

Background

- Phototaxis is a vital aspect of fish behavioral research, with light characteristics—such as spectral frequency, light intensity, and light duration—playing significant roles in influencing fish behavior. Understanding fish phototropism can be harnessed to attract fish in marine fishing, enhancing fishing efficiency. Selective devices can be developed to minimize bycatch of non-target species.
- To investigate the effects of light characteristics (specifically spectral frequency, light intensity, and light duration) on the phototropic behavior of yellowfin seabream (*Sparus latus*). Four types of full-spectrum light were used: white light (400-800 nm), blue light (450-470 nm), red light (645-665 nm), and green light (530-550 nm). Using LED lighting. The experiment analyzed the phototropic distribution of yellowfin seabream under these varying light conditions.

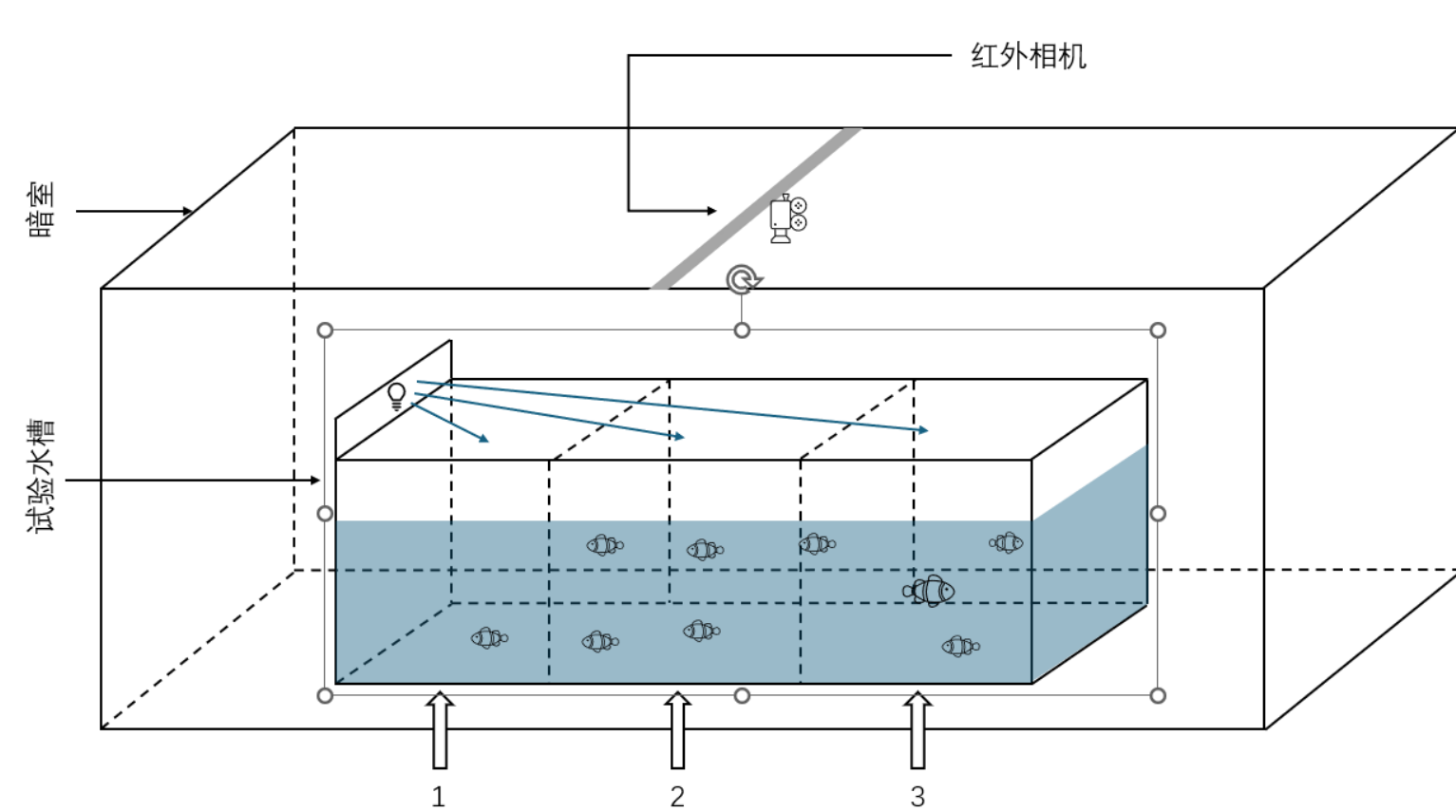
Materials and methods

Experiments on the effect of different light characteristics on the behaviour of marine fishes

