Depending on study objectives, numerous types of devices are available to sample insect communities and populations (Samways et al. 2010). Investigations aimed at acquiring information on seasonal adult emergences, distributions, or habitat associations will benefit from UV light-trapping when focal species are positively phototaxic. In some cases, light-trapping is a preferred method of sampling when adult insects are difficult to collect because of cryptic behaviors or occurrences in remote habitats. Light-trapping is routinely used in investigations involving mosquitoes (e.g., Ryan et al. 2004) and has been used in a multitude of other entomological applications (Muirhead-Thomson 1991). A variety of baited and unbaited solar-powered light traps have been used to monitor insect populations (Steinbauer 2003; Hanson et al. 2012; Oria et al. 2014; Homan et al. 2016), yet monitoring multiple species or communities using UV light traps has been conducted less frequently. When monitoring over time, solar-charged light traps can reduce the amount of labor required to operate and can increase the number of traps deployed across an area of interest (Hanson et al. 2012).

The Monahans sandhills, located in Ward and Winkler Counties, western Texas, are home to a unique insect community with several species more or less restricted to this region. In 2013, we initiated a series of studies to provide information on the phenologies, distributions, and habitat associations of a group of focal insect species including four strong-flying beetles: Prionus spinipennis Hovore and Tumbow (Cerambycidae); Prionus arenarius Hovore (Cerambycidae); Polyphylla pottorum Hardy (Scarabaeidae); and Polyphylla monahansensis Hardy and Andrews (Scarabaeidae). The sandy terrain and isolation of habitats within backcountry areas required a passive sampling device to both withstand harsh environmental conditions (e.g., sun, wind, and blowing sand) and be operated for long periods of time with minimal maintenance. For this application, our research team developed a system for continuous day-charging of batteries, which operated a standard 5-gallon (18.93 L) bucket UV light trap with propylene glycol killing/preserving agent (Figs. 1–2). The trap was designed to collect insects over consecutive nights at pre-determined sampling intervals based on study objectives and monitoring needs. Here, we provide an overview of the trap including its components, basic operation, and observations related to its use over a period of two years at the Monahans Sandhills State Park in seven semi-permanent locations.

Trap components can be purchased at various home hardware and entomological supply stores for a cost of approximately US$422 per trap (Table 1). One person can assemble the trap in less than one hour in the following process. First, a proper location to install the light trap is selected where the solar panel can receive optimal unobstructed sunlight. The solar panel (Fig. 1j) is mounted with multipurpose steel wire into a frame made of four 1.83 m long pieces of #4 steel rebar (1.27 cm diameter) (Fig. 2). The solar panel should be angled at approximately 45° to the ground and faced true south based on our latitude and according to manufacturer recommendations. After mounting the solar panel, we connect a solar charge regulator (Fig. 1o) designed to control the charging from the solar panel into the 12V DC, 35 Ah solar rechargeable battery (Fig. 1n), providing overcharge...