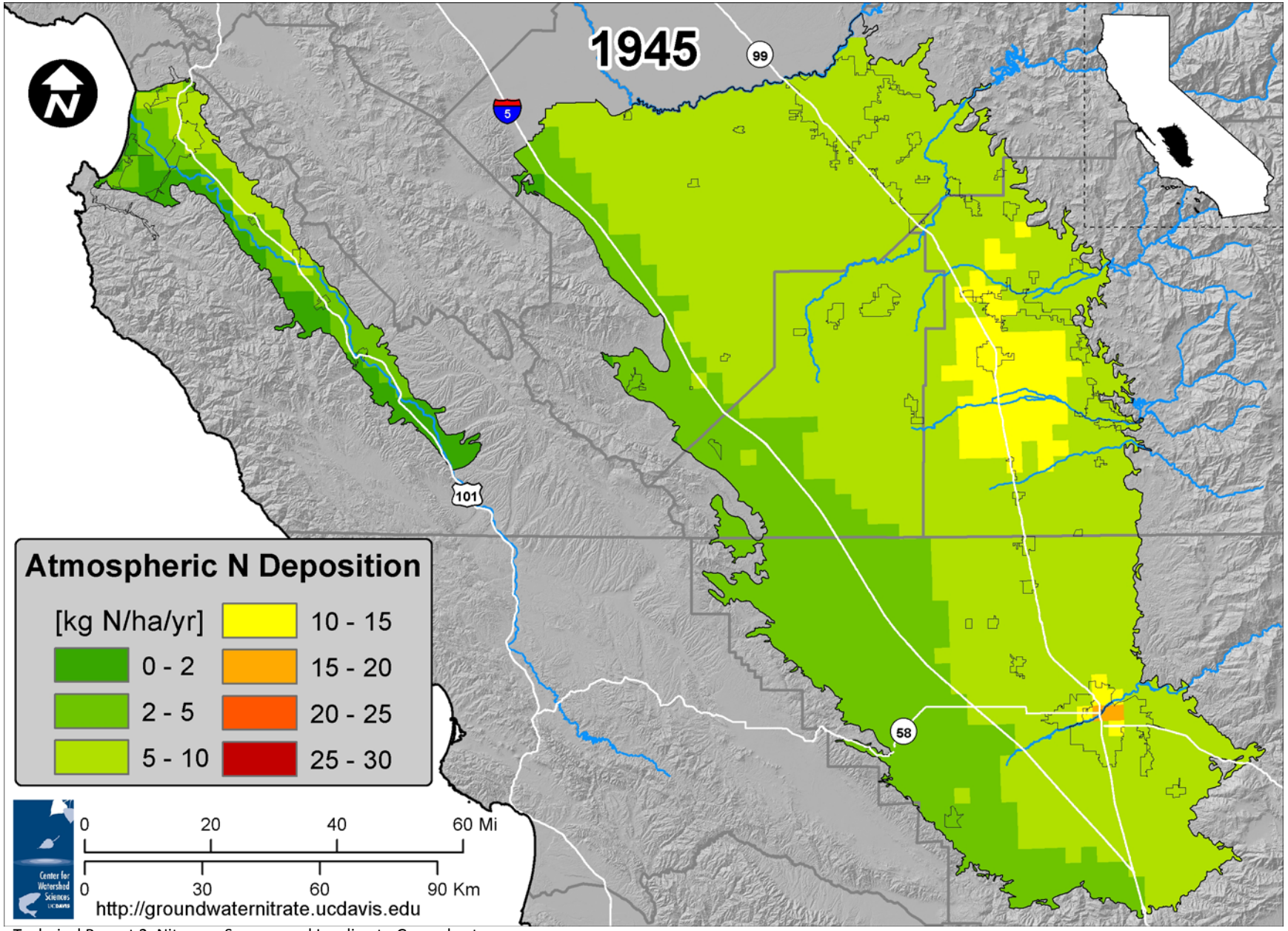
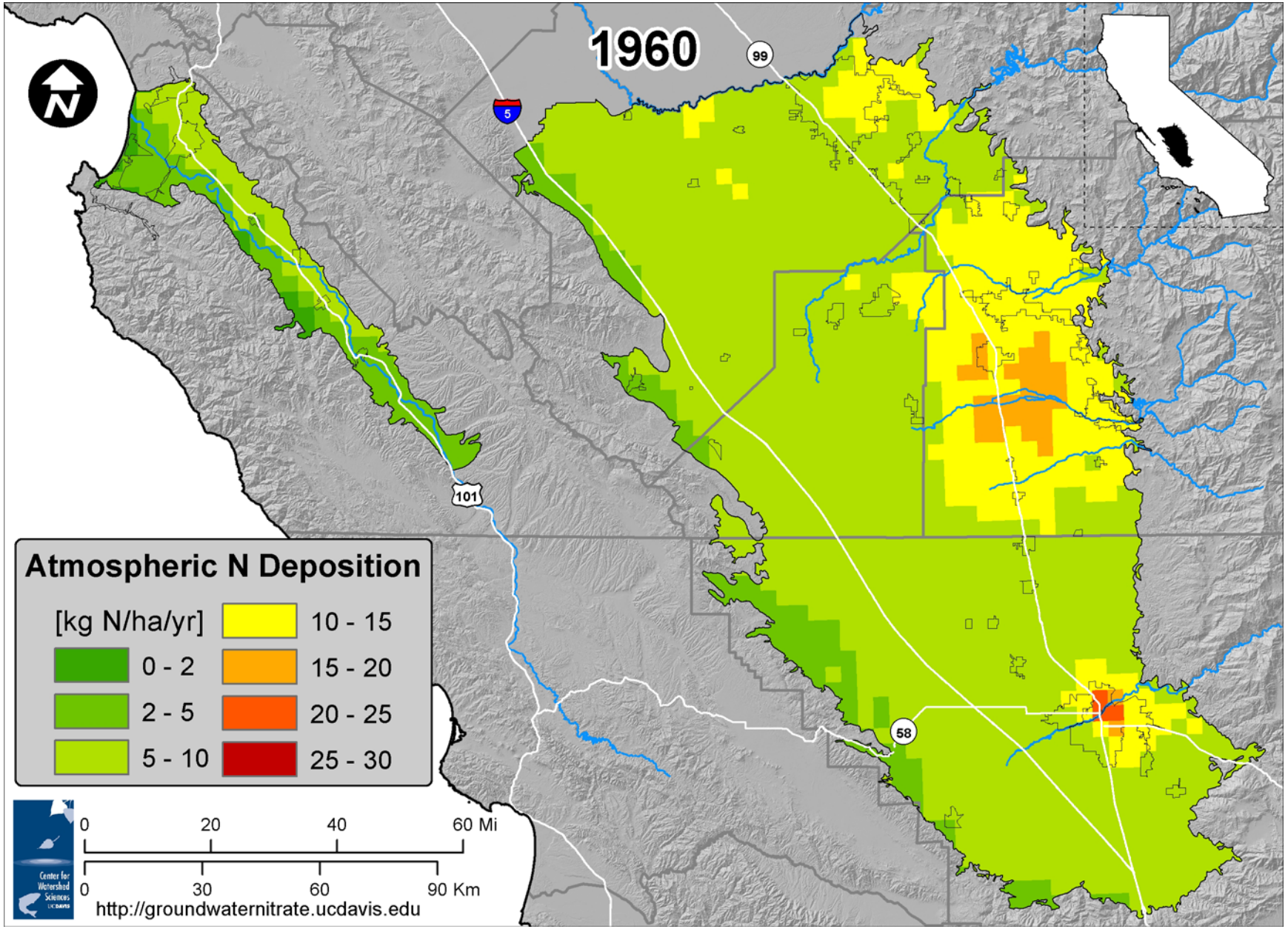
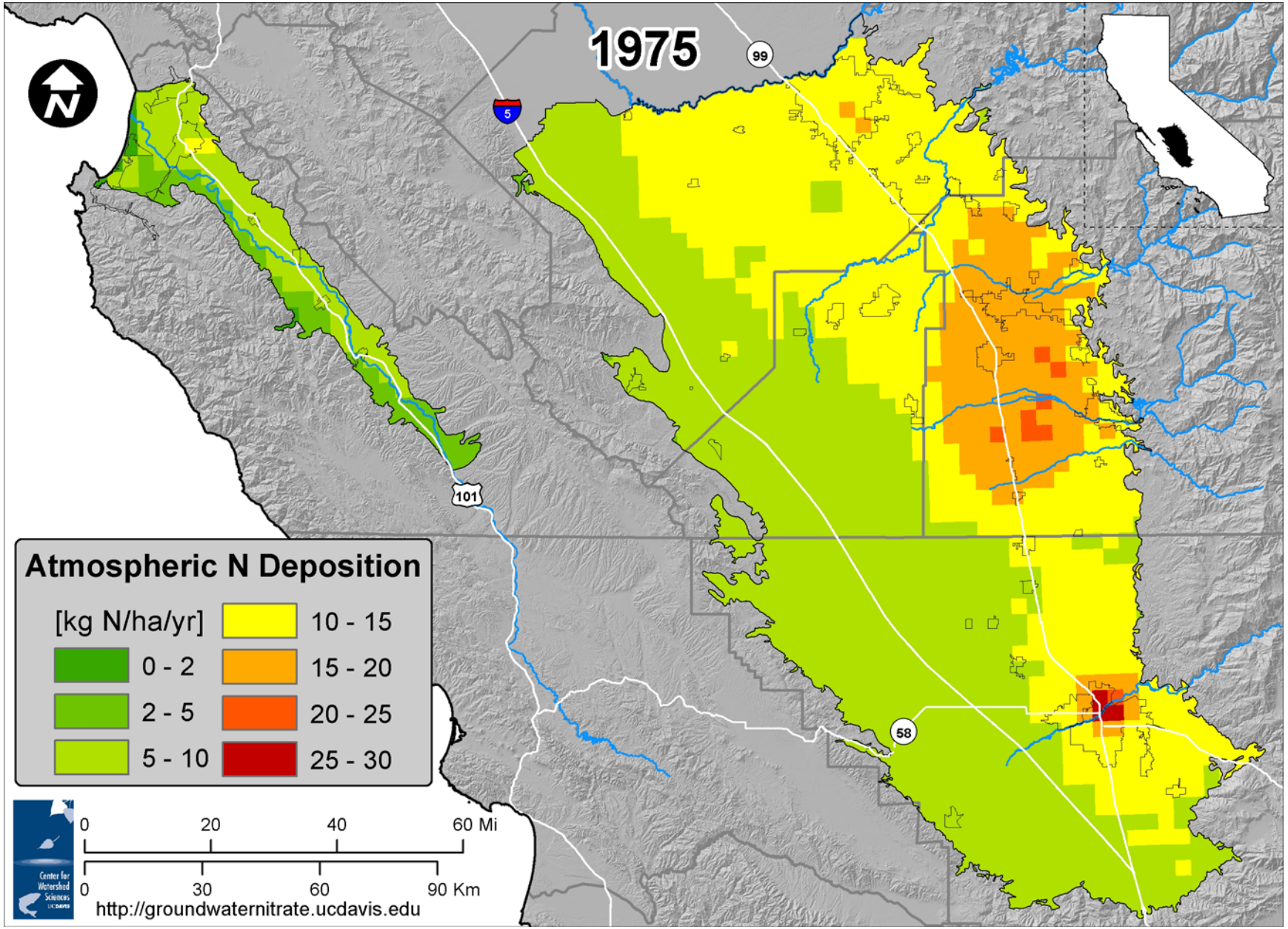
Appendix Figure 3. Estimated annual atmospheric nitrogen deposition in 1945.



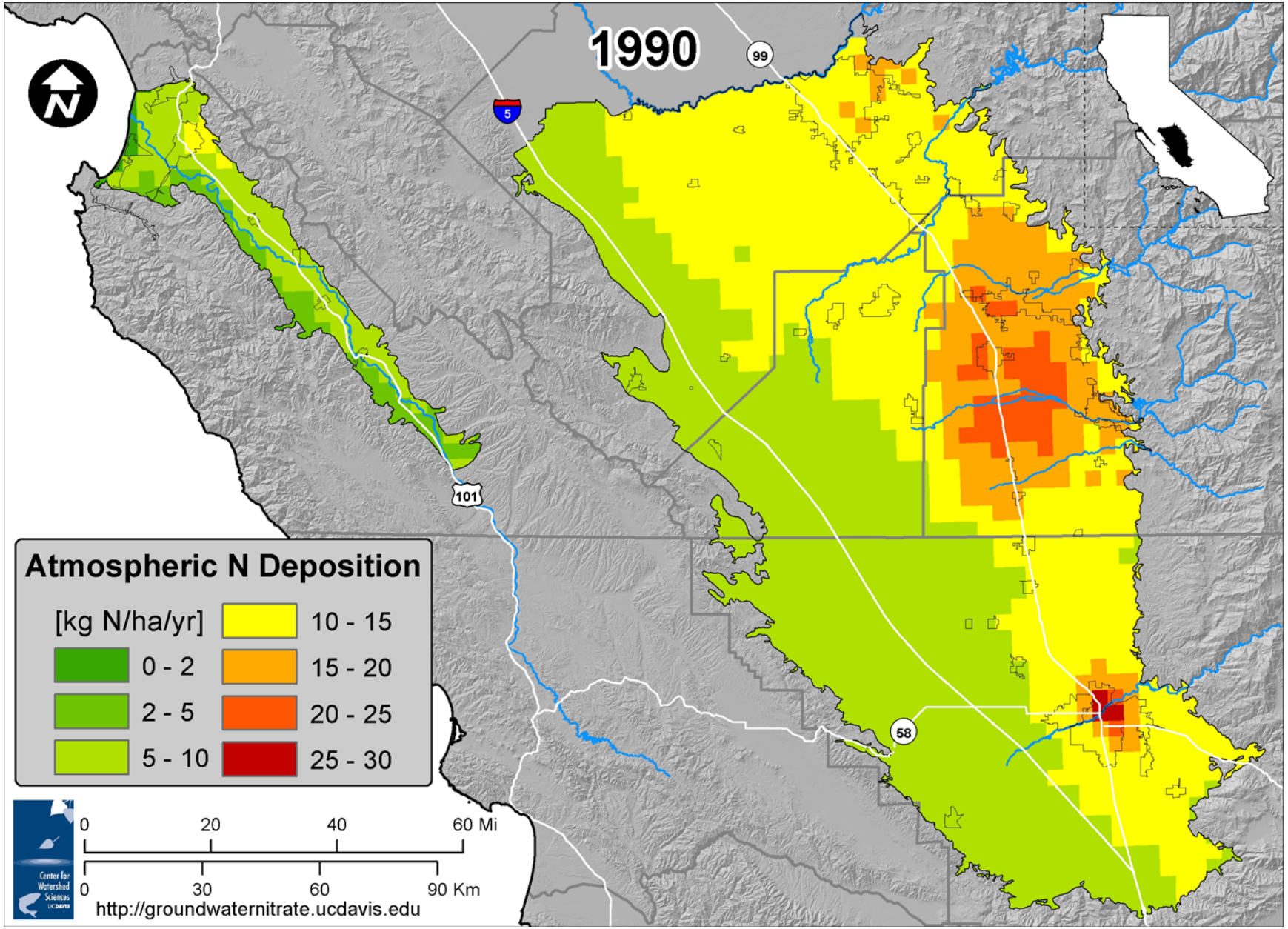
Appendix Figure 4. Estimated annual atmospheric nitrogen deposition in 1960.



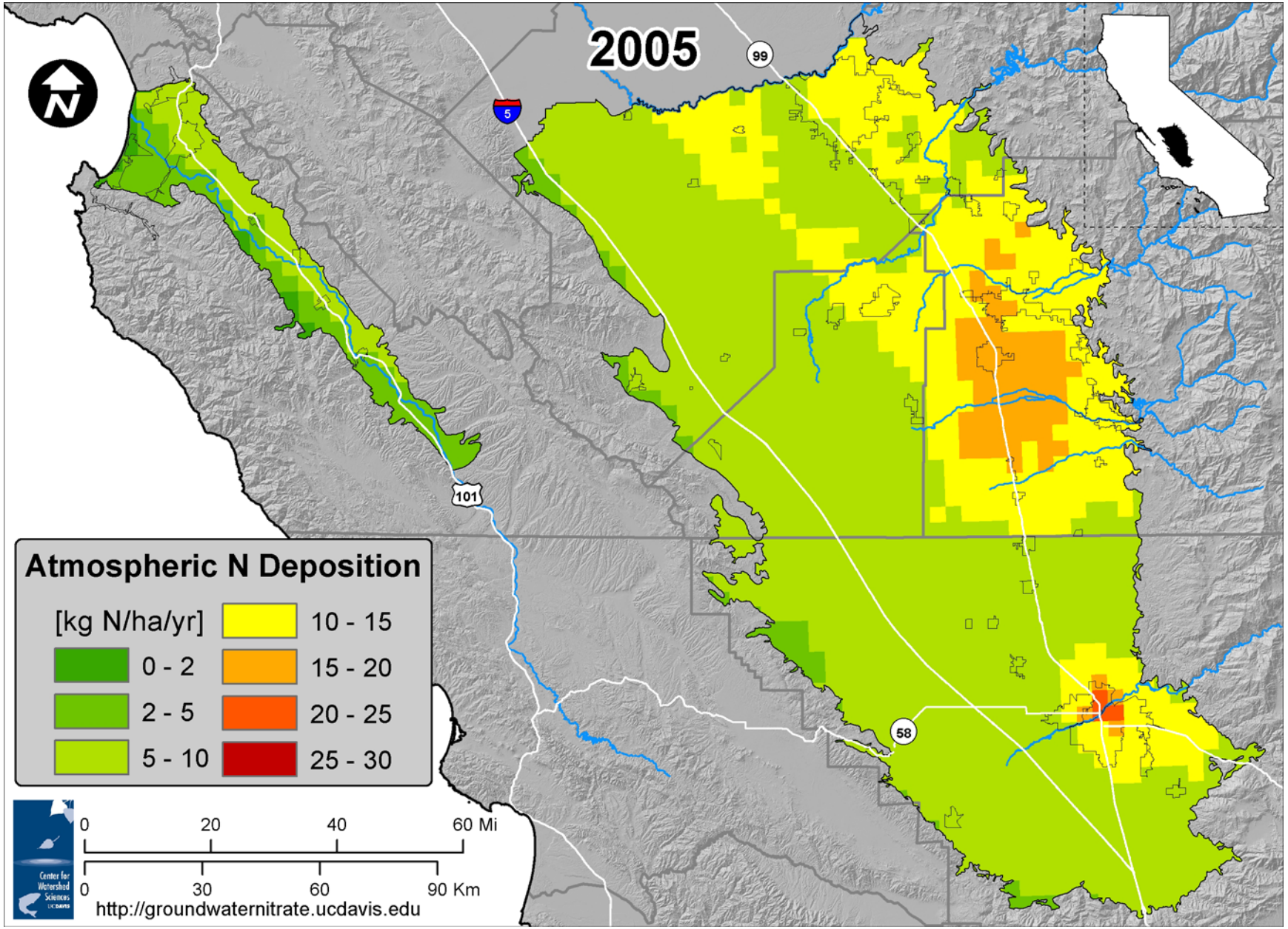
Appendix Figure 5. Estimated annual atmospheric nitrogen deposition in 1975.



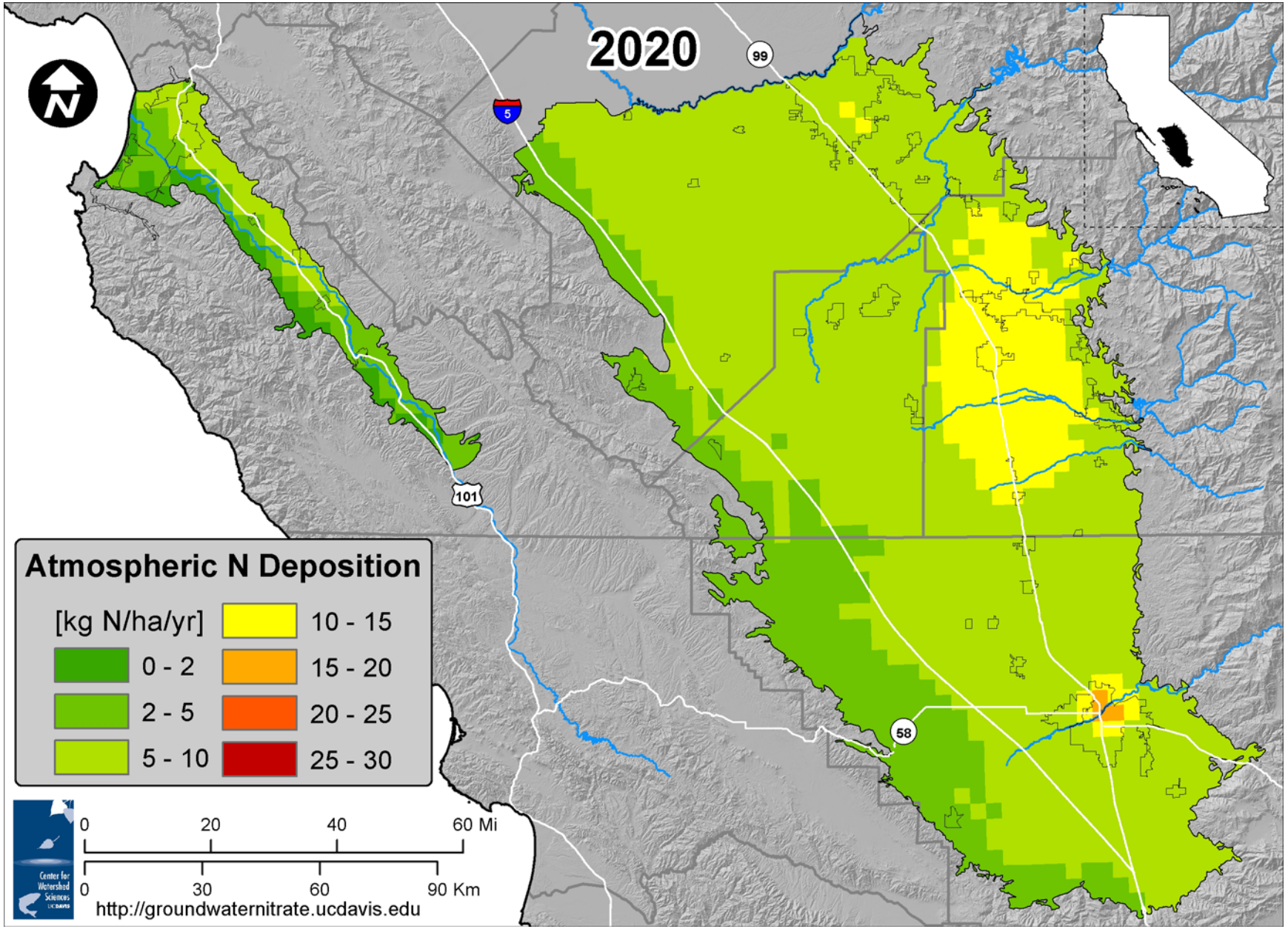
Appendix Figure 6. Estimated annual atmospheric nitrogen deposition in 1990.



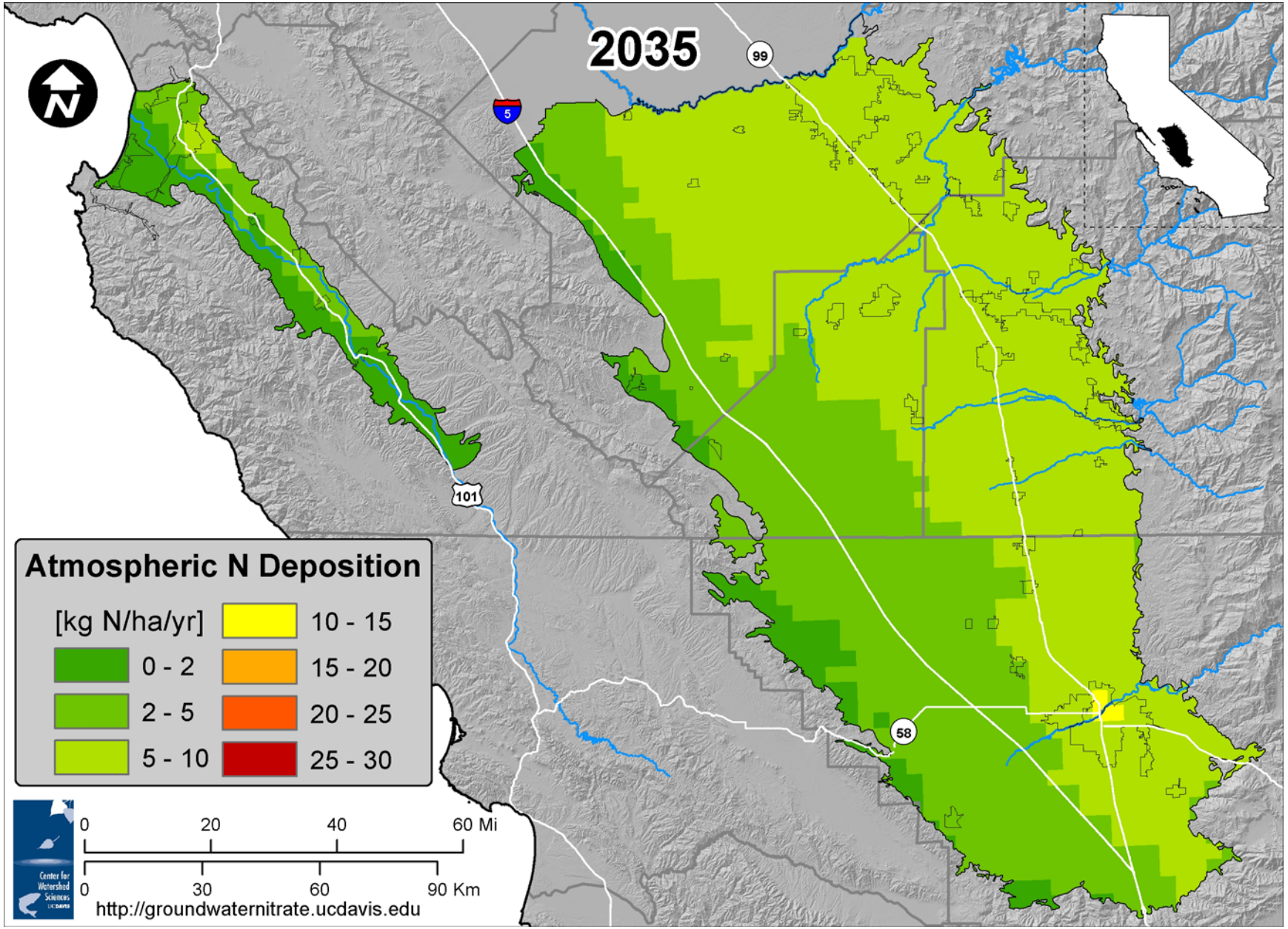
Appendix Figure 7. Estimated annual atmospheric nitrogen deposition in 2005.



