Appendix C: Deterministic Model Results

This Appendix contains maps and graphs of the deterministic model results from spill simulations at the Bull Arm site. Maps of the surface, shoreline or entrained oil are shown first, followed by a graph of the oil mass balance for the spill. On the maps, gray depicts the water surface area swept by surface oil at any time during the 30-day simulation. Black on the map depicts the location of surface oil at the end of the 30-day simulation. Areas of the shoreline highlighted in red indicate where oil is predicted to come in contact with the shoreline. The mass balance graphs depict the change in oil volume over the duration of the spill simulation for surface, shoreline, evaporated, decayed and water column oil.

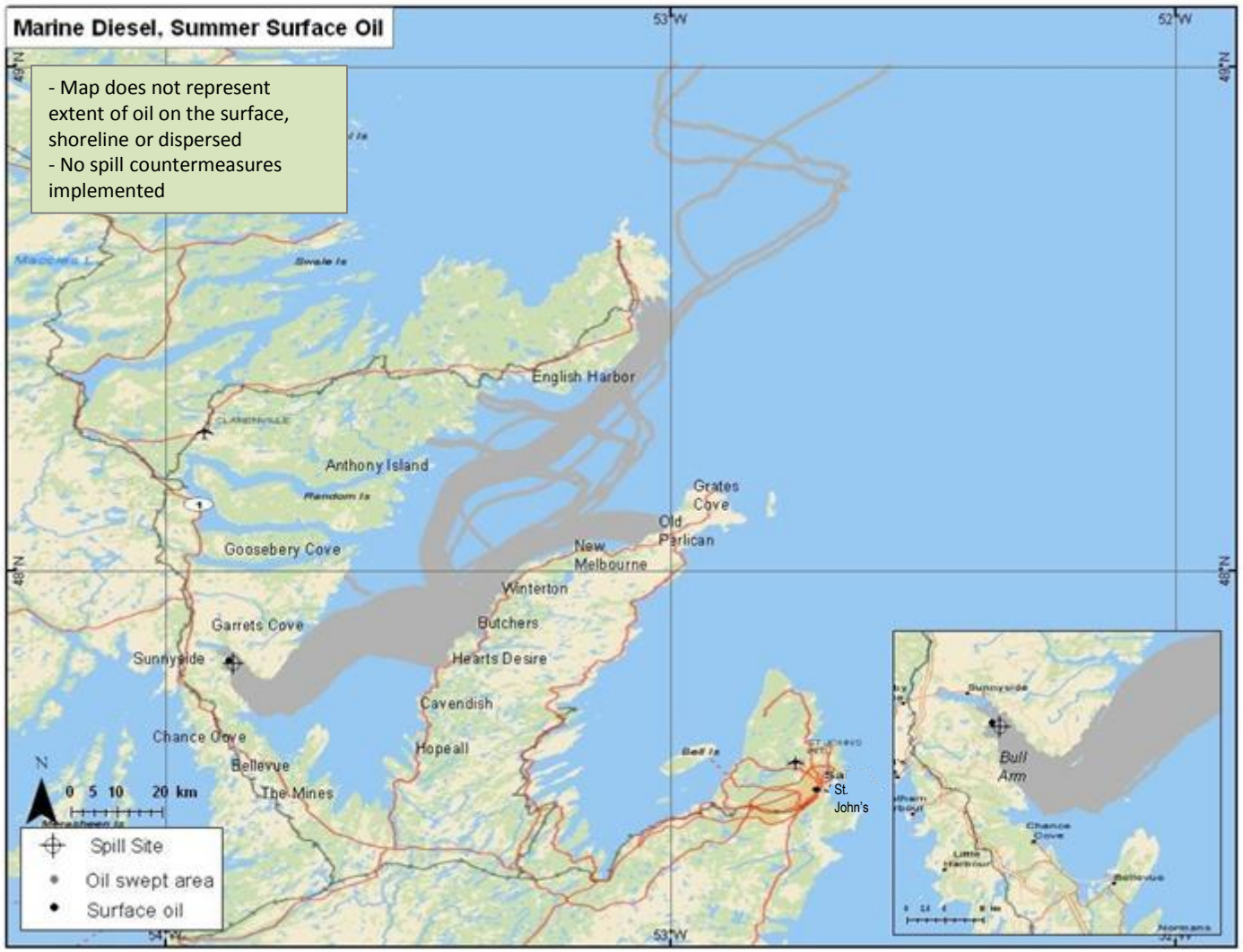


Figure C1. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the summer. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

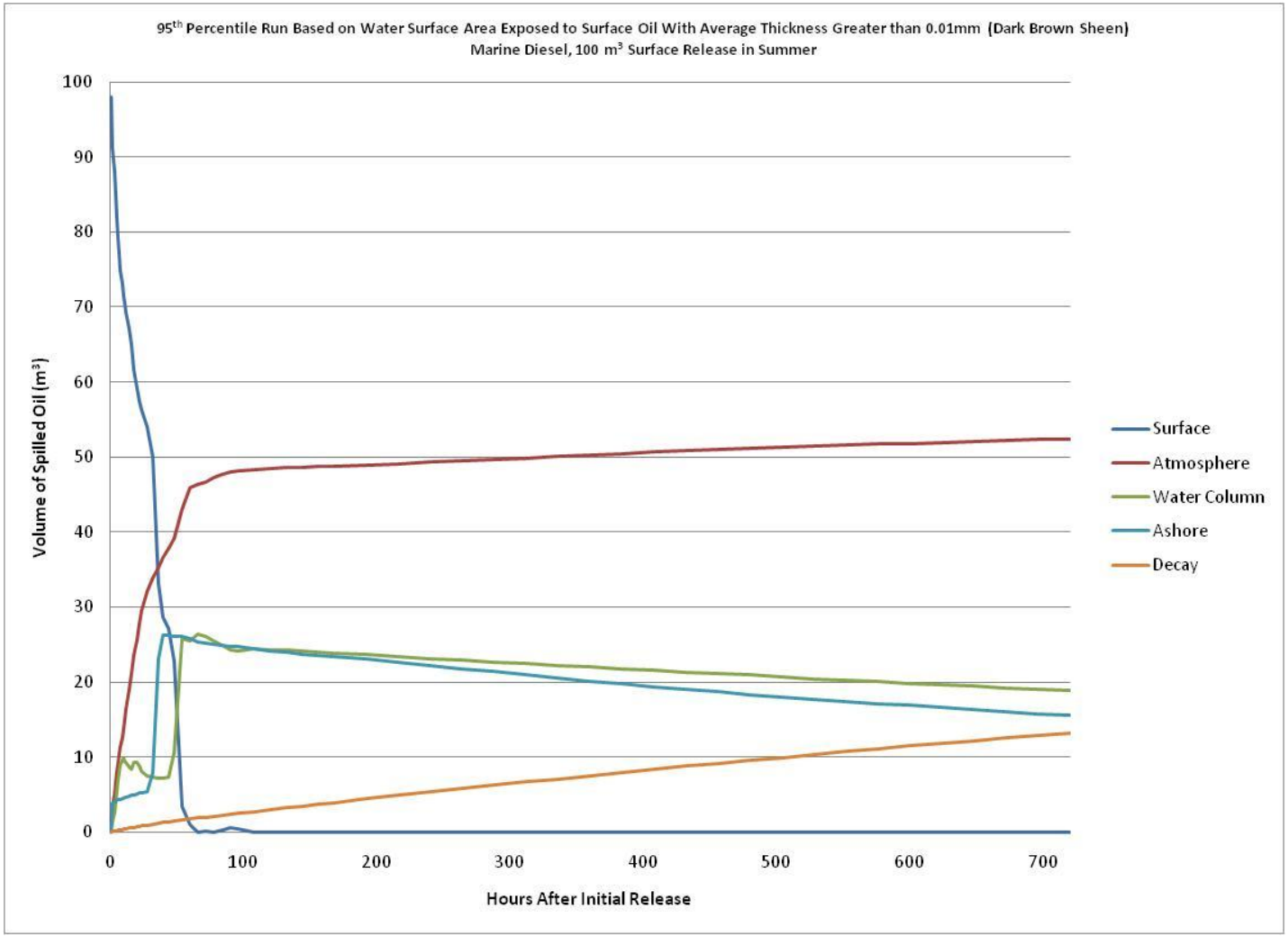


Figure C2. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the summer.

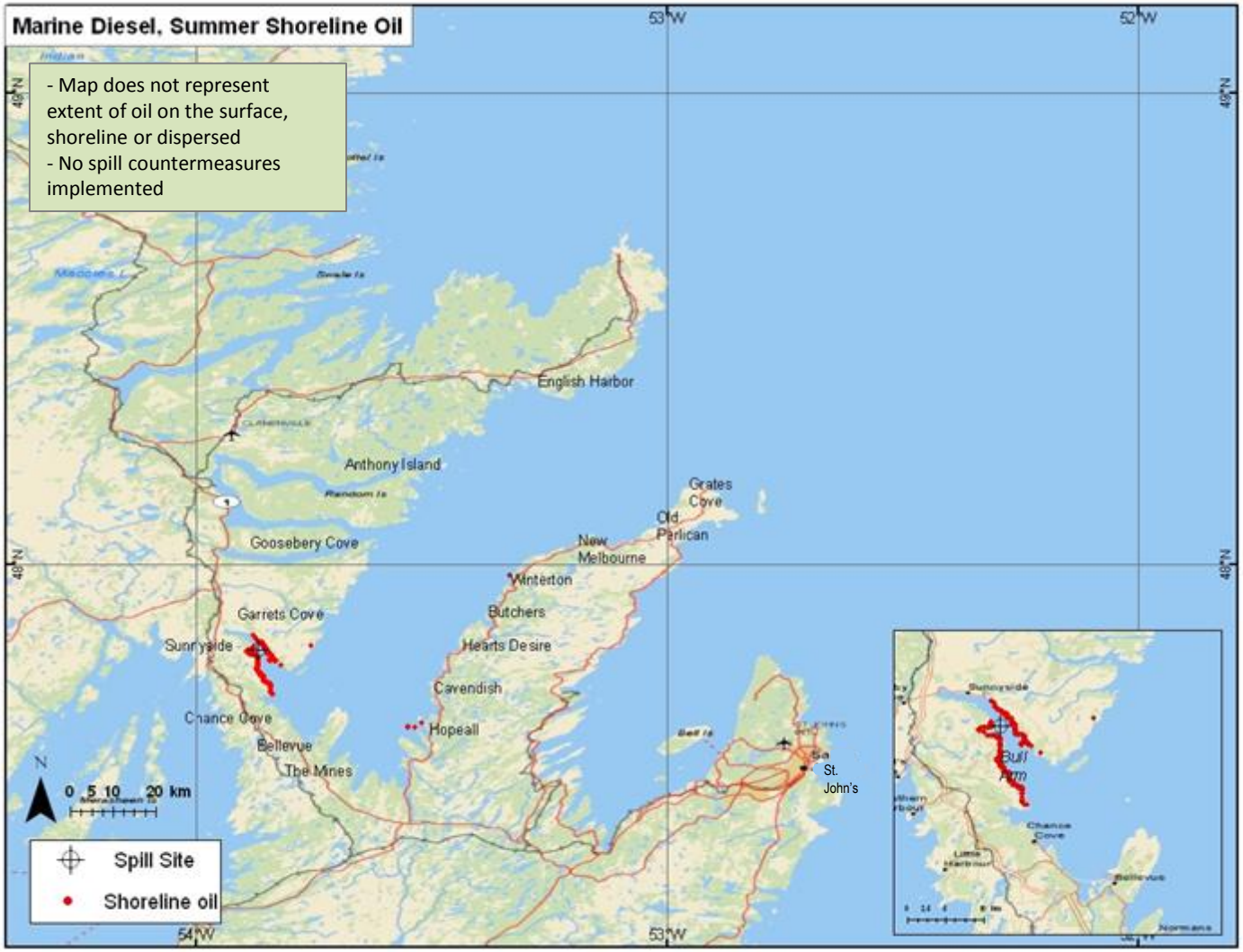


Figure C3. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the summer. Red color highlights the areas of predicted shoreline oiling.

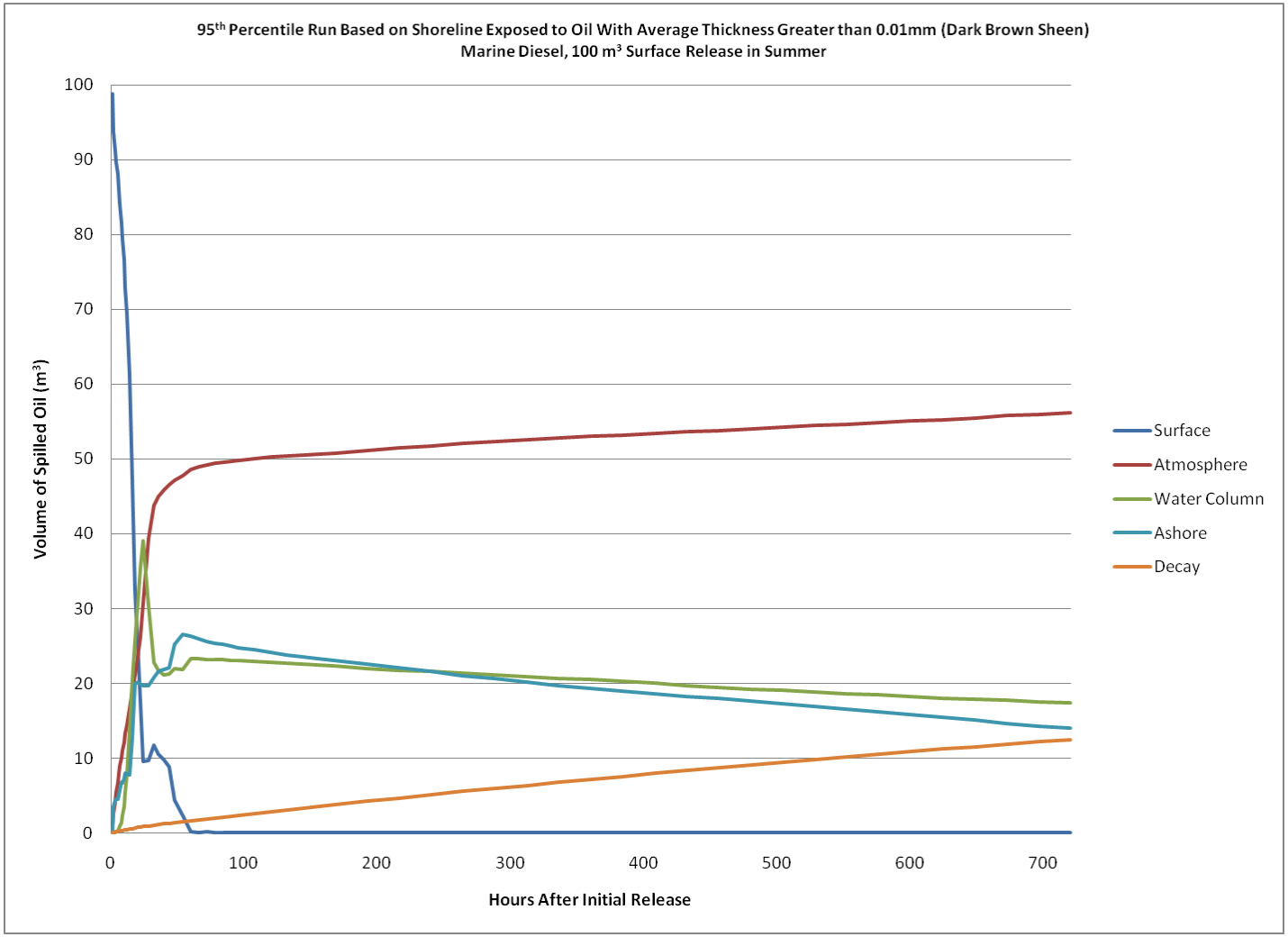


Figure C4. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the summer.

