



Ultrasonic tags reveal seasonal movements in red king crab (*Paralithodes camtschaticus*)

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The red king crab – a controversial alien

The species was introduced to the Barents Sea in the 1960s and has since spread over large parts of Russian and Norwegian waters. It has become a valuable fishing resource in northern Norway, but may also pose a serious threat to the benthic fauna as it invades ever new areas.

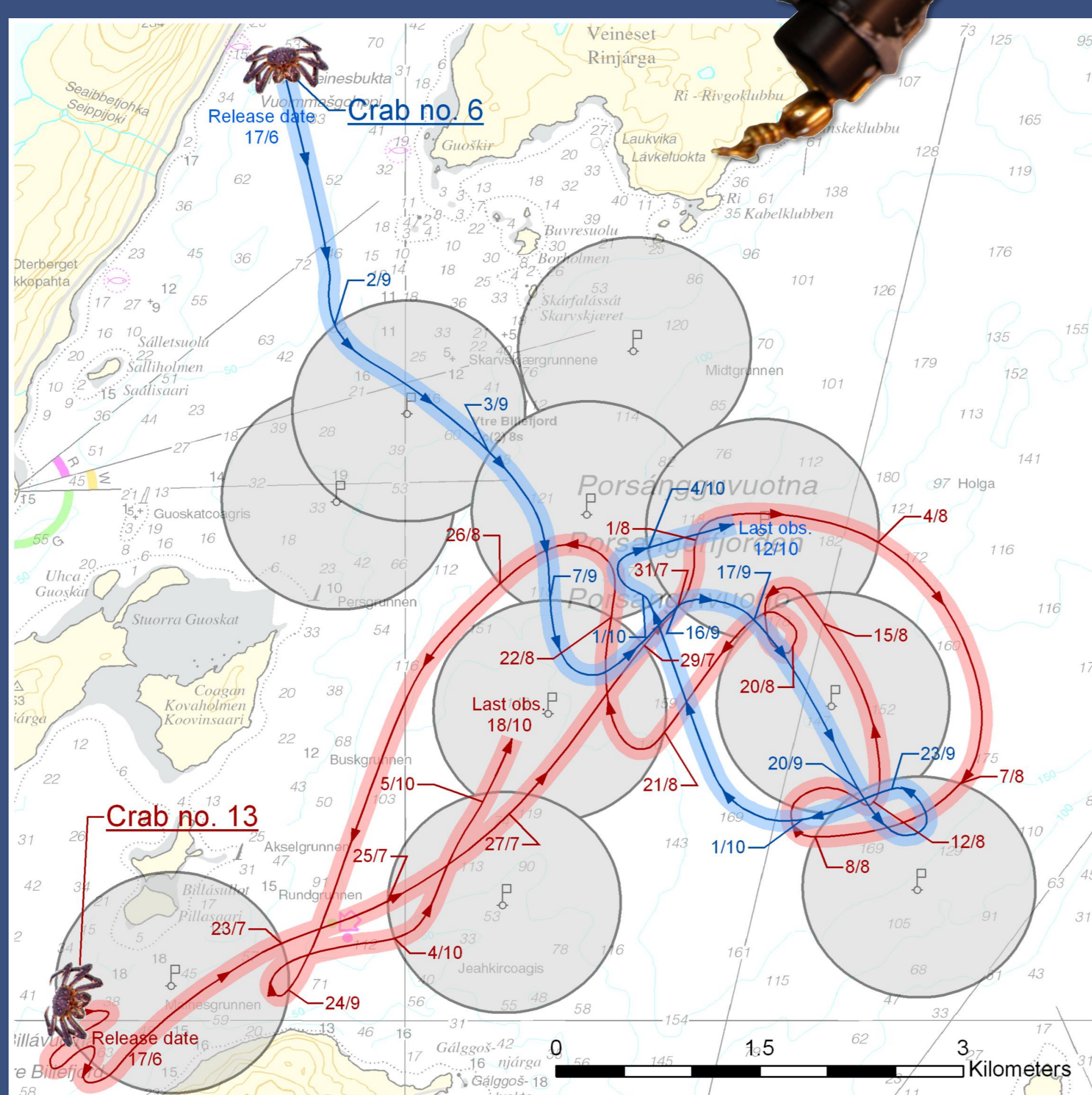
More knowledge on the seasonal movement of red king crab is crucial to evaluate its potential impact on the ecosystem, and to suggest management measures to limit further spread.