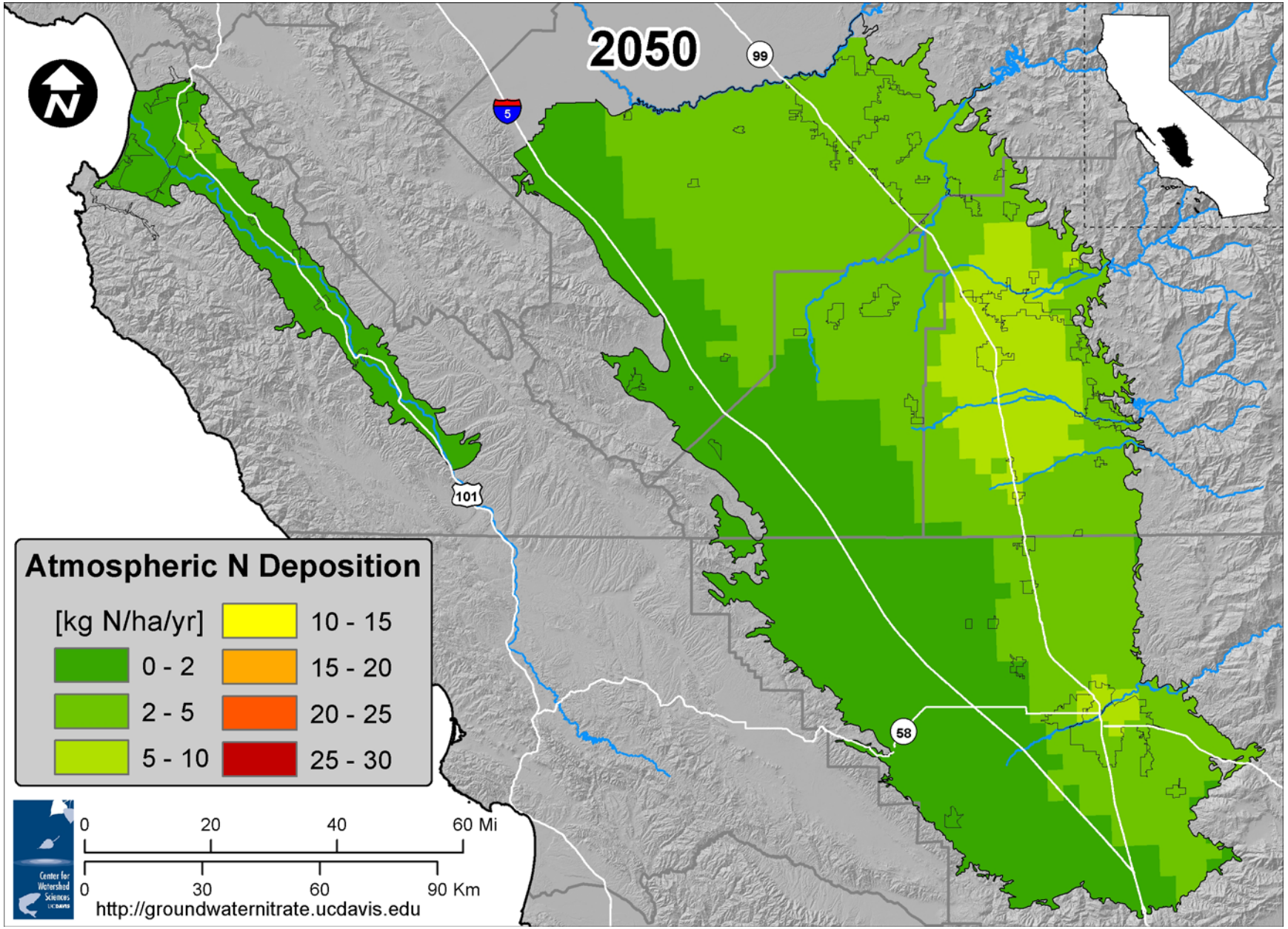
Appendix Figure 8. Estimated annual atmospheric nitrogen deposition in 2020.



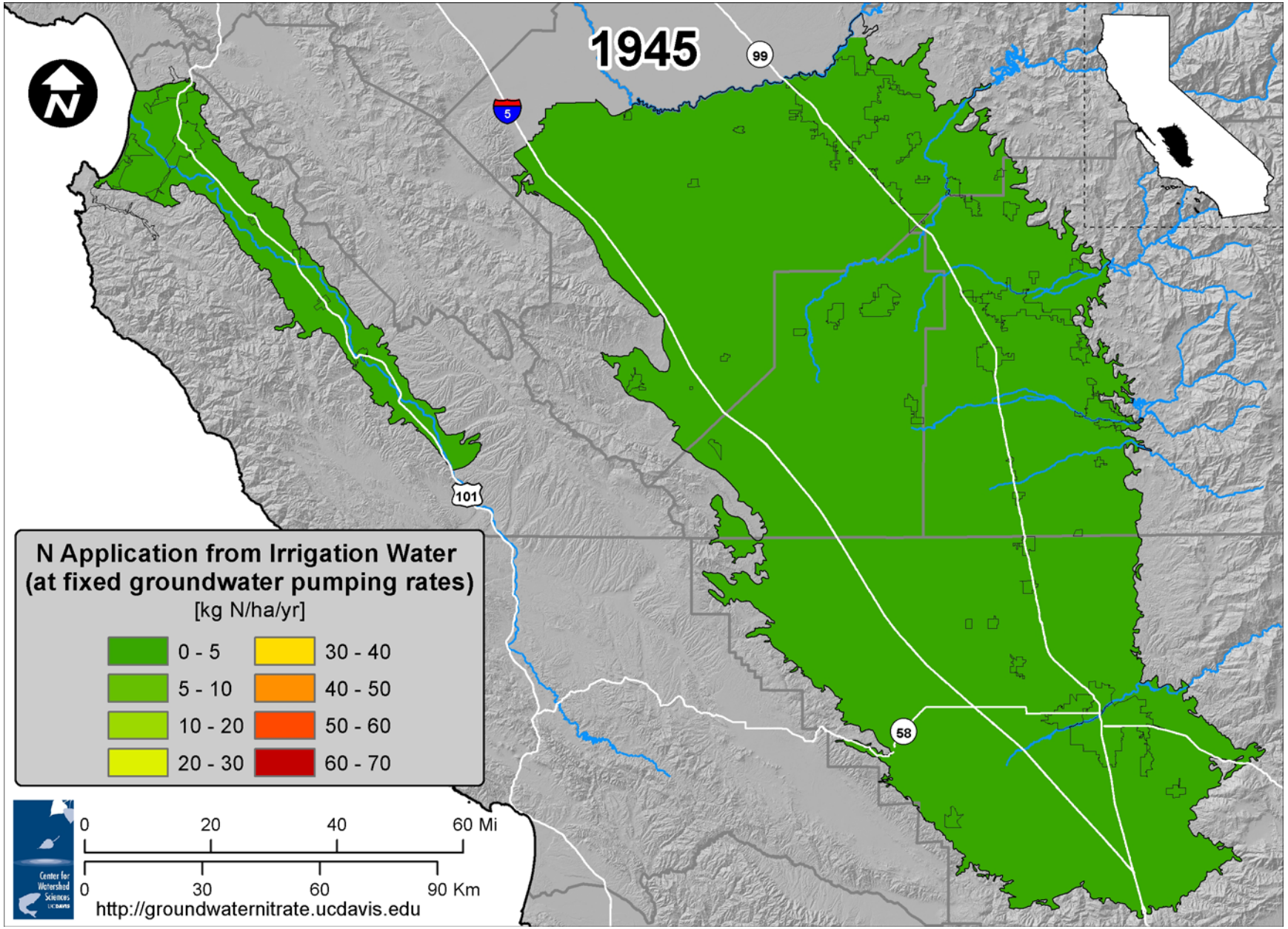
Appendix Figure 9. Estimated annual atmospheric nitrogen deposition in 2035.



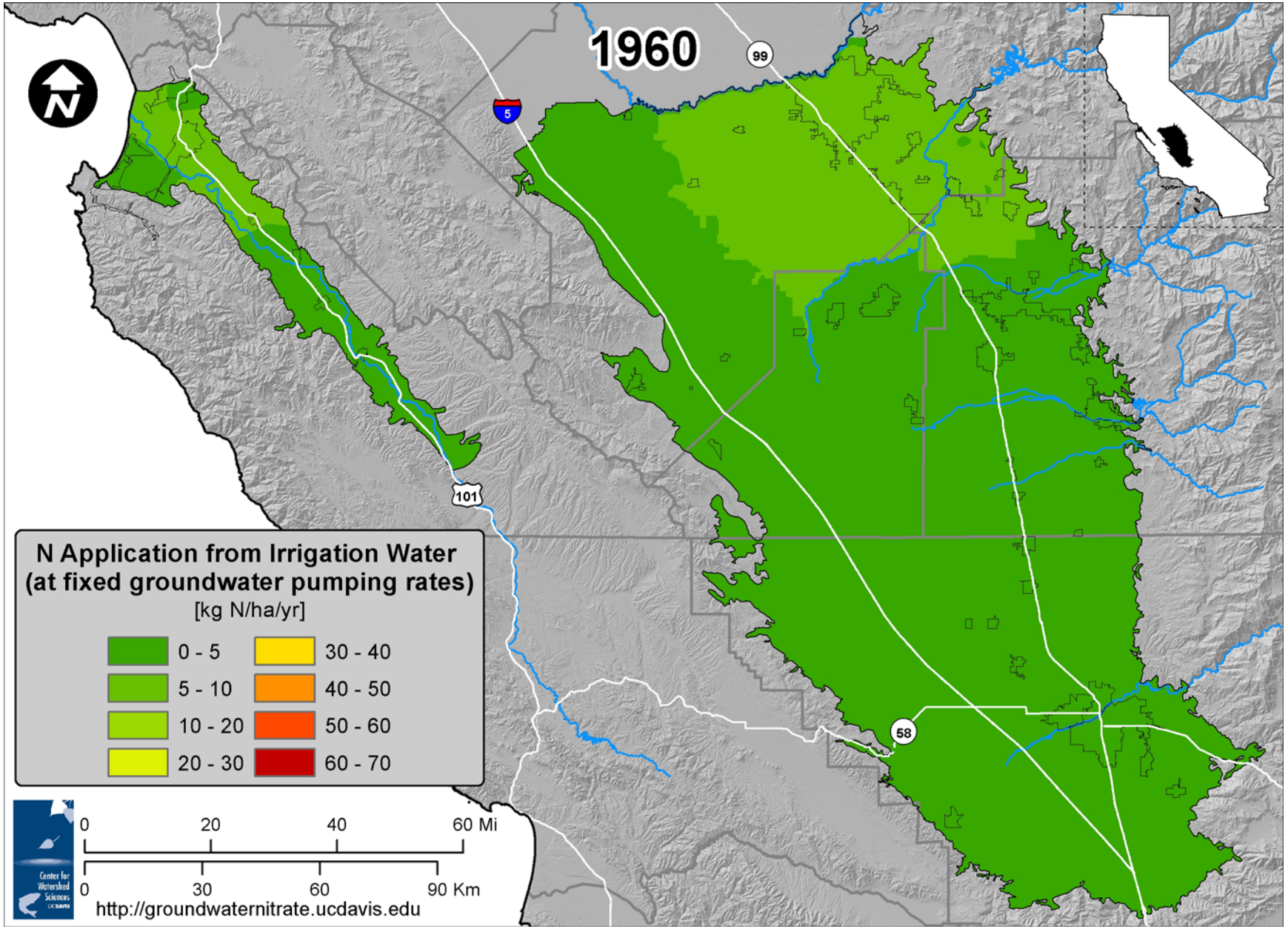
Appendix Figure 10. Estimated annual atmospheric nitrogen deposition in 2050.



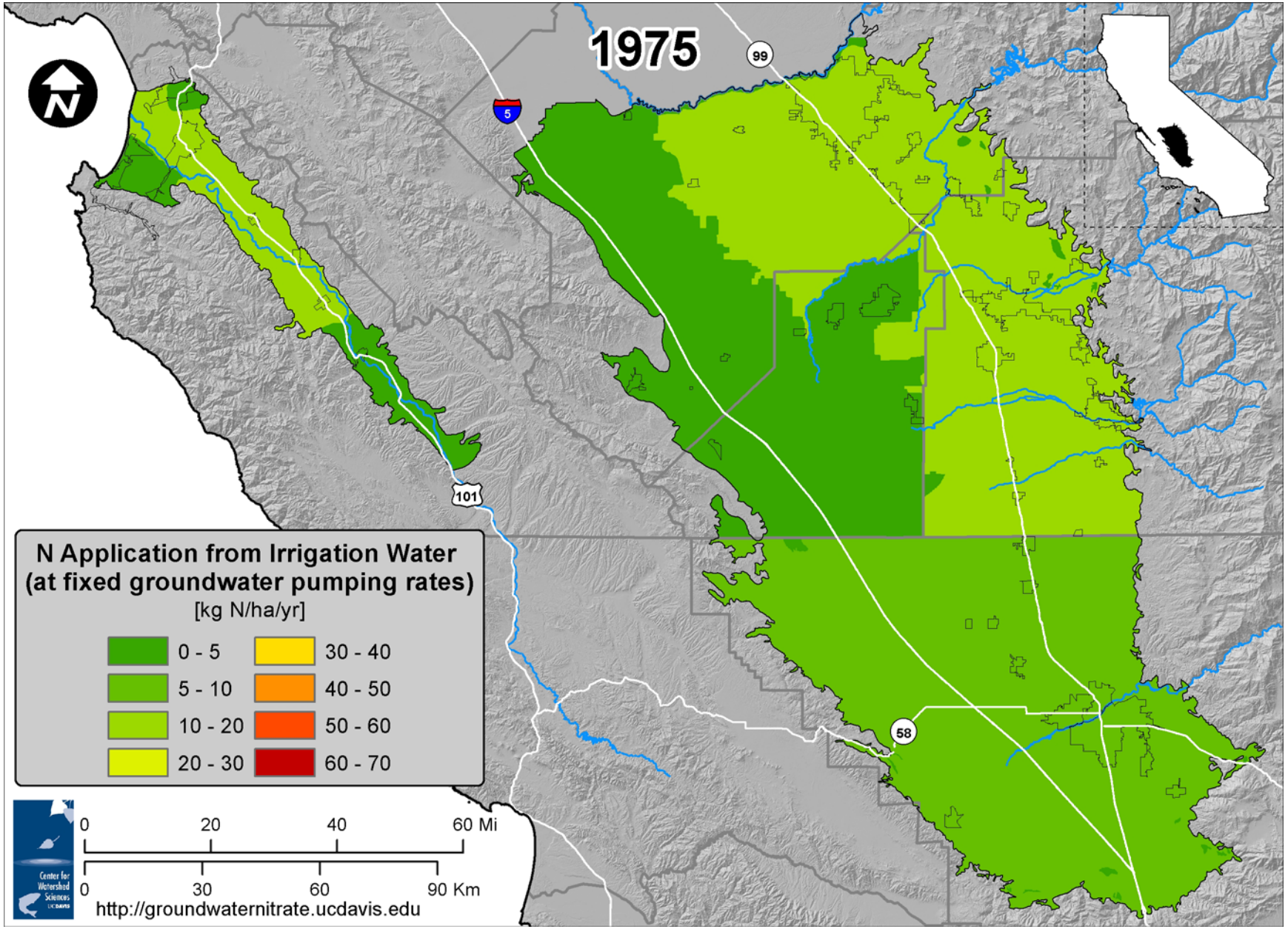
Appendix Figure 11. Estimated annual nitrogen in irrigation water applied to land in 1945.



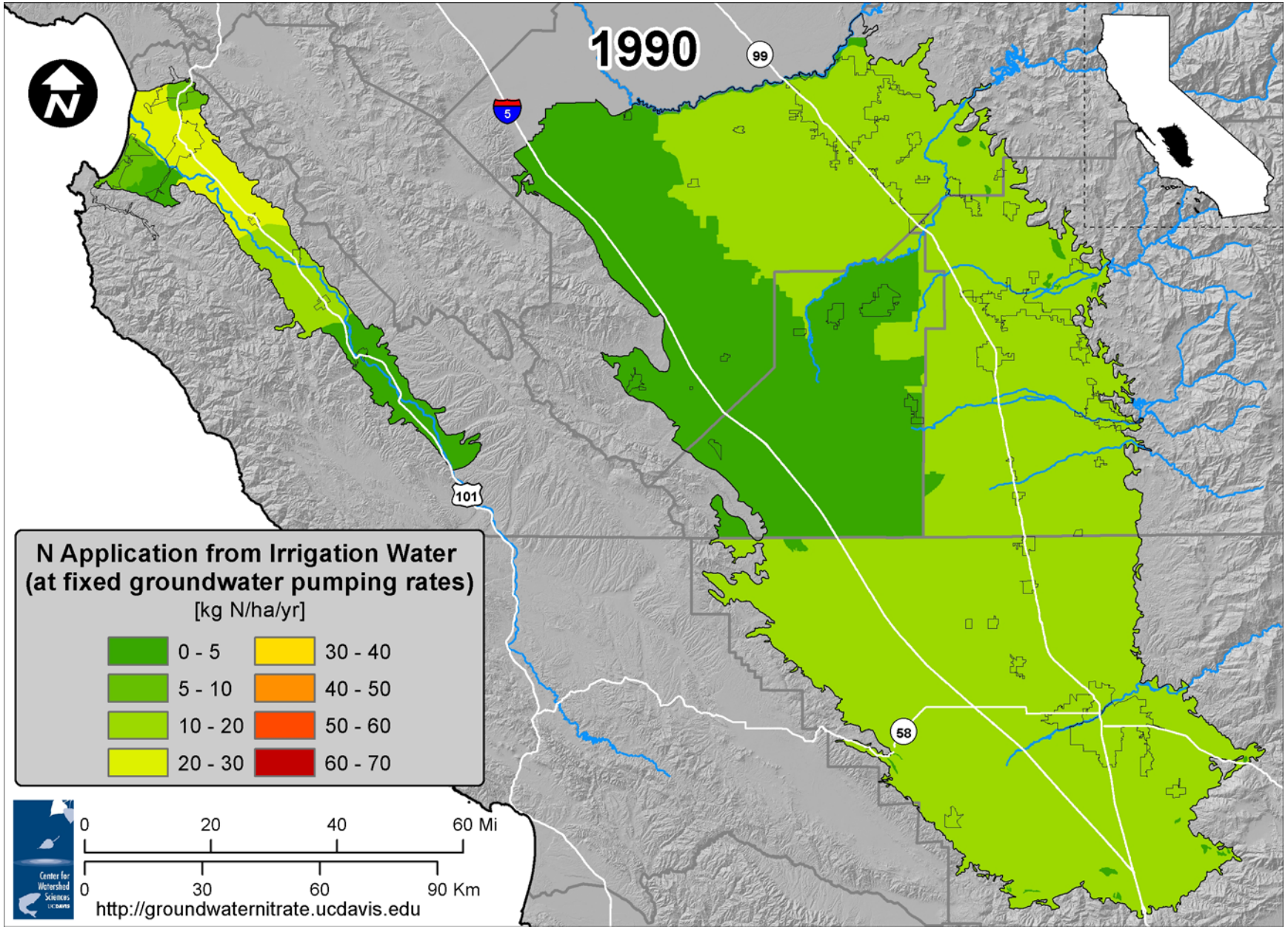
Appendix Figure 12. Estimated annual nitrogen in irrigation water applied to land in 1960.



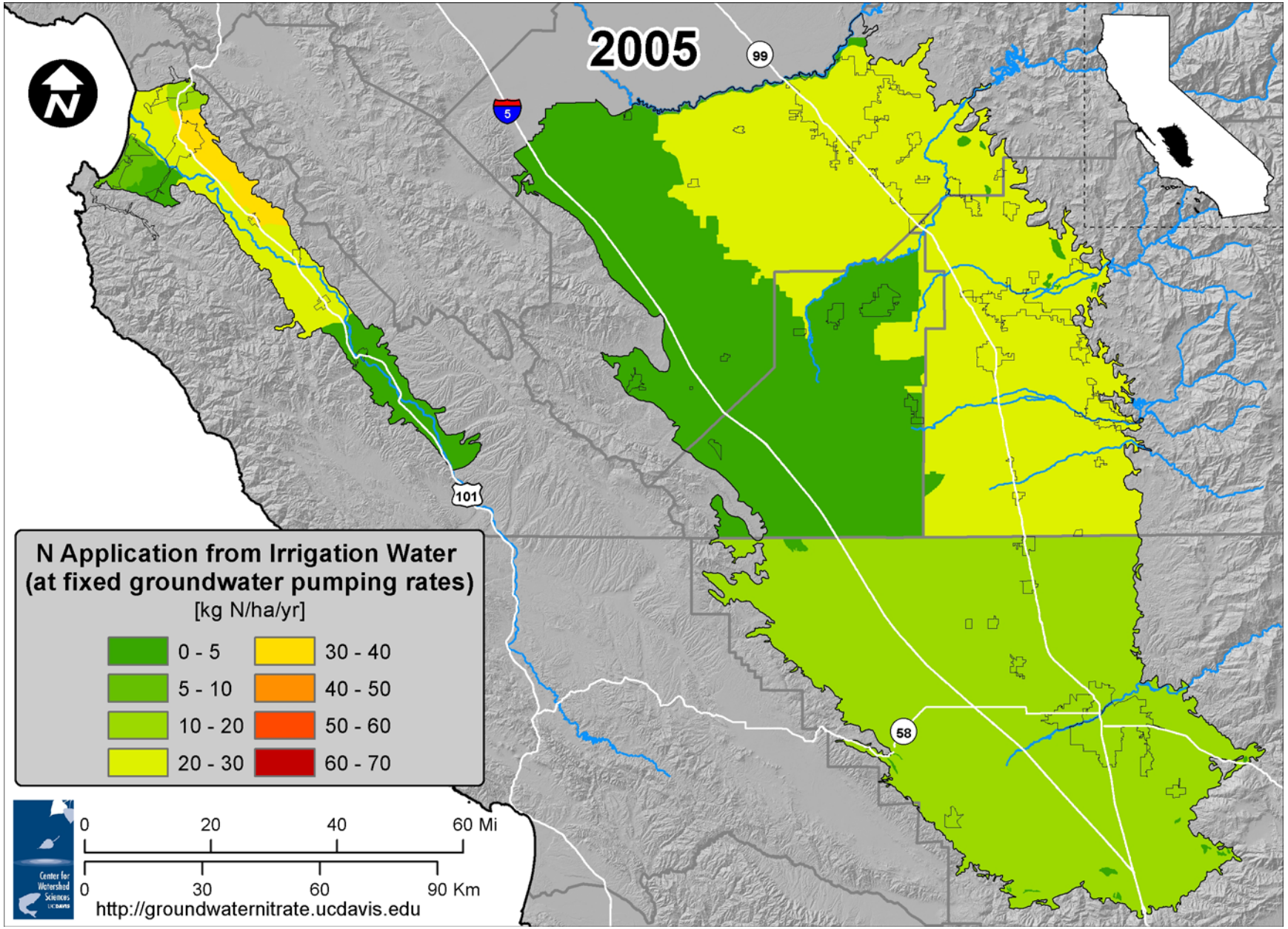
Appendix Figure 13. Estimated annual nitrogen in irrigation water applied to land in 1975.



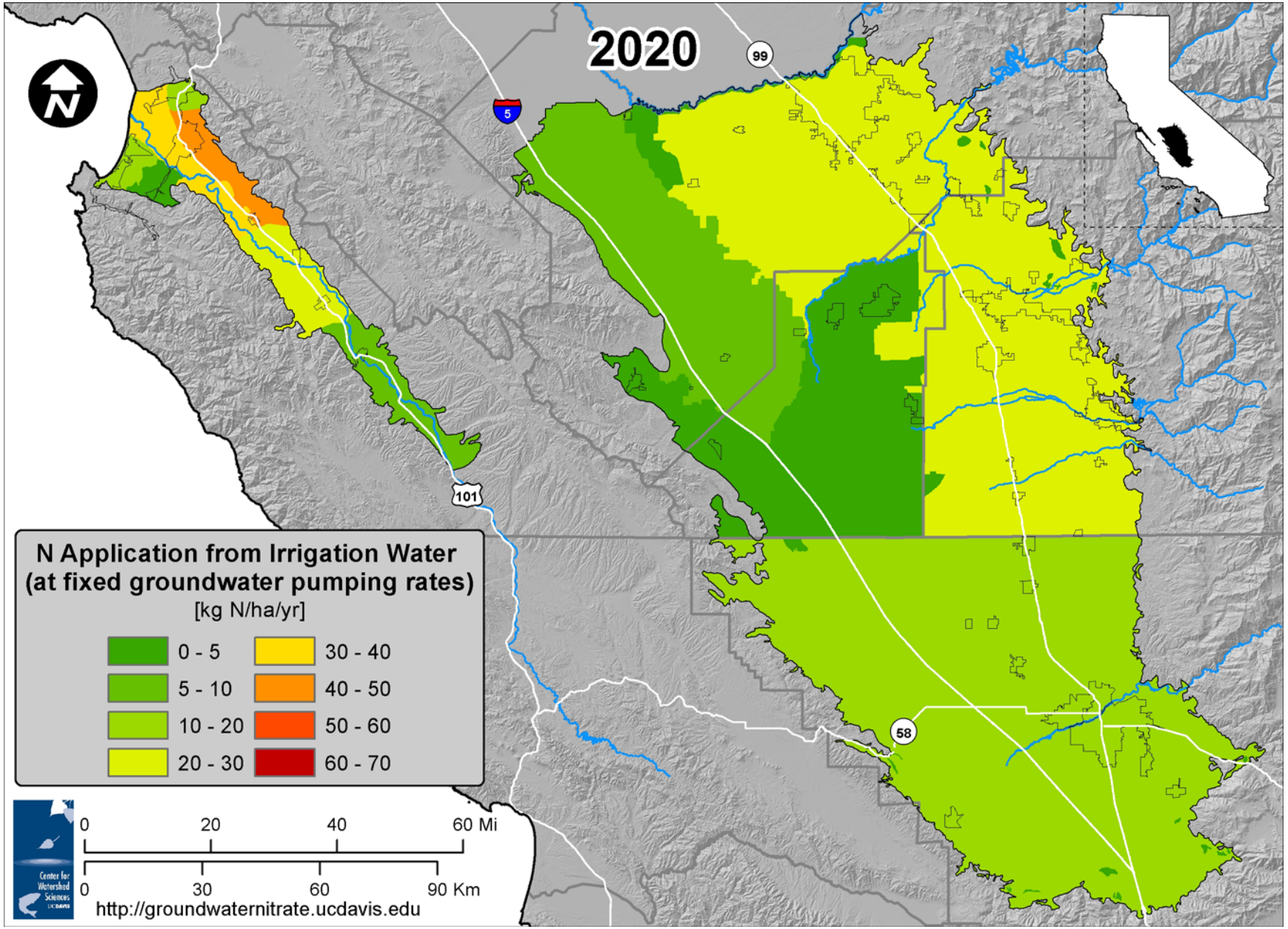
Appendix Figure 14. Estimated annual nitrogen in irrigation water applied to land in 1990.