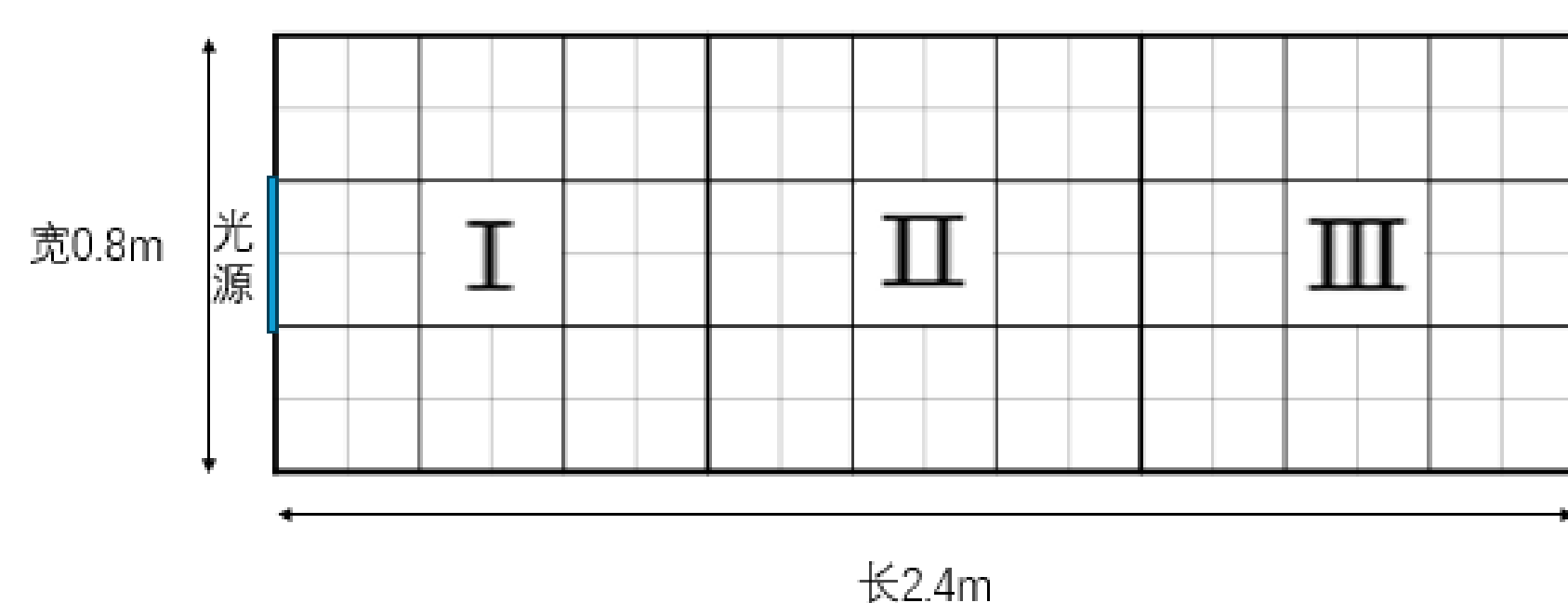
A. Test Object (*Sparus latus*)



