Population recovery of *Paracentrotus lividus* following a multi-year fishing ban: insights from the Apulian coastline

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The sea urchin *Paracentrotus lividus* is the most heavily exploited echinoid in the Mediterranean Sea. Despite evidence of overexploitation, coordinated management measures across the basin remain insufficient. In Italy, national regulations (MD 12/01/1995) establish minimum size limits, daily catch quotas, and seasonal closures, but the most adaptive management strategies have emerged through regional initiatives. A notable example is the intervention by the Apulian Regional Government, which, in response to scientific evidence of critically low population densities, implemented a three-year harvesting ban (RL No. 6/2023), effective until May 2026. This study evaluates the preliminary effects of this moratorium by comparing population density and structure data collected at the onset of the ban in 2023 with results from 2025. Monitoring was conducted across 14 consistent sites within the 0-10 m depth range along the Apulian coasts. Our results indicate that the average density of *P. lividus* did not vary significantly in relation to the protection period or sampling year. Overall densities remained stable between 2023 (0.25 ± 0.05 ind. m^{-2}) and 2025 (0.32 ± 0.05 ind. m^{-2}) (mean ± SE). However, size-class analysis revealed distinct demographic shifts: while juvenile and sub-adult densities (0-4 cm) remained constant, adult density increased significantly in the 4-5 cm size class. Furthermore, the 5-6 cm class exhibited an upward trend, suggesting a consolidation of the adult population, although this was not statistically significant. Consequently, the mean individual size increased from 3.43 ± 0.01 cm in 2023 to 3.67 ± 0.02 cm in 2025 (mean ± SE). In conclusion, a two-year fishing moratorium appears insufficient to trigger significant recovery in density, though it has fostered early signs of population restructuring. These findings emphasise the necessity for extended monitoring and more rigorous surveillance to combat illegal harvesting, ensure compliance, and support the long-term efficacy of resource recovery efforts.