Bioluminescence plays a vital role in the marine environment, aiding in camouflage, predation, mating, and defense. Luminescent displays come in a variety of forms, with glows hypothesized to act as lures and flashes as deterrents. *Harmothoe imbricata* is an intertidal polynoid polychaete worm that utilizes both flashing behavior and autotomization of glowing scales or body segments when approached or attacked by predators. We studied the role of vision in the response of predators to these displays to determine how successfully bioluminescence affects worm survivorship. The eyes of the nocturnal crustacean predator *Carcinus maenas* (green crab) and *Homarus americanus* (American lobster) were painted with matte–black or clear nail polish while others were left unpainted, and allowed to interact with *H. imbricata*. The survivorship of *H. imbricata* was compared between attacks by predators that could see the displays and blinded predators. Attacks were recorded with infrared cameras, a night vision device, and photomultipliers. Blinded predators were 5-15% more successful attacking worms than predators that could see the displays. In a number of trials, unblinded predators pursued the glowing autotomized scales and segments, indicating luminescence may successfully function as a decoy. To further investigate how light affects predator behavior, we isolated vision as a sensory modality in predators by exposing crabs and lobsters to green LEDs that mimic the various bioluminescent displays of *H. imbricata*. From this, we may be able to determine how predators respond to only light.