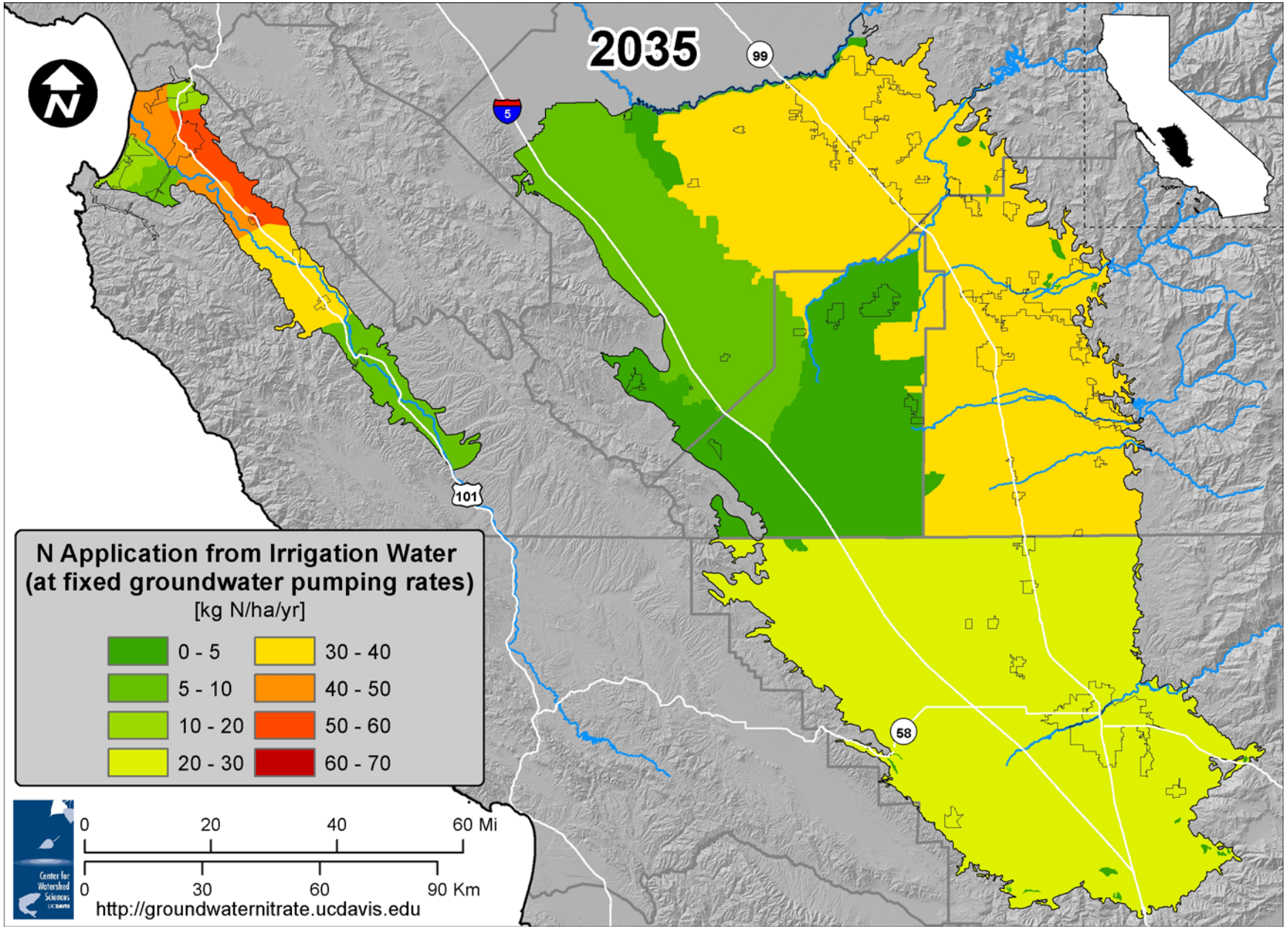
Appendix Figure 15. Estimated annual nitrogen in irrigation water applied to land in 2005.



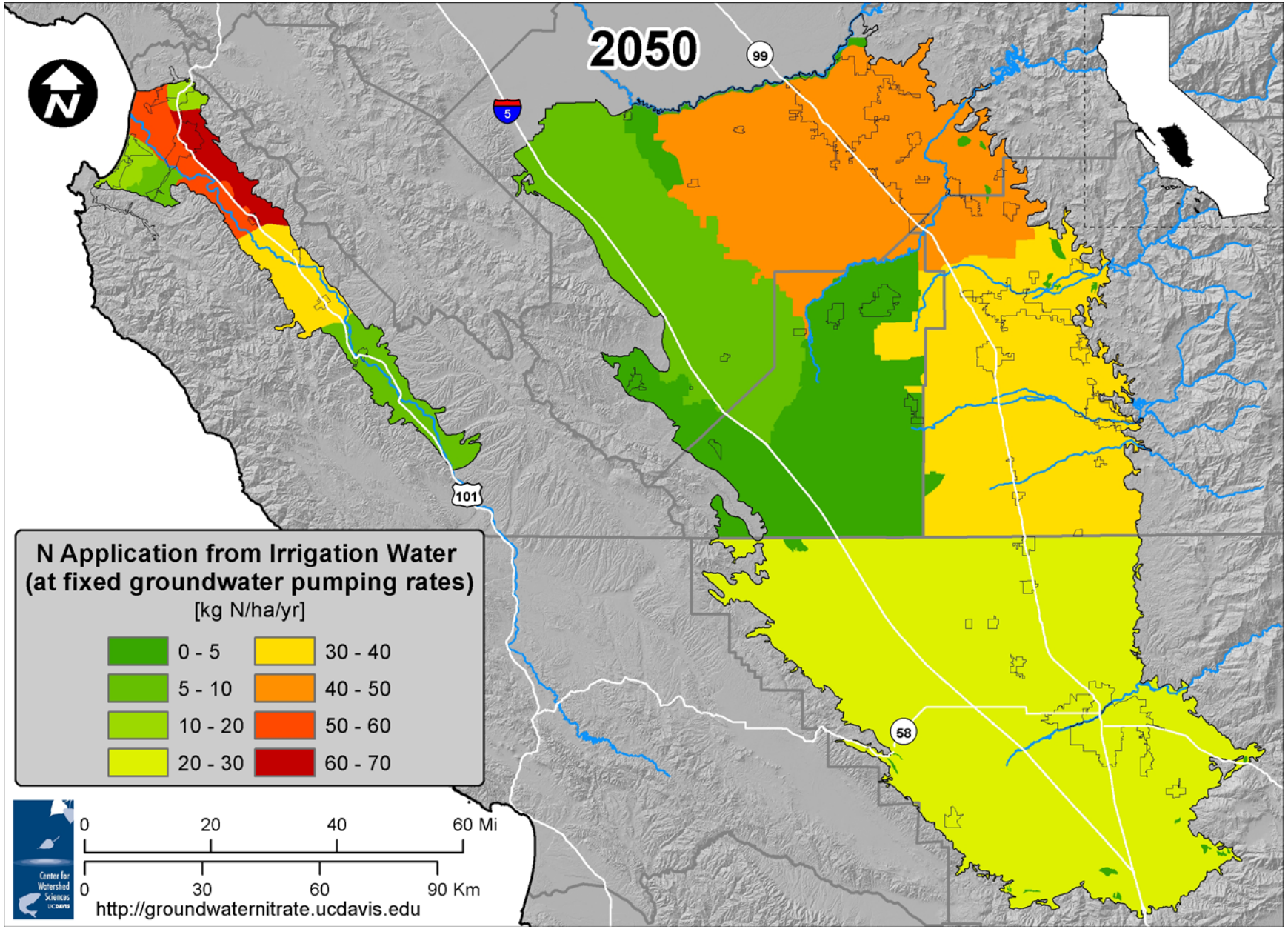
Appendix Figure 16. Estimated annual nitrogen in irrigation water applied to land in 2020.



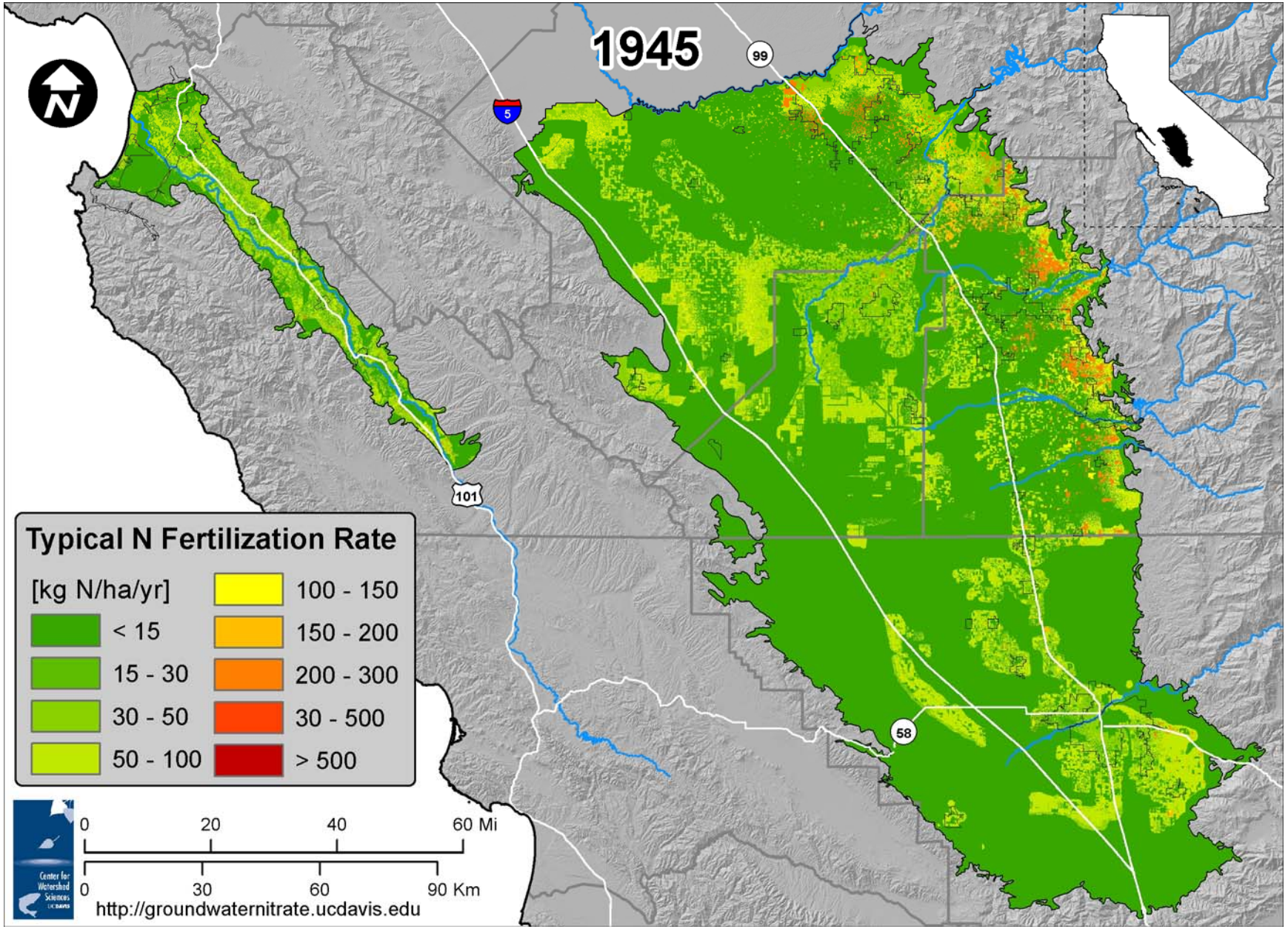
Appendix Figure 17. Estimated annual nitrogen in irrigation water applied to land in 2035.



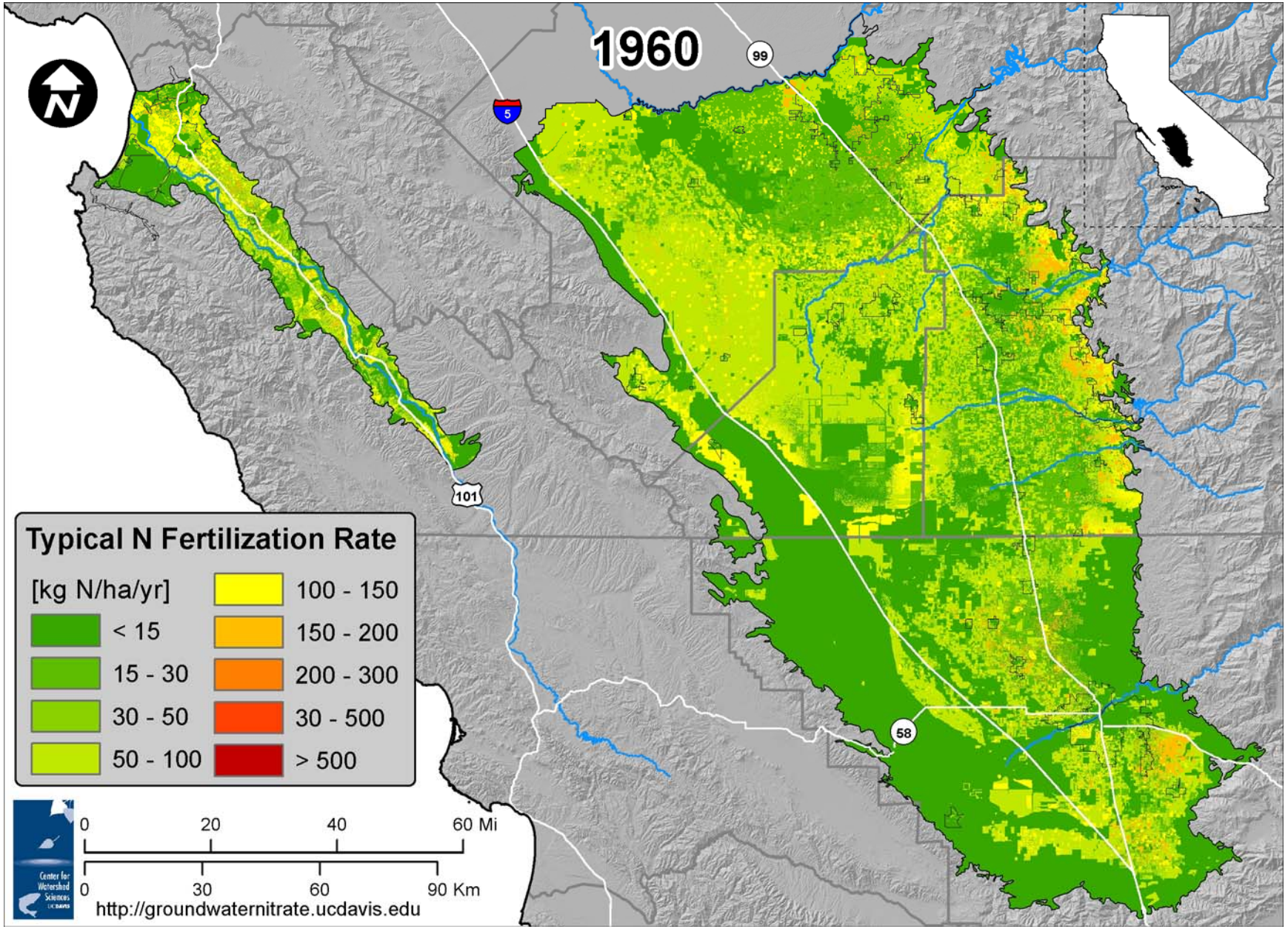
Appendix Figure 18. Estimated annual nitrogen in irrigation water applied to land in 2050.



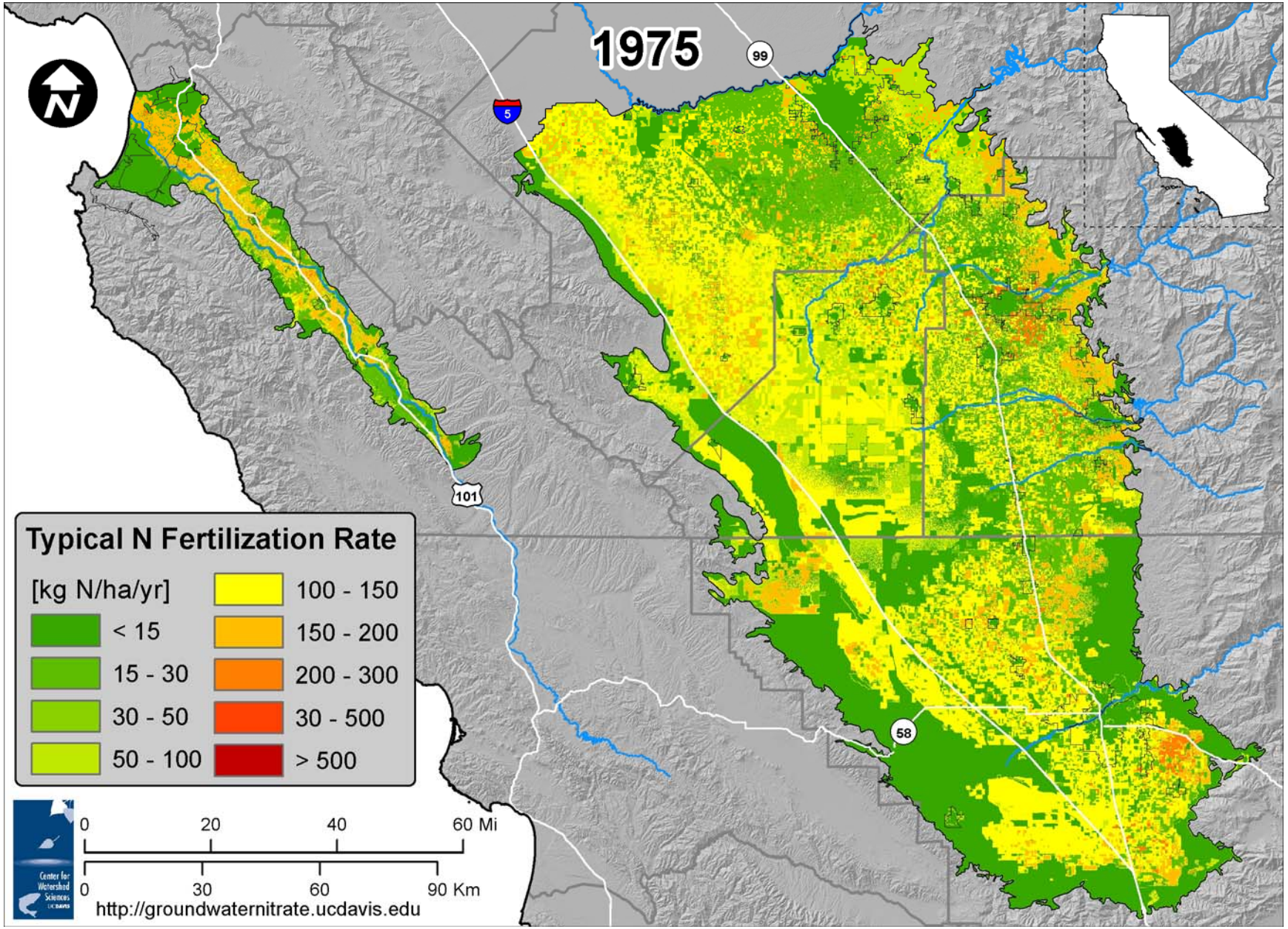
Appendix Figure 19. Typical nitrogen application rate in 1945.



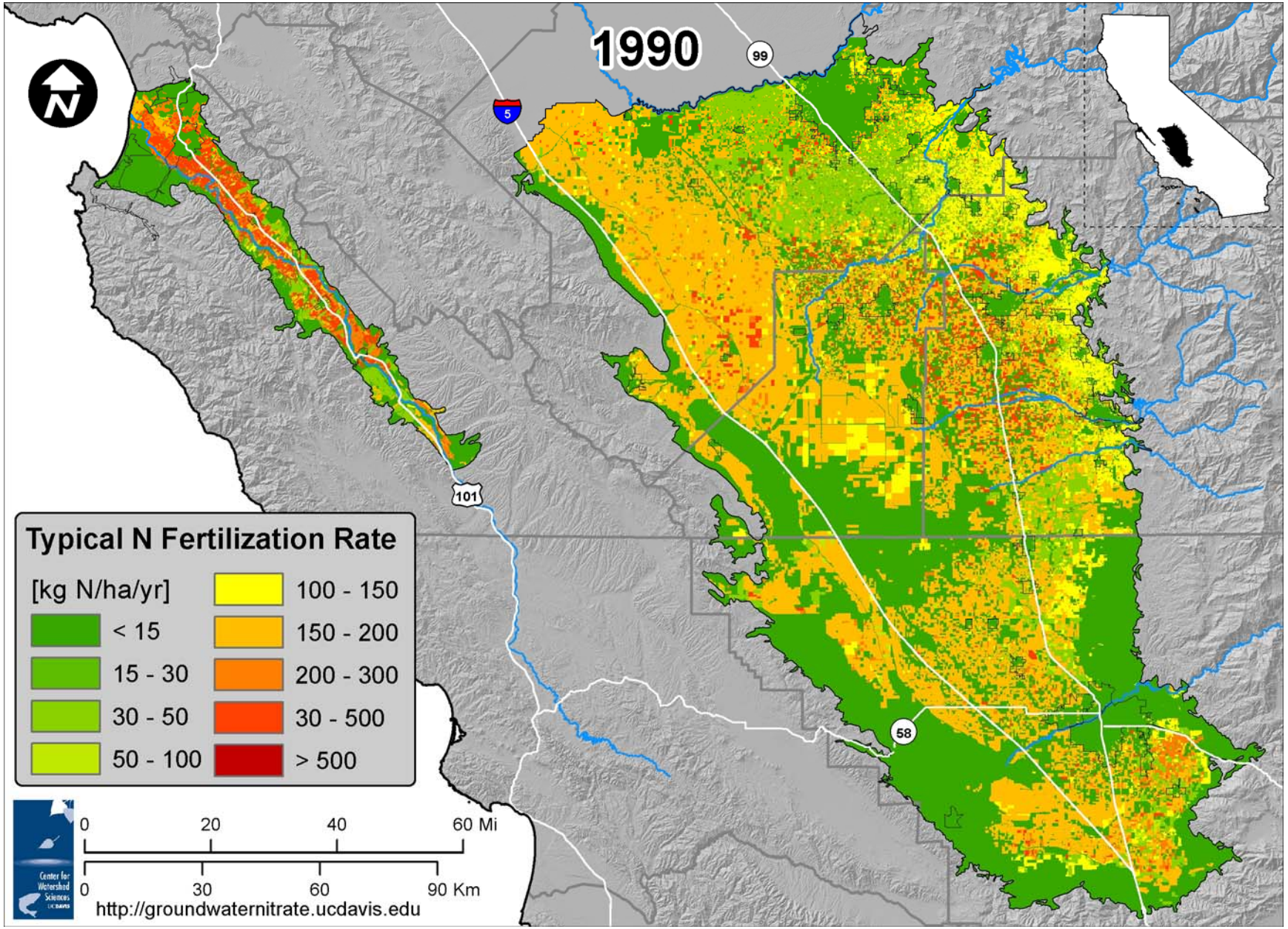
Appendix Figure 20. Typical nitrogen application rate in 1960.



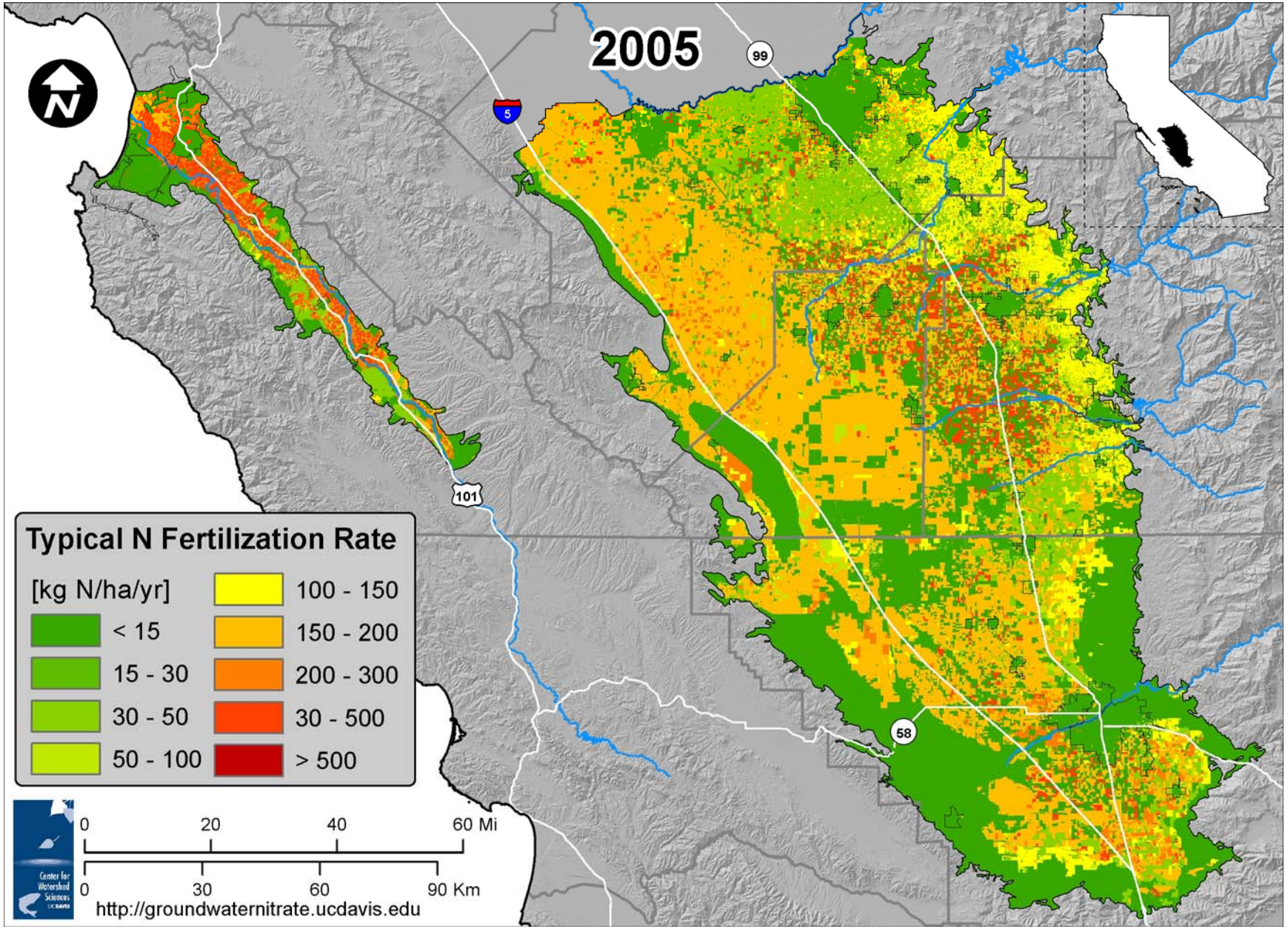
Appendix Figure 21. Typical nitrogen application rate in 1975.