Ultrasonic tags – a powerful new survey tool

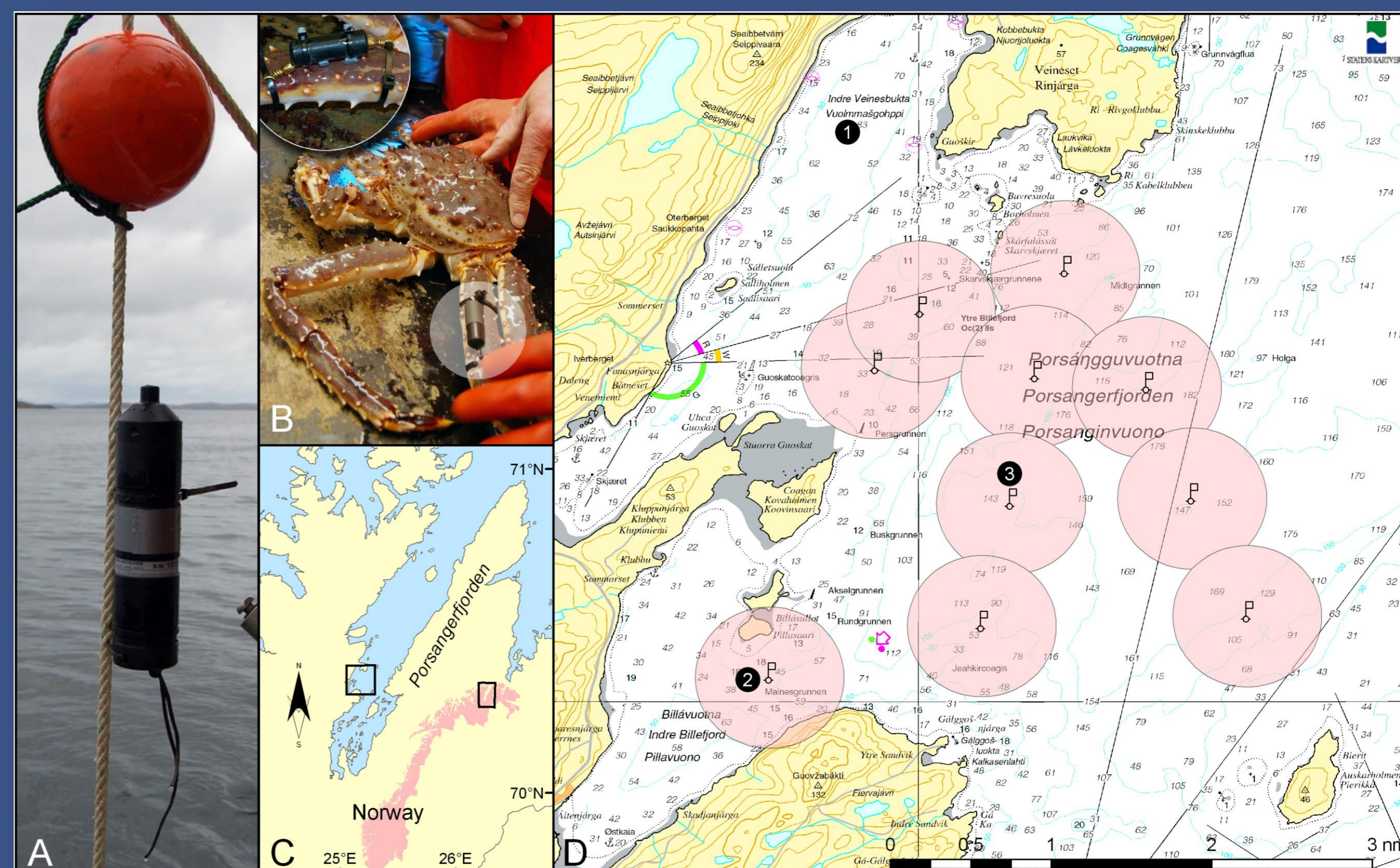
To study their seasonal movement we caught crabs in a newly invaded fjord in northern Norway, equipped them with ultrasonic tags and recorded their movement patterns with listening buoys.

The figure illustrates how data from ultrasonic tags can be used to recreate routes along which the crabs may have travelled.

The suggested movement tracks indicate that crabs in these areas are more or less continuously moving around.