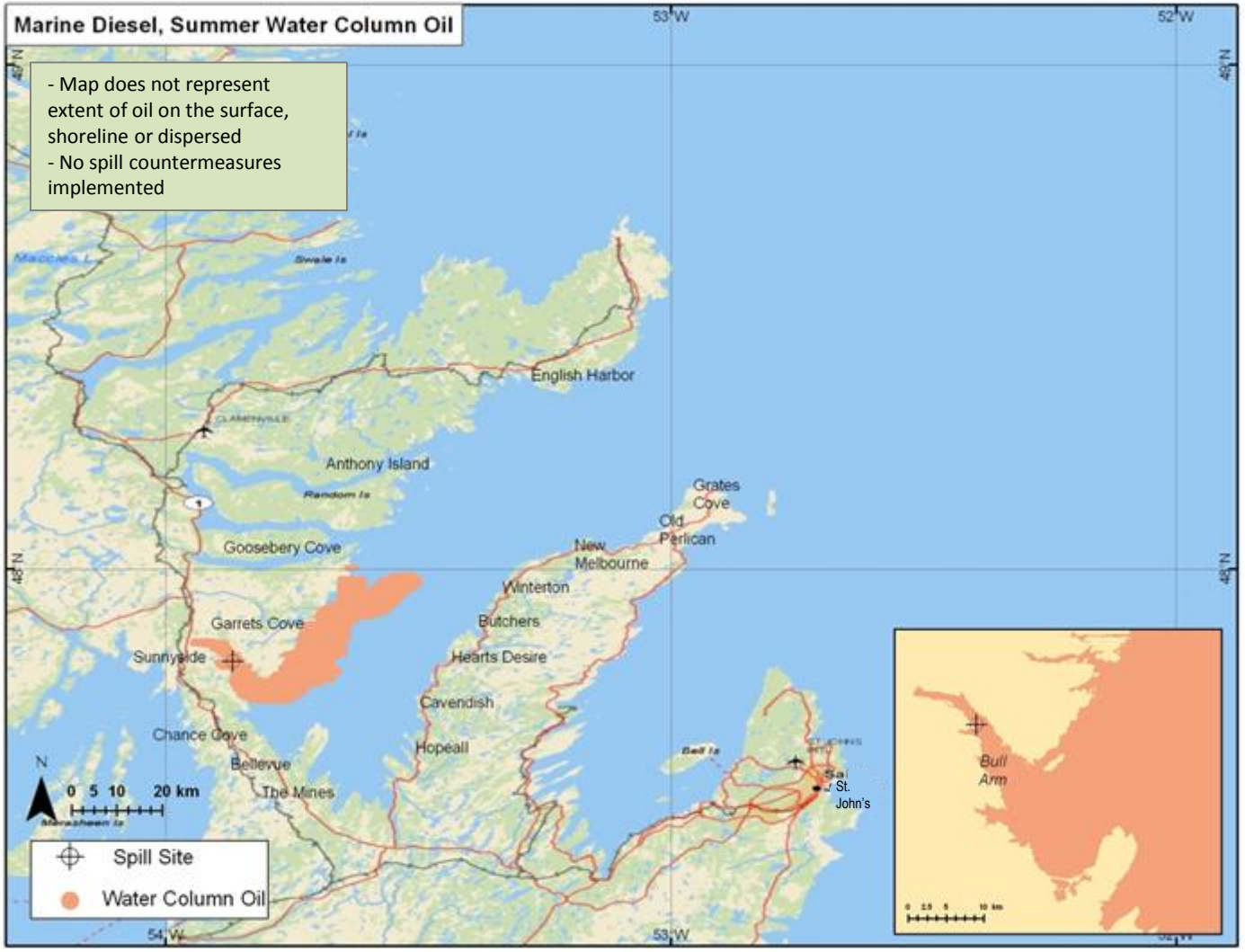


Figure C5. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 100 m^3 release of marine diesel in the summer.

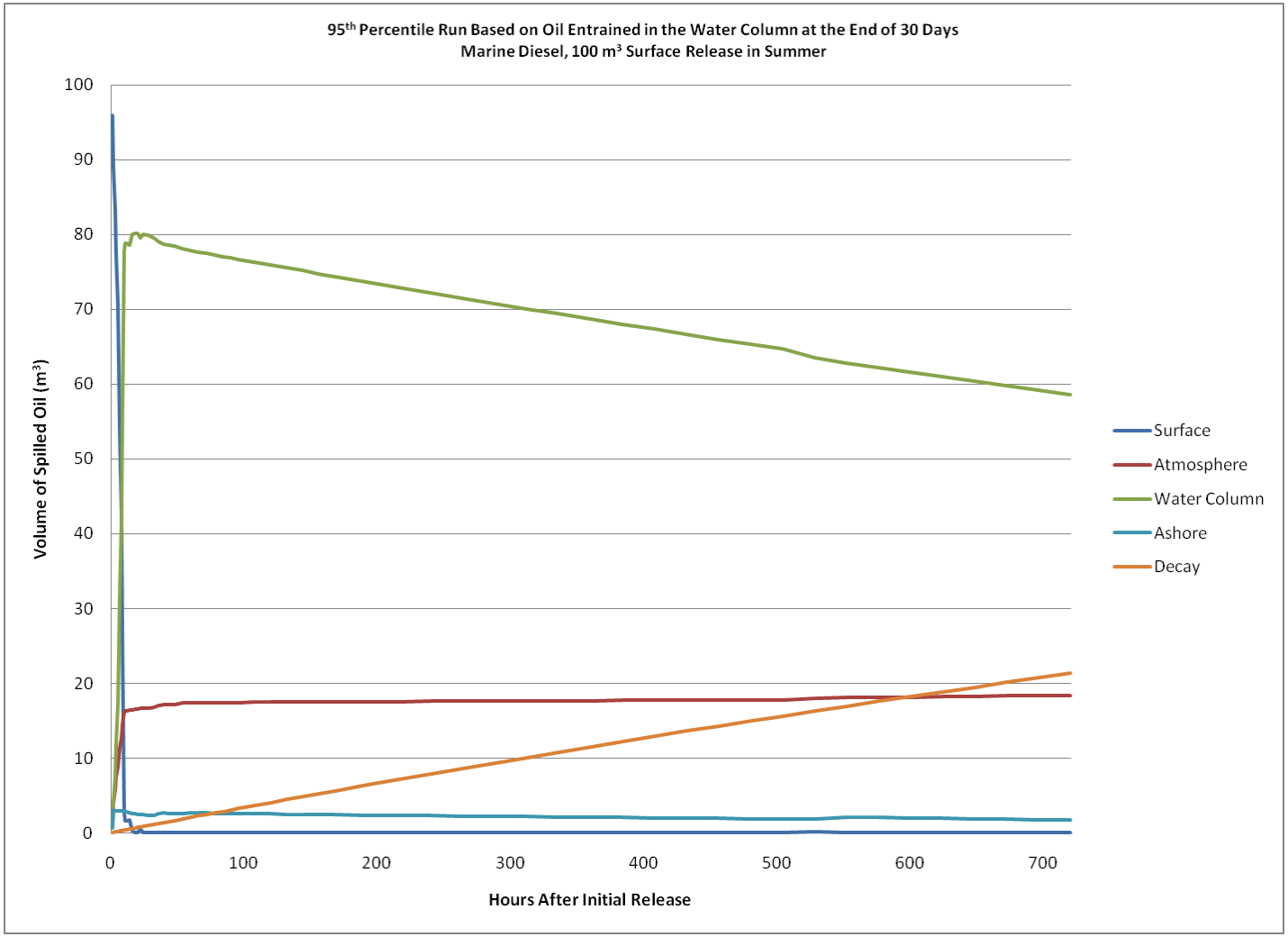


Figure C6. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 100 m^3 release of marine diesel in the summer.

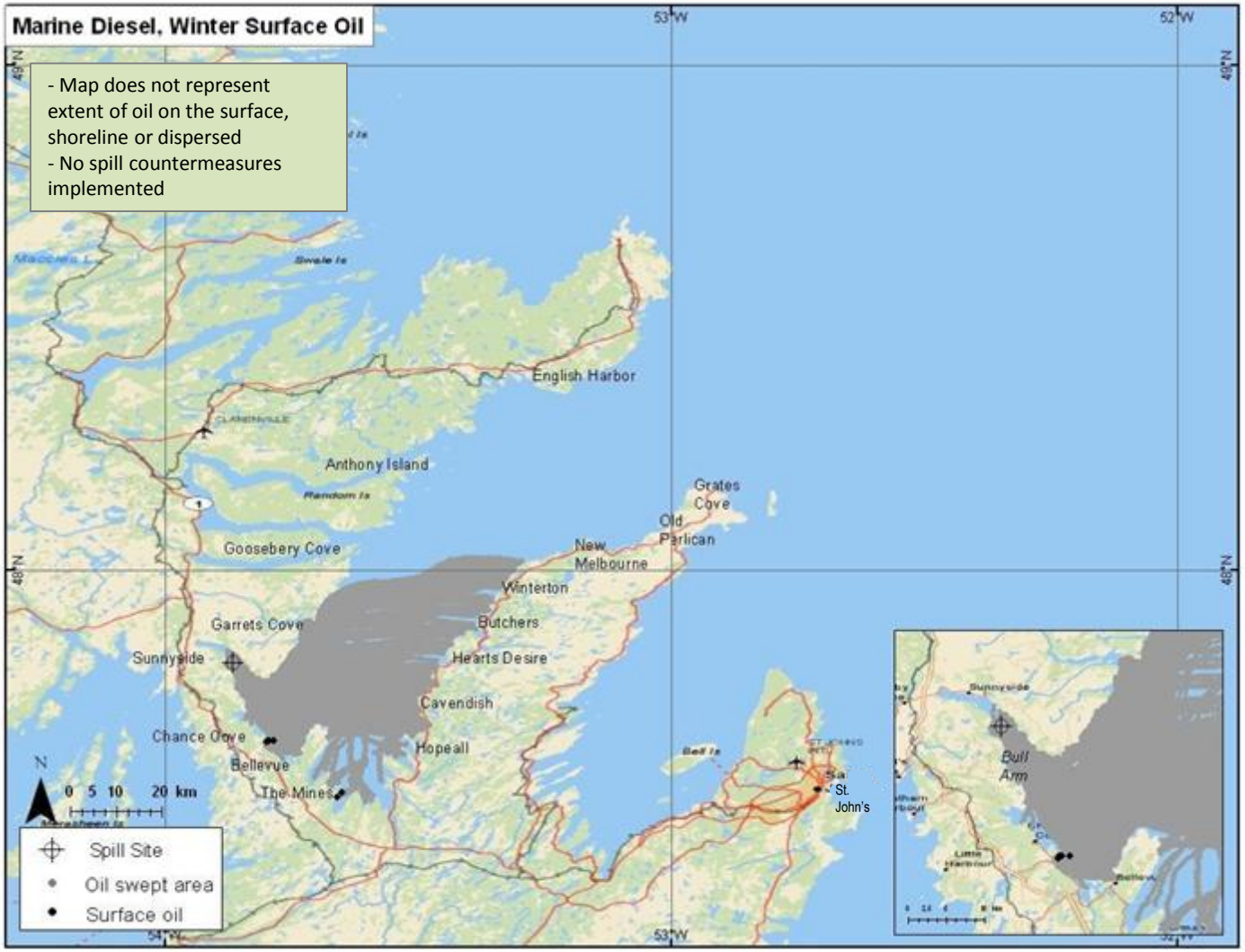


Figure C7. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

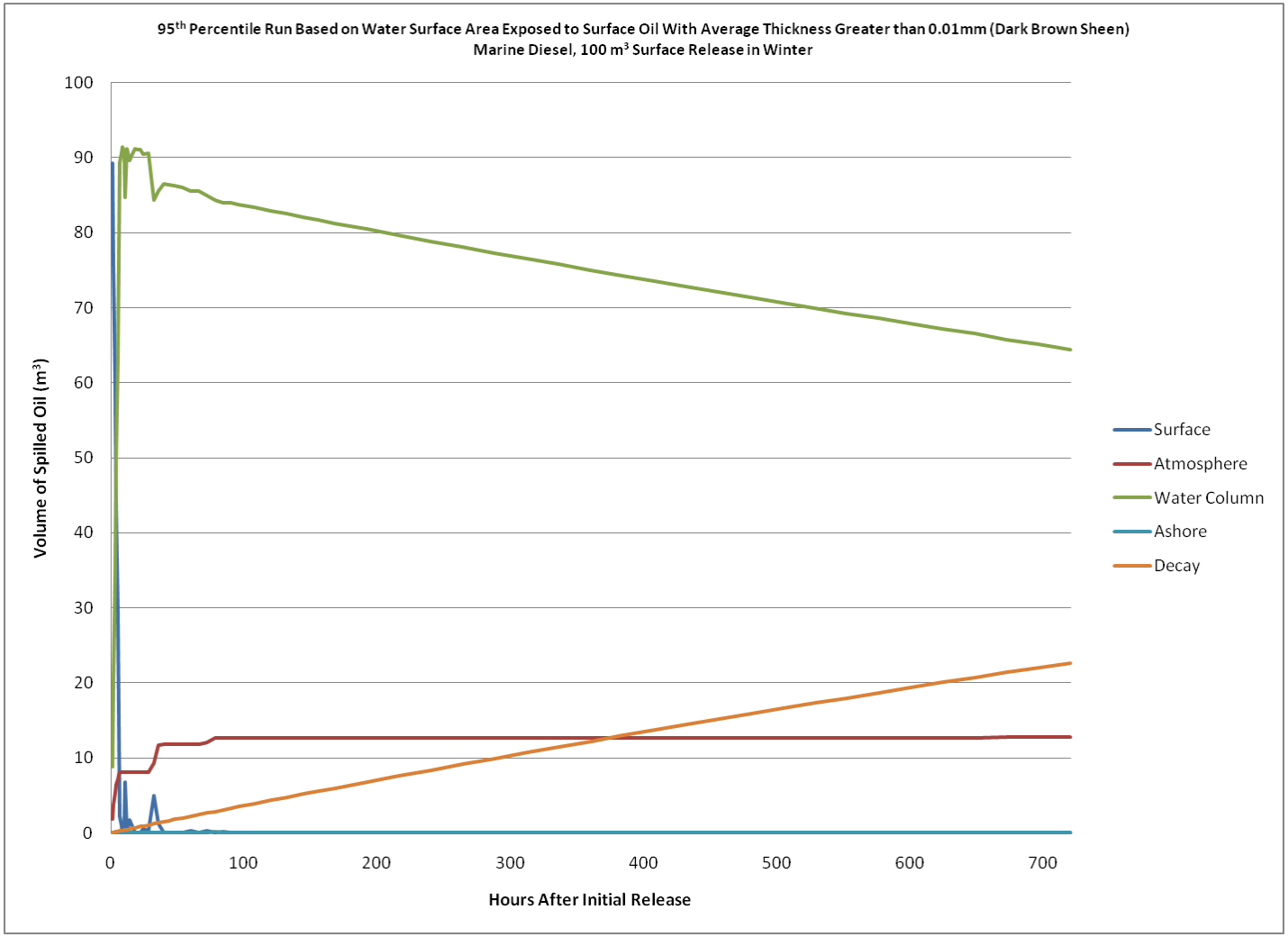


Figure C8. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter.

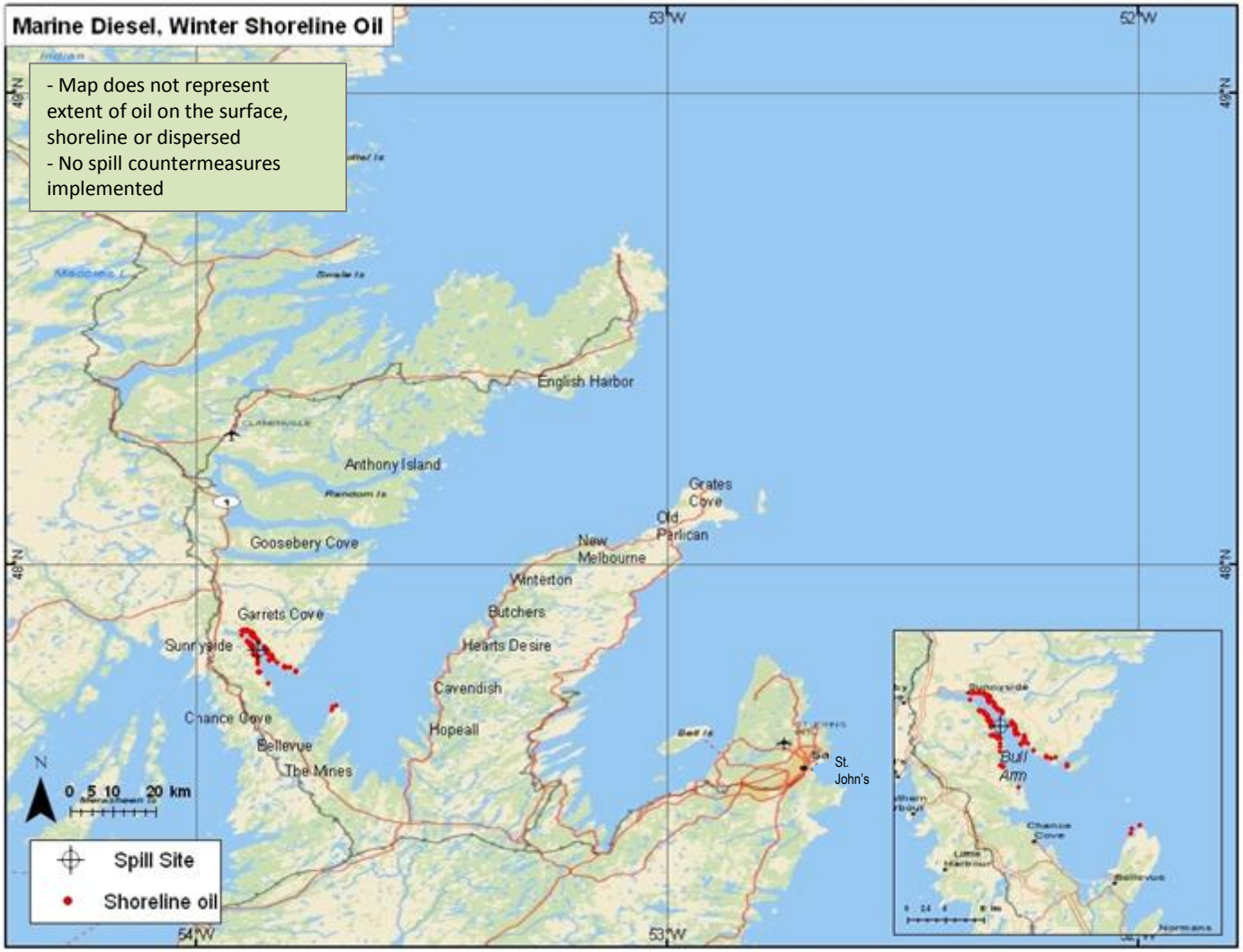


Figure C9. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter. Red color highlights the areas of predicted shoreline oiling.