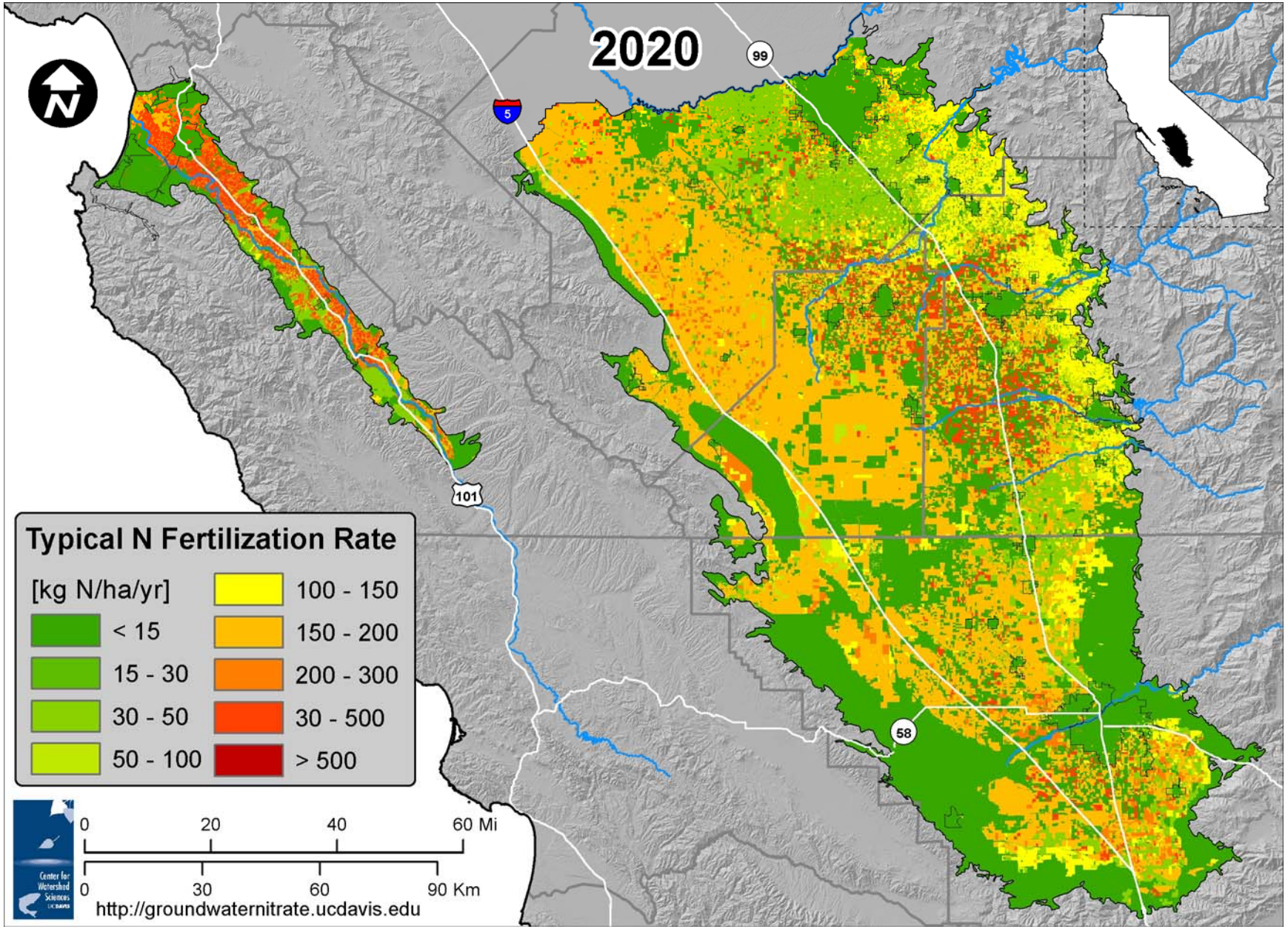
Appendix Figure 22. Typical nitrogen application rate in 1990.



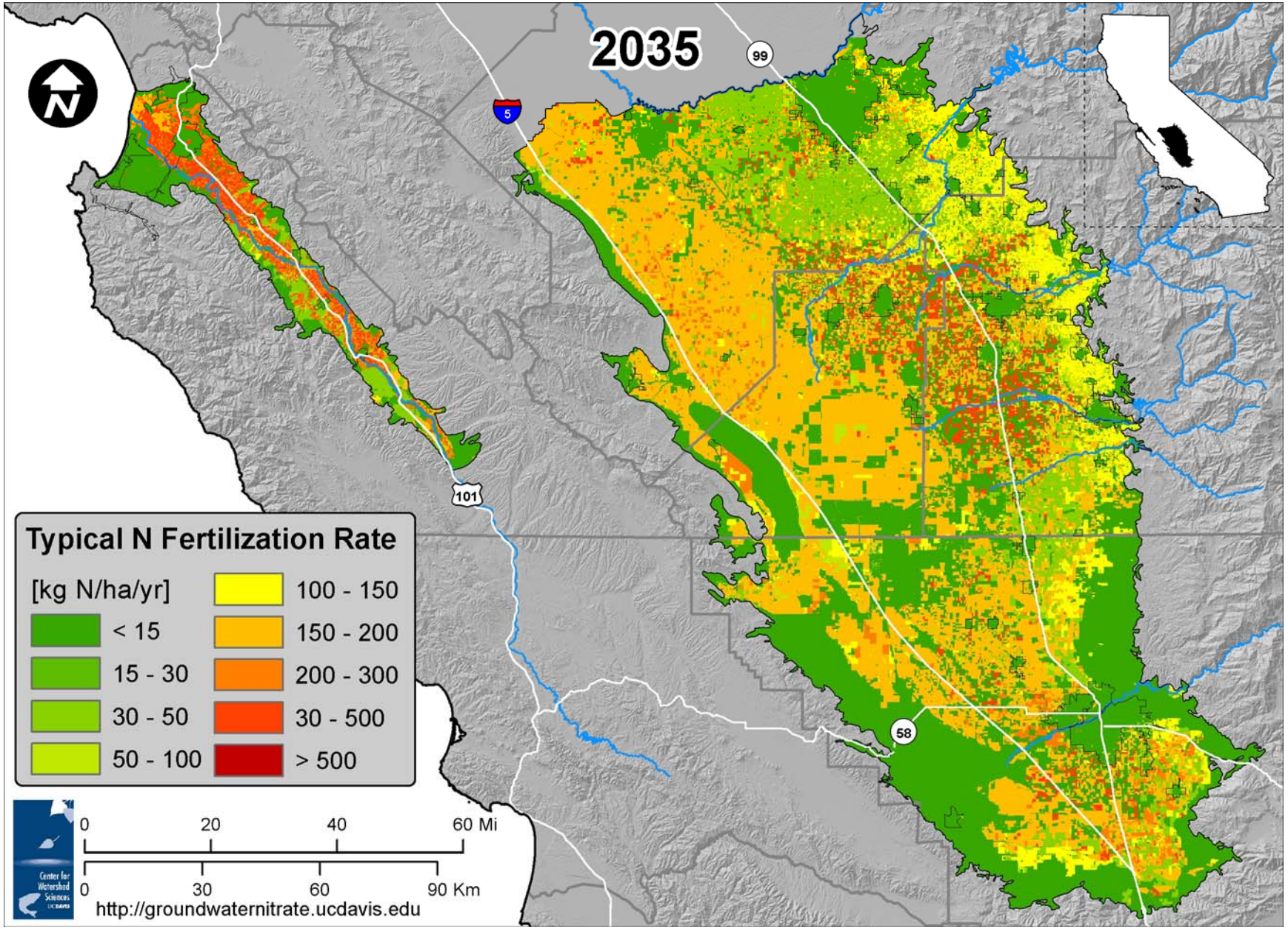
Appendix Figure 23. Typical nitrogen application rate in 2005.



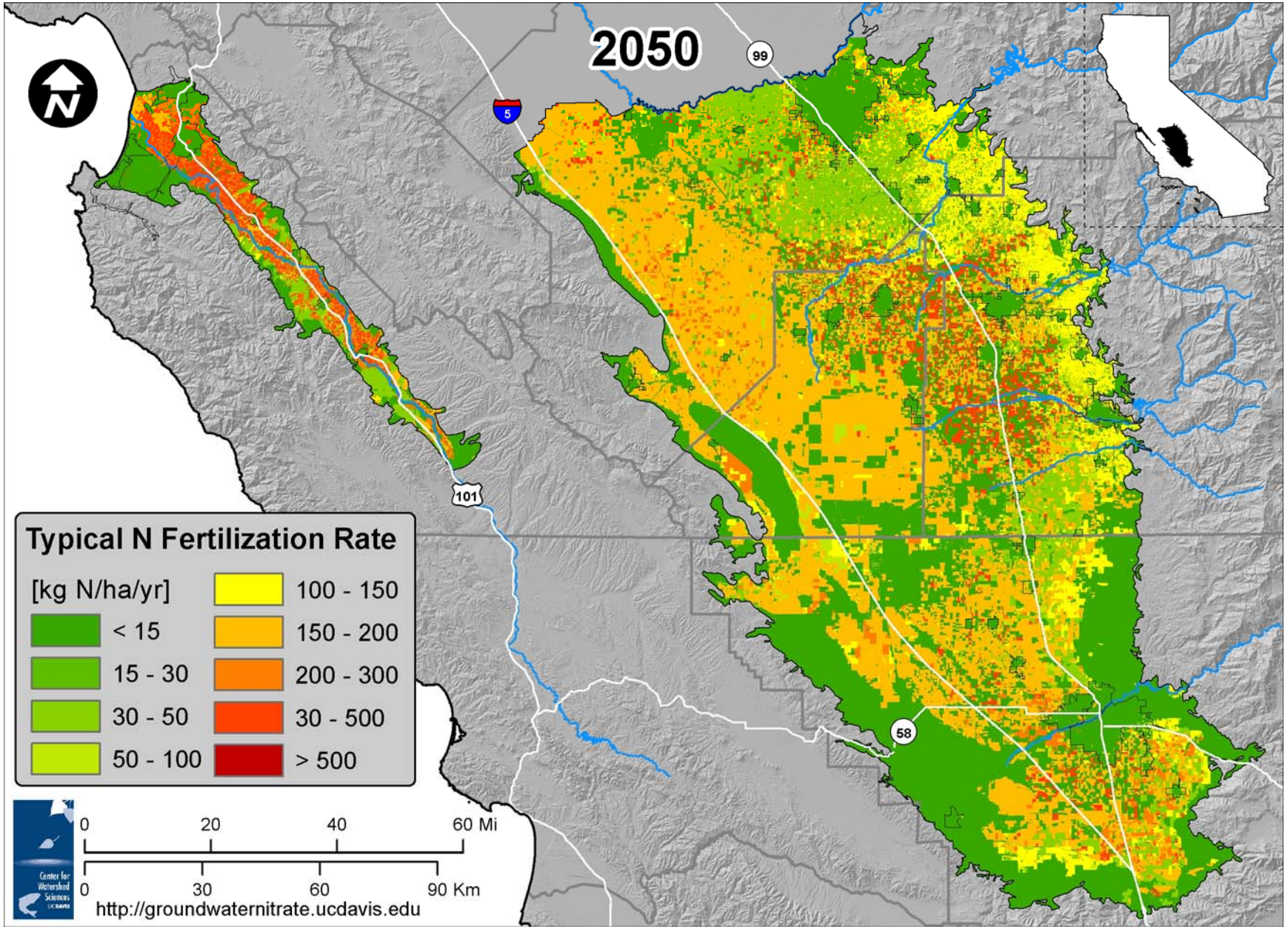
Appendix Figure 24. Typical nitrogen application rate in 2020.



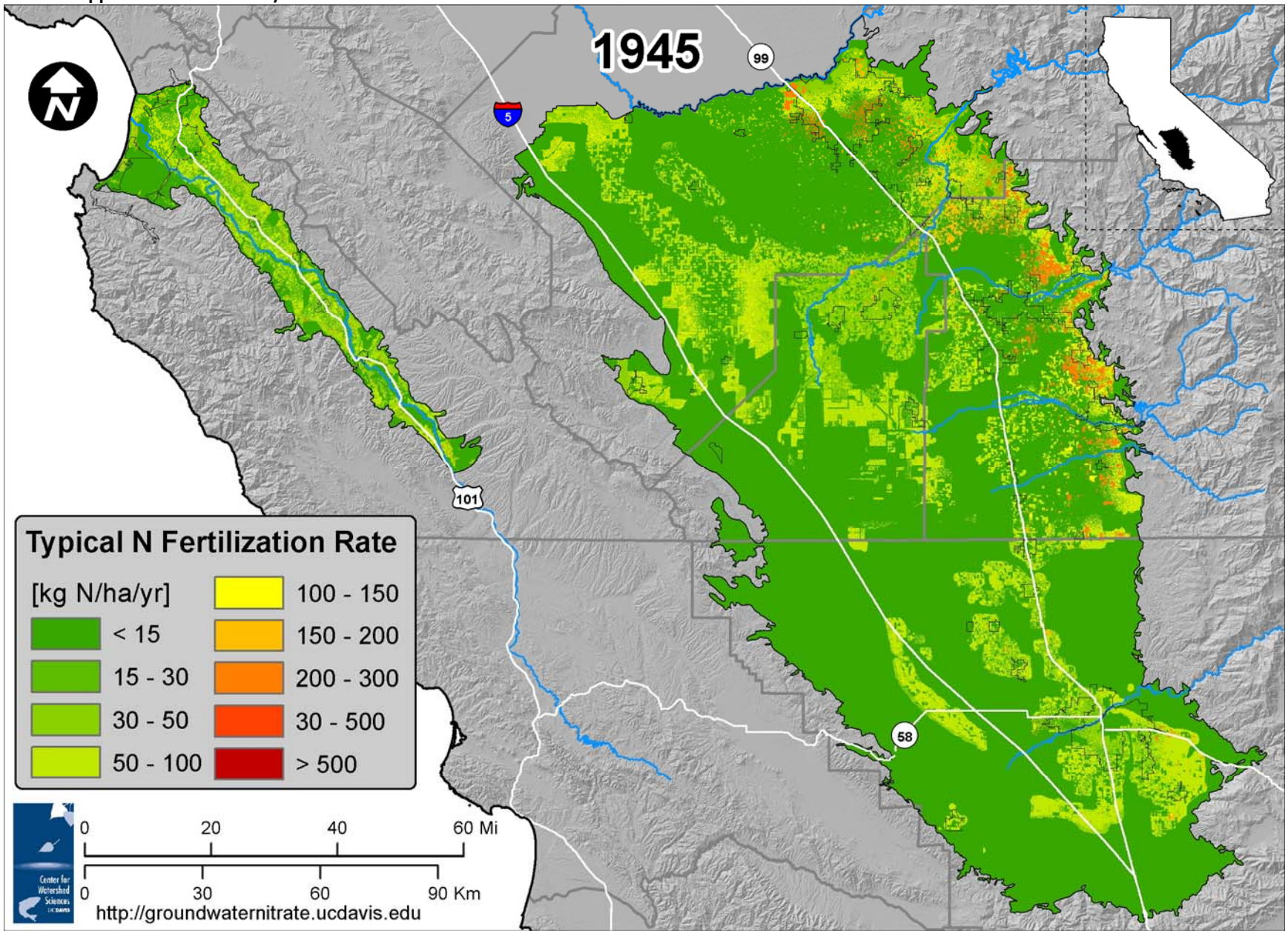
Appendix Figure 25. Typical nitrogen application rate in 2035.



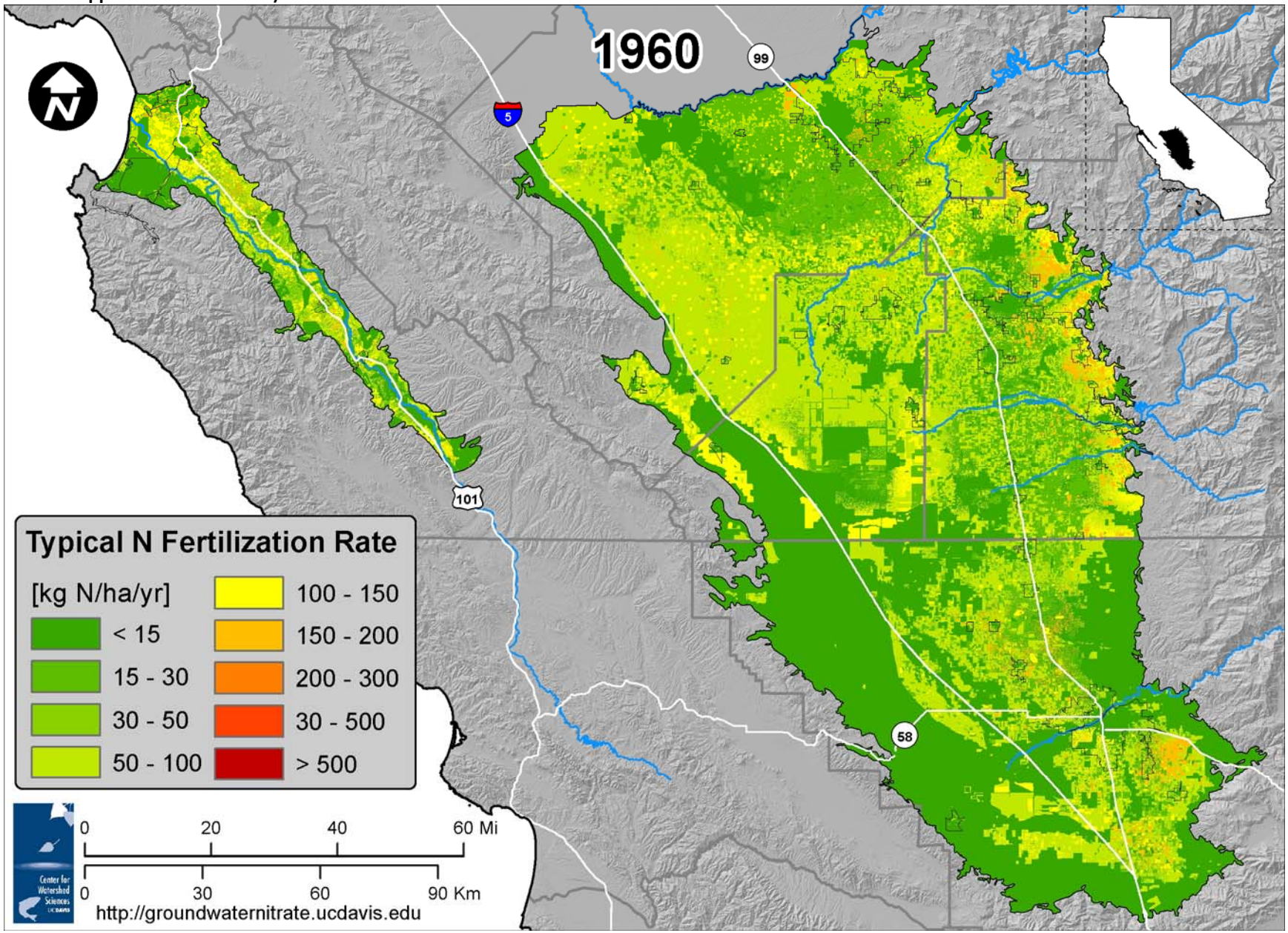
Appendix Figure 26. Typical nitrogen application rate in 2050.



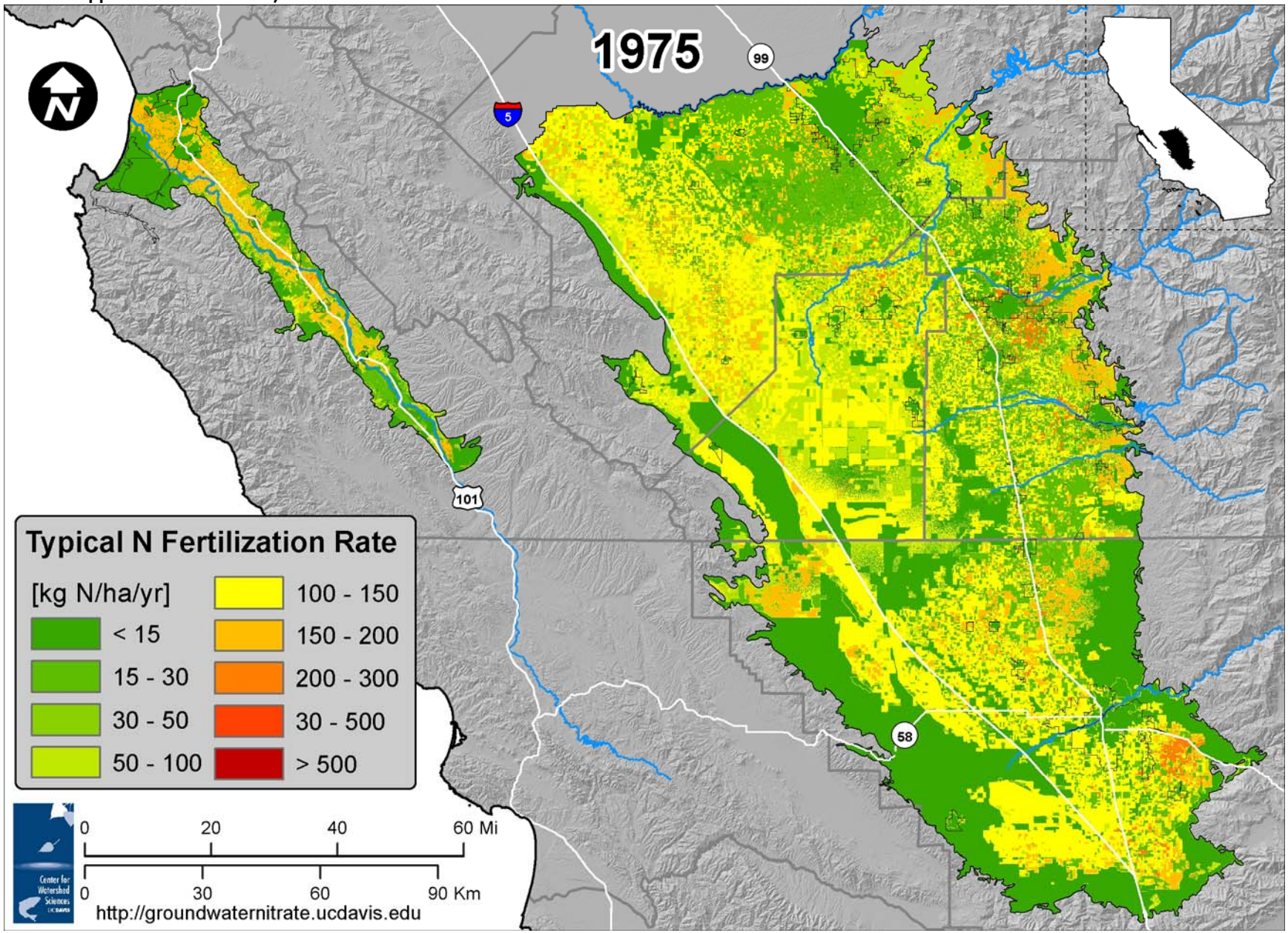
Appendix Figure 27. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 1945 (same as typical fertilizer application rate in 1945).



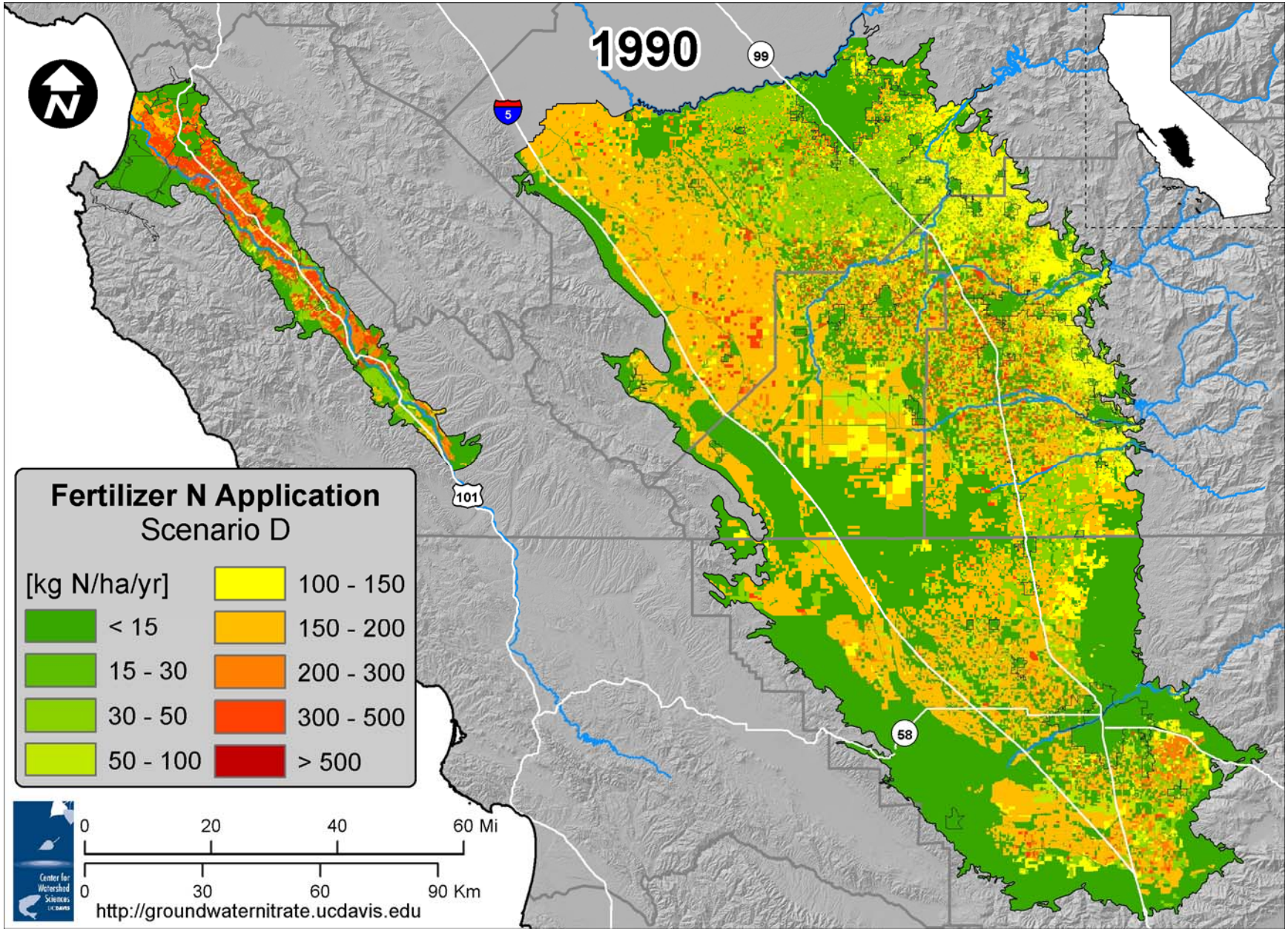
Appendix Figure 28. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 1960 (same as typical fertilizer application rate in 1960).



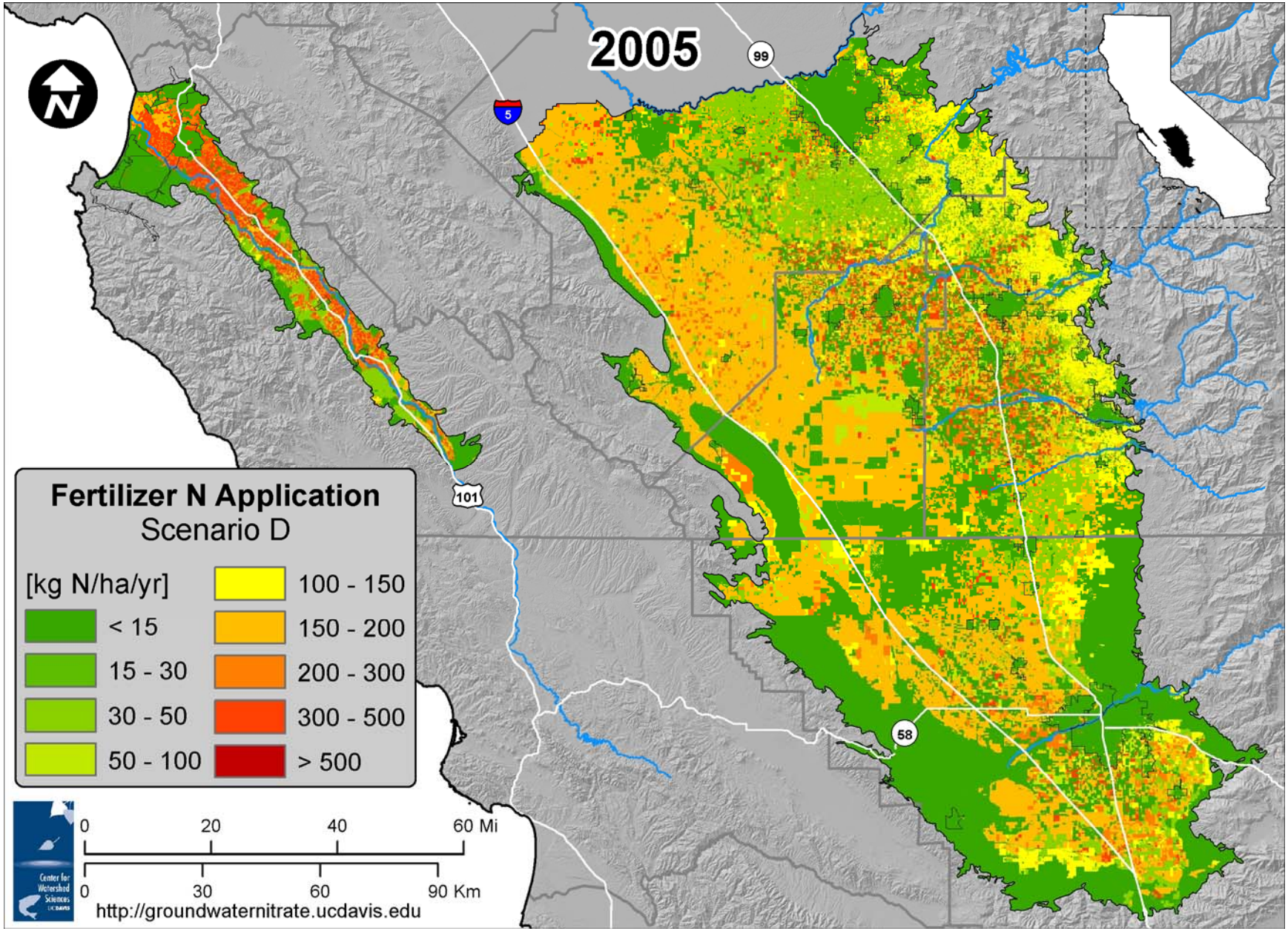
Appendix Figure 29. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 1975 (same as typical fertilizer application rate in 1975).