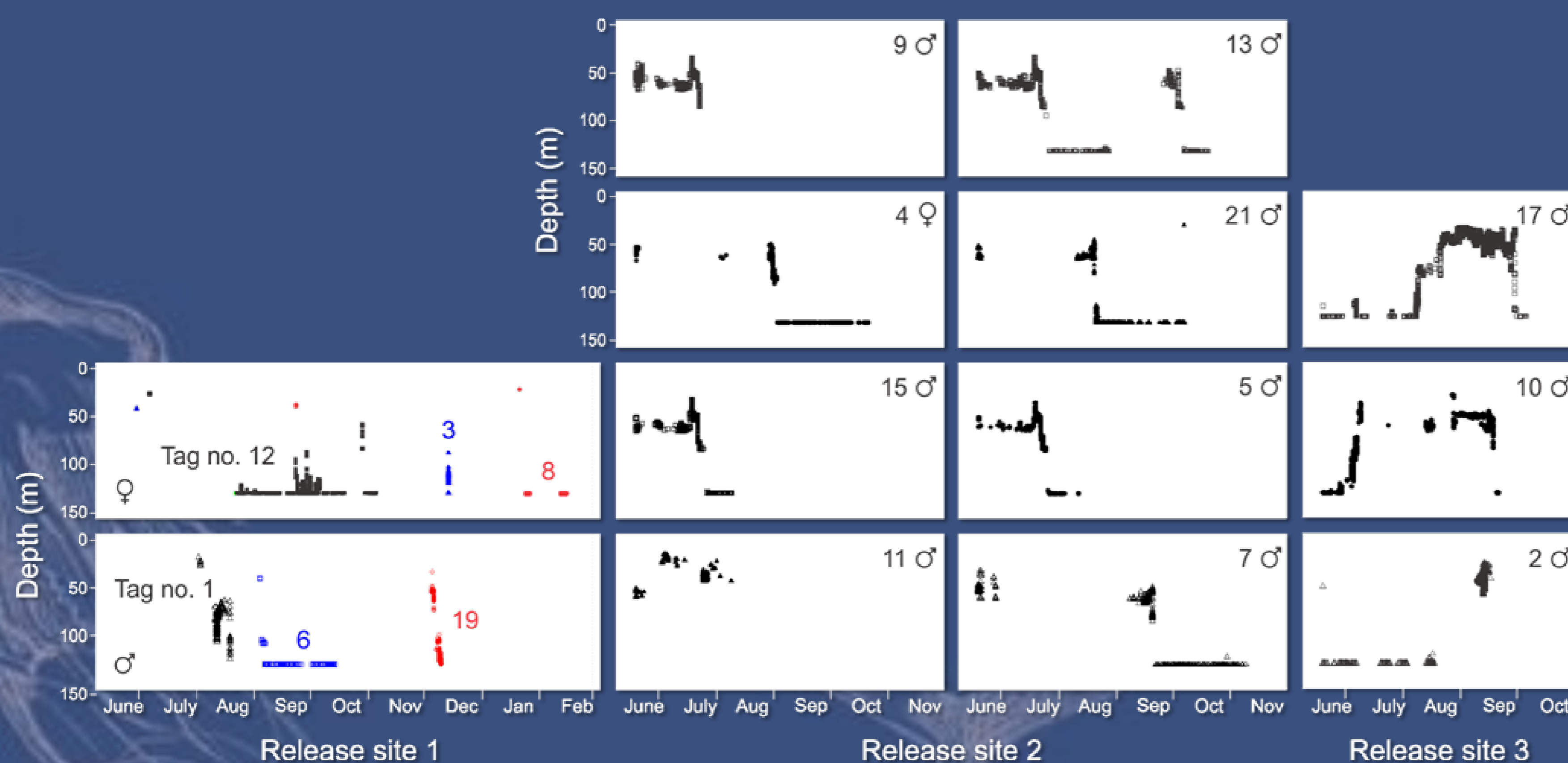
Project area and tagging methods



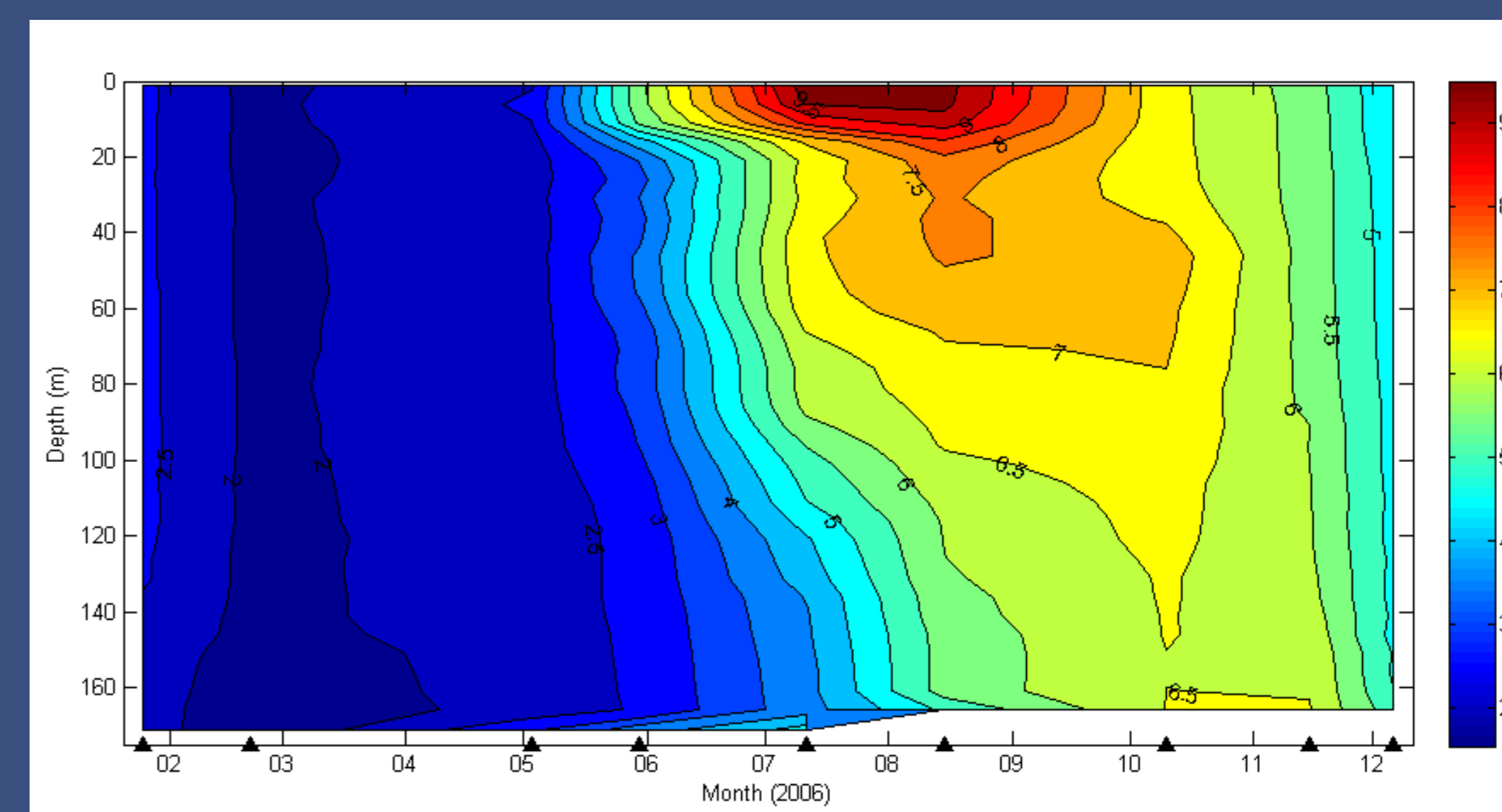
Crabs were caught at three sites in Porsangerfjorden, northern Norway (C, D), using baited pots, and tagged and released at the same spots. Tags were attached to the *merus* of the 2nd left walking leg (B) on 20 crabs of different size and sex. The tags transmitted an acoustic signal every fifth minute. Ten receivers (A) were mounted to anchored buoys and placed 20 meters above the bottom (⌘ symbol in D). The signal range of the tags was 800 m, indicated by circles around the buoy anchor points in D. Data sampled by the receivers were collected at regular intervals during the experimental period from June 2009 to June 2010, and stored in a database.

Experimental results

We recorded data from 19 out of 20 crabs tagged in June, and four of these transmitted signals later than December, one as late as February. The transmitted signals revealed large variations in individual movements between deep and shallow areas during this period.



- Released outside the range of any of the receivers, these crabs were recorded only sporadically. Any movement pattern was consequently difficult to detect.
- All crabs except one moved to deeper areas during autumn, but at different times. No. 13 and 21 were also observed in shallower waters for a short period after having moved deeper earlier.
- All three crabs moved to shallower areas for a period during autumn, before they seemed to descend to deeper waters.



Typical temperature profile for 2006 for a sampling location close to release site 3*. Although the temperature levels in the different water layers vary in amplitude between years, the overall stratification pattern is similar and occurs mostly at the same time of year.

* Courtesy of the University of Tromsø, Faculty of Bioscience

Discussion and conclusions

Red king crabs in Porsangerfjorden are normally found in shallow waters in early summer, and move to deeper areas during autumn. In this experiment, however, crabs that were caught and released at larger depth instead appear to move to shallower regions for a period before migrating back to deeper water in late autumn.

Temperature is thought to trigger the onset of seasonal movement in red king crabs, but in this experiment temperature changes seem to play only a minor role. Since all tagged crabs were mature, the observed movement patterns are probably governed more by foraging and reproductive behaviour than by seasonal changes in temperature.

