Each year, poachers illegally take marine wildlife from the Santa Barbara Channel’s Marine Protected Areas (MPAs). To monitor and track vessel activity and notify the authorities of illegal poaching, the Technical Tapirs created a trailer-based mobile radar system (TeTRS).

Power
TeTRS is an “off the grid” solution. Due to TeTRS’ power consumption of 3.3 kWh/day, it houses a power system with 4 320 W solar panels and 6 high-capacity AGM batteries. This design allows for 1.5 days of autonomy with no power generation. All the supporting electronics are stored in a waterproof “dry box”.

Structures // Design Specifications

Enclosure
- Protection from marine environment
- Silicon sealant for water proofing
- Wood painted green to prolong life and blend in with environment.

Solar Rack
- Holds 4 solar panels
- Wings fold up for operation and fold down for transport
- Secured with a pinned connection
- Painted black to protect from corrosion

Tower
- 18’ winch tower to clear visual obstructions
- 5’ foot collapsed
- Retooled for easy removal and replacement
- Bought “off the shelf” for easy duplication

Fig 1: MPA’s around Channel Islands
Fig 2 & 3 Left: Power System, Right: Dry Box in trailer
Fig 4: TeTRS
Fig 5: Enclosure
Fig 6: Trailer collapsed

Software
Switching the radar between stand-by and transmission can save 25% of the total power consumption. We call this the Battery Management System (BMS) and the logic can be seen to the right.

Simulations
Several theoretical models were performed before building:
1. Wind load tests confirmed winch tower can support 70 mph winds.
2. COMSOL Thermal simulations of enclosed electronics box validated the ability of two circulation fans to keep temperatures at safe operating levels.

NOAA Rooftop Tests
Having the radar on top of the NOAA building enabled BMS proof of concept tests. Further testing determined that a 5 min wait time was the best compromise for saving power and tacking vessels.

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