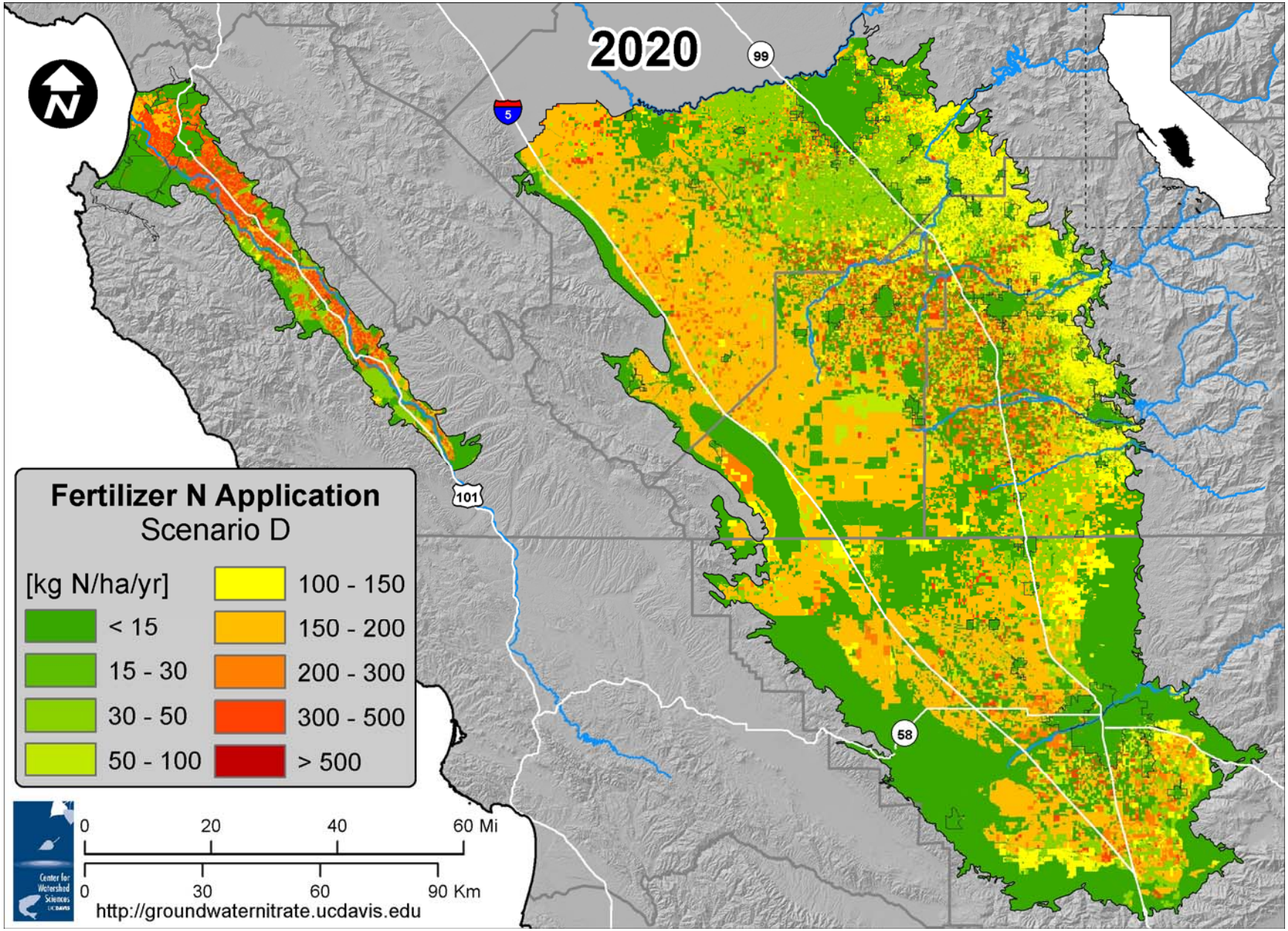
Appendix Figure 30. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 1990.



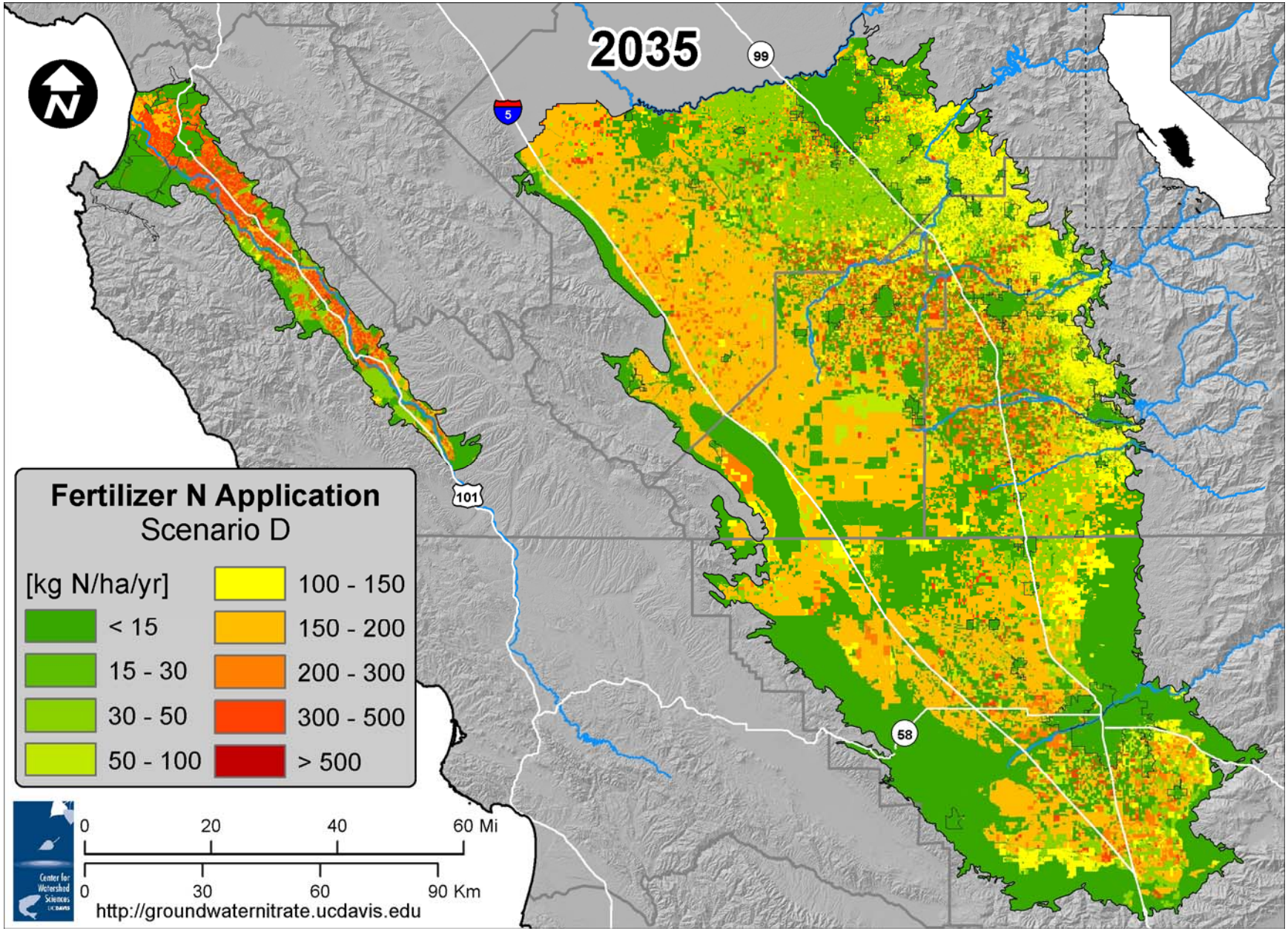
Appendix Figure 31. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 2005.



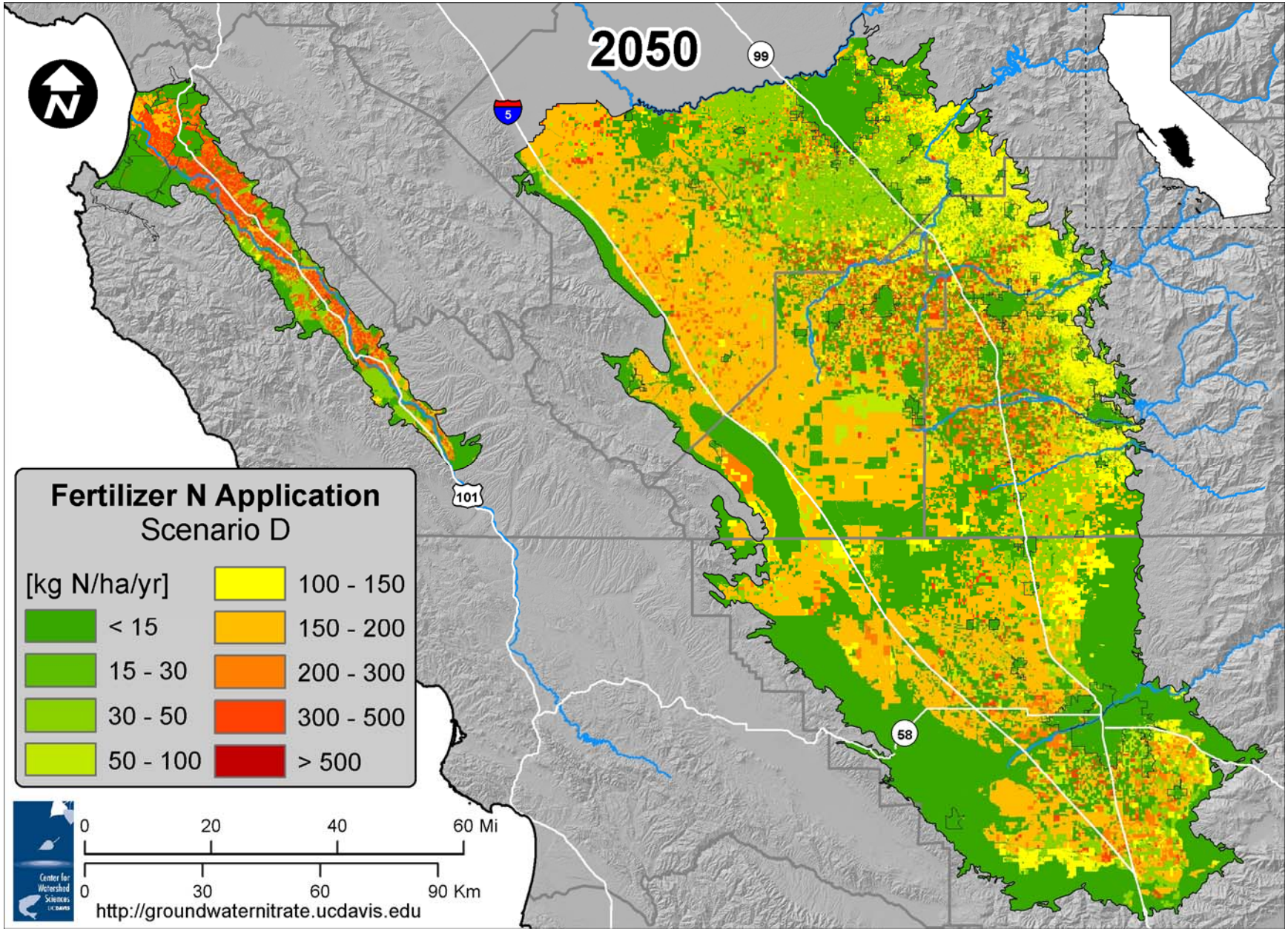
Appendix Figure 32. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 2020.



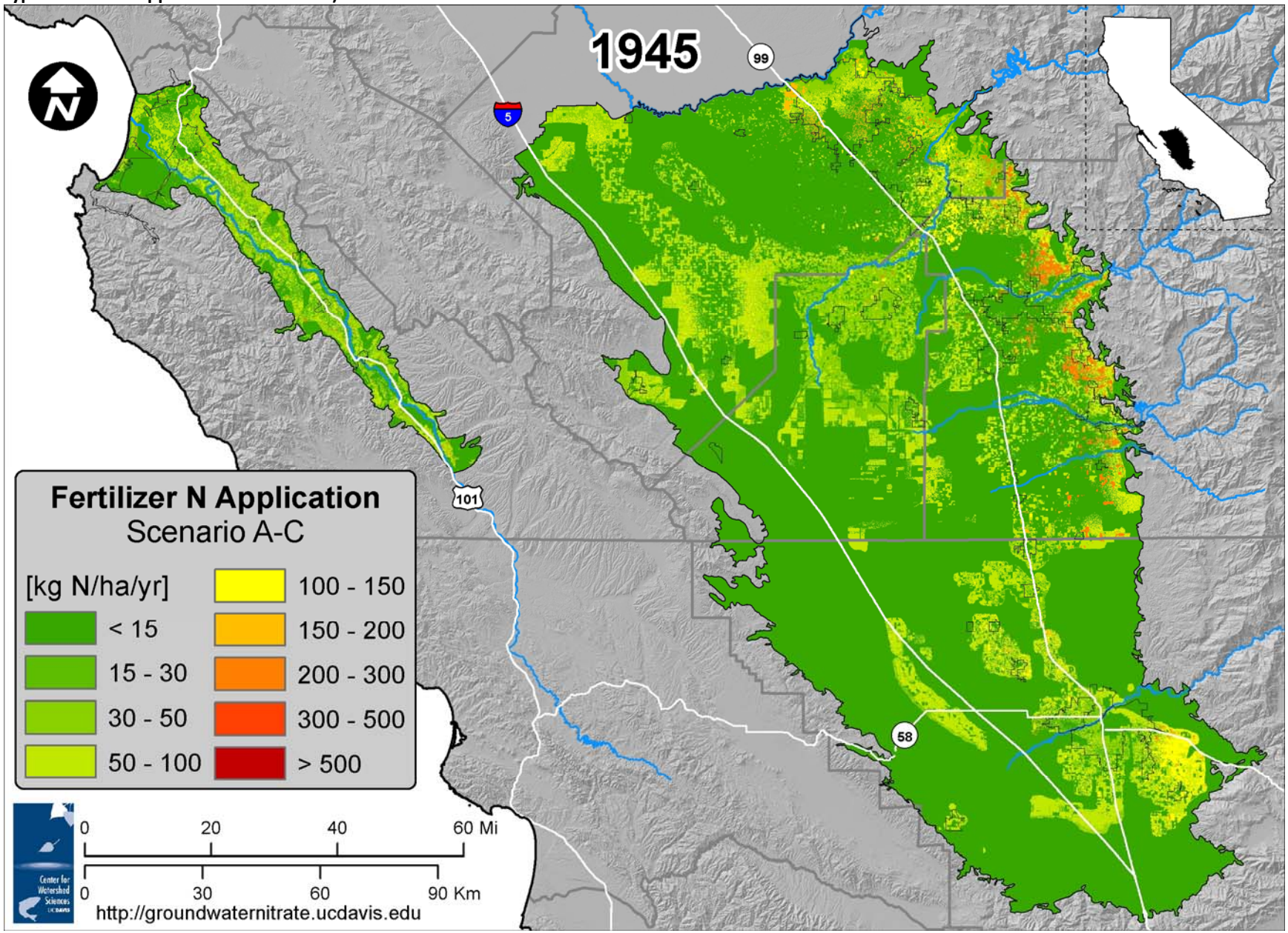
Appendix Figure 33. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 2035.



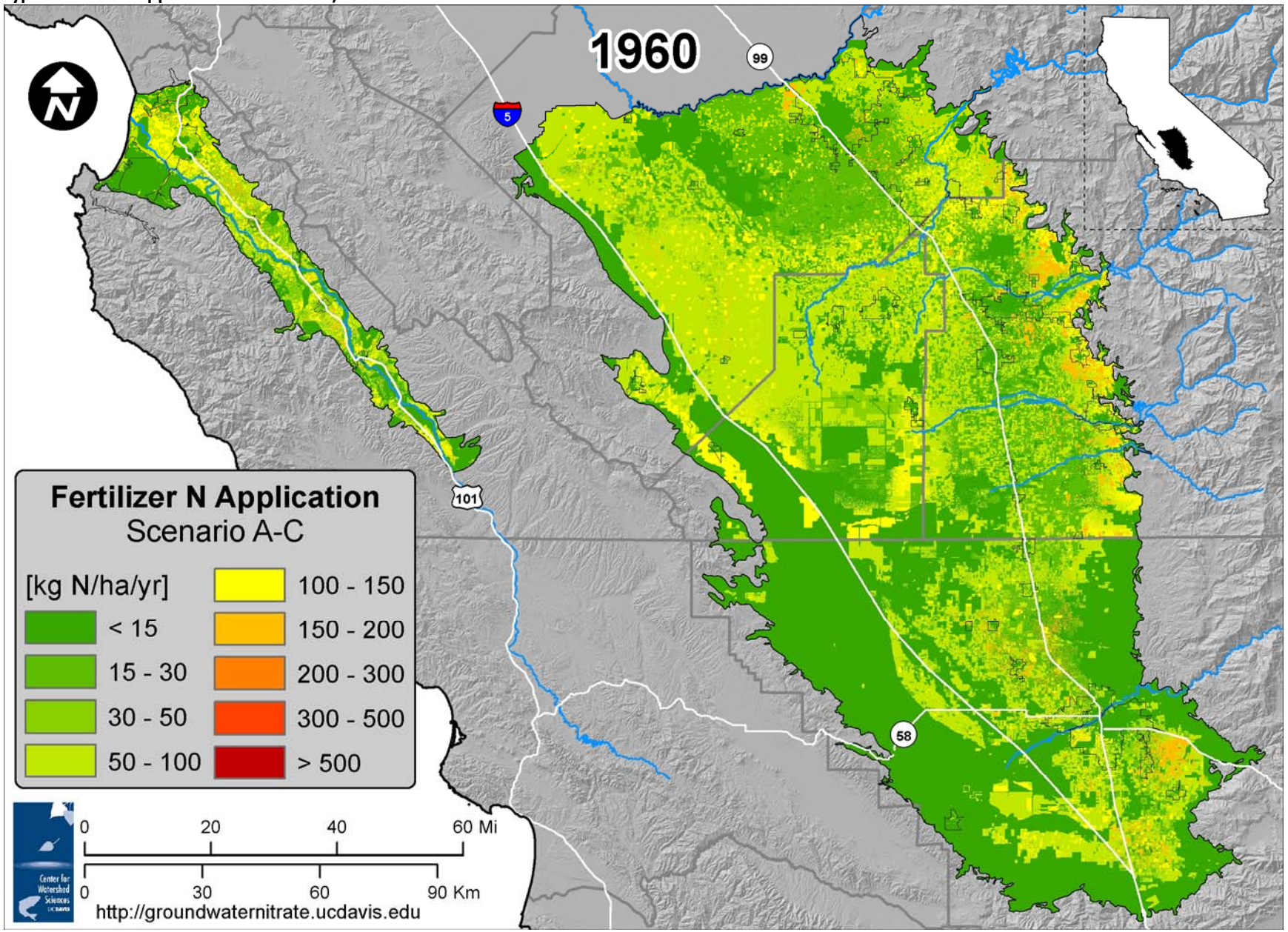
Appendix Figure 34. Actual synthetic fertilizer application rate, assuming that all manure stays within the dairy's cropland, in 2050.



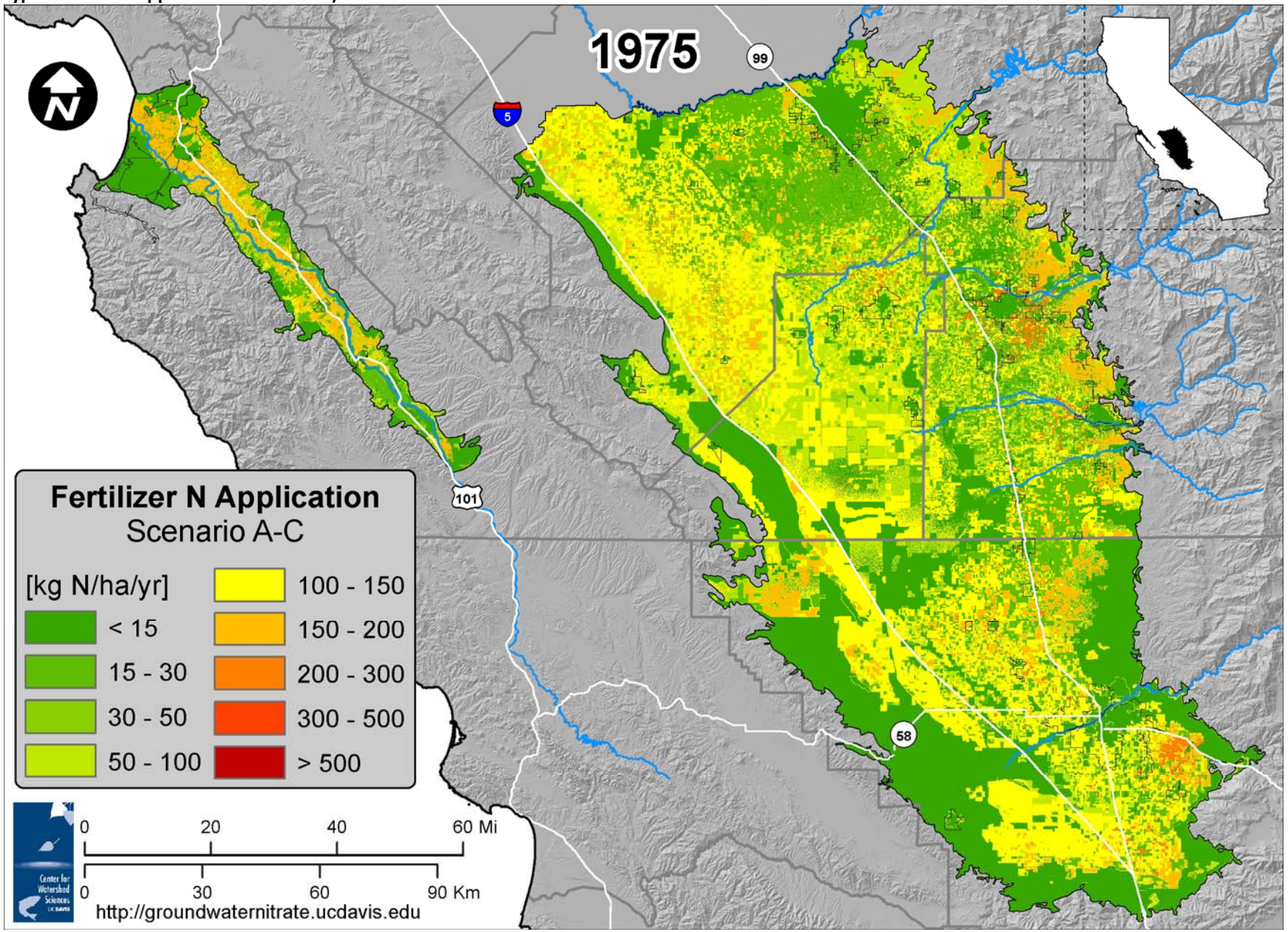
Appendix Figure 35. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 1945 (same as typical fertilizer application rate in 1945).



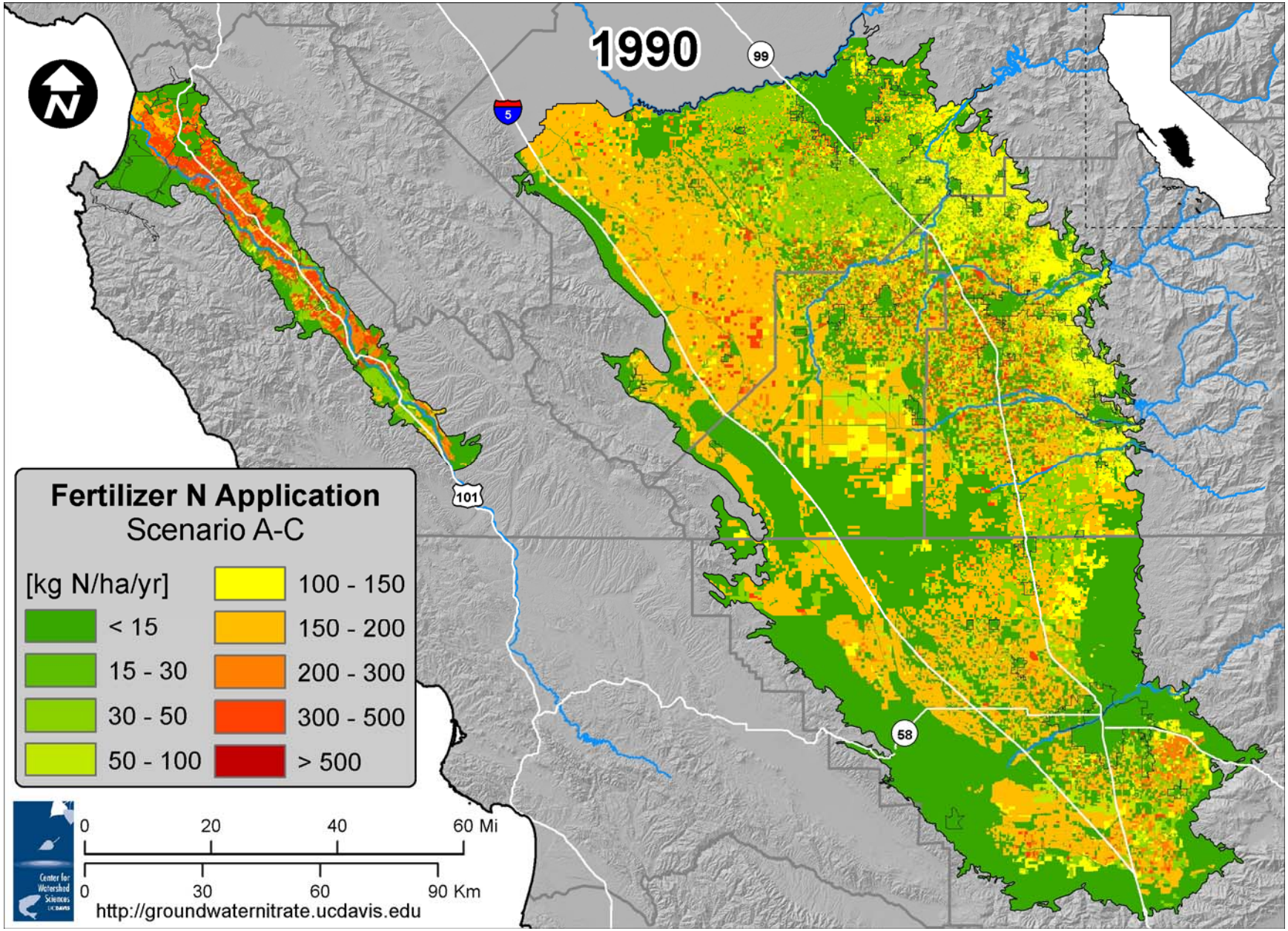
Appendix Figure 36. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 1960 (same as typical fertilizer application rate in 1960).