B. Hydrostatic tank and equipment



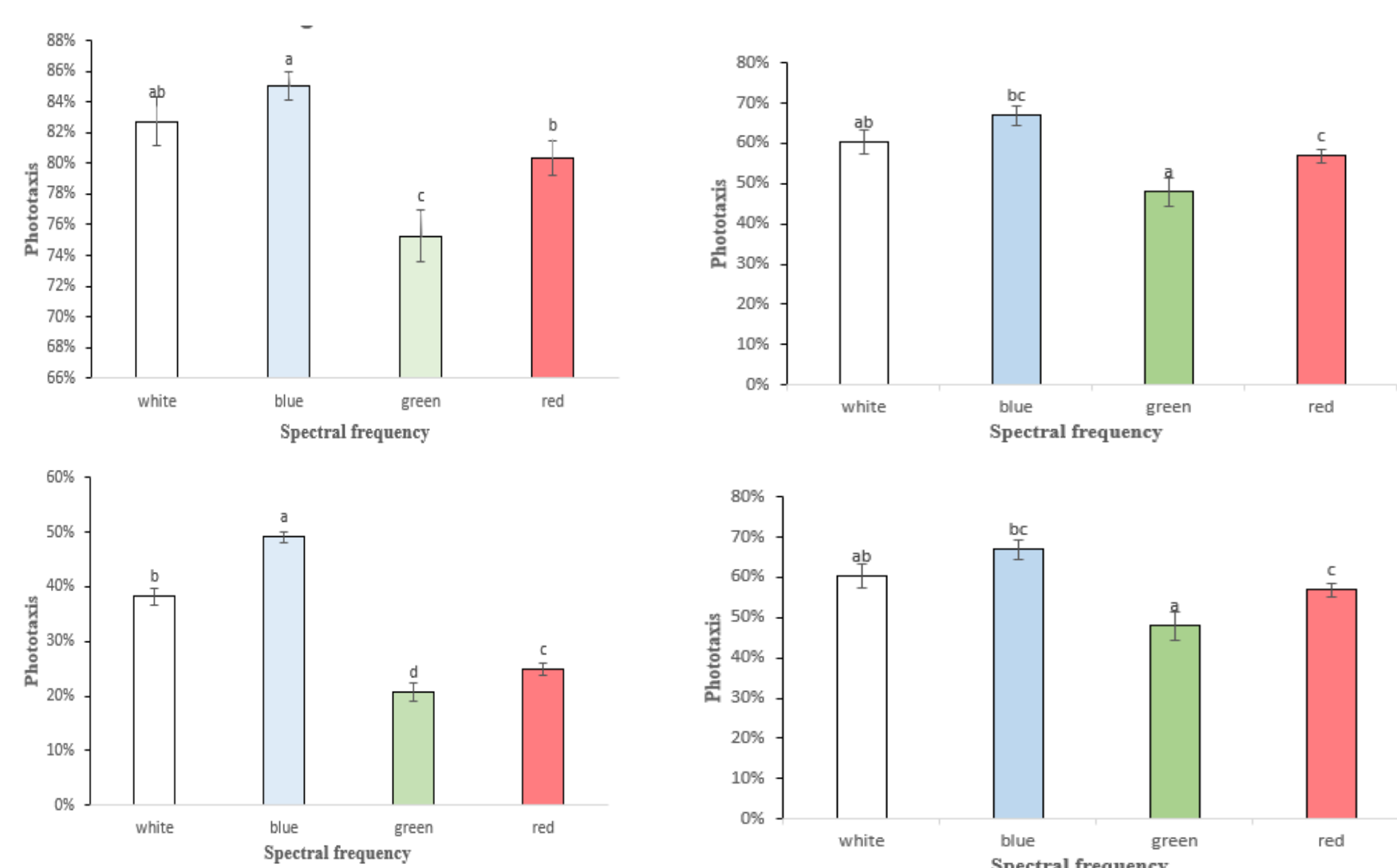
C. Division of light zones



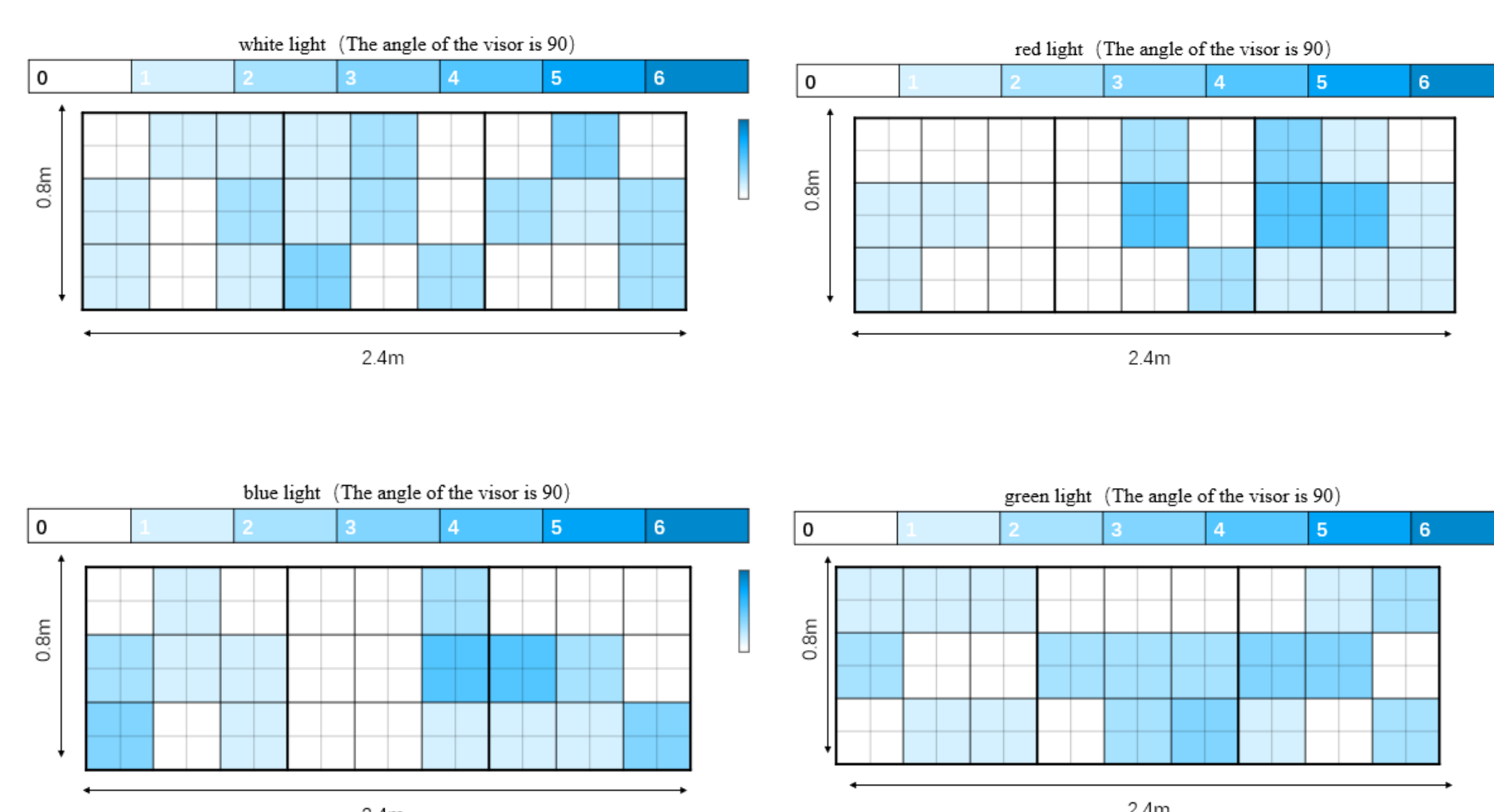
- The effects of light with different spectral frequencies on the behavior of yellowfin seabream were analyzed through observations of their behavioral trajectories and phototaxis rates.
- The video tracking software Tracker was employed to capture the positional coordinates of the test fish, allowing for a detailed description of their phototropic behavioral trajectories.

