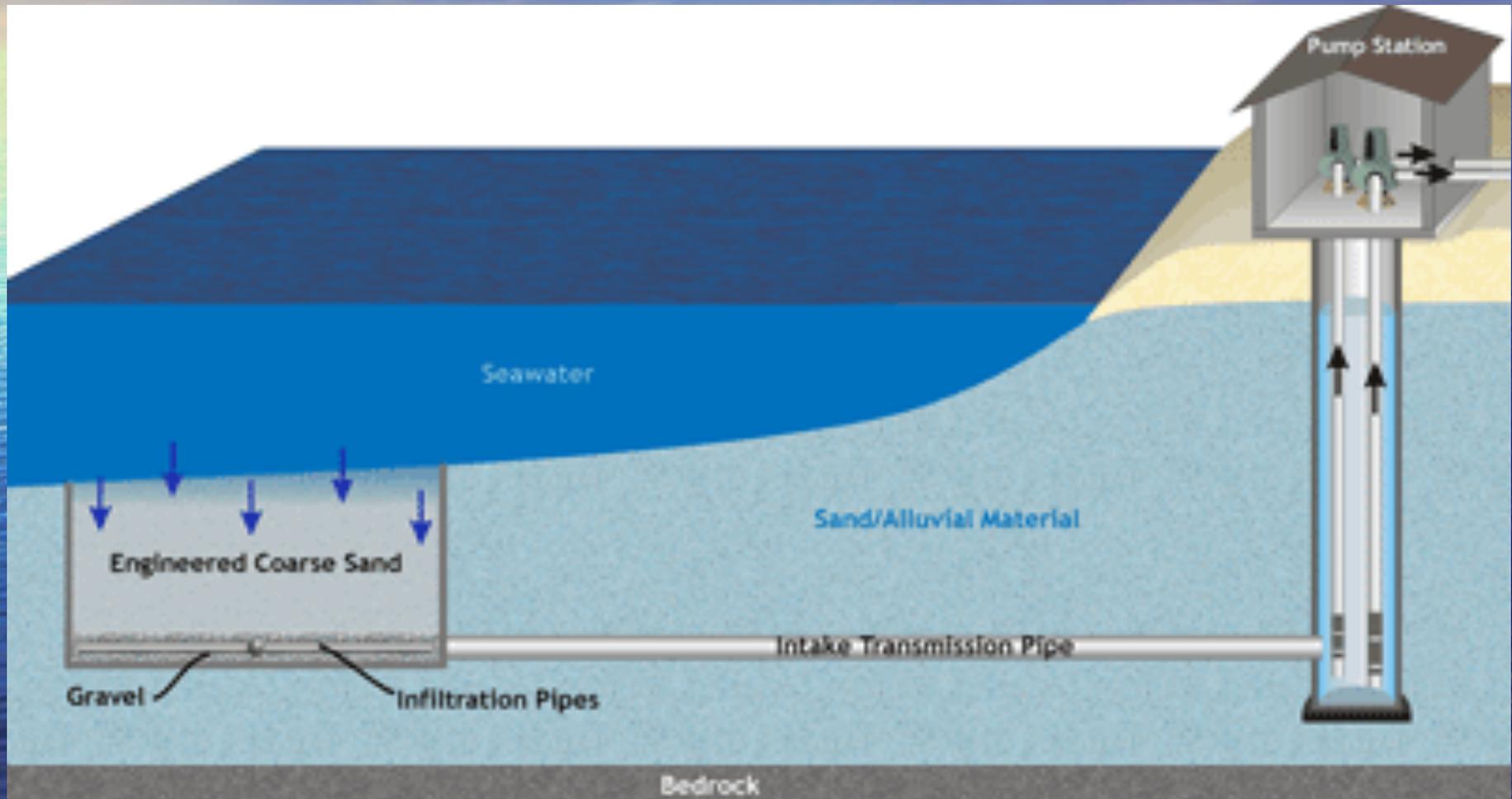
Subsurface: Vertical Beach Well

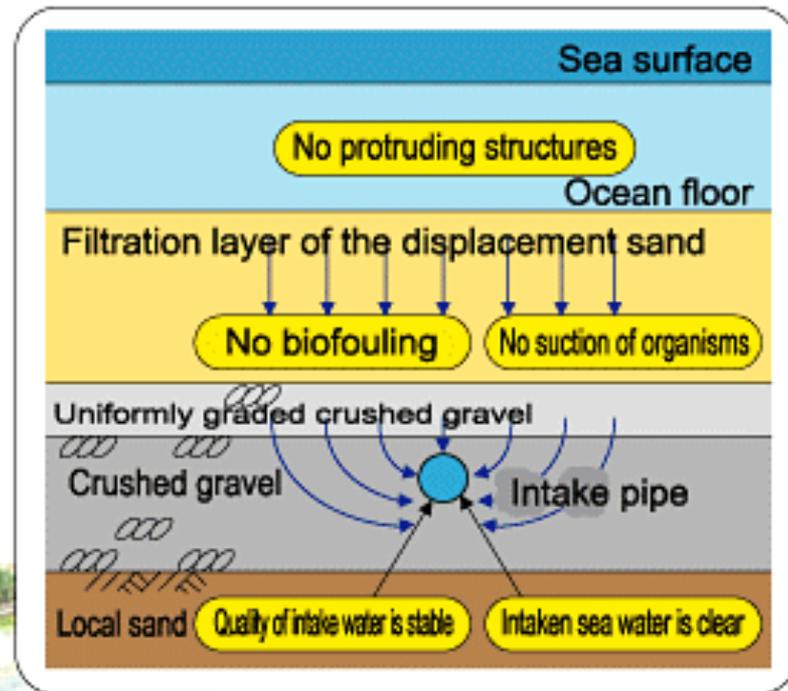
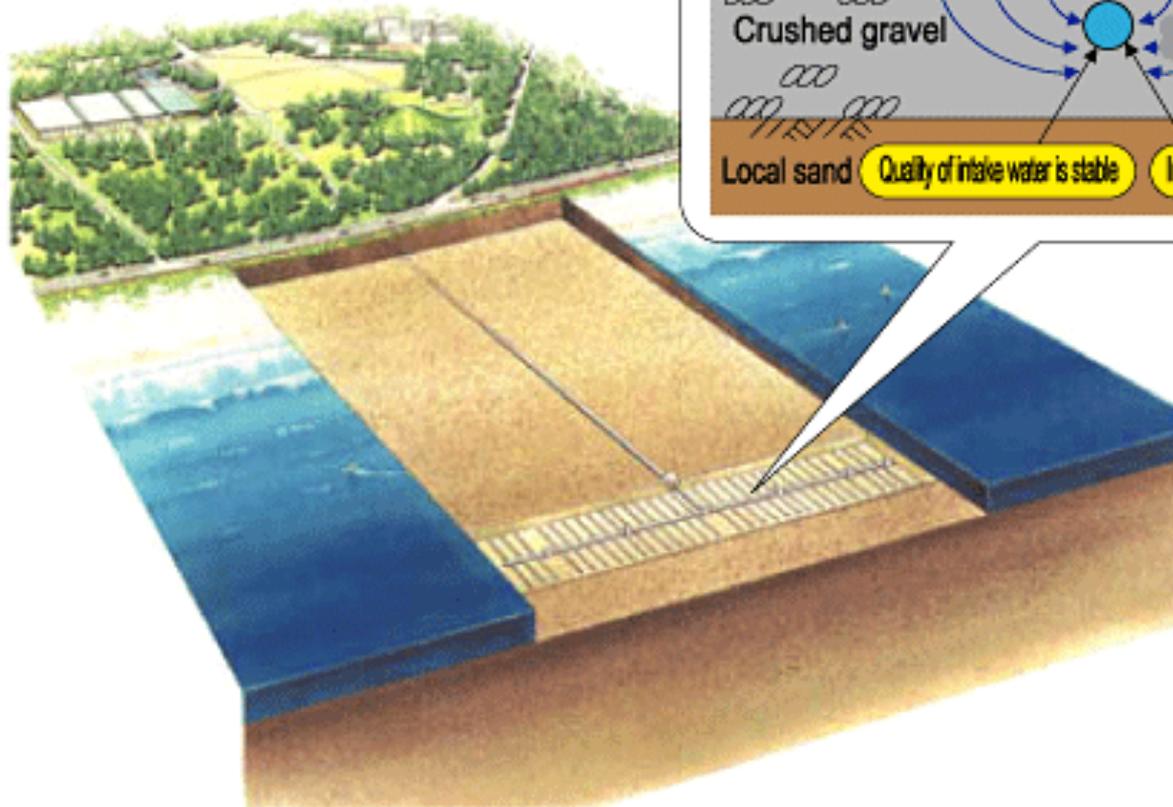


Subsurface: Ranney Well



Subsurface: Infiltration Gallery





Screened open-water intakes



Key Considerations for Facility Design & Review

“Easier” review:	“More difficult” review:
Away from shoreline.	On or next to shoreline.
Subsurface intake.	Open-water intake.
Public facility.	Private facility.
Defined service area with known level of build-out.	Unknown or extensive service area.
Part of local/regional plan in area where significant part of water portfolio is conservation.	Not part of a local/regional plan; in an area without much effective conservation.
Early, extensive coordination w/agencies & stakeholders.	Poor or little coordination.

Key Consideration for Desal Proposals:

**What is the least environmentally
damaging and feasible way to
provide the needed water supply?**

Questions?



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