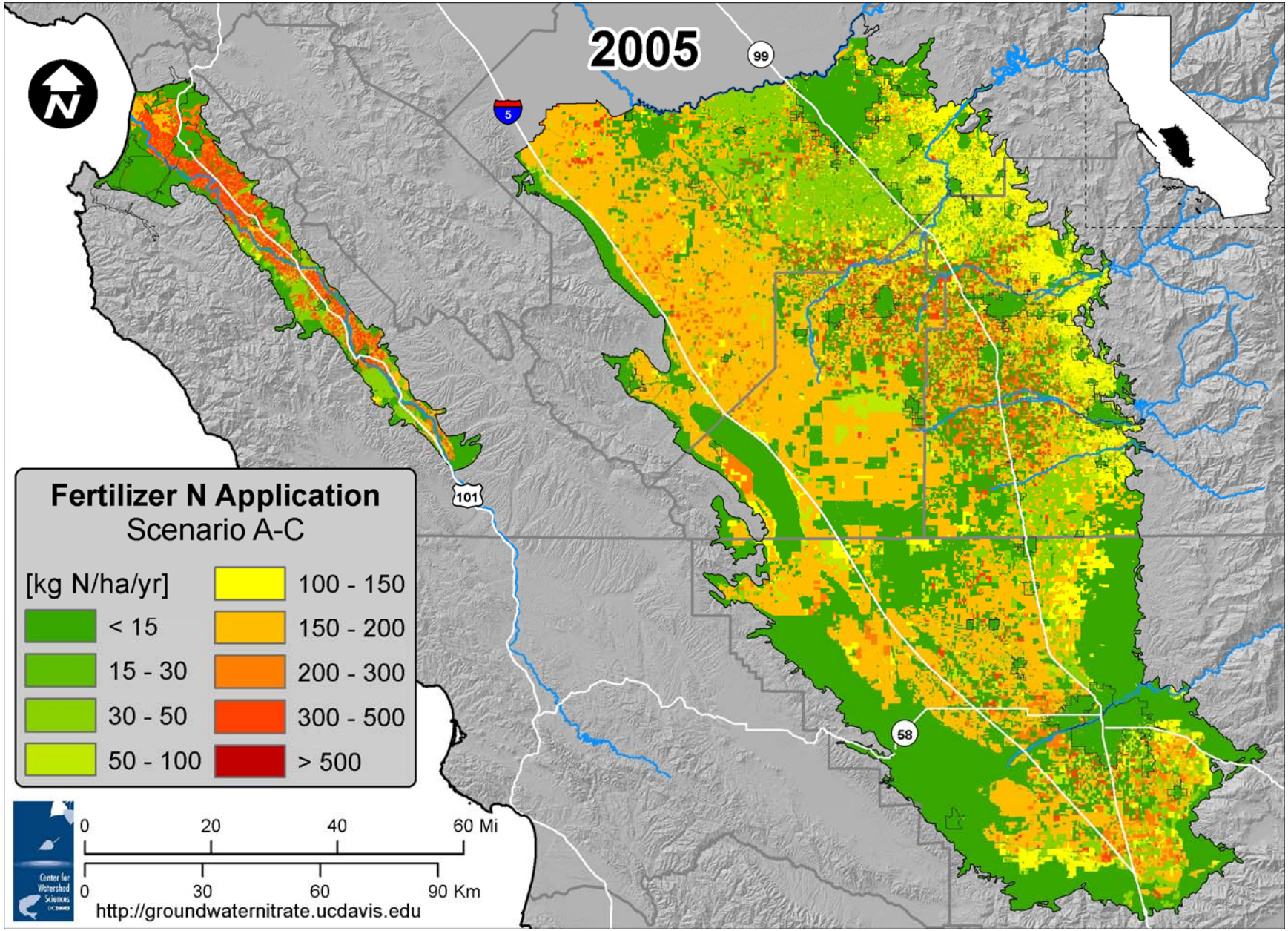
Appendix Figure 37. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 1975 (same as typical fertilizer application rate in 1975).



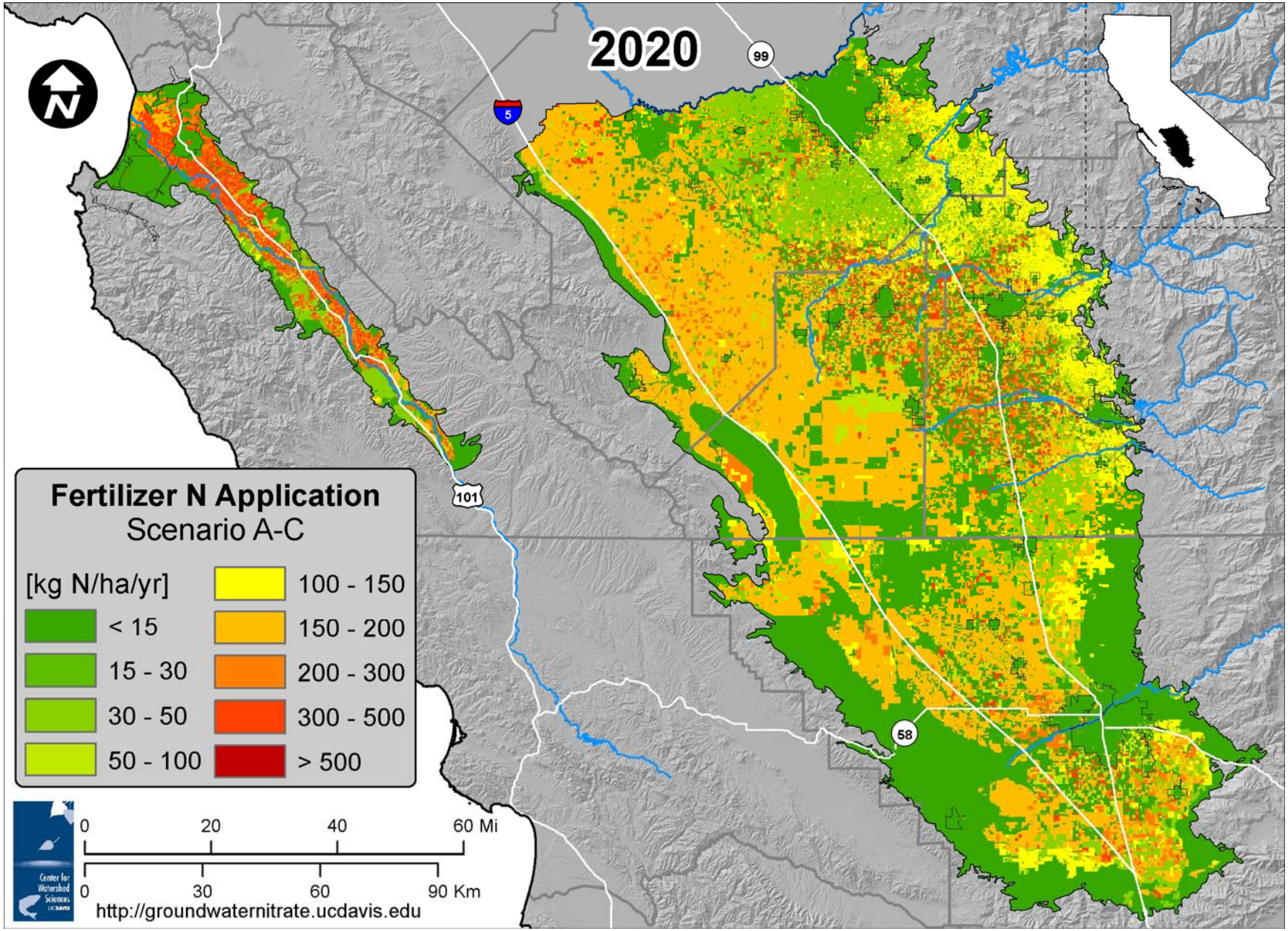
Appendix Figure 38. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 1990.



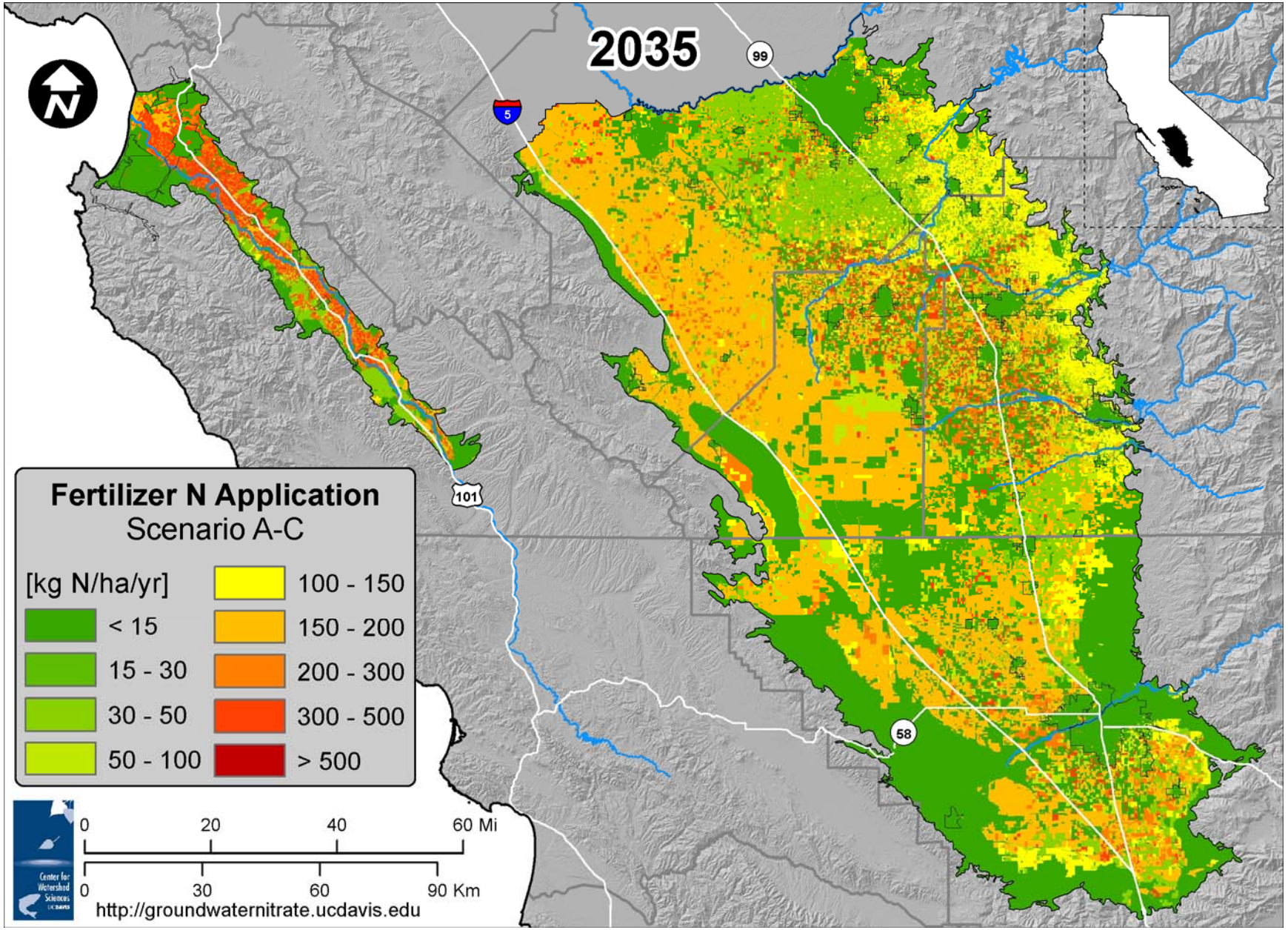
Appendix Figure 39. Actual synthetic fertilizer application rate, assuming that 38% of excreted of manure nitrogen is exported from dairies, in 2005.



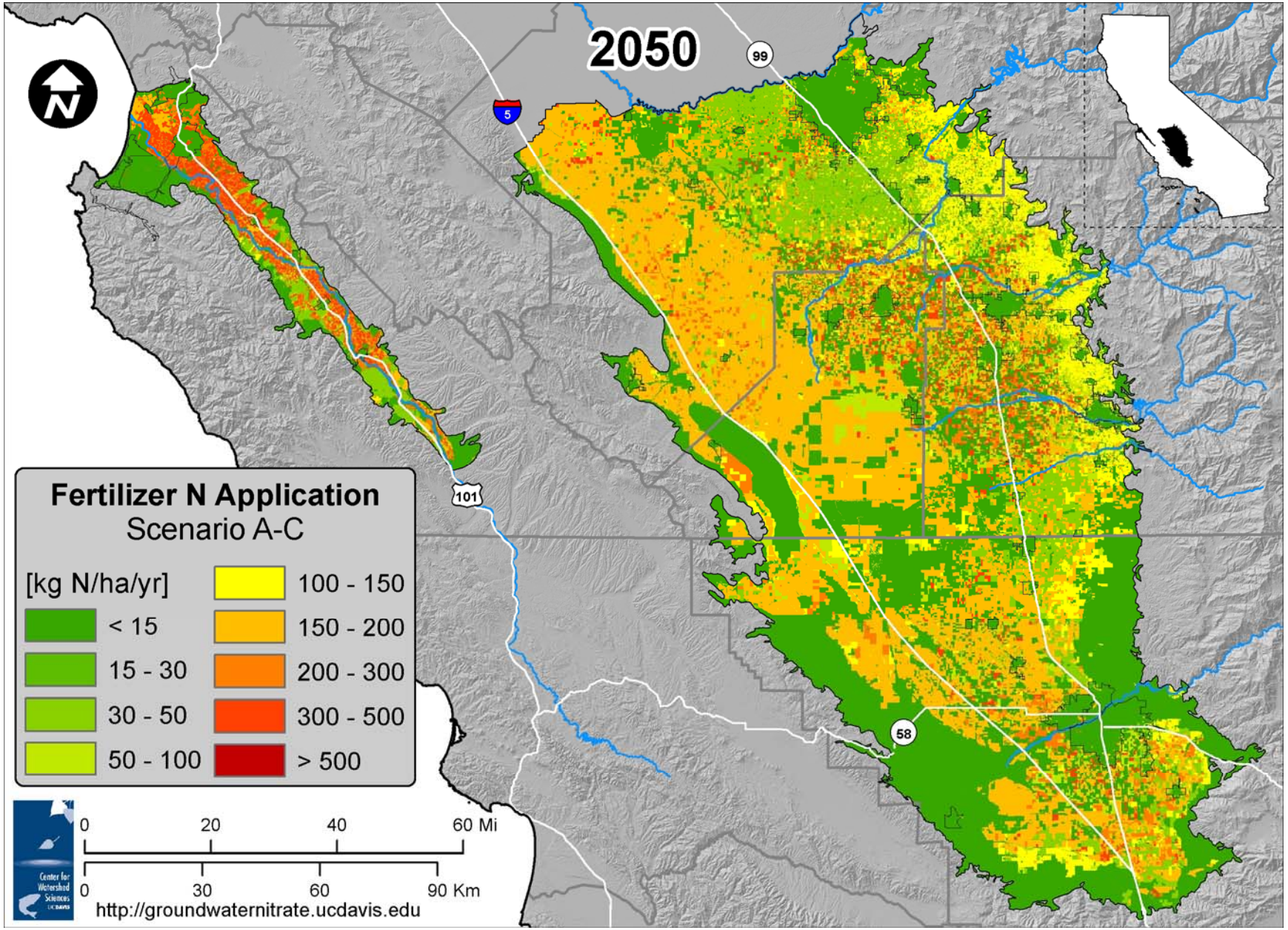
Appendix Figure 40. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 2020.



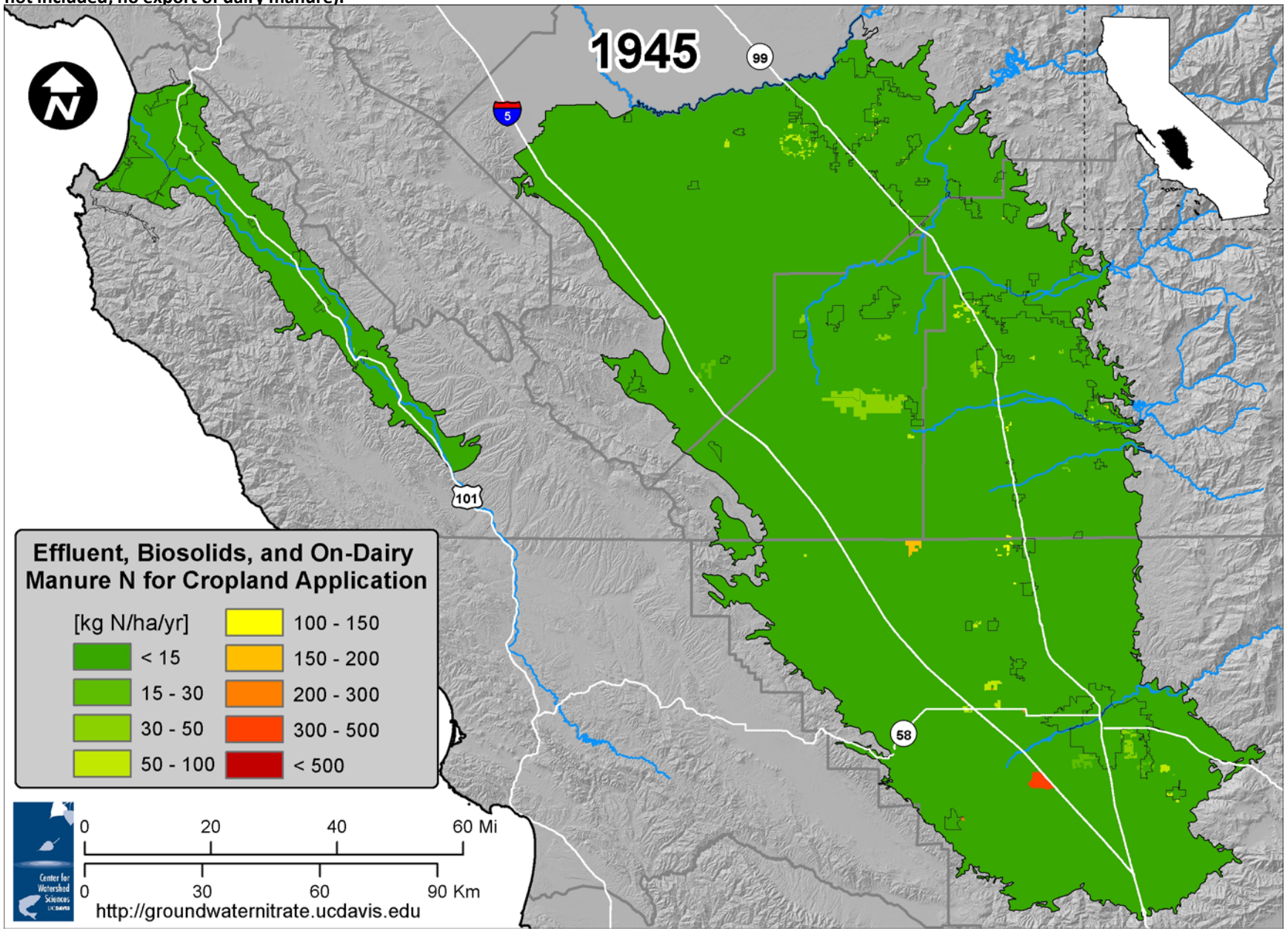
Appendix Figure 41. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 2035.



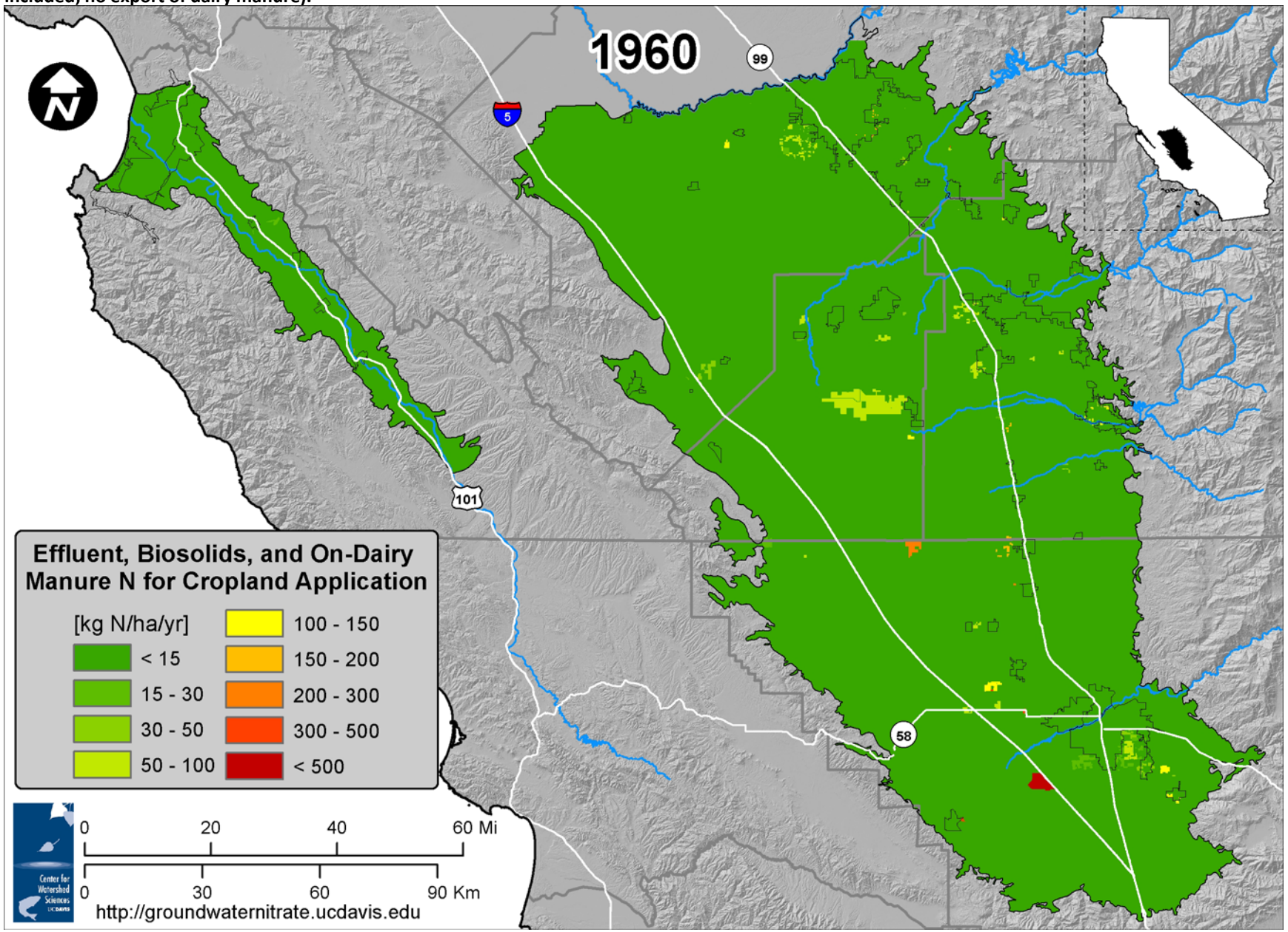
Appendix Figure 42. Actual synthetic fertilizer application rate, assuming that 38% of excreted manure nitrogen is exported from dairies, in 2050.



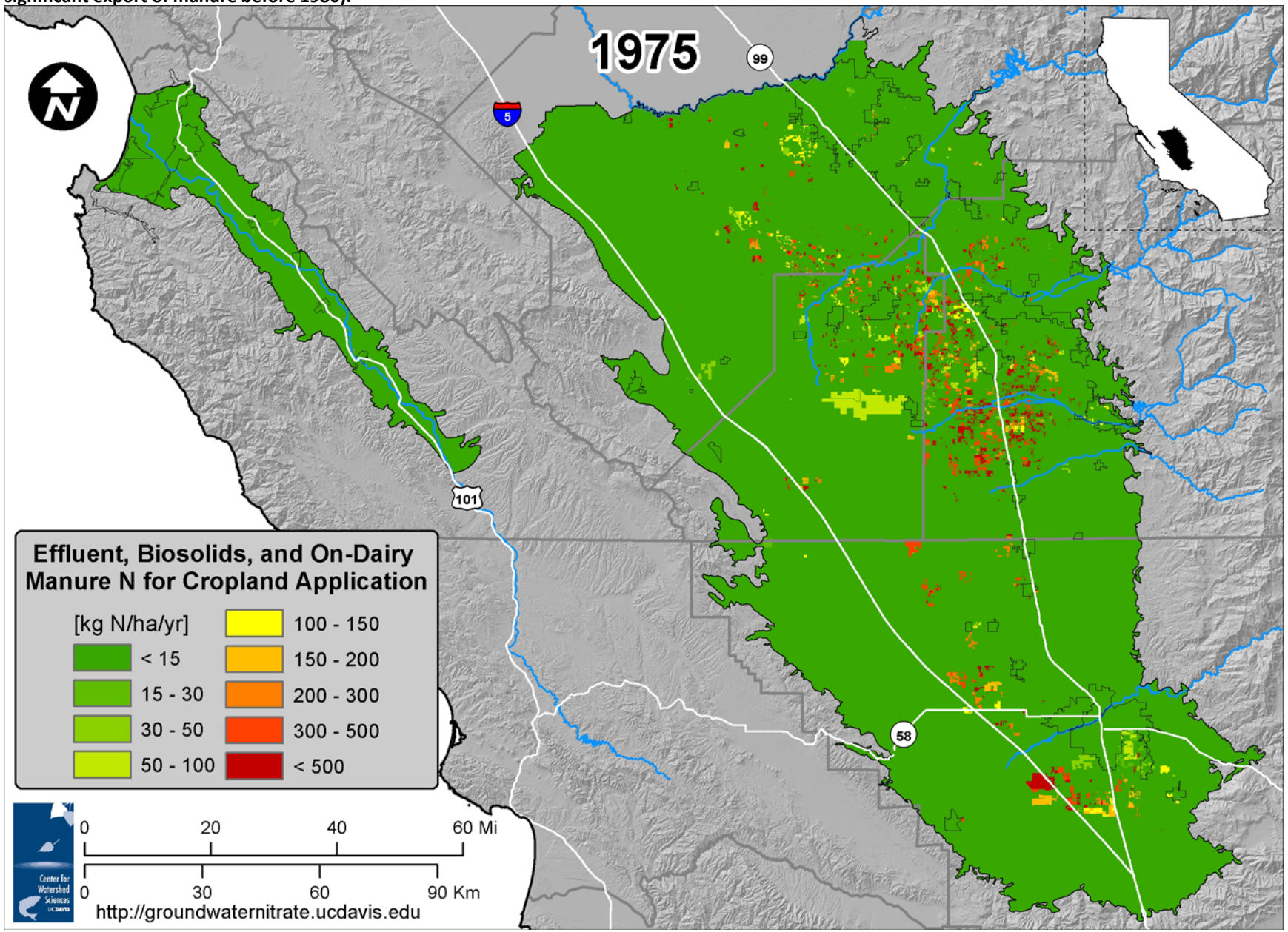
Appendix Figure 43. Land applied nitrogen from WWTP effluent, FP effluent, and biosolids, in 1945 (dairy animals assumed to be in pasture; manure N not included; no export of dairy manure).