Results

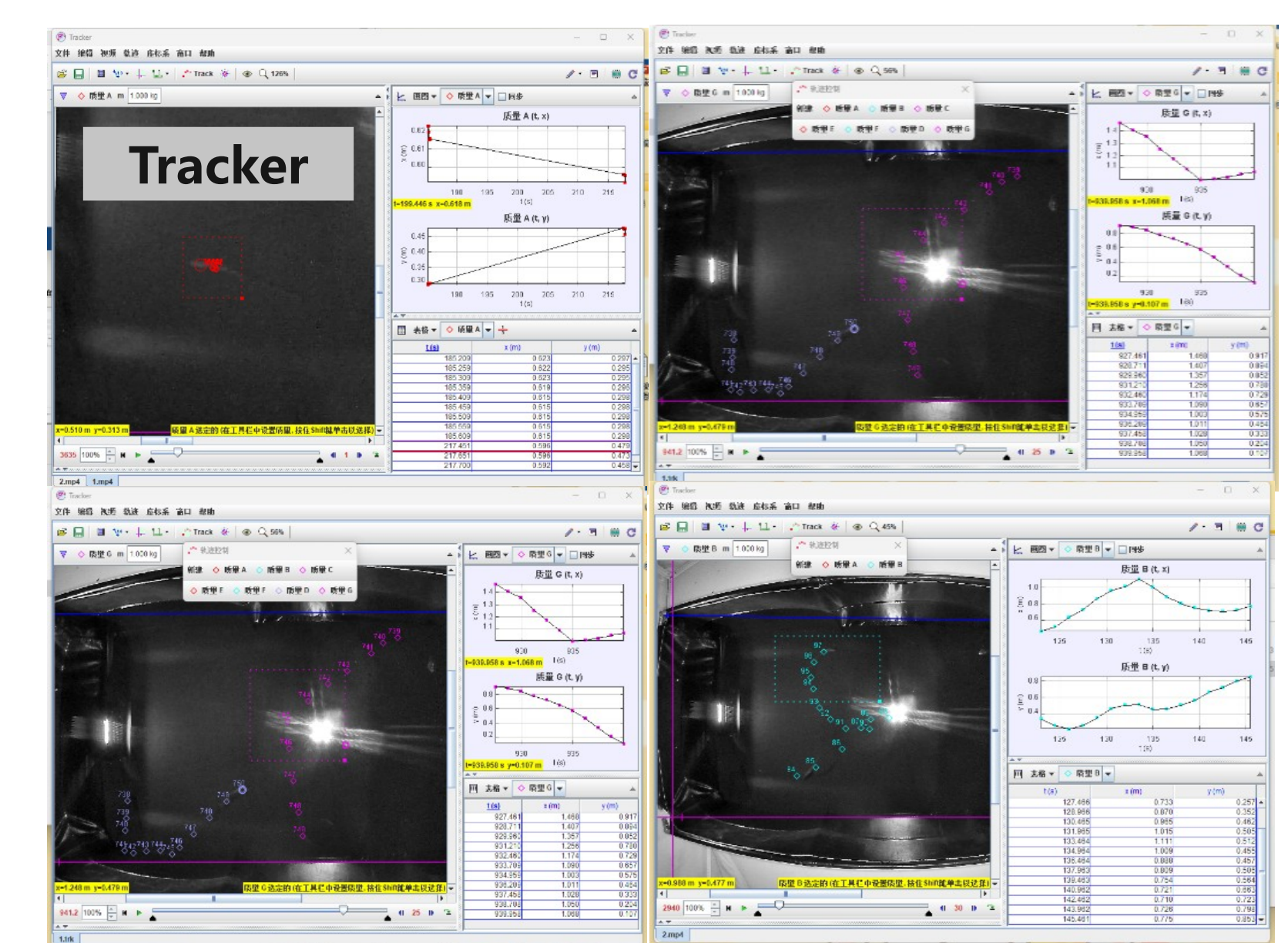
Selectivity of yellowfin seabream for spectral frequencies



Selectivity of yellowfin seabream to light intensity



Effects of light duration on phototropic behaviour of yellowfin seabream



Conclusions

- Yellowfin seabream fry exhibited varying degrees of phototropism in response to the four spectral frequencies, with the phototropic responses ranked from strongest to weakest as follows: blue light, white light, red light, and green light.
- Fish phototropism showed a positive correlation with light intensity under white light, a negative correlation under red and green light, and no significant response under blue light. Light intensity significantly affected the phototropic behavior of yellowfin seabream fry ($P < 0.05$).
- Fish exhibited a stress response by moving away from the light source when transitioning from a dark to a light environment. There was no significant change in the phototaxis rate with increased light duration, indicating that light duration did not significantly affect the phototaxis rate of yellowfin seabream fry ($P > 0.05$).