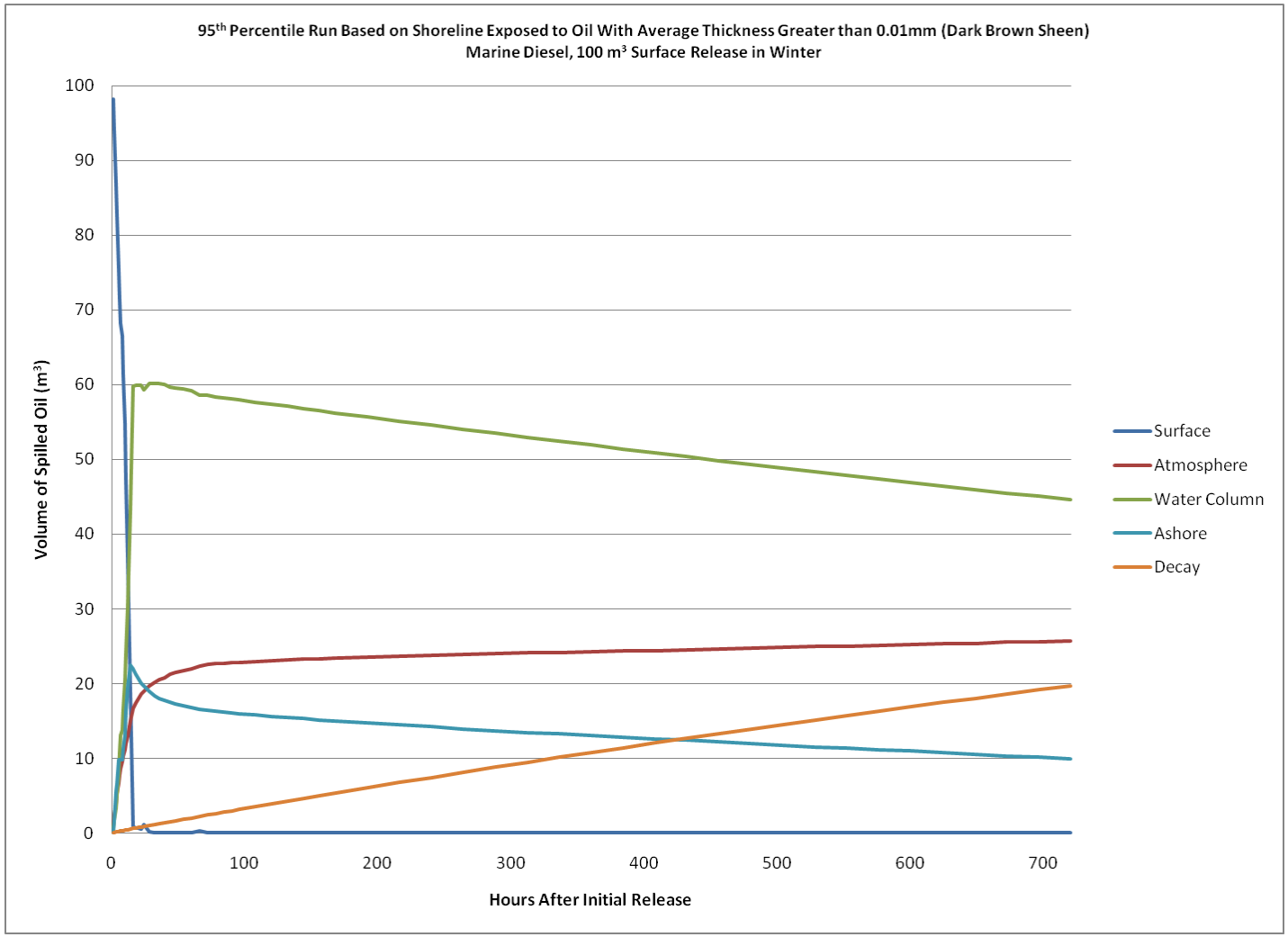


Figure C10. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter.

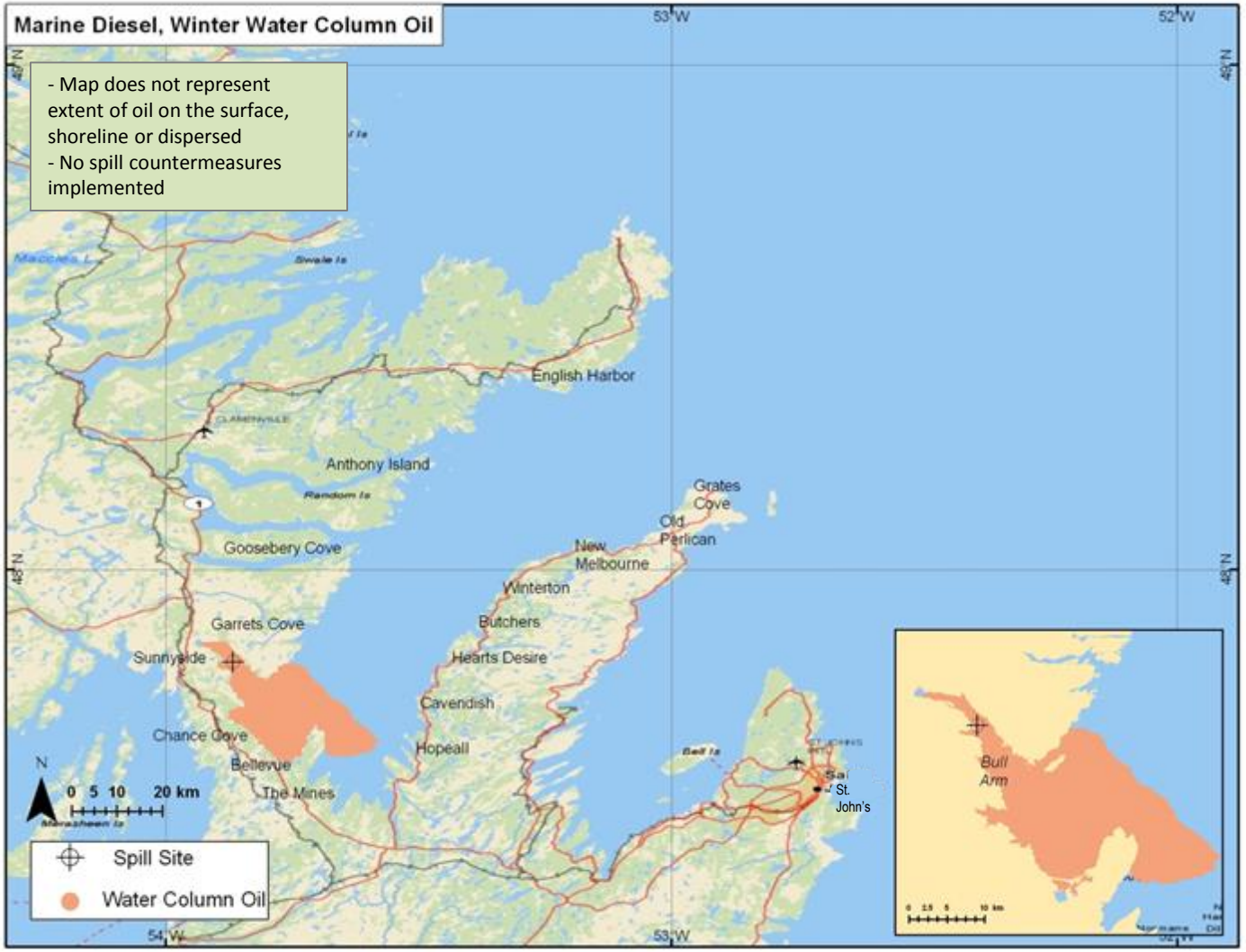


Figure C11. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 100 m^3 release of marine diesel in the winter.

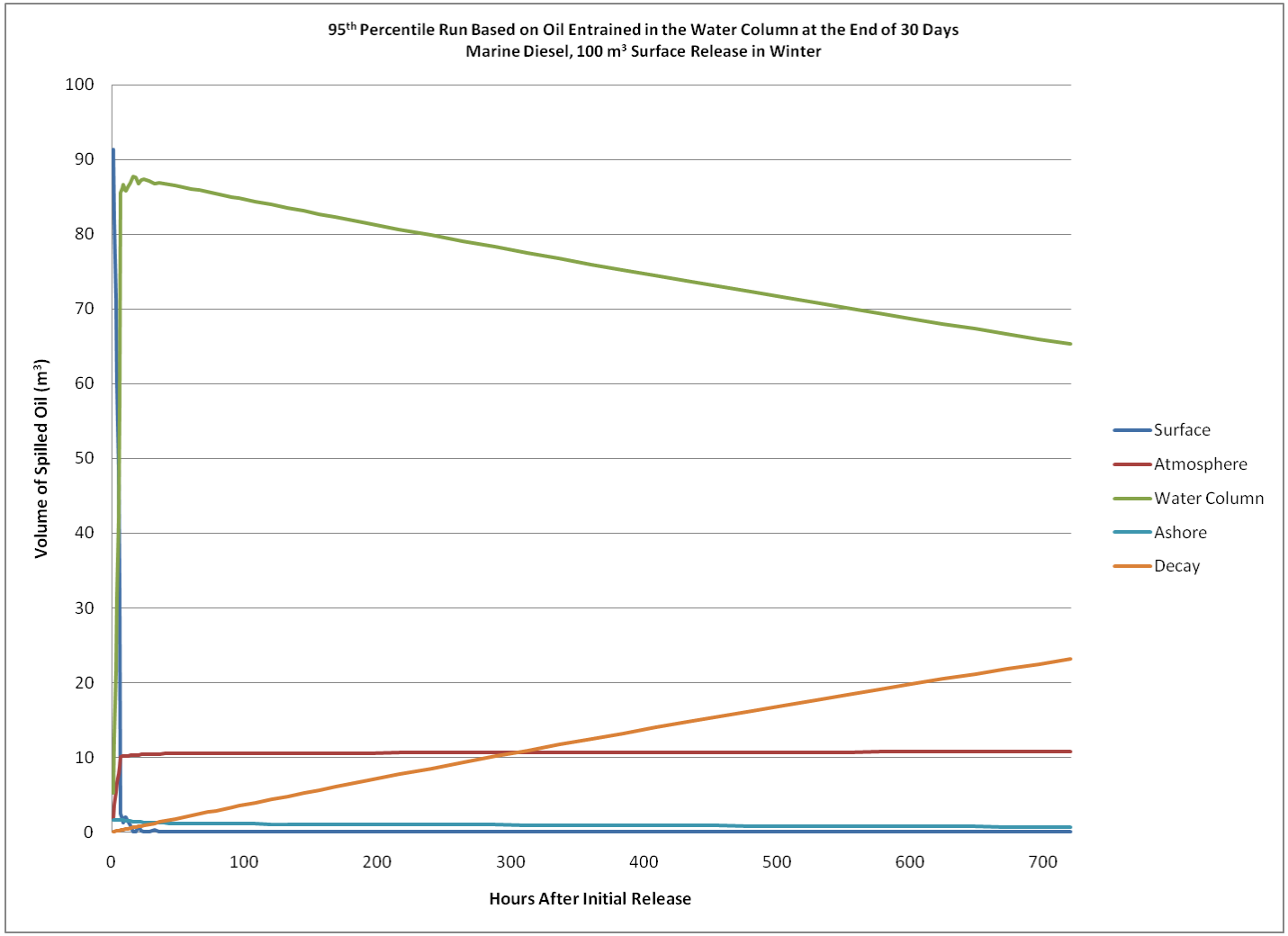


Figure C12. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 100 m^3 release of marine diesel in the winter.

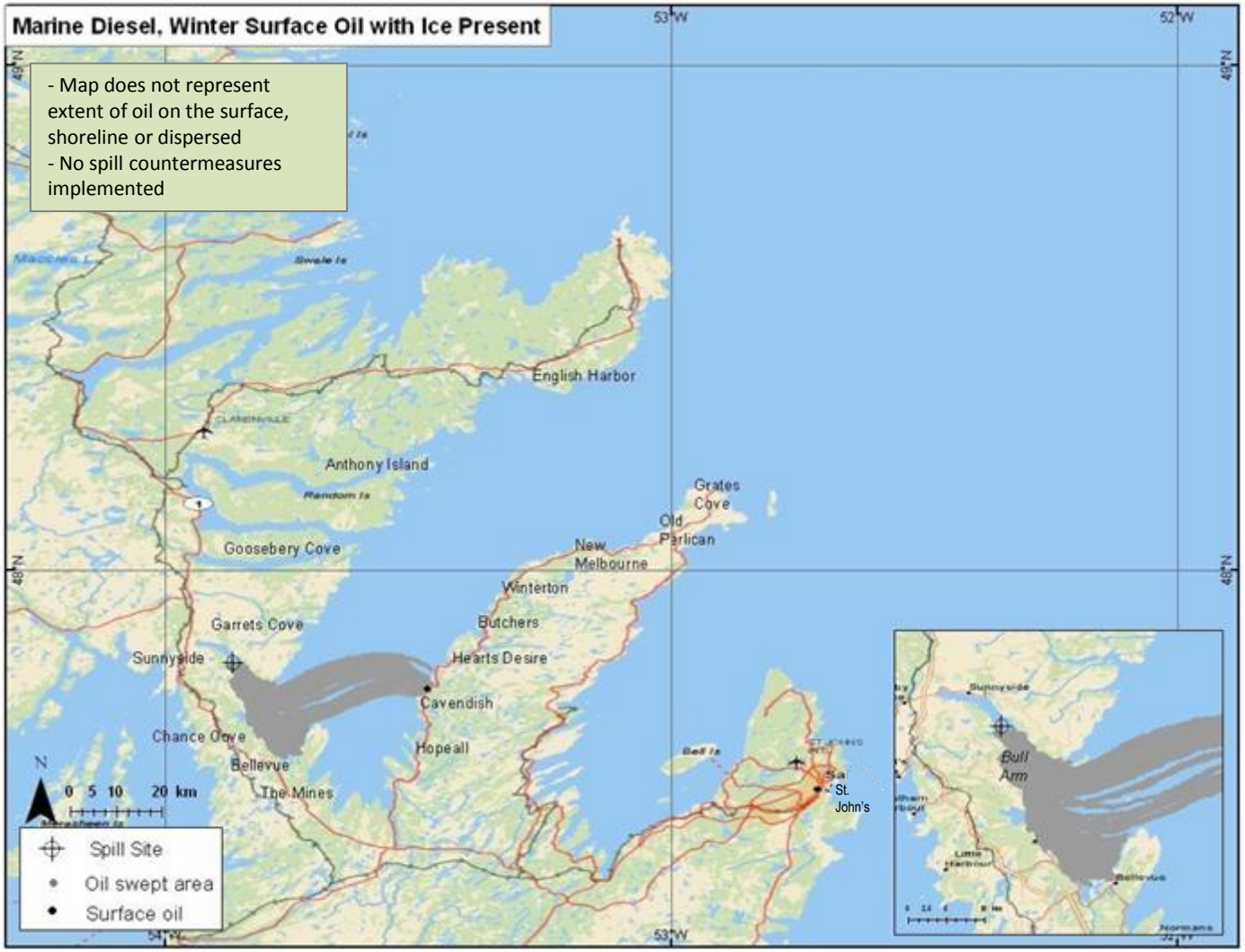


Figure C13. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter with 65% ice coverage. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

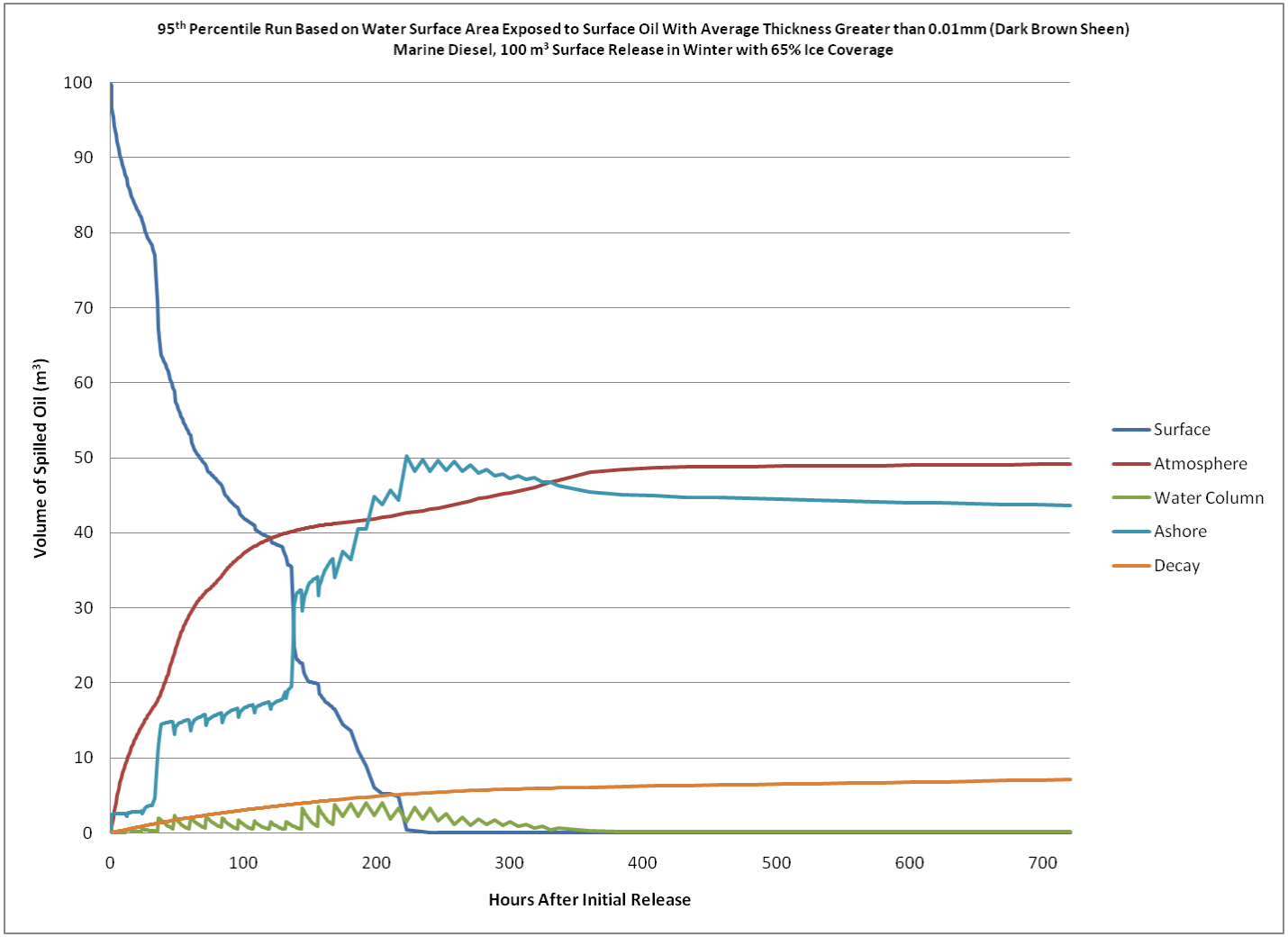


Figure C14. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter with 65% ice coverage.