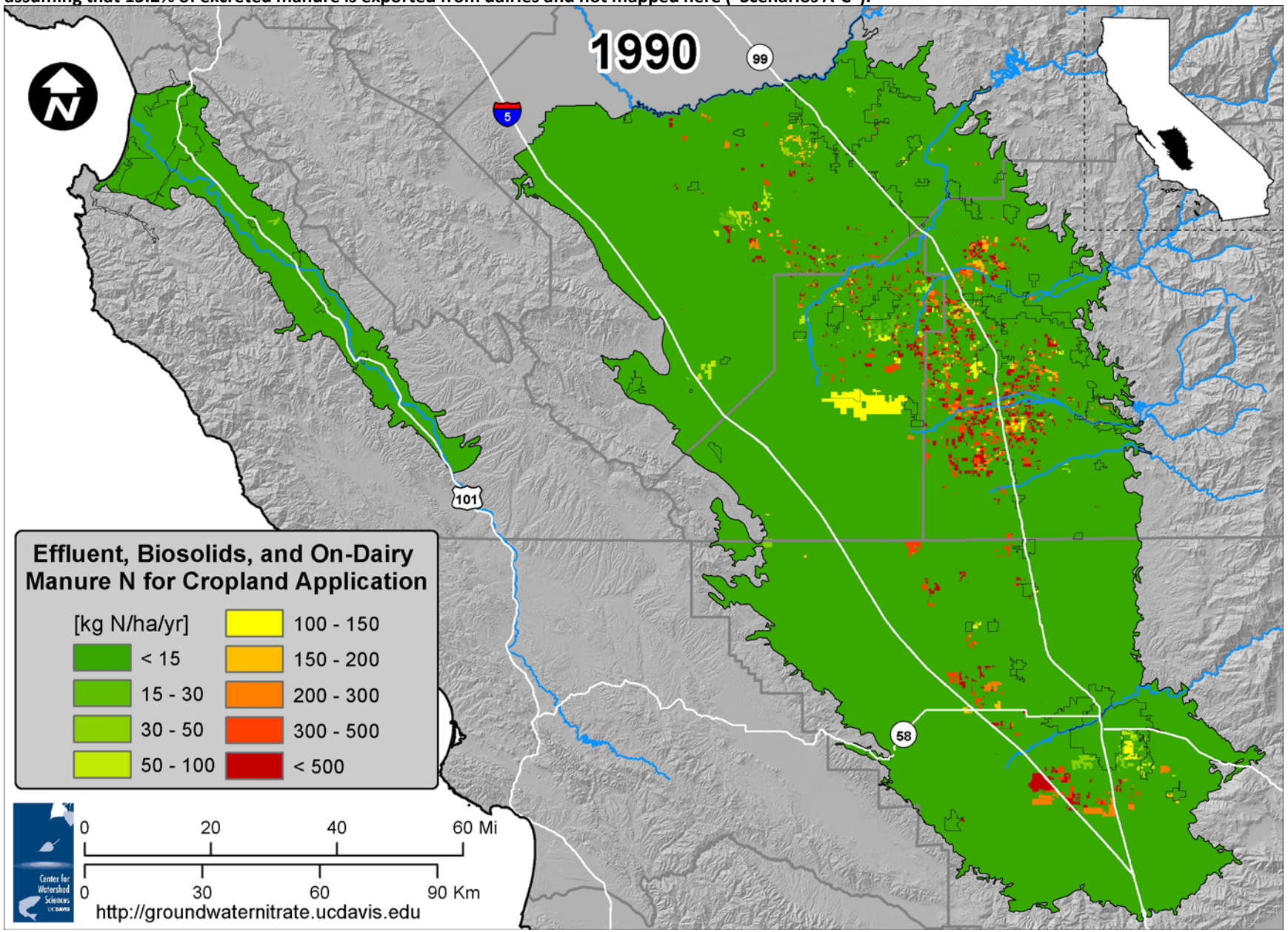
Appendix Figure 44. Land applied nitrogen from WWTP effluent, FP effluent, and biosolids, in 1960 (dairy animals assumed to be in pasture; manure N not included; no export of dairy manure).



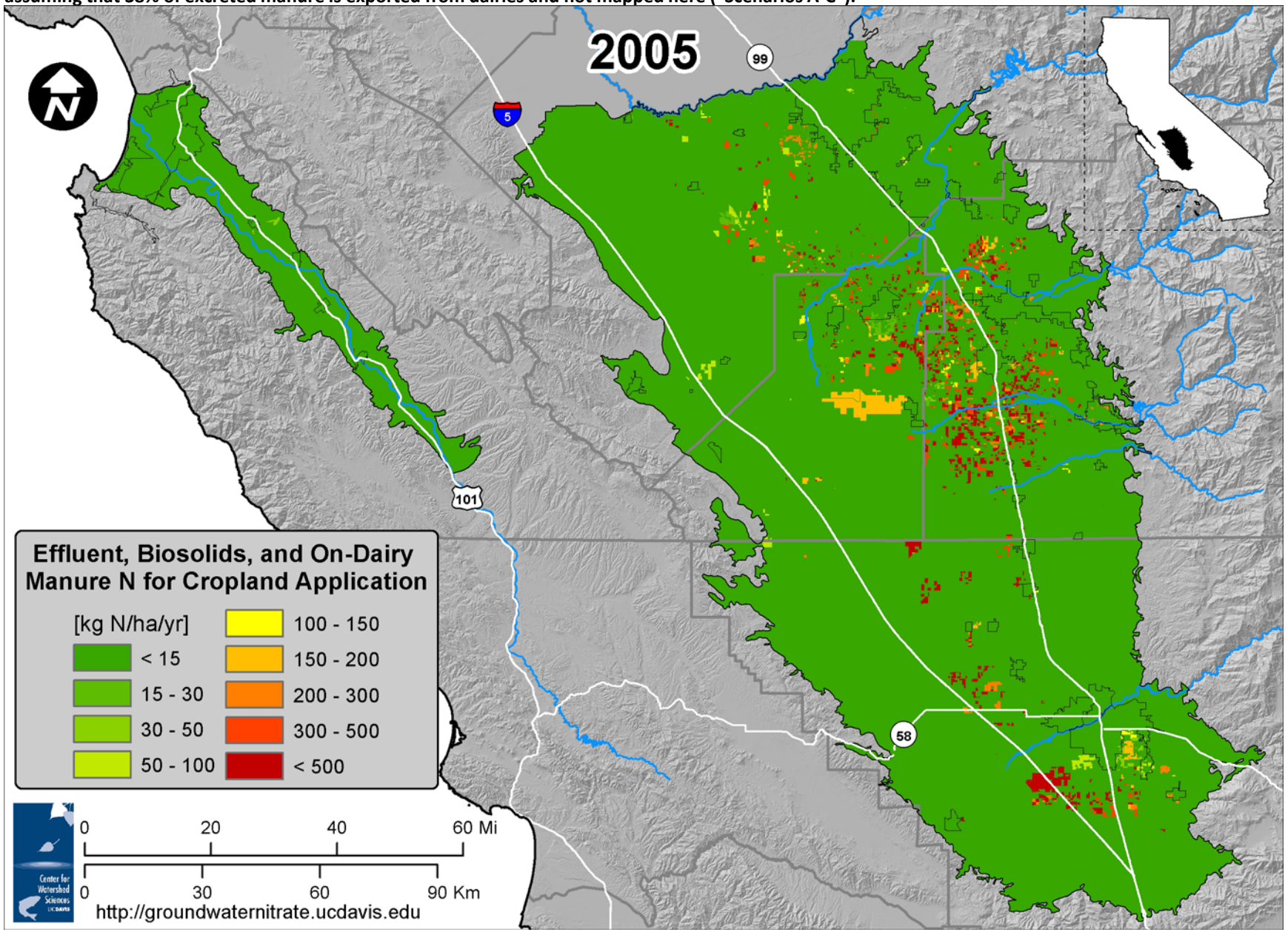
Appendix Figure 45. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 1975 (no significant export of manure before 1980).



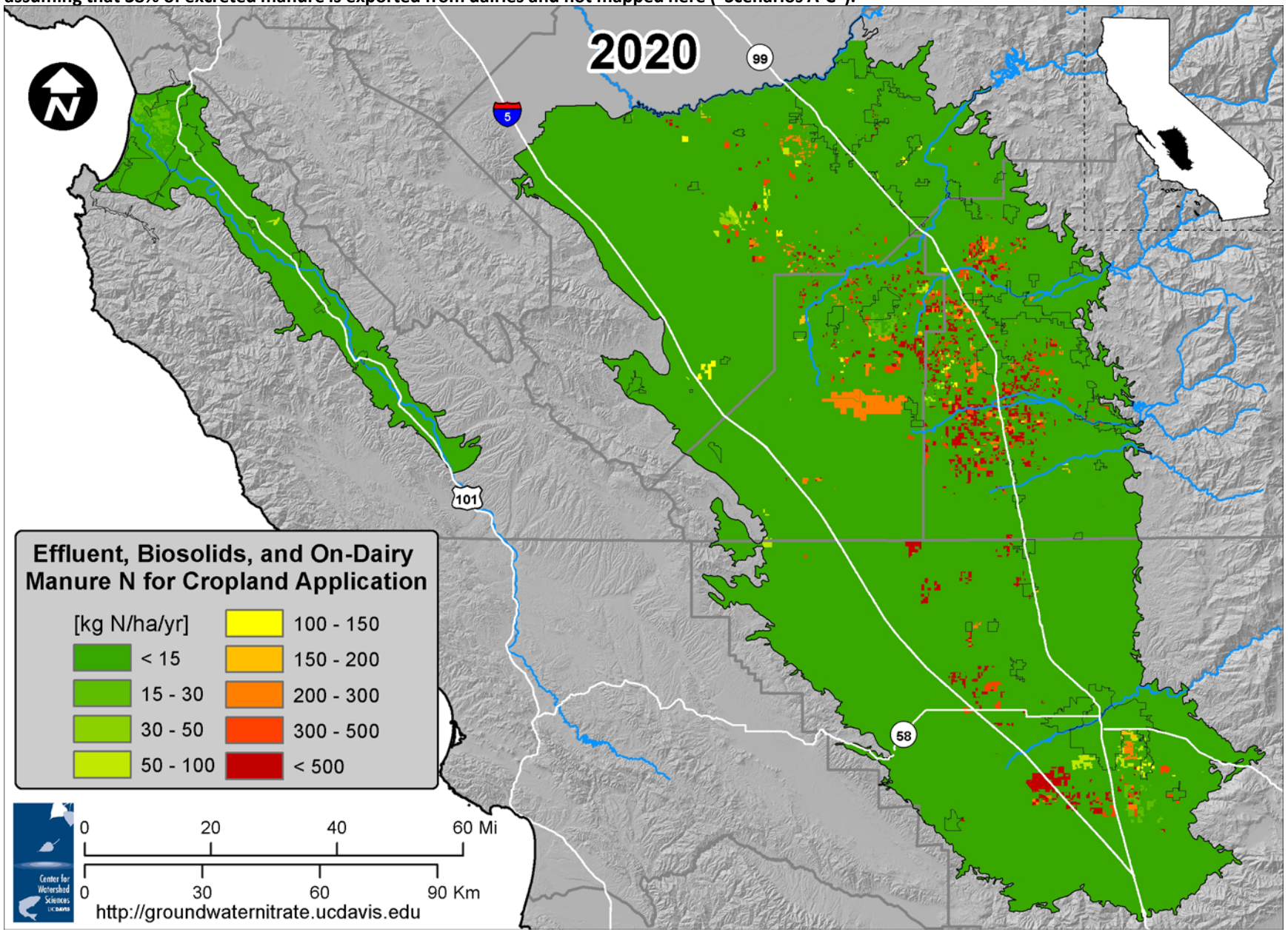
Appendix Figure 46. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 1990, assuming that 15.2% of excreted manure is exported from dairies and not mapped here ("Scenarios A-C").



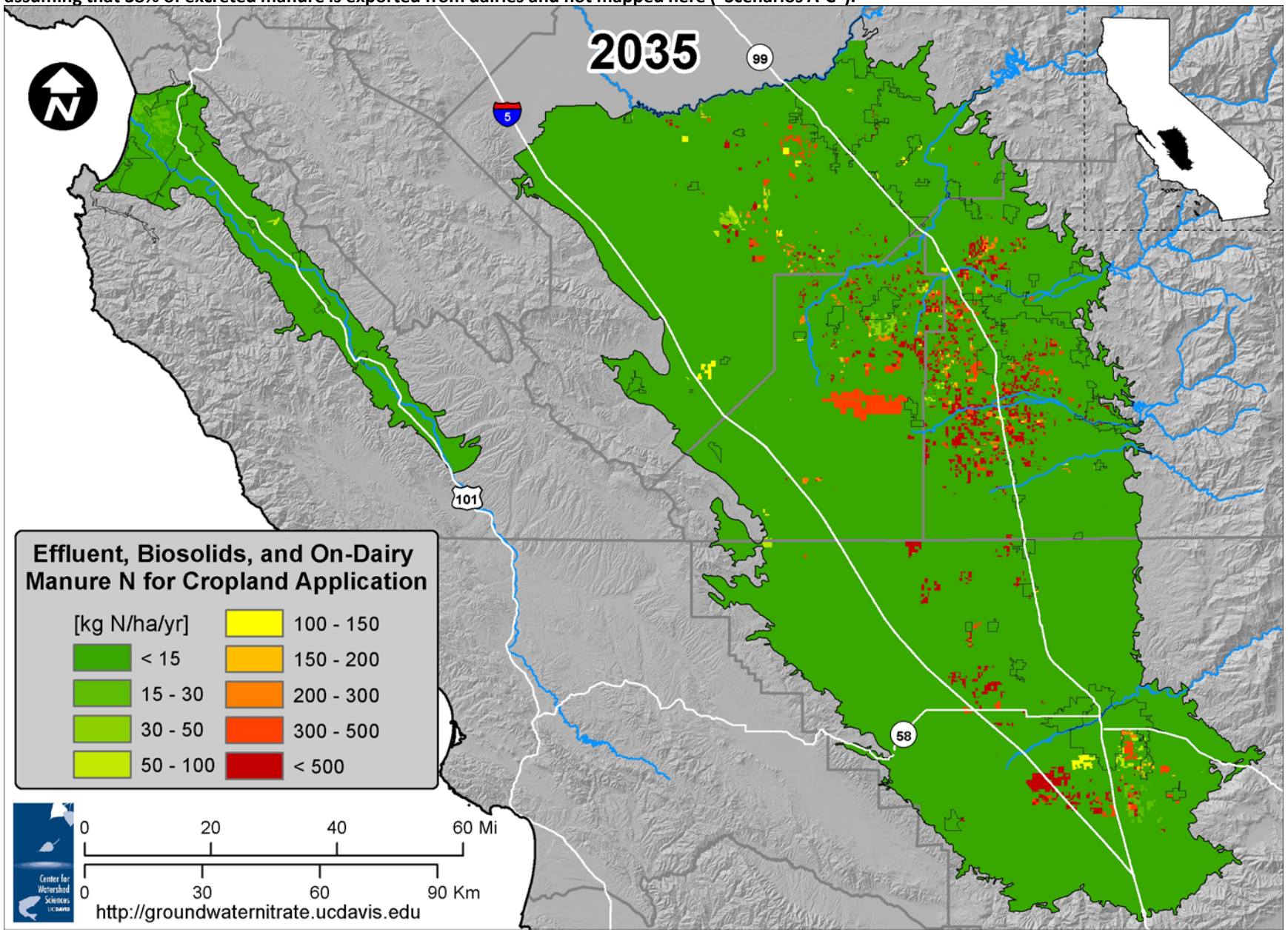
Appendix Figure 47. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 2005, assuming that 38% of excreted manure is exported from dairies and not mapped here ("Scenarios A-C").



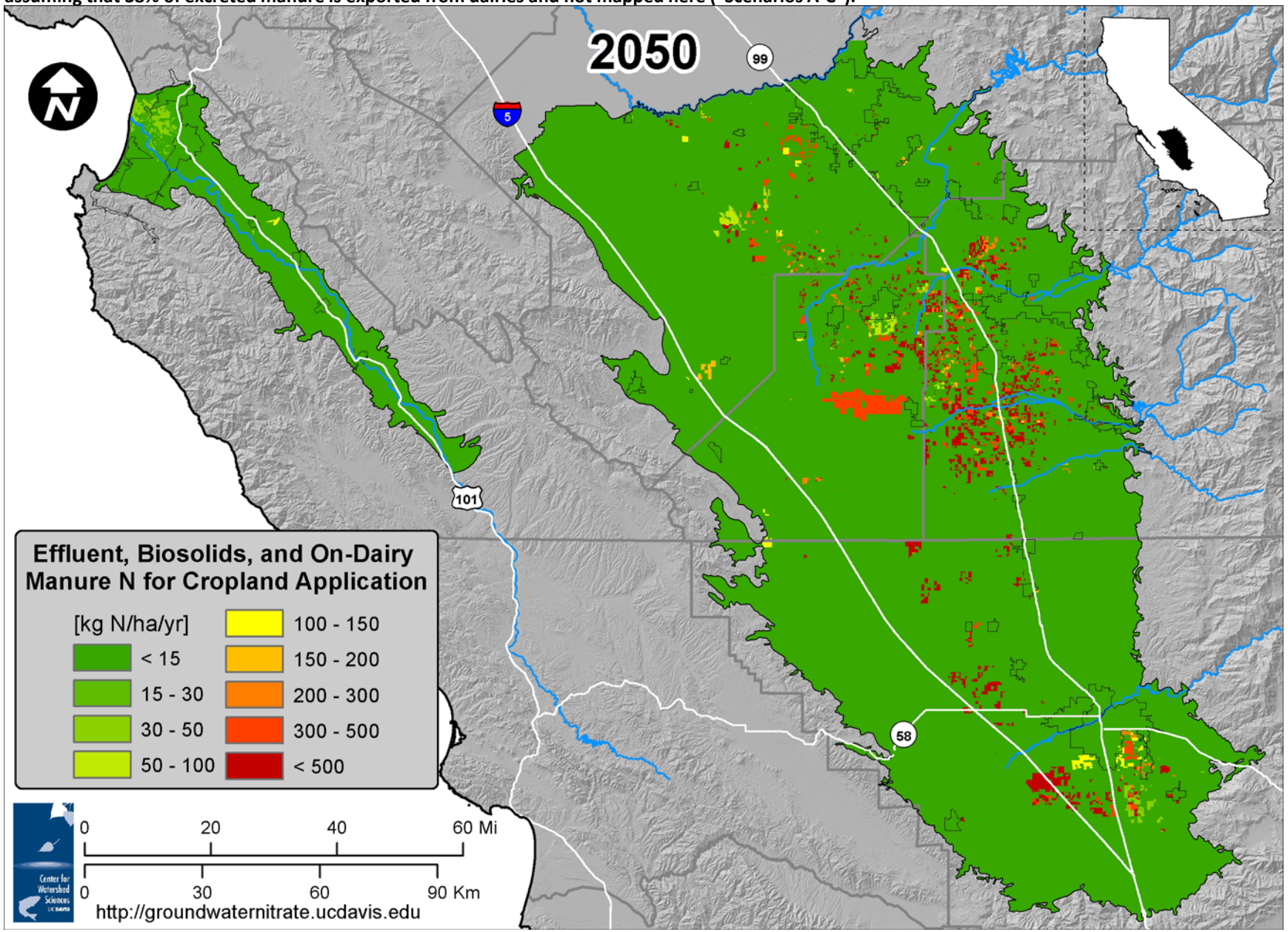
Appendix Figure 48. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 2020, assuming that 38% of excreted manure is exported from dairies and not mapped here ("Scenarios A-C").



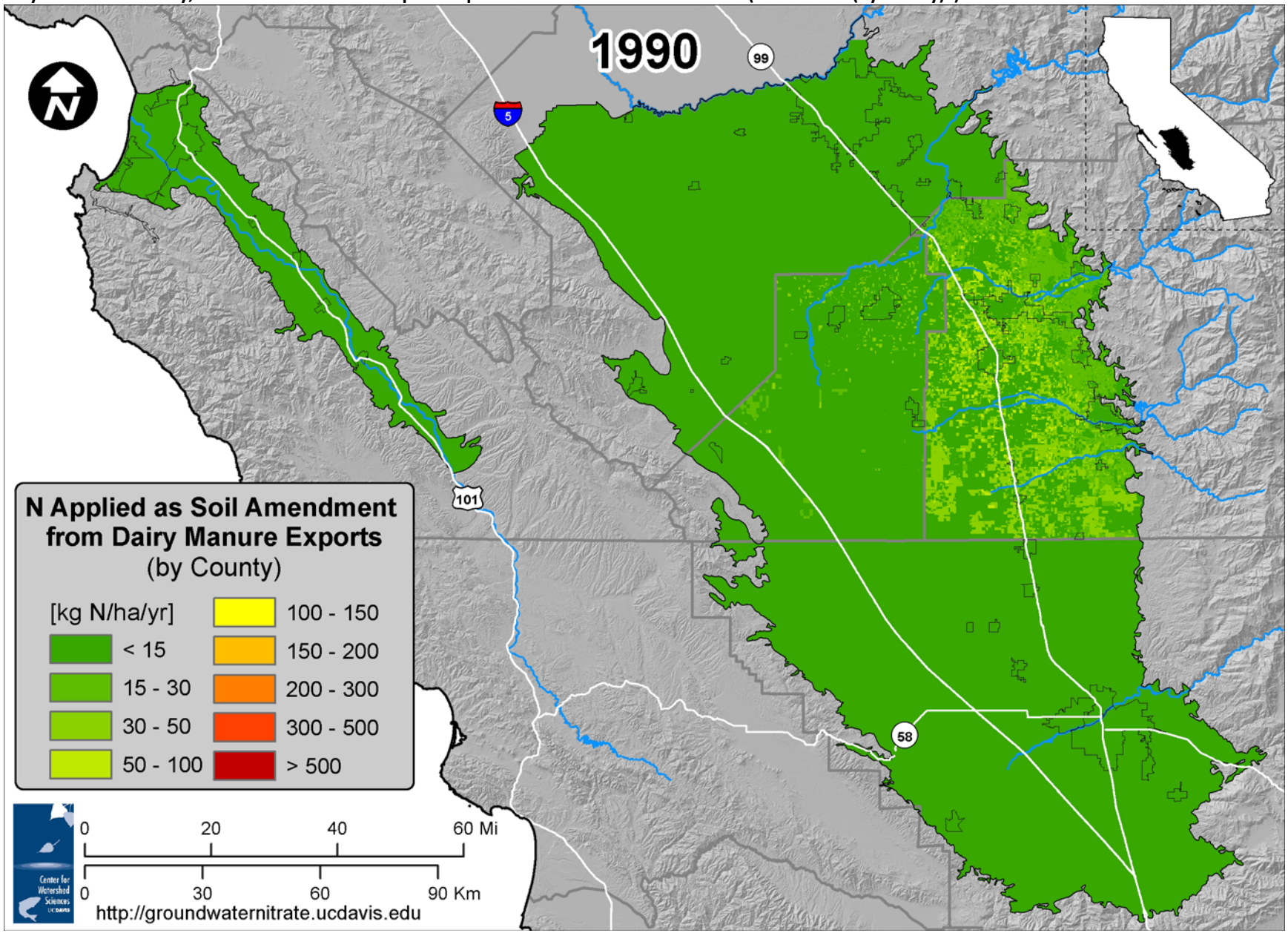
Appendix Figure 49. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 2035, assuming that 38% of excreted manure is exported from dairies and not mapped here ("Scenarios A-C").



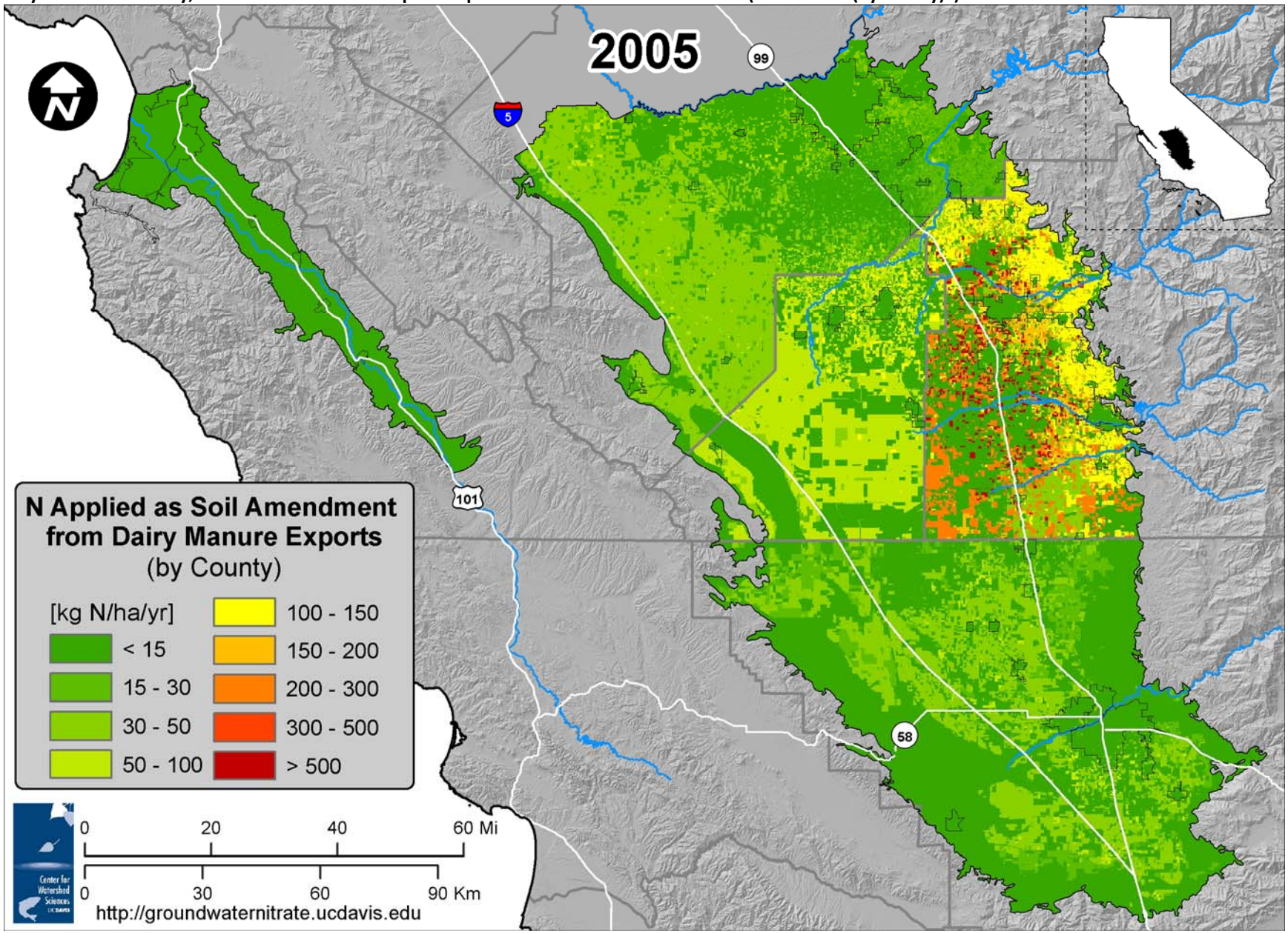
Appendix Figure 50. Land applied nitrogen from WWTP effluent, FP effluent, biosolids, and from dairy manure on dairy-controlled land areas, in 2050, assuming that 38% of excreted manure is exported from dairies and not mapped here ("Scenarios A-C").



