on screen, following movement patterns, and sorting different elements into broad groups (Khiem et al., 2025). On a number of Australian longline vessels, this setup has already become part of regular practice. Fishing records are produced as trips are still underway, so crews no longer need to wait until returning to port to complete their logs. Other systems place their emphasis elsewhere. AI-RCAS, for instance, is built around speed rather than post-trip analysis. Instead of waiting until fishing operations are finished, it delivers information while work is still in progress. This makes it possible for crews and managers to respond to on-board situations as they unfold, adjusting actions in real time rather than relying only on later reviews. Beyond deck-level cameras, underwater imaging and towed cable observation devices are also used to turn raw video into useful population data. With these components working together, a clear pattern has emerged in recent applications. Most fishery AI video monitoring systems now follow a structure in which data are collected at the front end and processed centrally at the back end, a setup that has gradually become the common approach in practice.

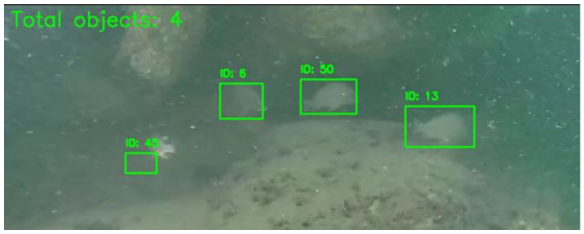

Figure 2 Fish counting results show the number of objects with bounding boxes in each frame (Adopted from Khiem et al., 2025)

5.2 Actual performance in resource assessment and law enforcement

Judging from how these systems are currently used, AI-based video monitoring can generally cope with everyday resource assessment tasks, even though its limitations are well recognized. In most routine situations, it provides information that is sufficient for basic management needs. On Australian trawler vessels, for example, early versions of the models produced catch counts that were broadly consistent with manual observations, with only small differences between the two approaches (Khiem et al., 2025). Similar technologies have also been applied to monitoring black cod populations and documenting underwater coral habitats, often without requiring major changes to existing equipment or operating procedures. Once the systems are in place, day-to-day operation tends to be relatively uncomplicated.

The value of video-based monitoring is often felt most clearly during enforcement work. Conventional observation relies largely on on-site personnel, and records usually have to be reviewed after the fact, which can take time. By comparison, AI-supported systems operate continuously in the background, so footage does not need to be examined from scratch once an issue arises. When real-time analysis is added, these systems can also support the management of total allowable catch limits and, in certain situations, help flag fishing activity occurring in areas where access is restricted. However, this technology is not perfect. In situations with insufficient light or turbid water bodies, the recognition effect will significantly decline; for some uncommon species that are also caught incidentally, the model is prone to make incorrect judgments. Therefore, if the goal is long-term and stable supervision, relying solely on algorithms is clearly insufficient. Establishing a dedicated quality control process is still necessary.

5.3 Key technical points and promotion potential

Looking at how AI video monitoring performs in everyday use, its effectiveness often comes down to a series of quite ordinary details. Model choice plays a role, but it is rarely decisive on its own. In routine operation, the size of the training dataset and the amount of effort put into labeling tend to have a visible impact on results. Under suitable conditions, recognition accuracy for some commercially important species can reach close to 90%, although this level is usually the outcome of repeated adjustment rather than a one-off installation (Khiem et al., 2025). Practical experience also shows that decisions made during system design can matter just as much as the algorithm. Camera placement is a typical example. It is easy to treat as a secondary concern, yet it strongly affects both species recognition and the stability of body length estimates (Baker et al., 2025). Hardware adds another