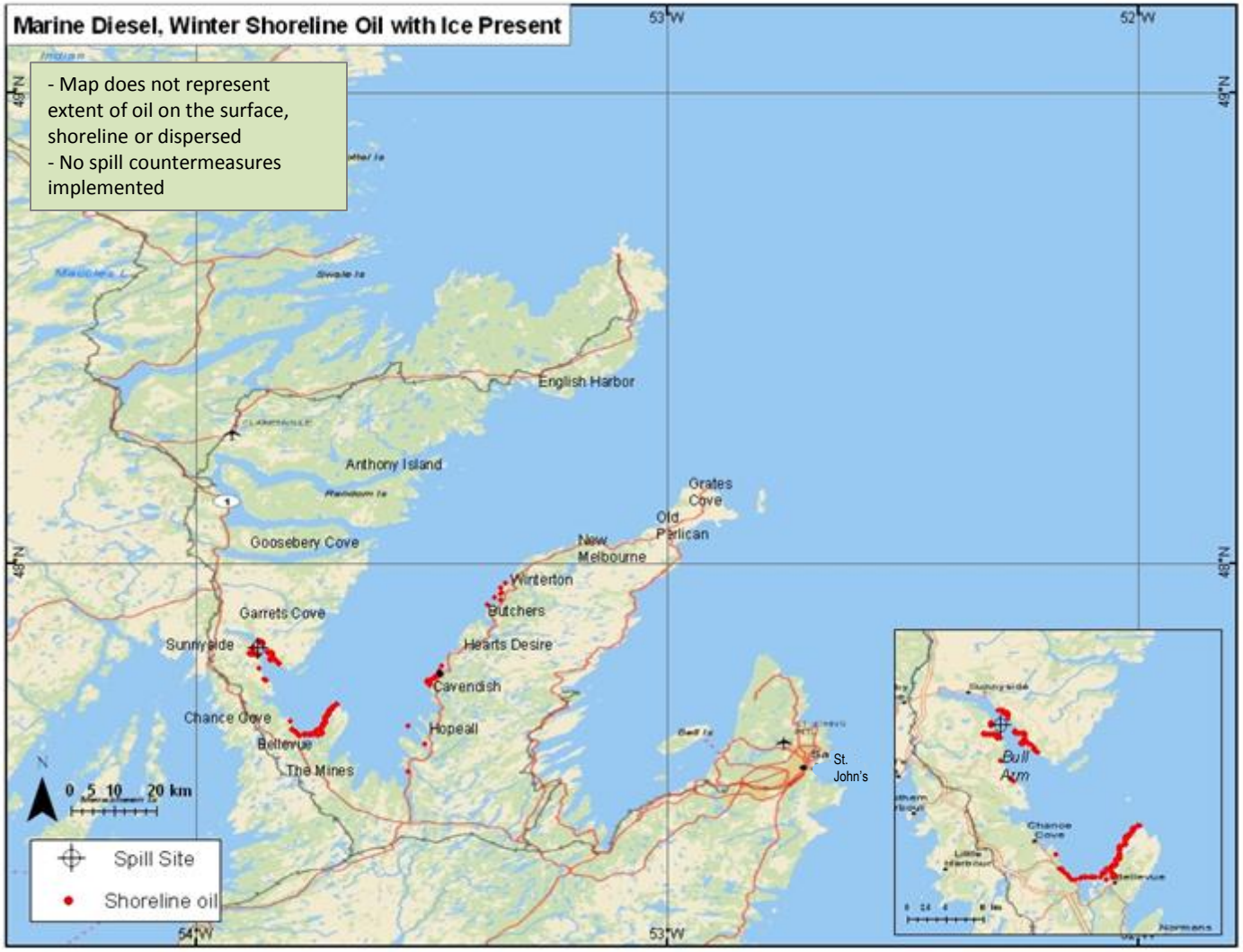


Figure C15. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter with 65% ice coverage. Red color highlights the areas of predicted shoreline oiling.

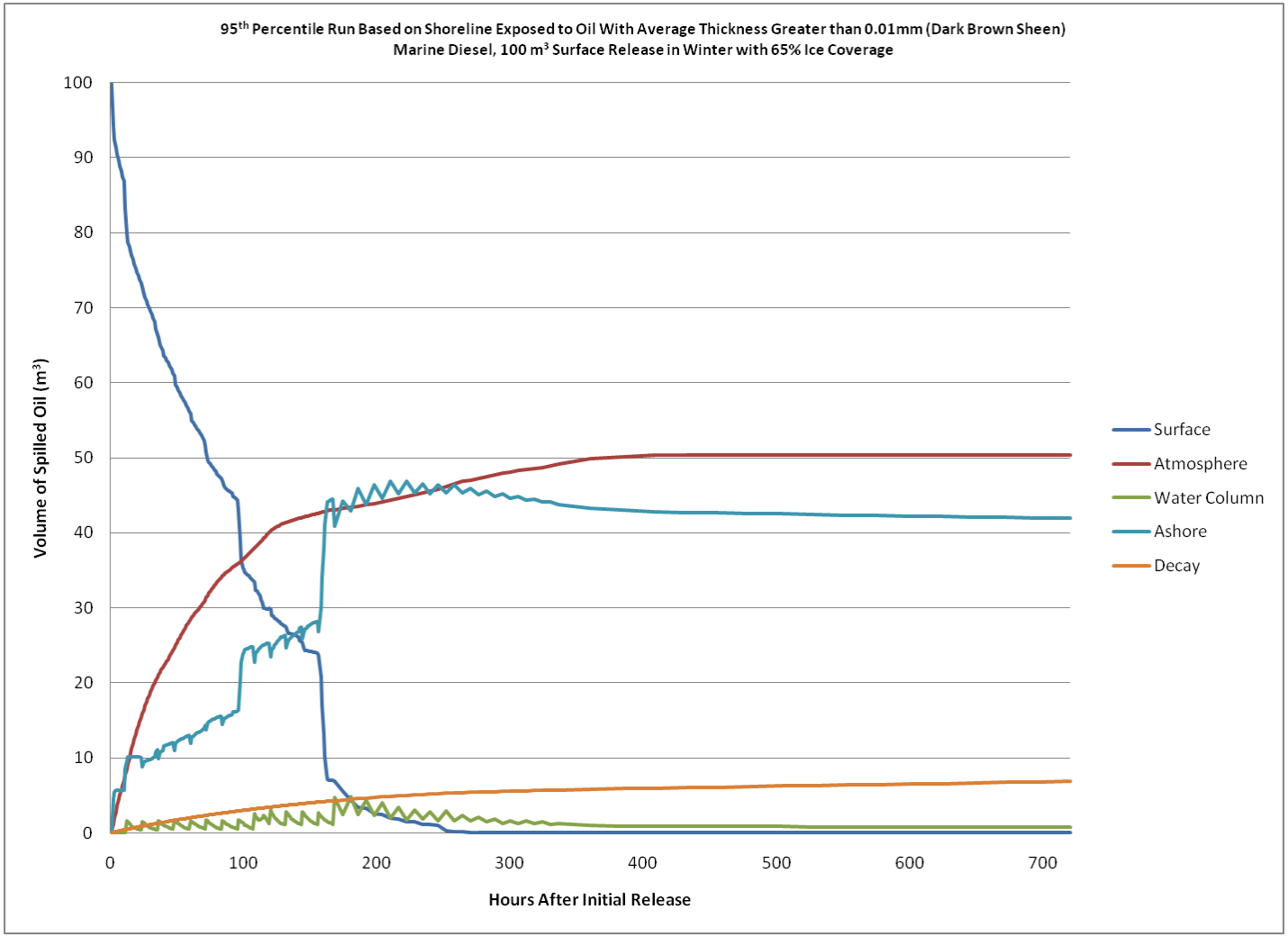


Figure C16. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 100 m^3 release of marine diesel in the winter with 65% ice coverage.

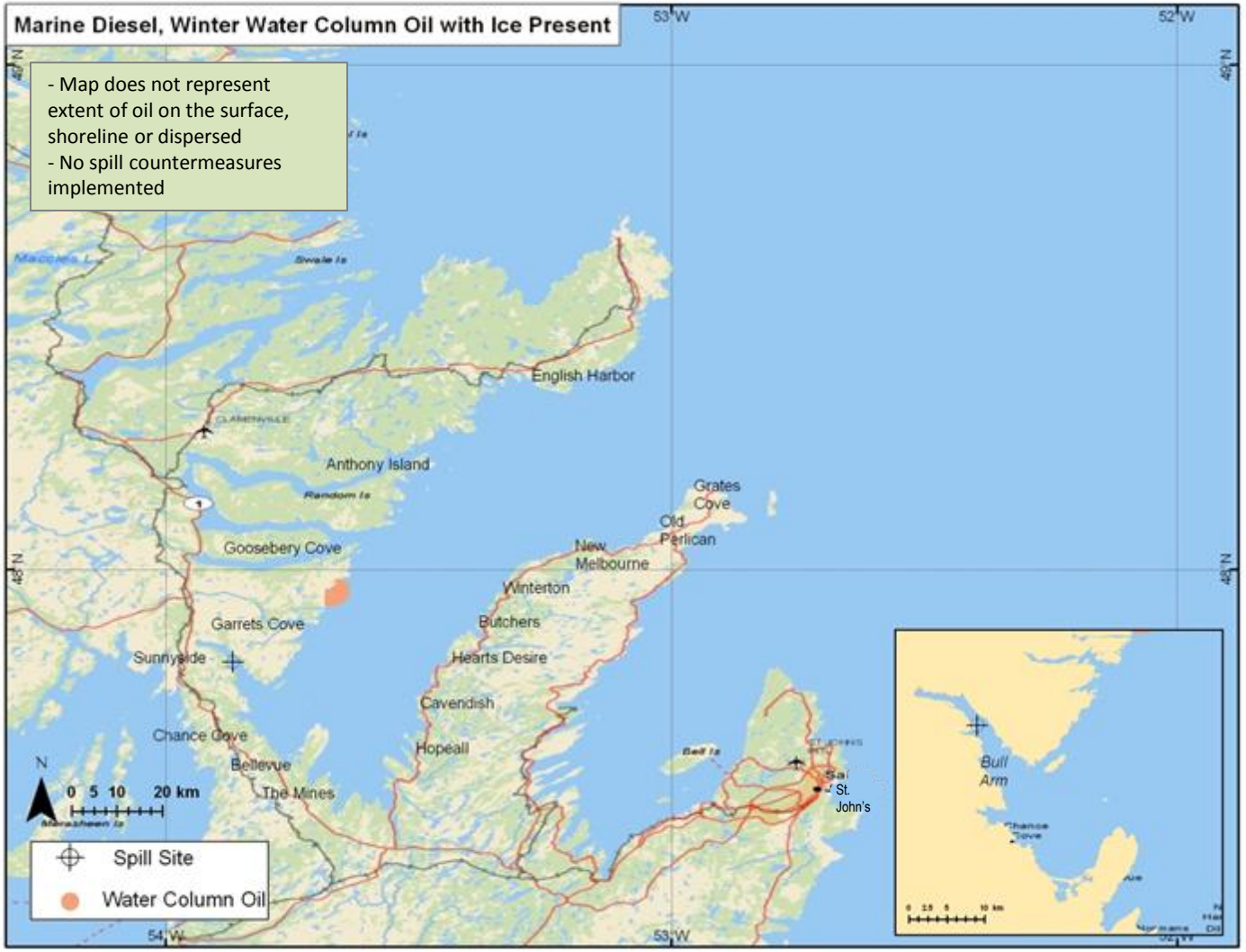


Figure C17. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 100 m^3 release of marine diesel in the winter with 65% ice coverage.

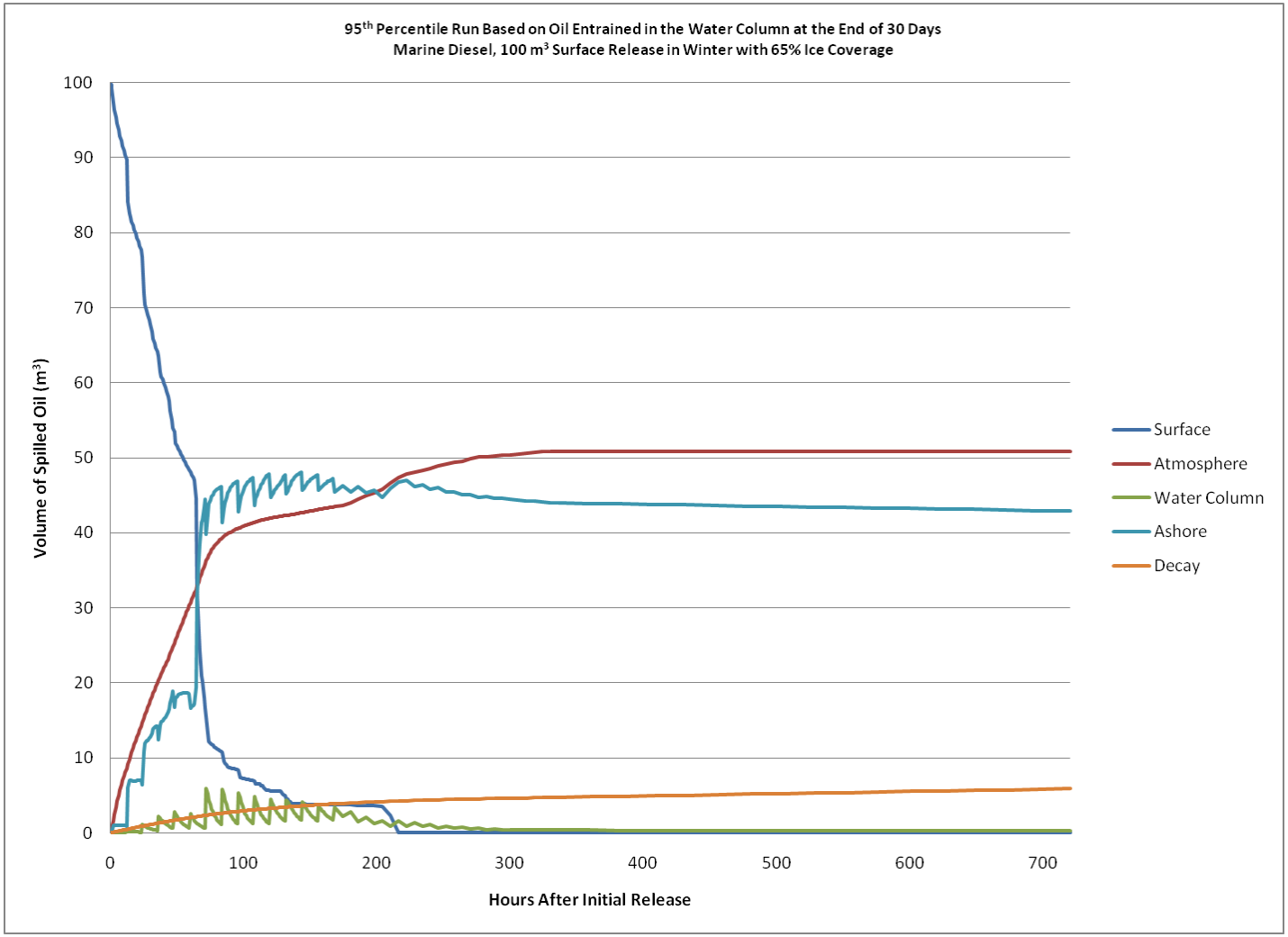


Figure C18. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 100 m^3 release of marine diesel in the winter with 65% ice coverage.

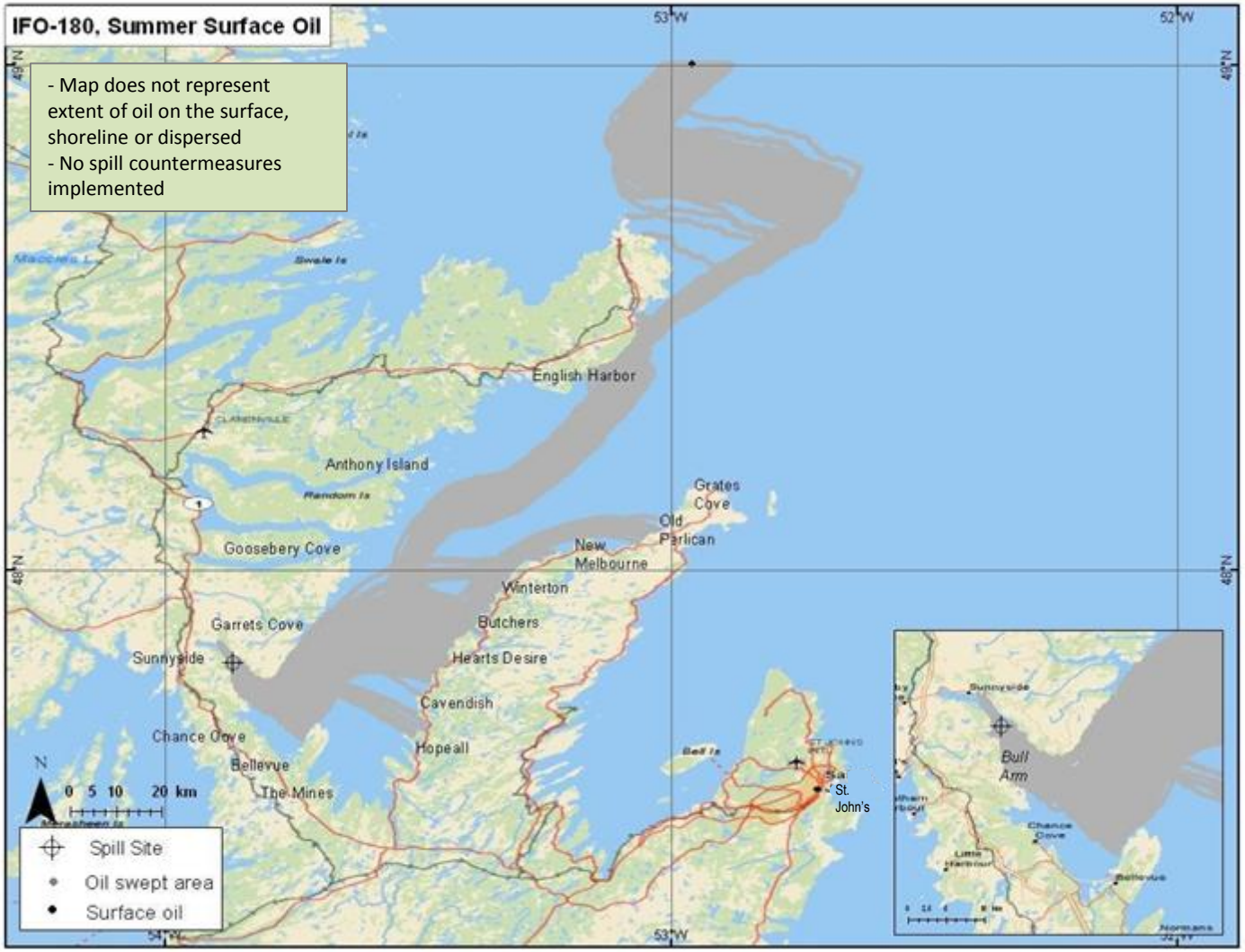


Figure C19. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the summer. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

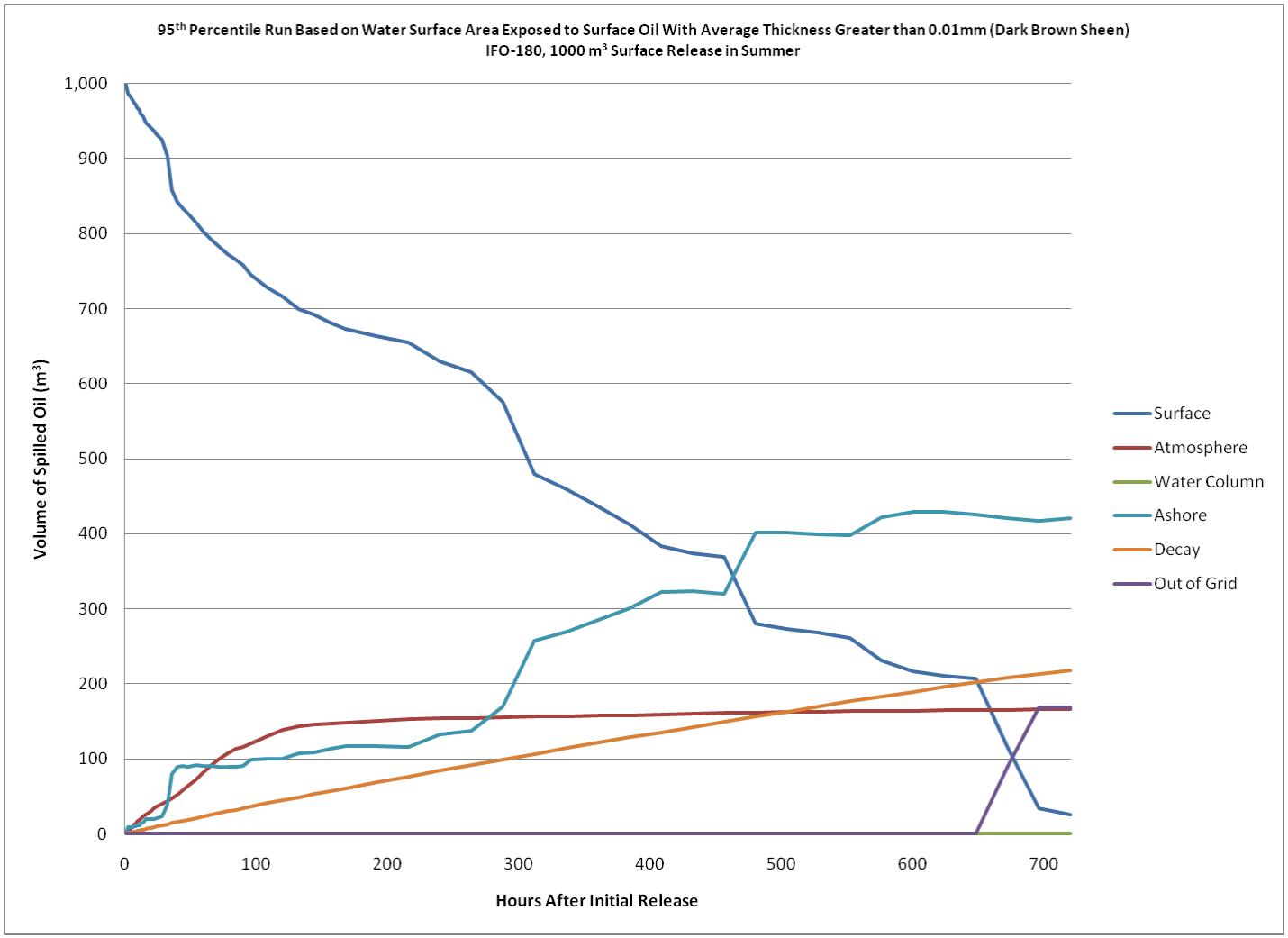


Figure C20. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the summer.

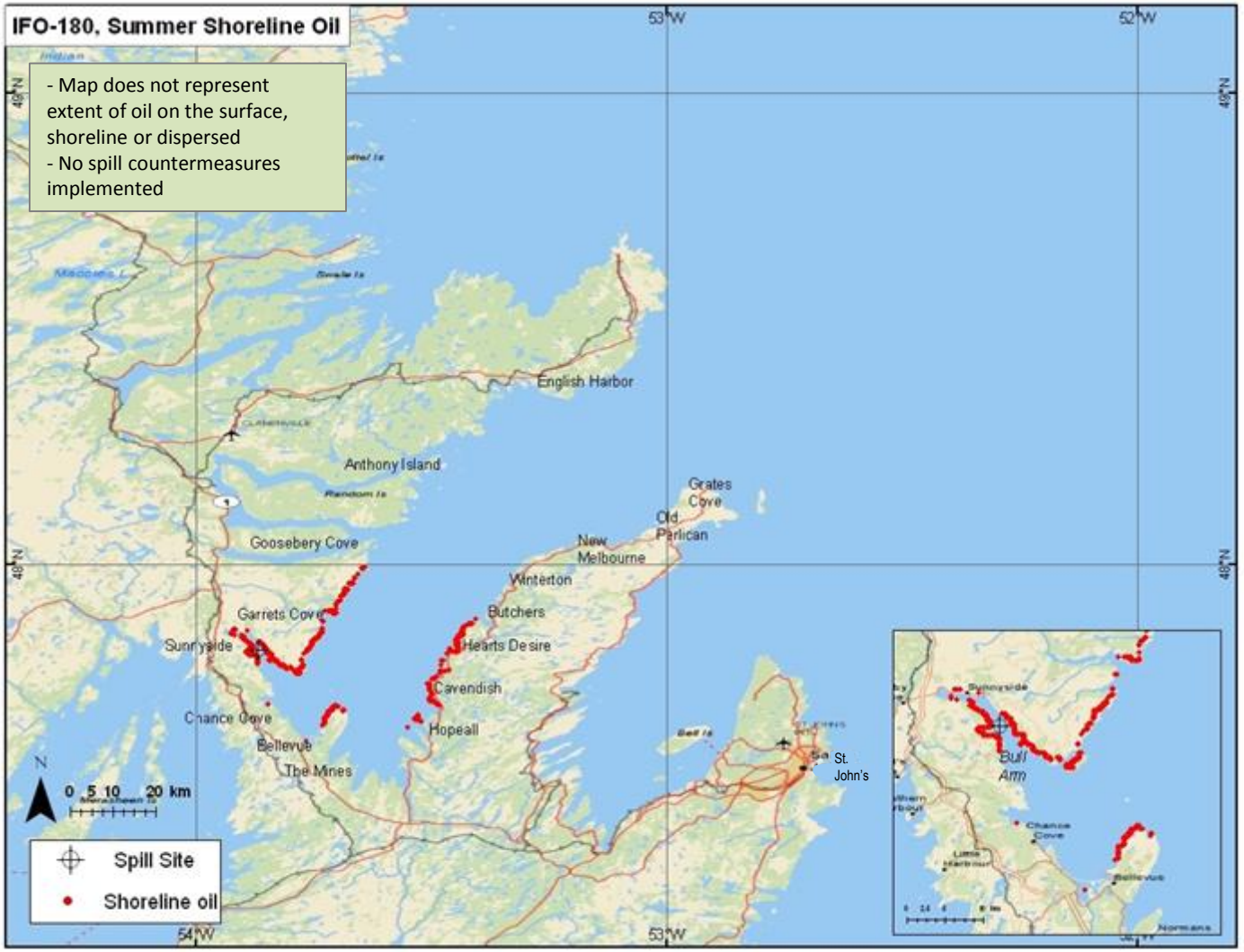


Figure C21. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the summer. Red color highlights the areas of predicted shoreline oiling.

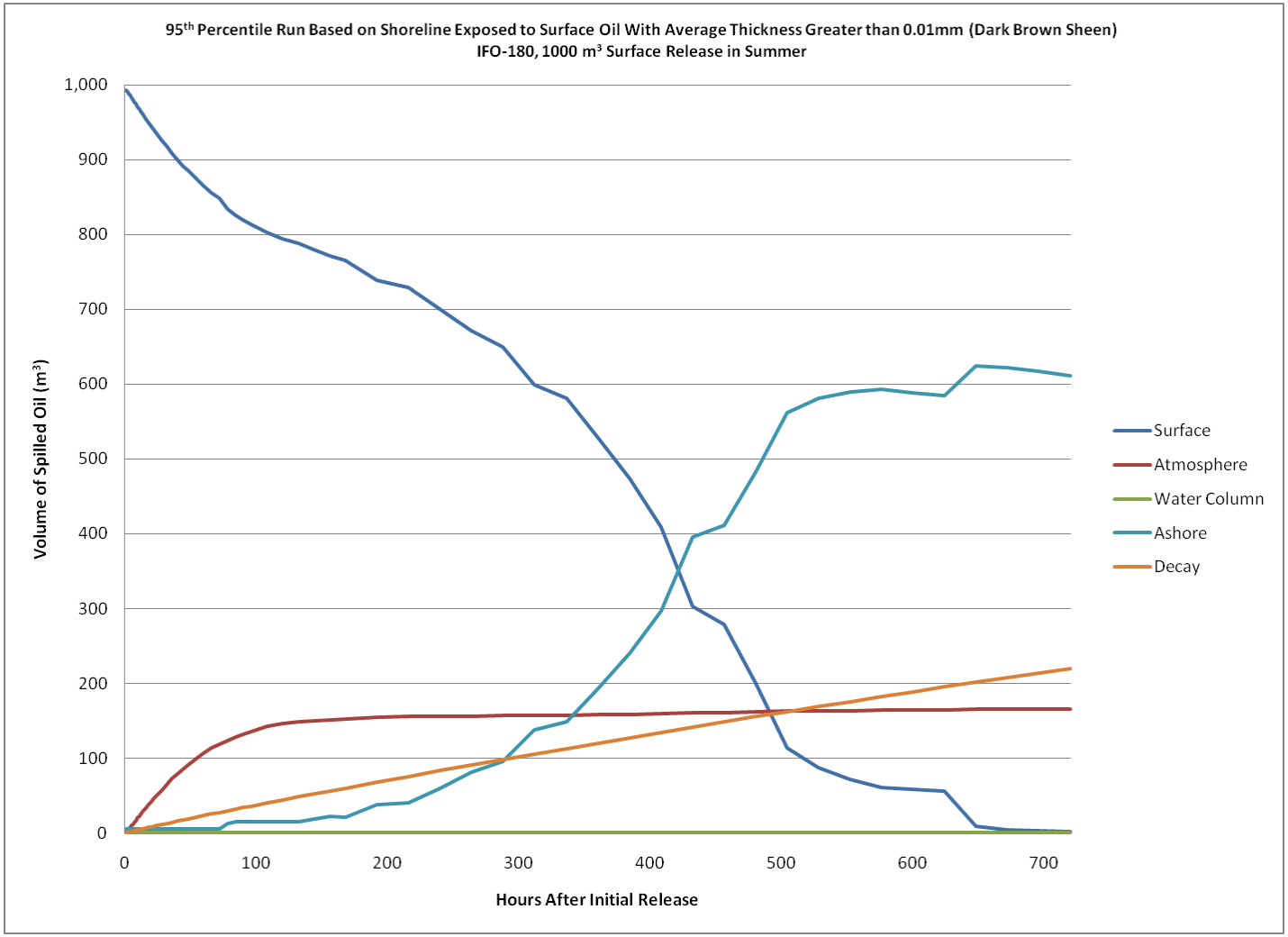


Figure C22. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the summer.

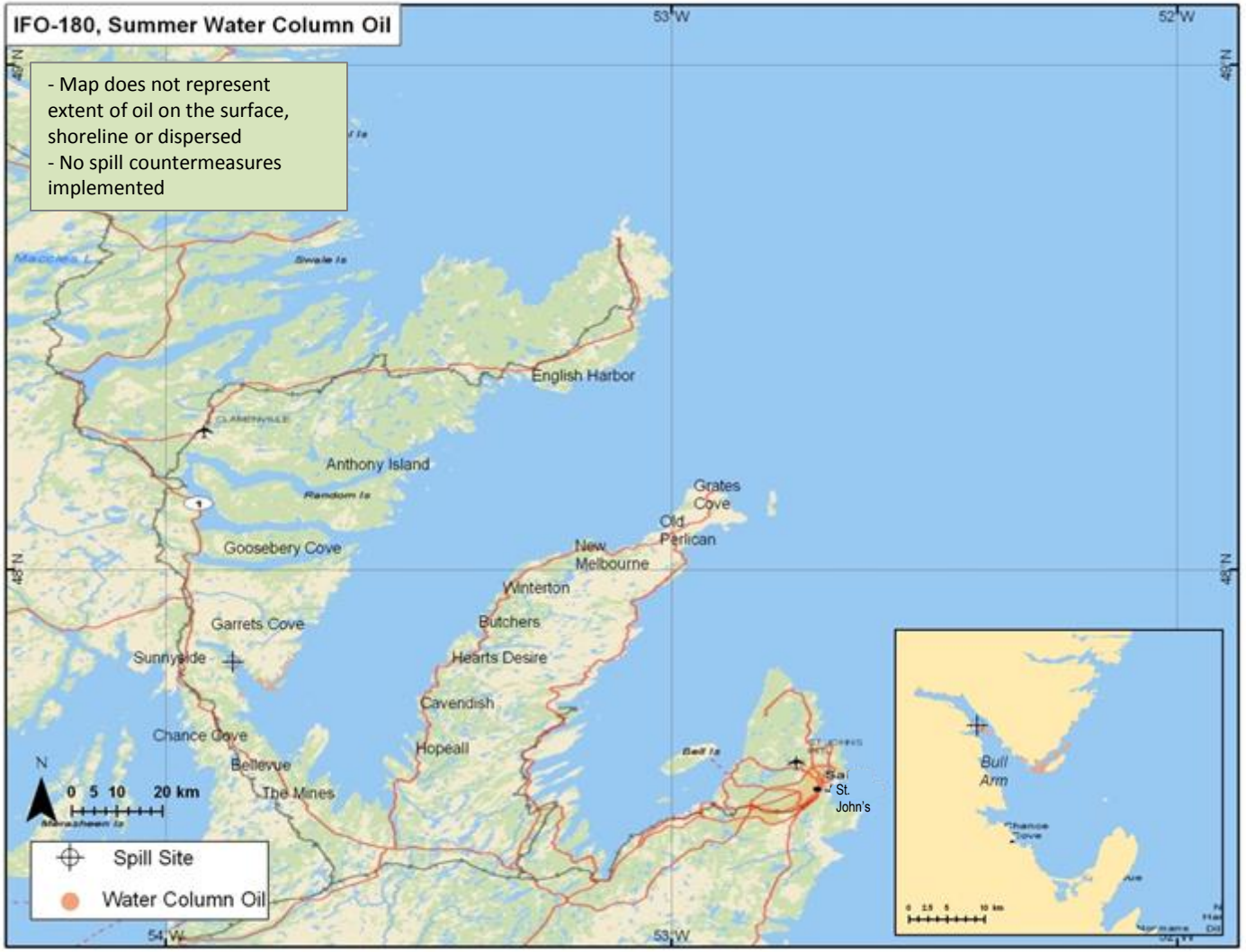


Figure C23. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 1,000 m^3 release of IFO-180 in the summer.

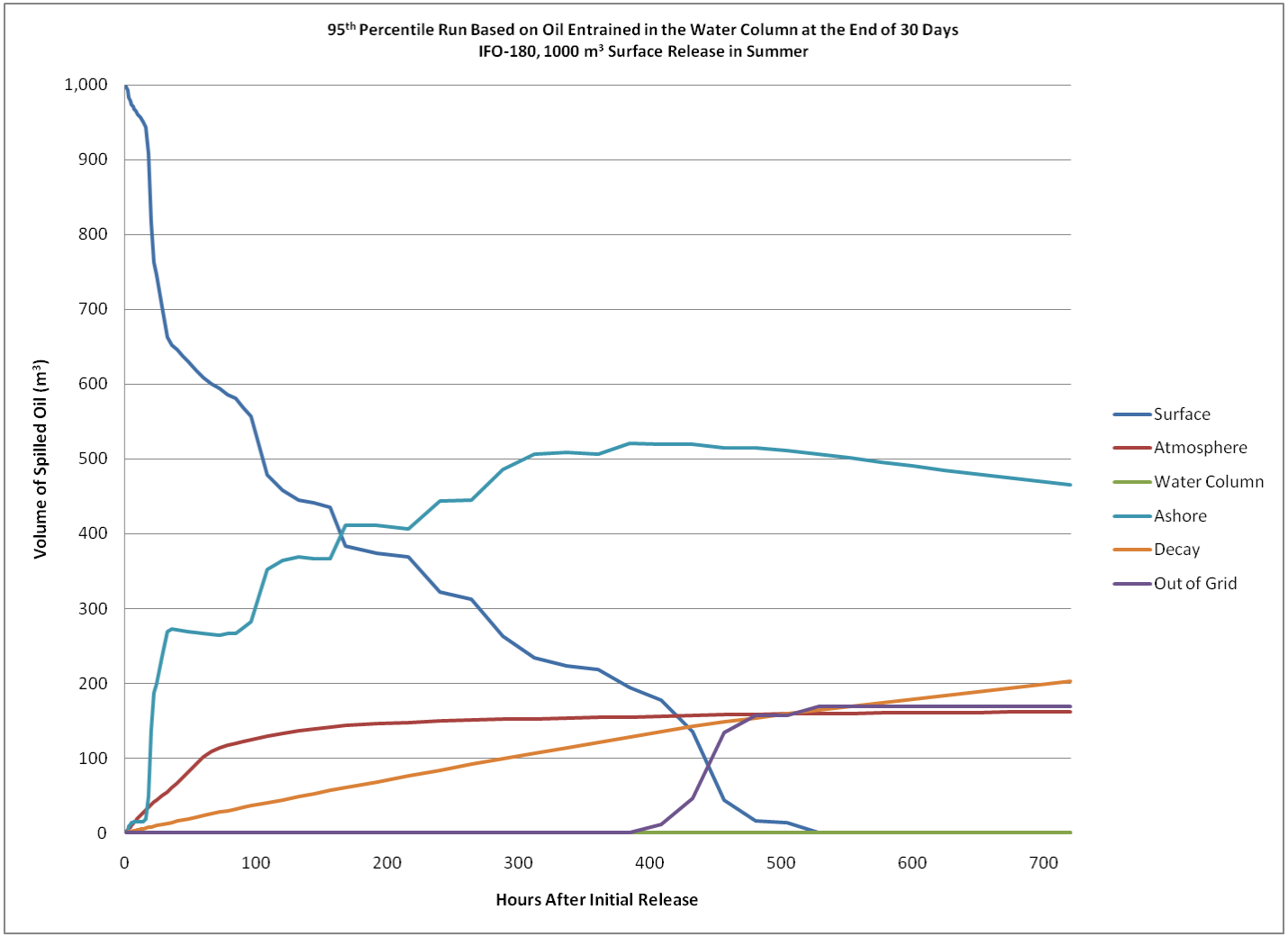


Figure C24. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 1000 m^3 release of IFO-180 in the summer.

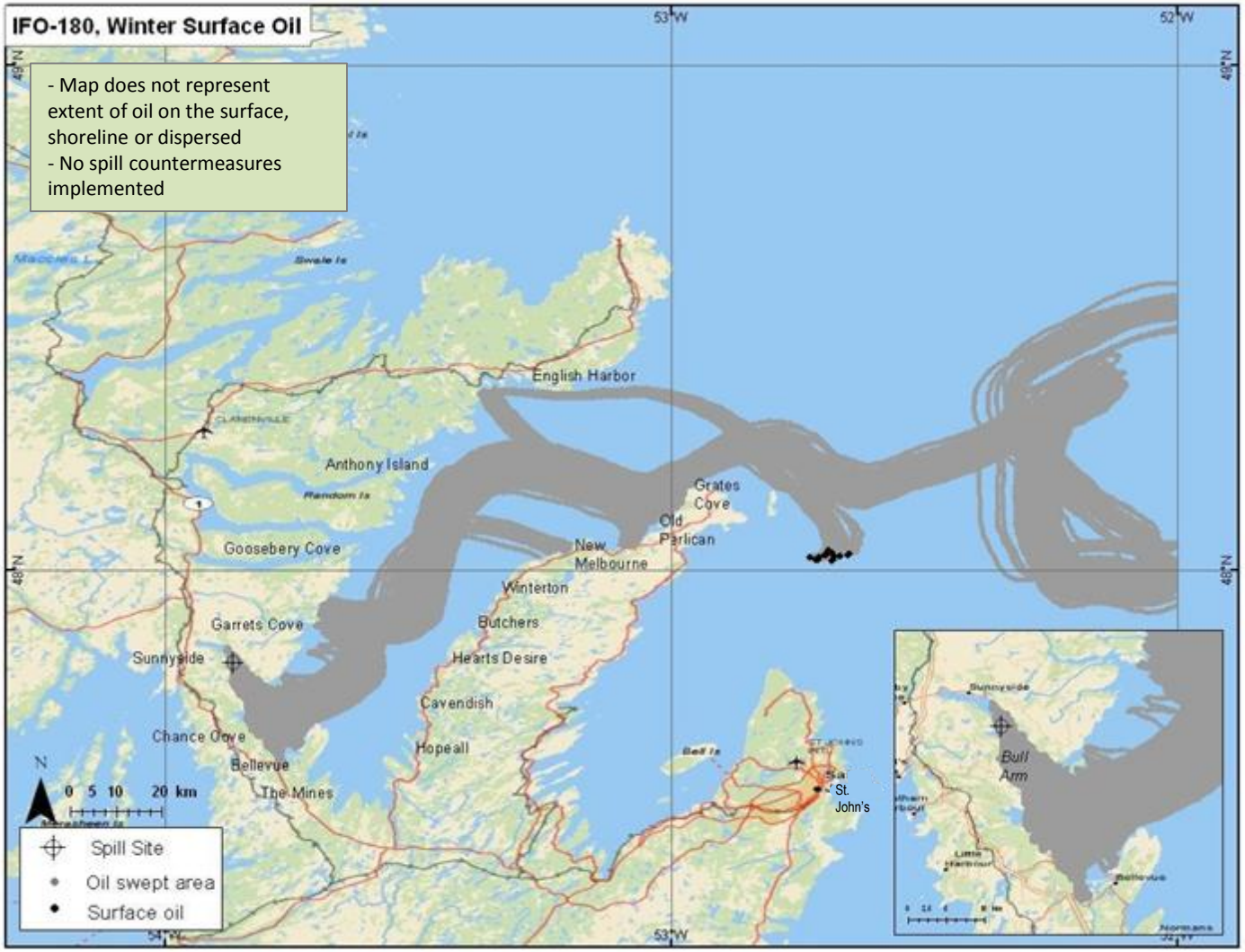


Figure C25. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

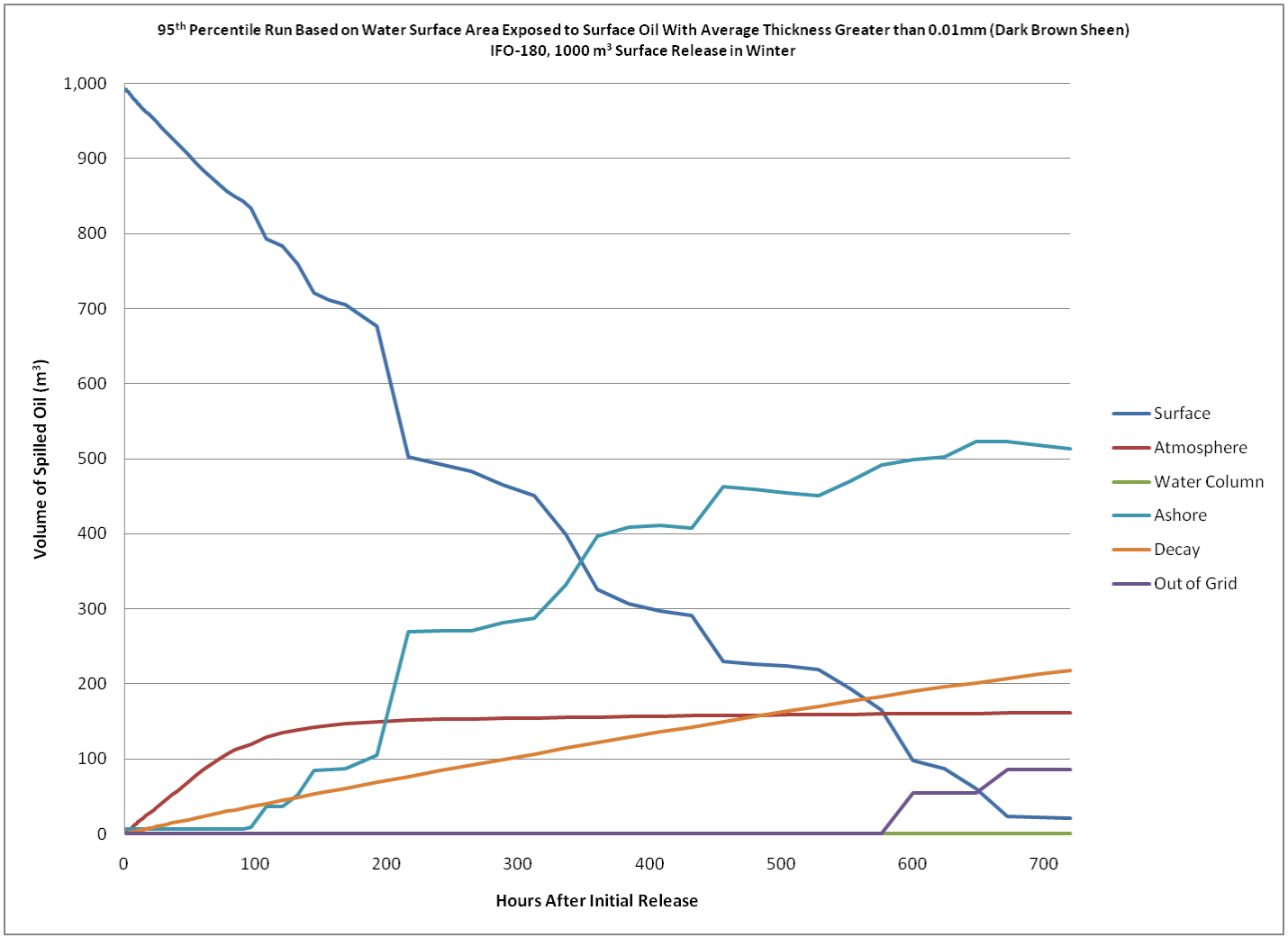


Figure C26. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter.

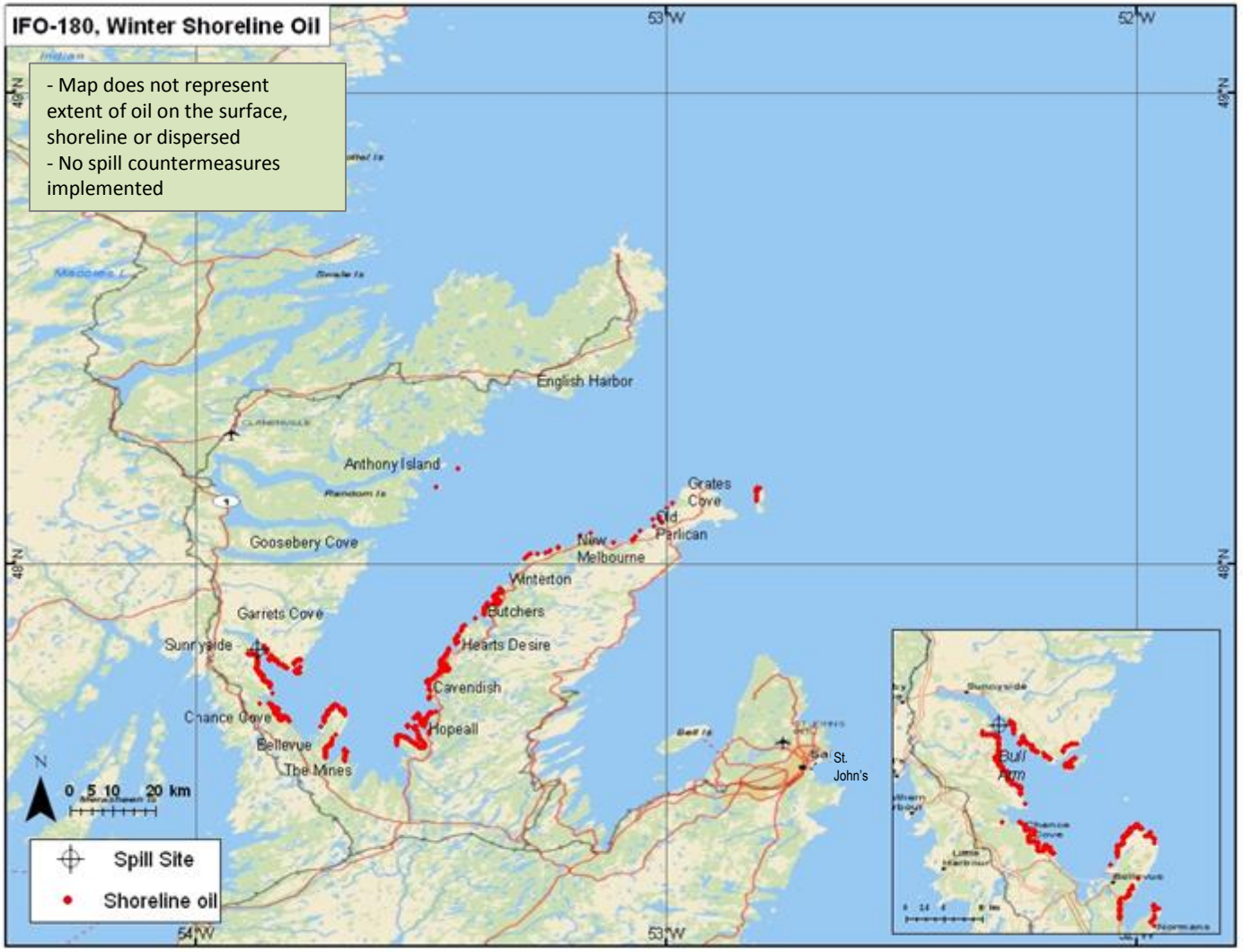


Figure C27. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter. Red color highlights the areas of predicted shoreline oiling.

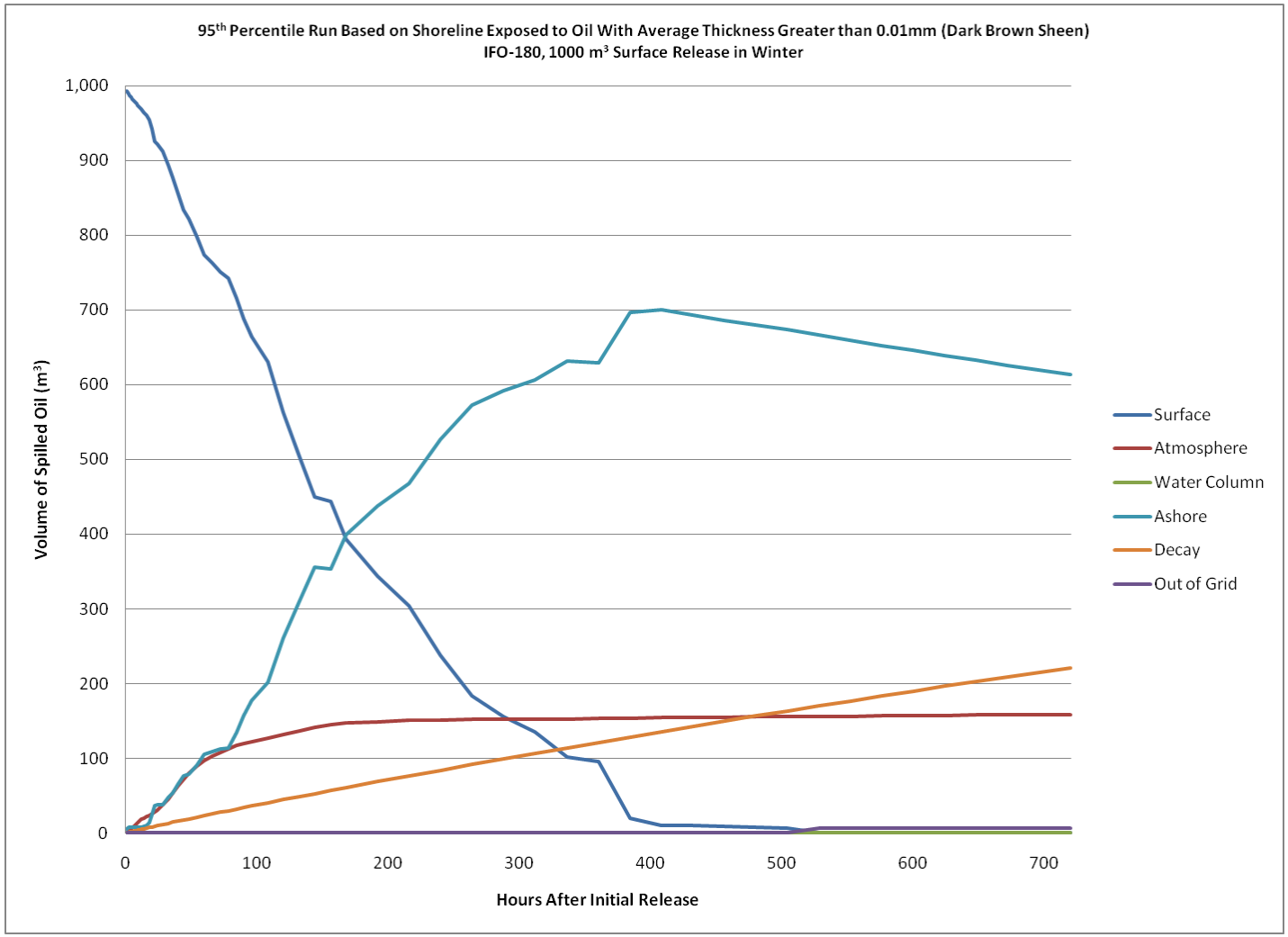


Figure C28. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter.

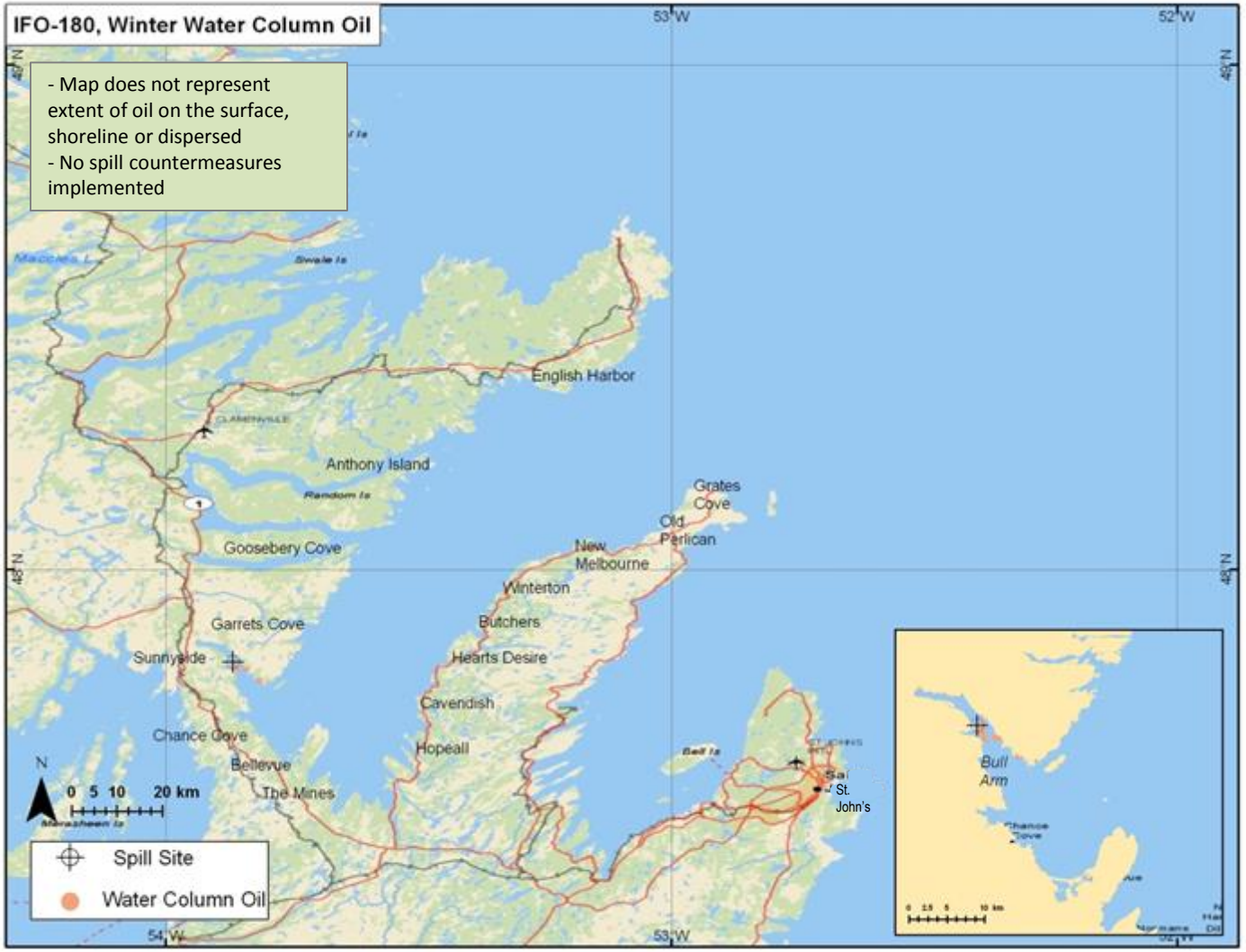


Figure C29. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 1,000 m^3 release of IFO-180 in the winter.

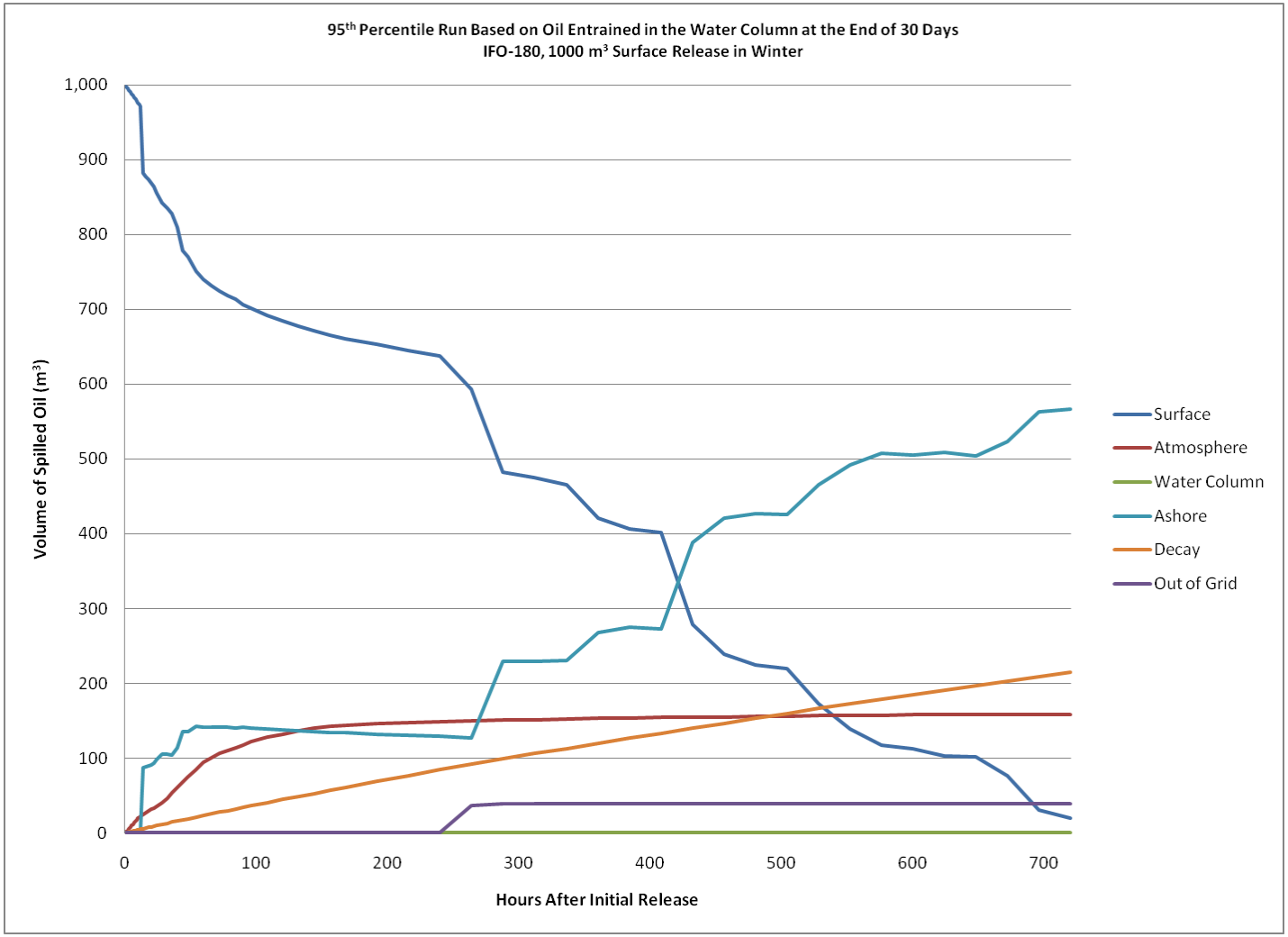


Figure C30. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 1000 m^3 release of IFO-180 in the winter.

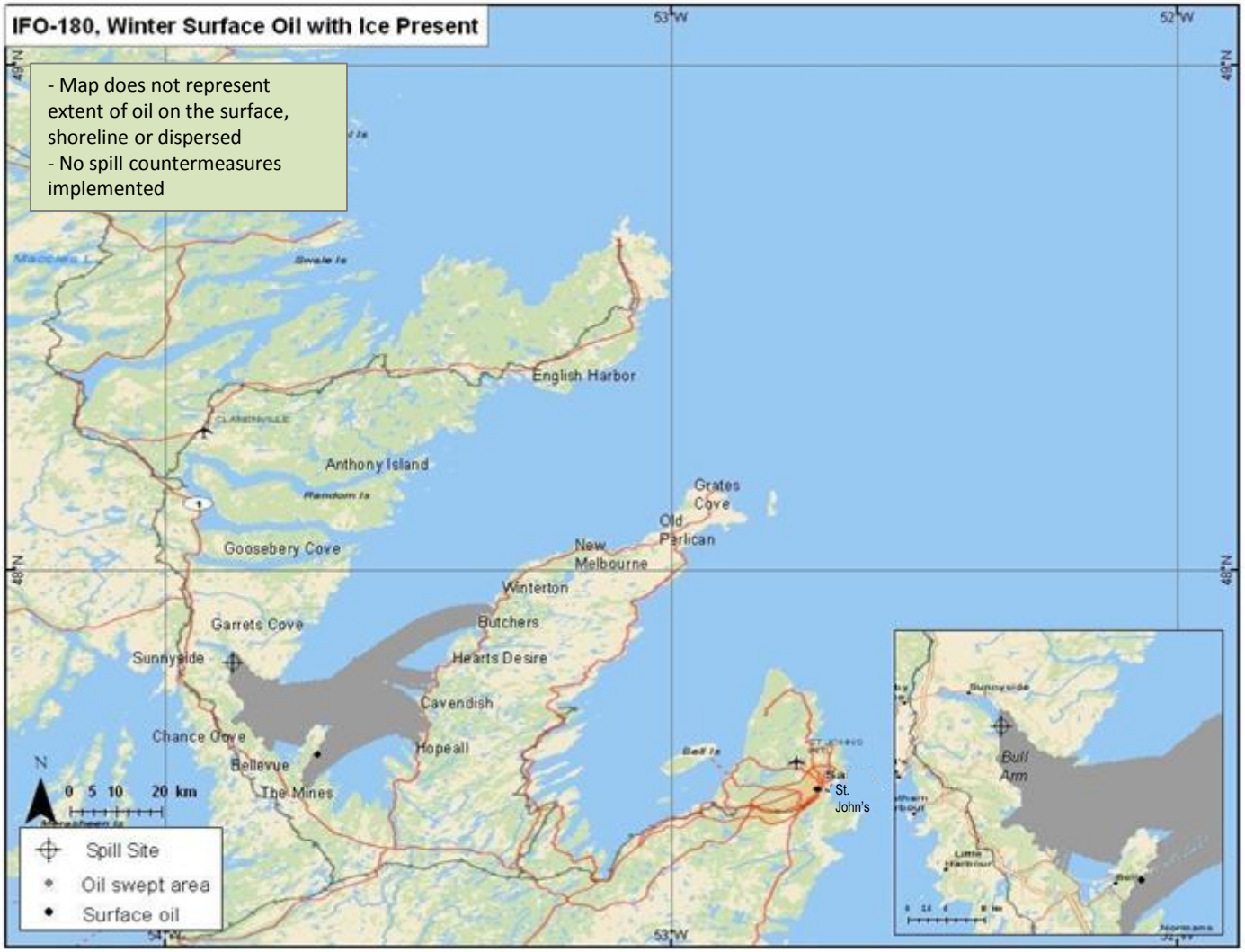


Figure C31. Water surface exposure to surface oil for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter with 65% ice coverage. Gray depicts the area of the sea surface swept by surface oil over the 30-day period, not a continuous surface slick. Black areas depict oil on the water surface at the end of the 30 day simulation.

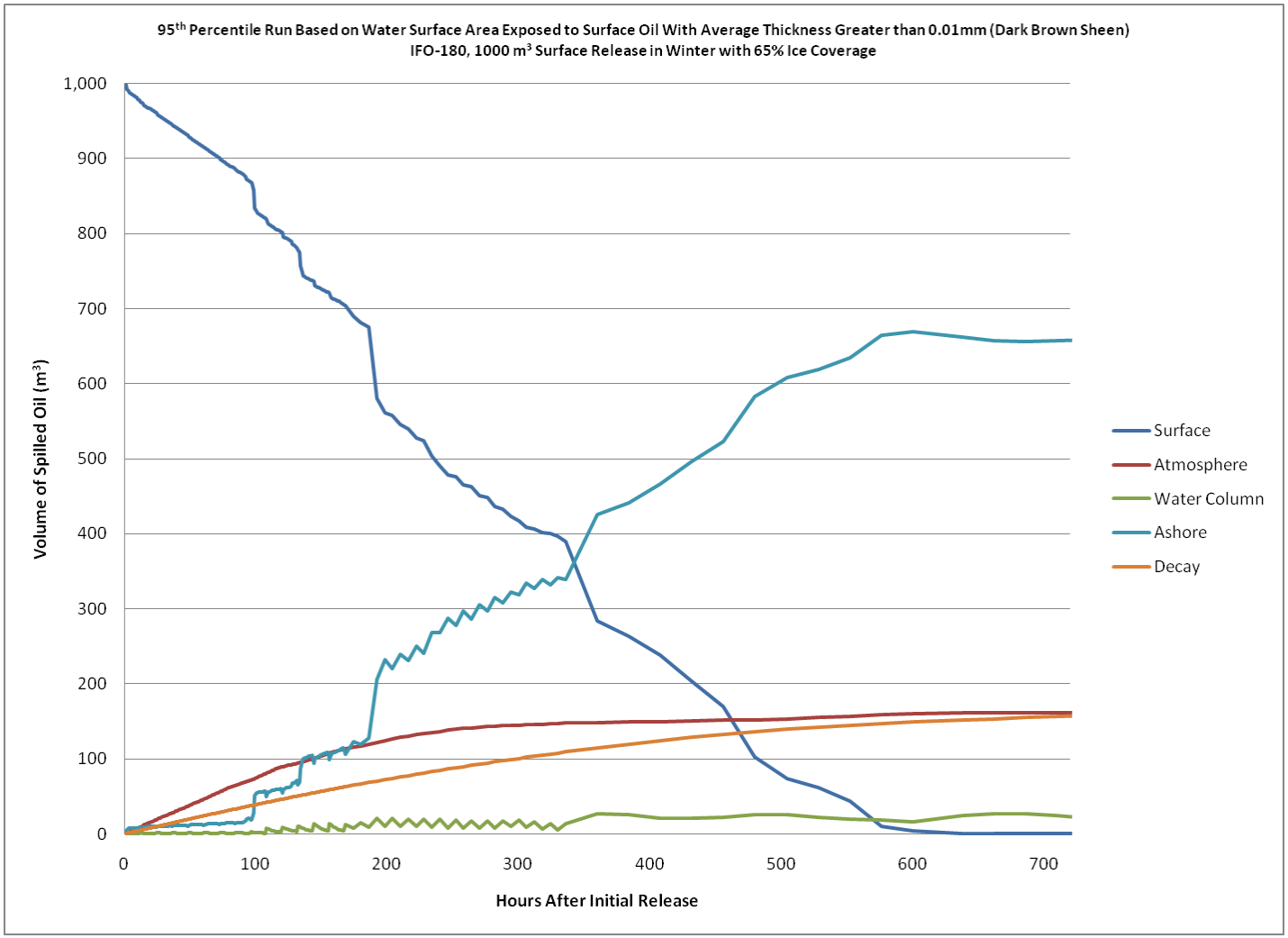


Figure C32. Mass balance graph for 95th percentile run based on water surface area exposed to surface oil with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter with 65% ice coverage.

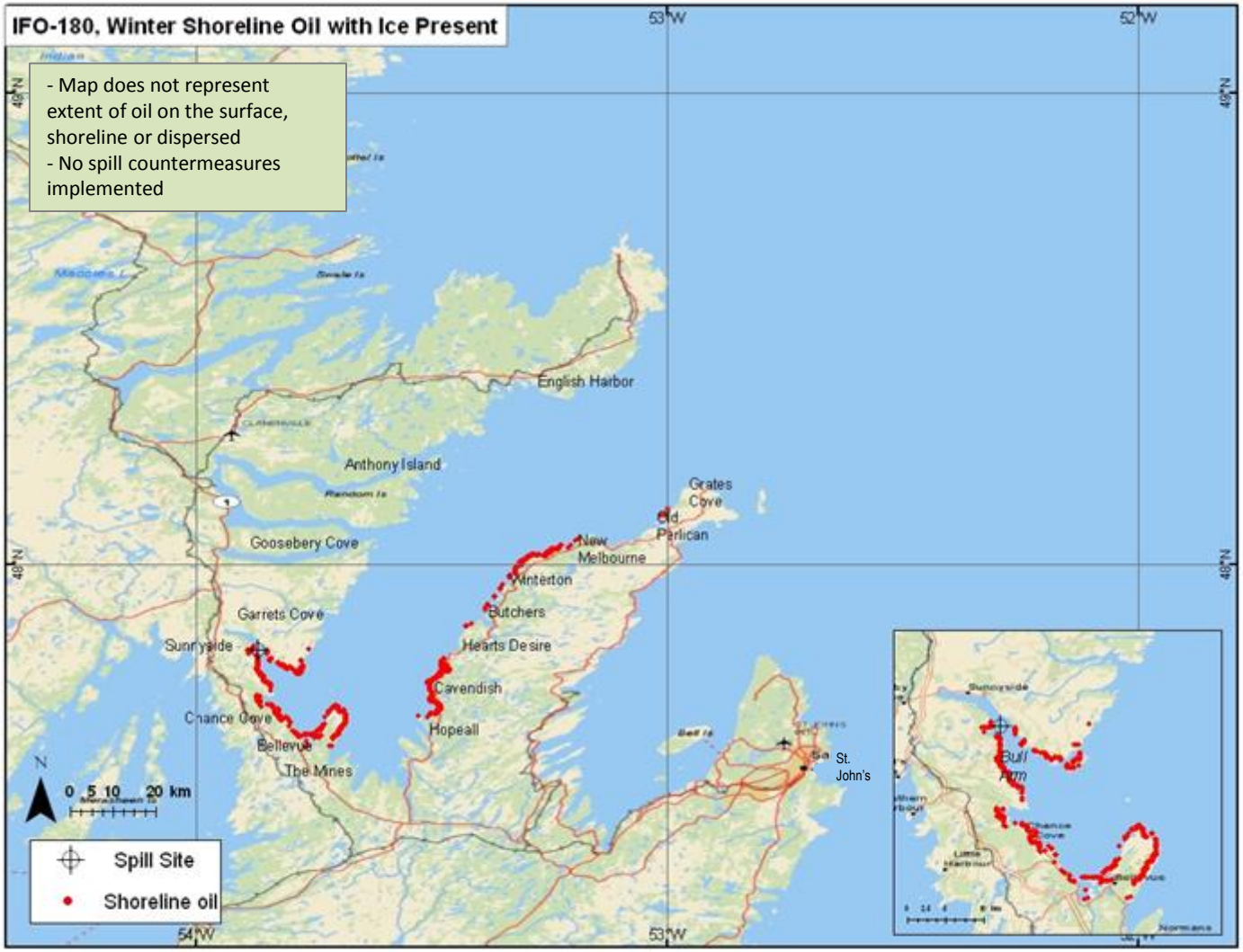


Figure C33. Shoreline exposure to hydrocarbons (mm) for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter with 65% ice coverage. Red color highlights the areas of predicted shoreline oiling.

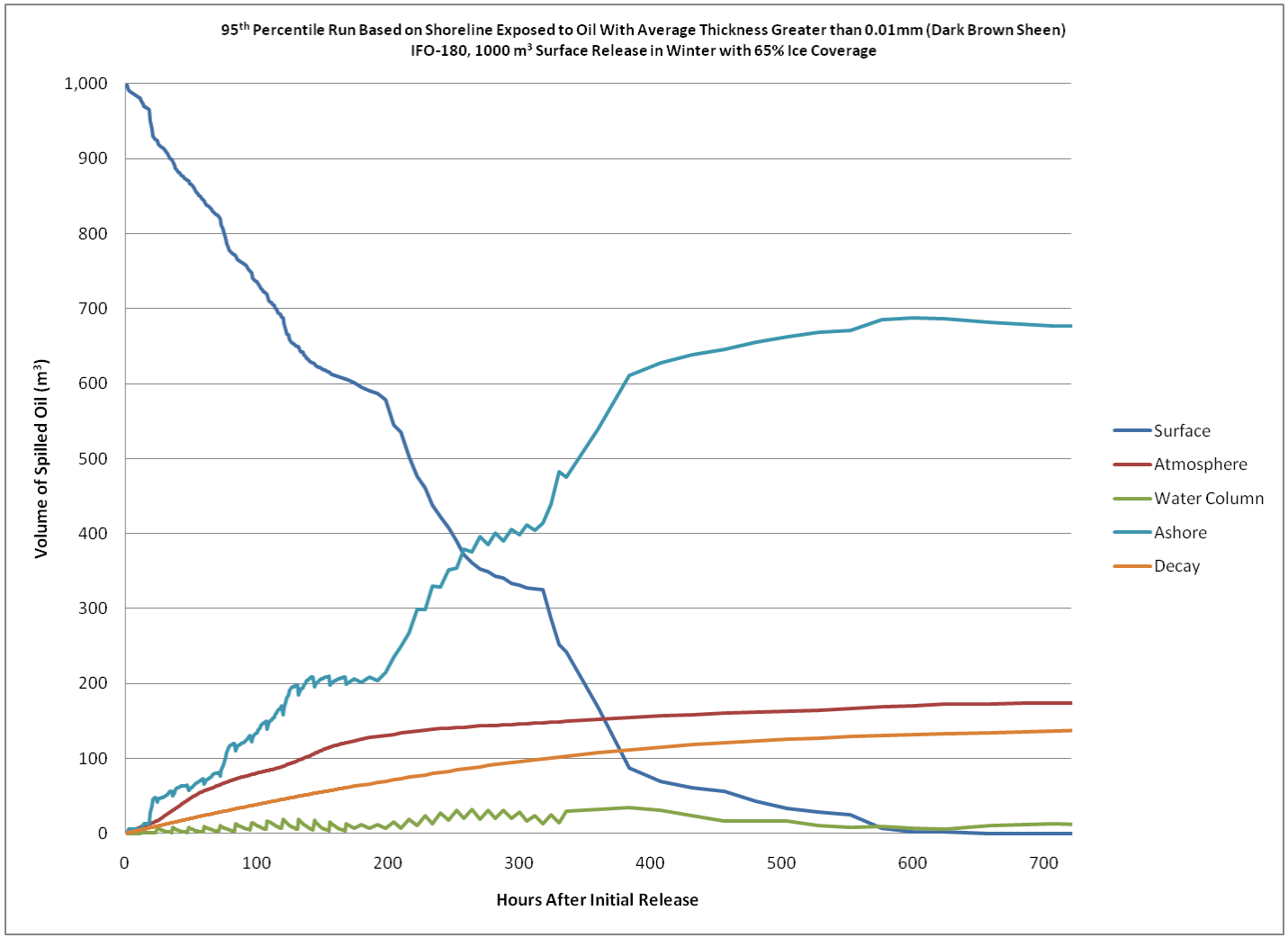


Figure C34. Mass balance graph for 95th percentile run based on area of shoreline oiled with average thickness greater than 0.01mm (dark brown sheen) for a 1000 m^3 release of IFO-180 in the winter with 65% ice coverage.

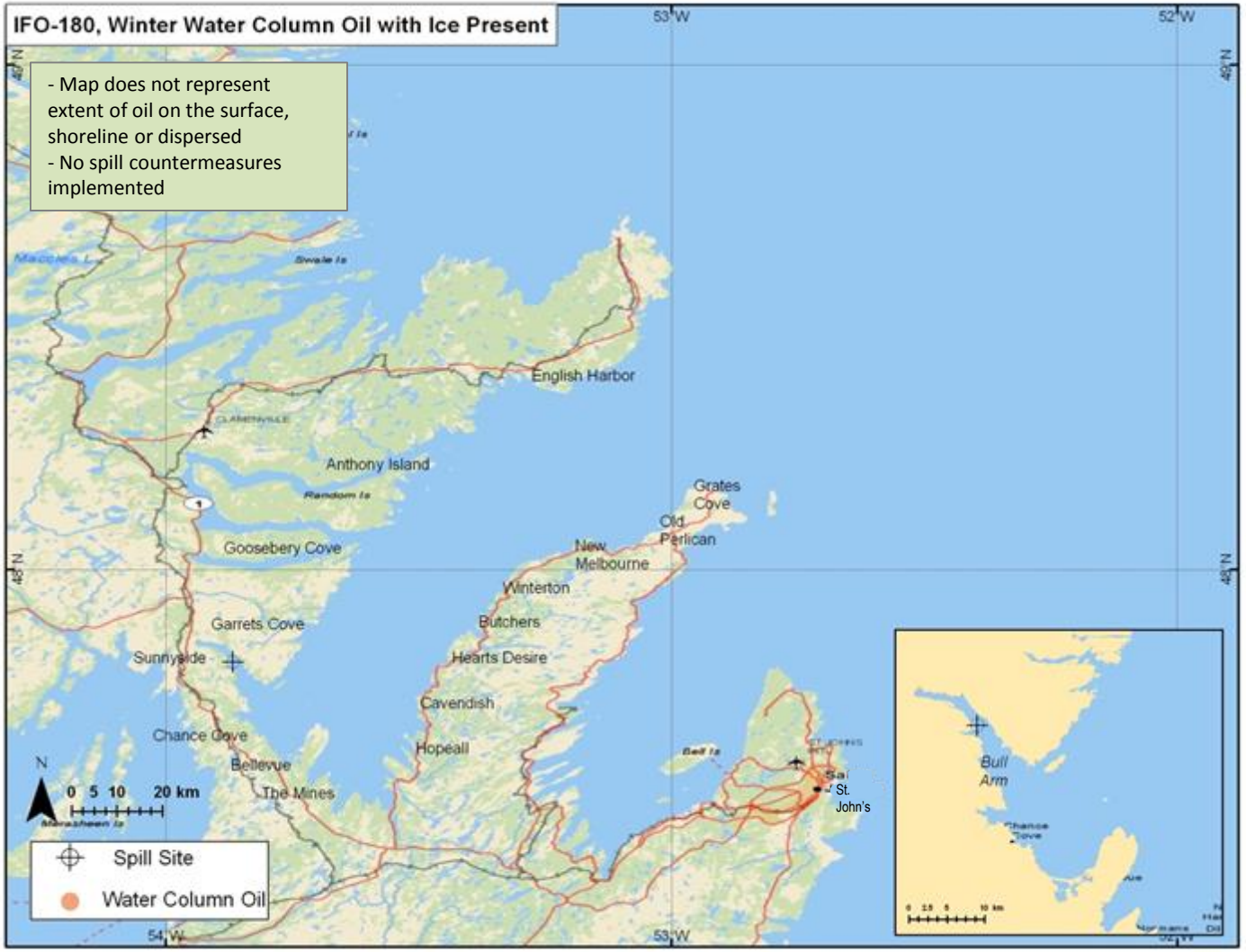


Figure C35. Area where the water column is exposed to a total hydrocarbon concentration exceeding 10ppb based on the 95th percentile run for a 1,000 m^3 release of IFO-180 in the winter with 65% ice coverage.

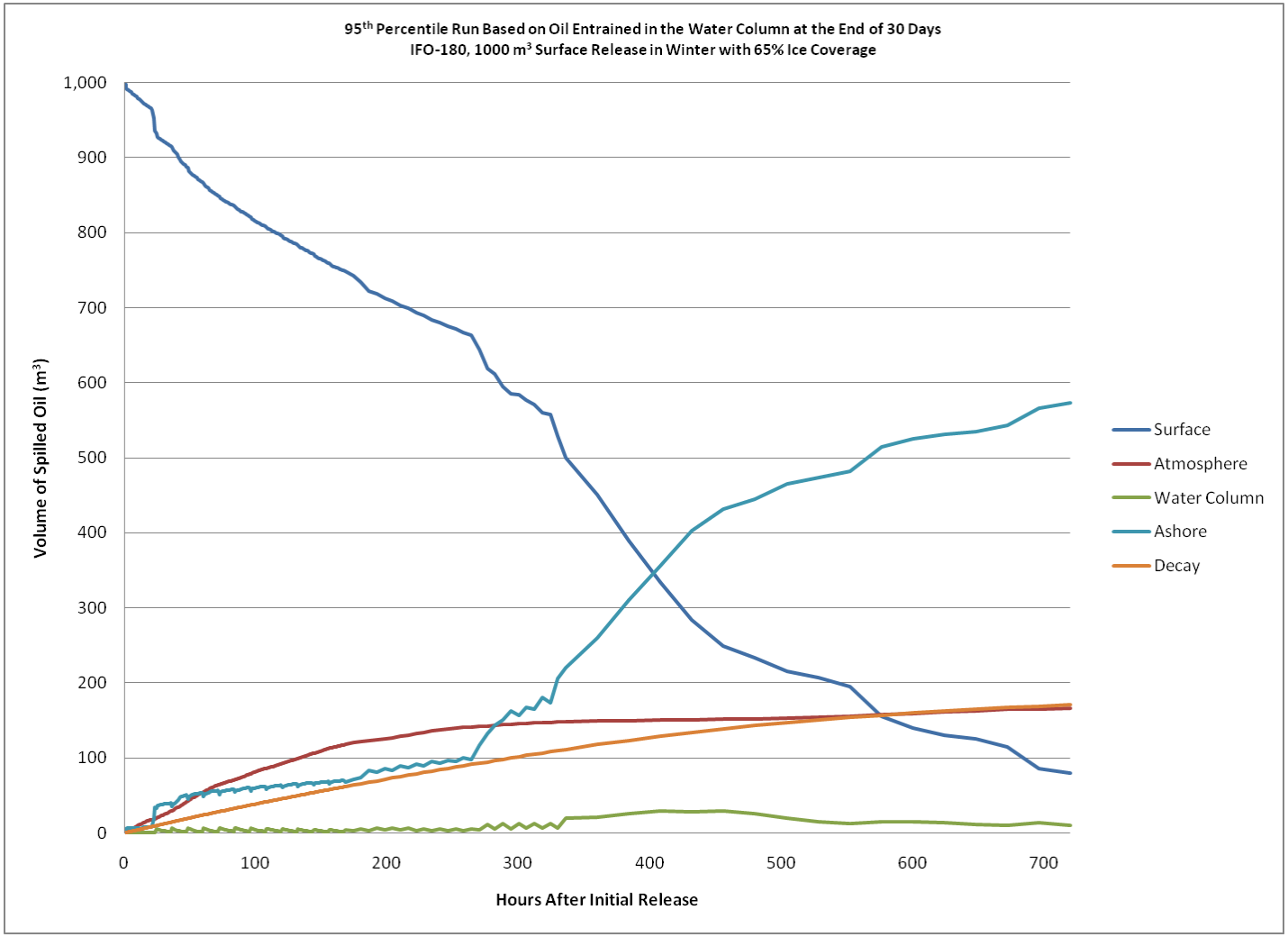


Figure C36. Mass balance graph for 95th percentile run based on subsurface oil entrained in the water column after 30 days for a 1000 m^3 release of IFO-180 in the winter with 65% ice coverage.