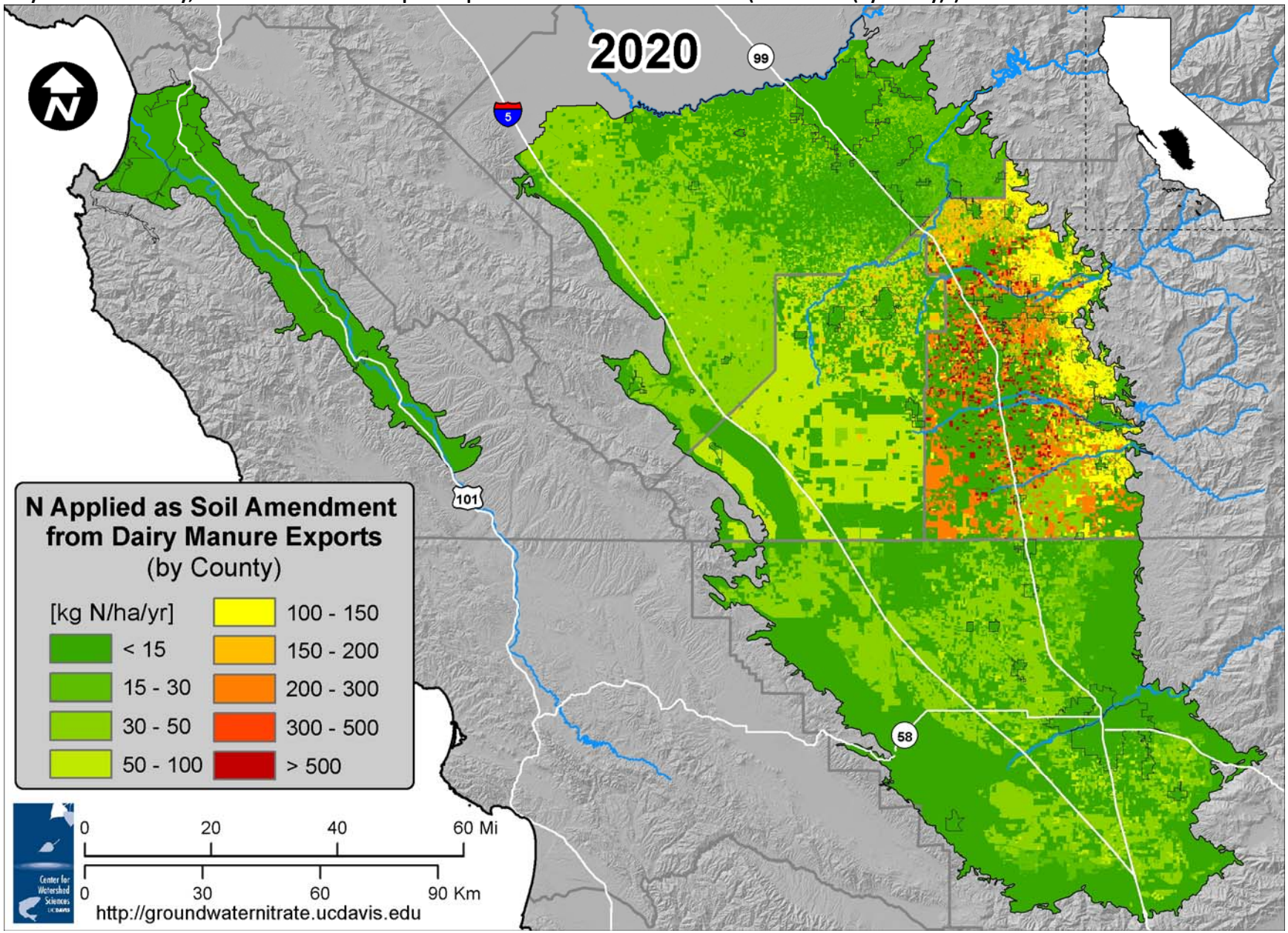
Appendix Figure 51. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the county, in 1990. Total manure exports represent 38% of animal N excreted ("Scenario C (by county)").



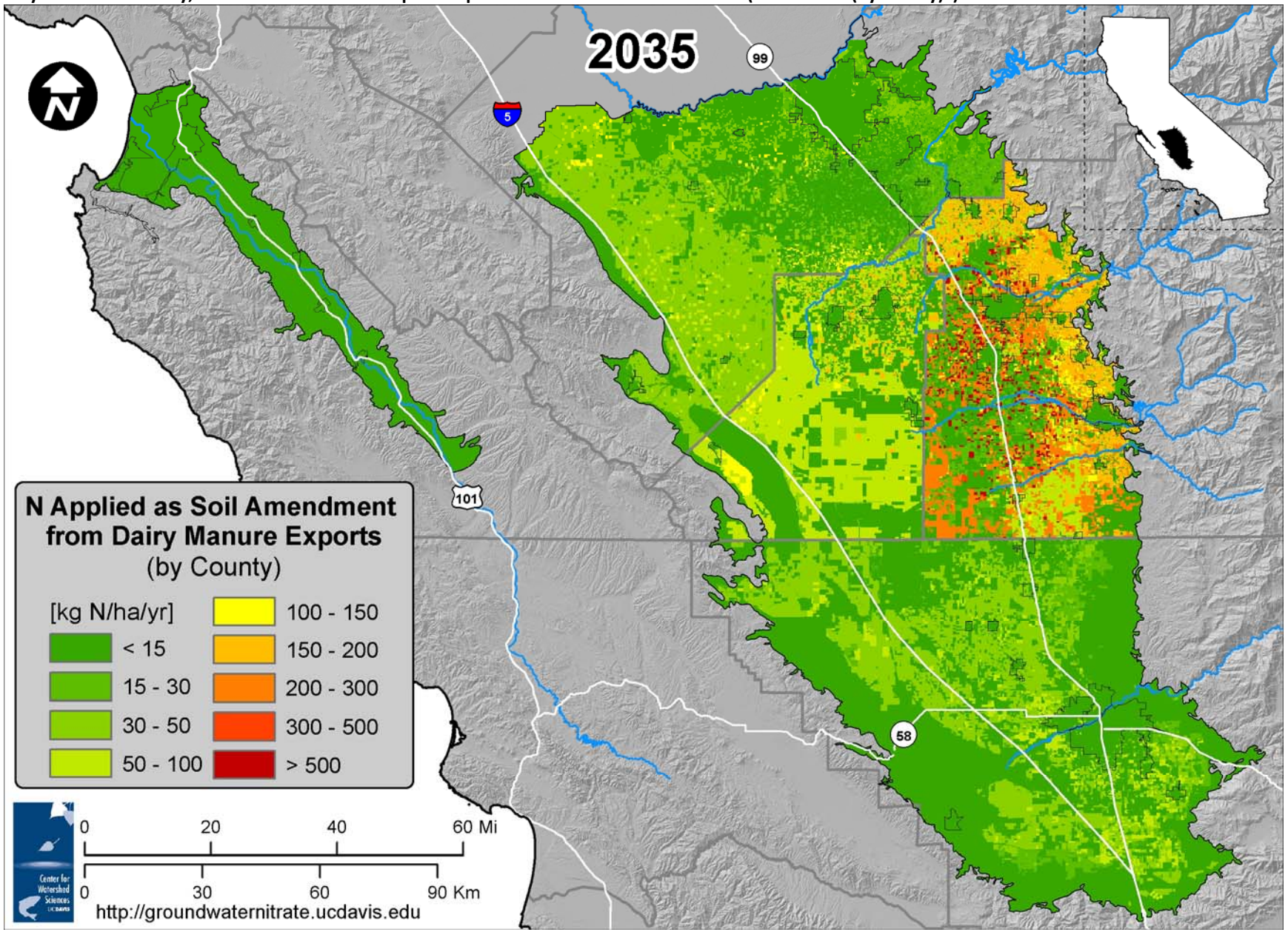
Appendix Figure 52. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the county, in 2005. Total manure exports represent 38% of animal N excreted ("Scenario C (by county)").



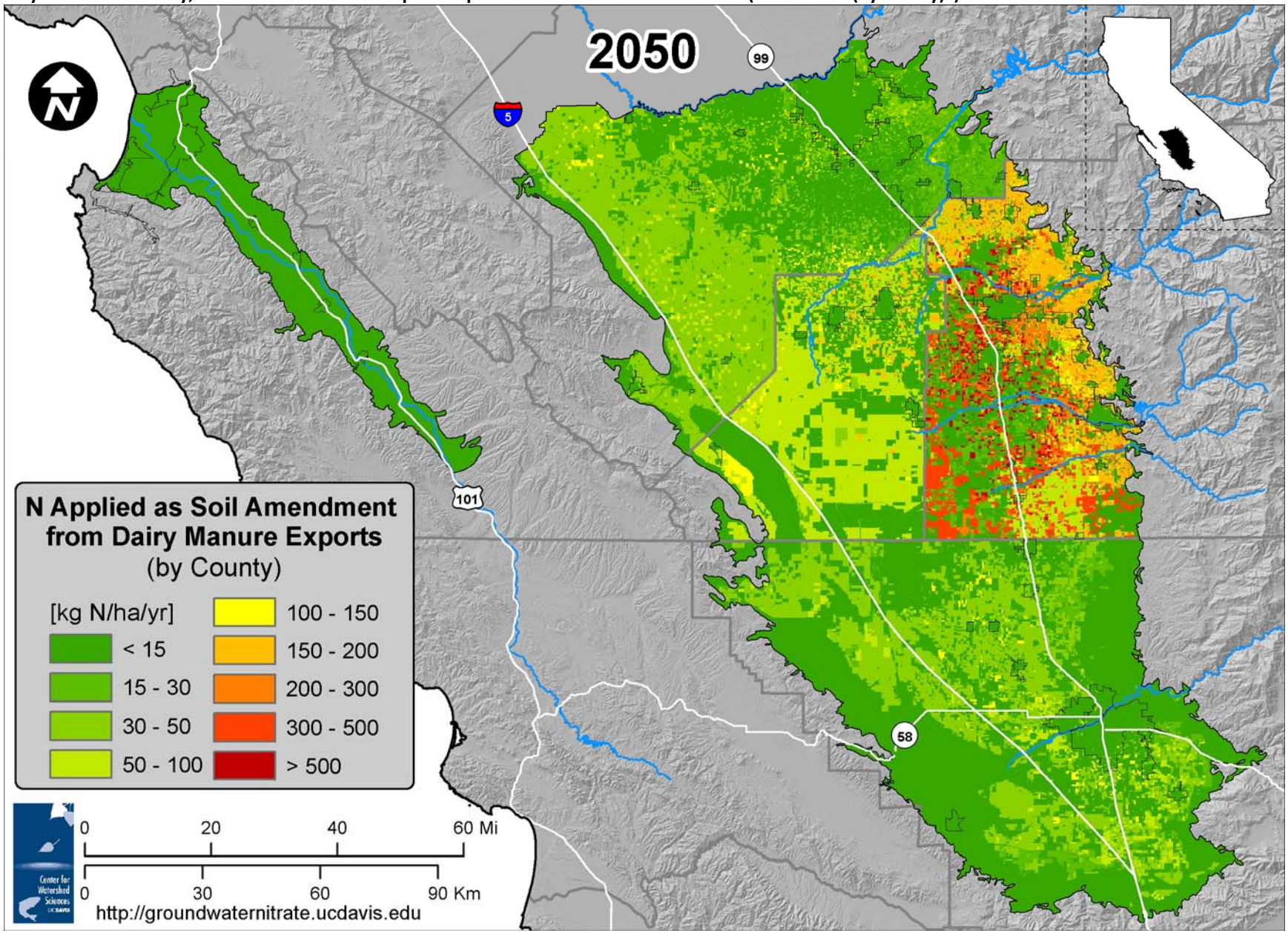
Appendix Figure 53. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the county, in 2020. Total manure exports represent 38% of animal N excreted ("Scenario C (by county)").



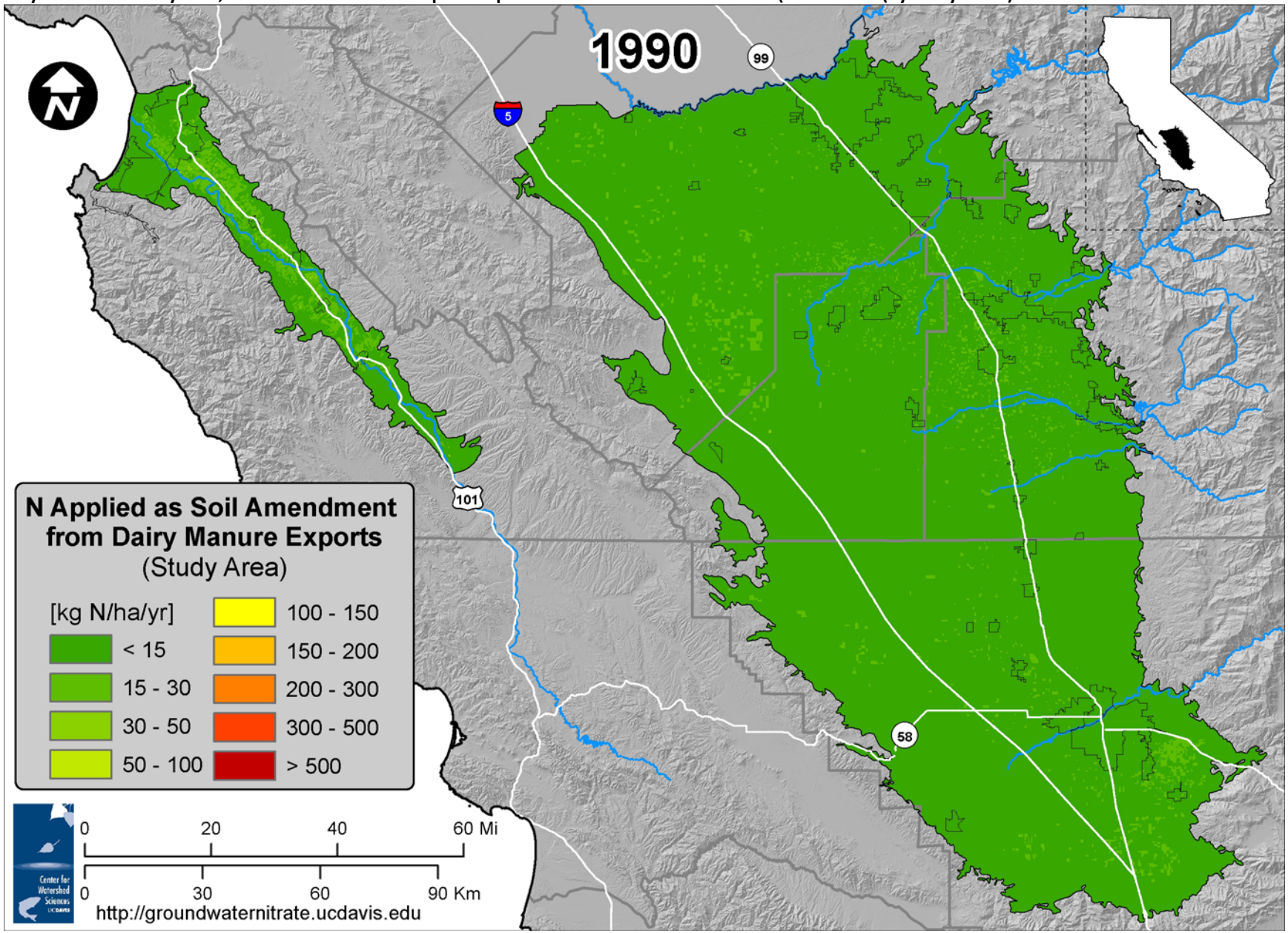
Appendix Figure 54. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the county, in 2035. Total manure exports represent 38% of animal N excreted ("Scenario C (by county)").



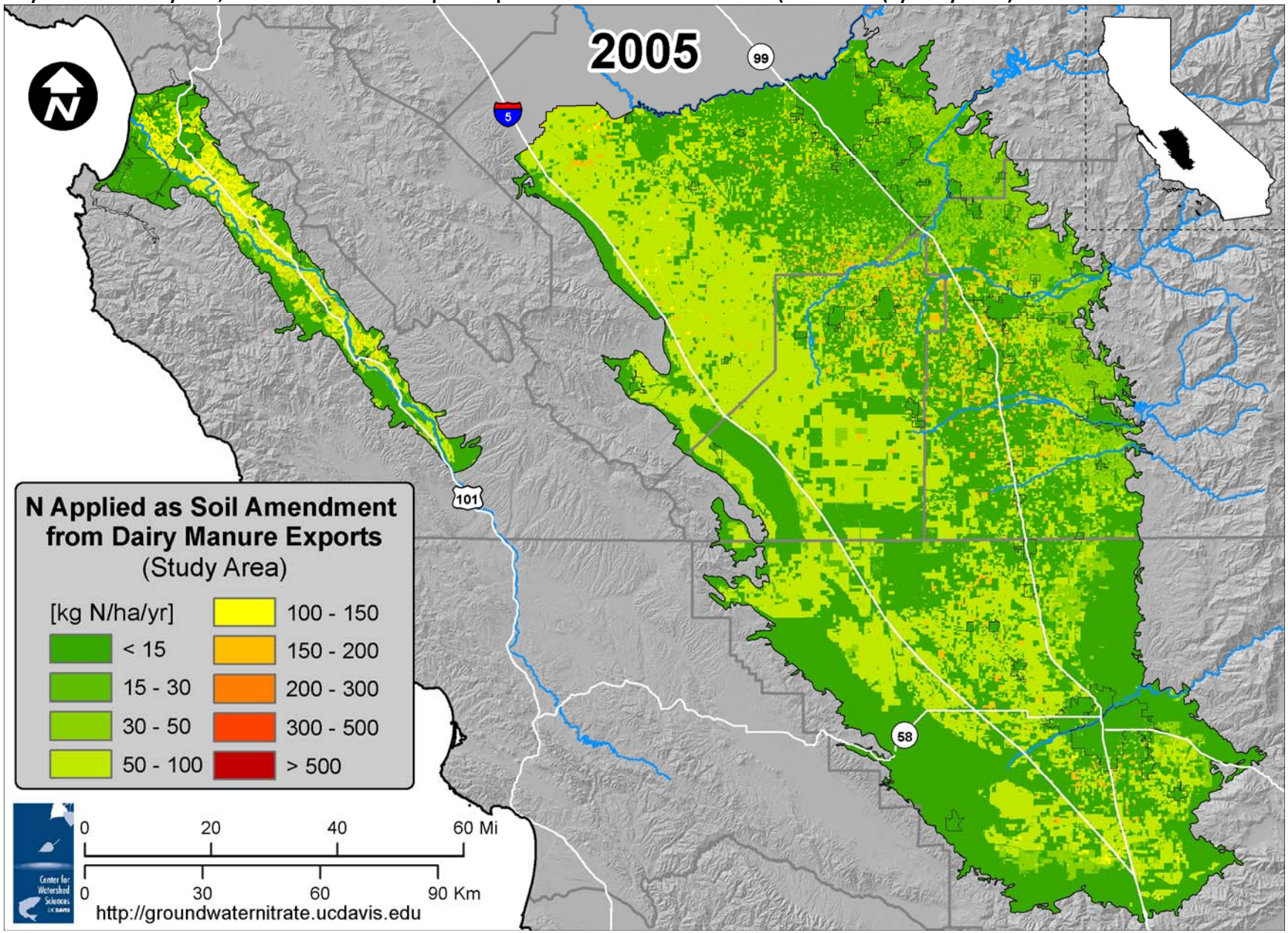
Appendix Figure 55. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the county, in 2050. Total manure exports represent 38% of animal N excreted ("Scenario C (by county)").



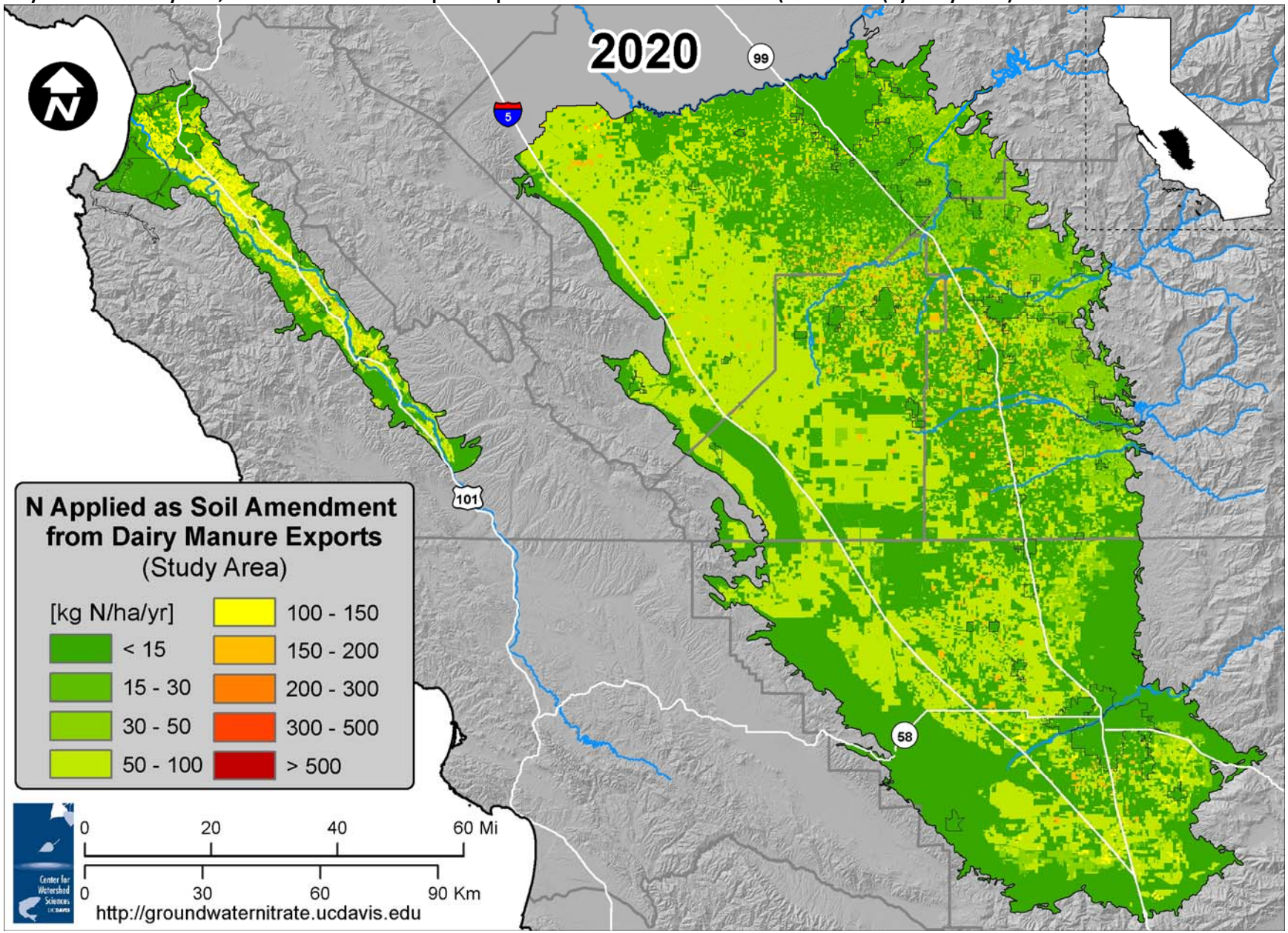
Appendix Figure 56. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the study area, in 1990. Total manure exports represent 38% of animal N excreted ("Scenario C (by study area").



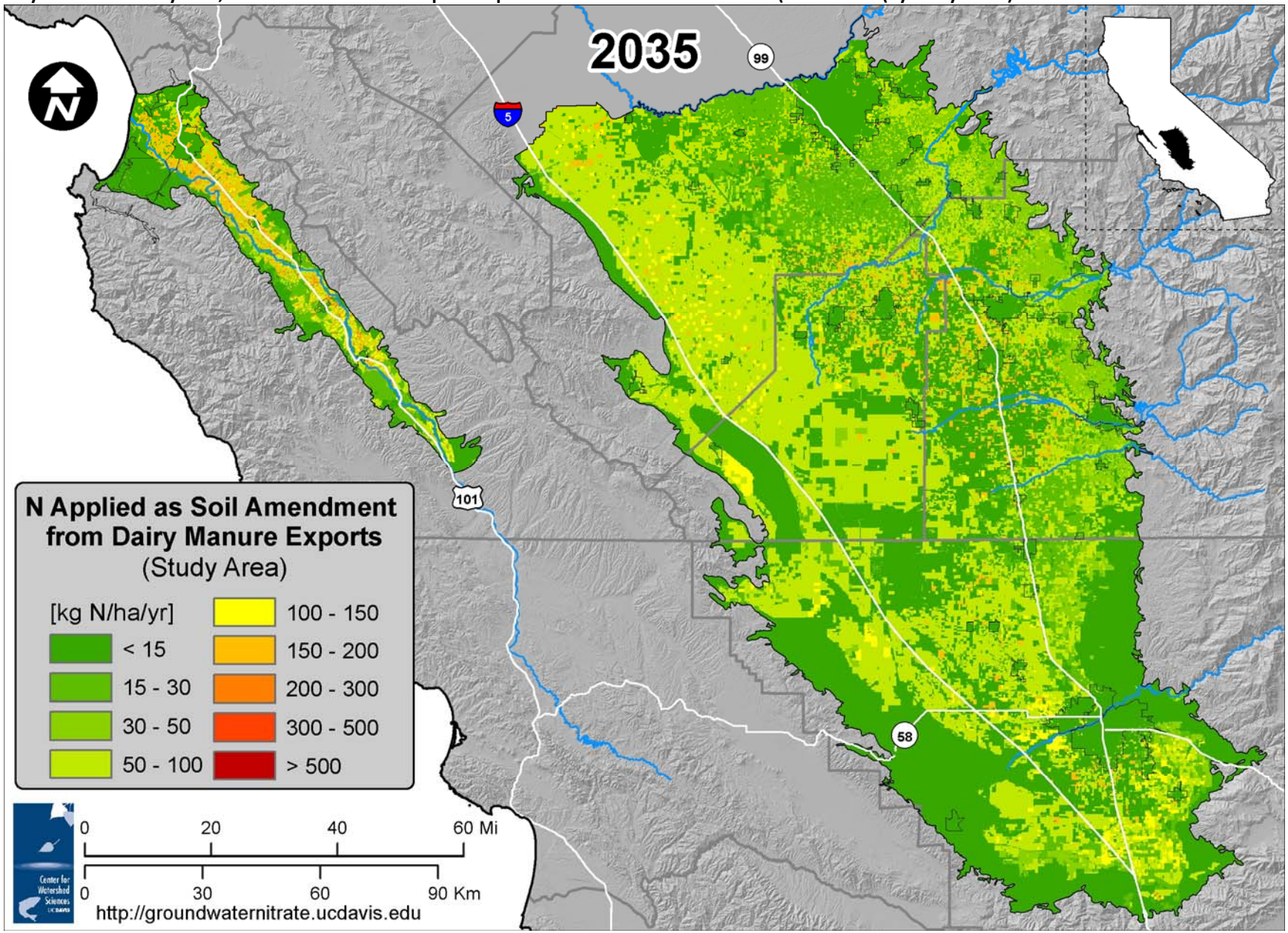
Appendix Figure 57. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the study area, in 2005. Total manure exports represent 38% of animal N excreted ("Scenario C (by study area").



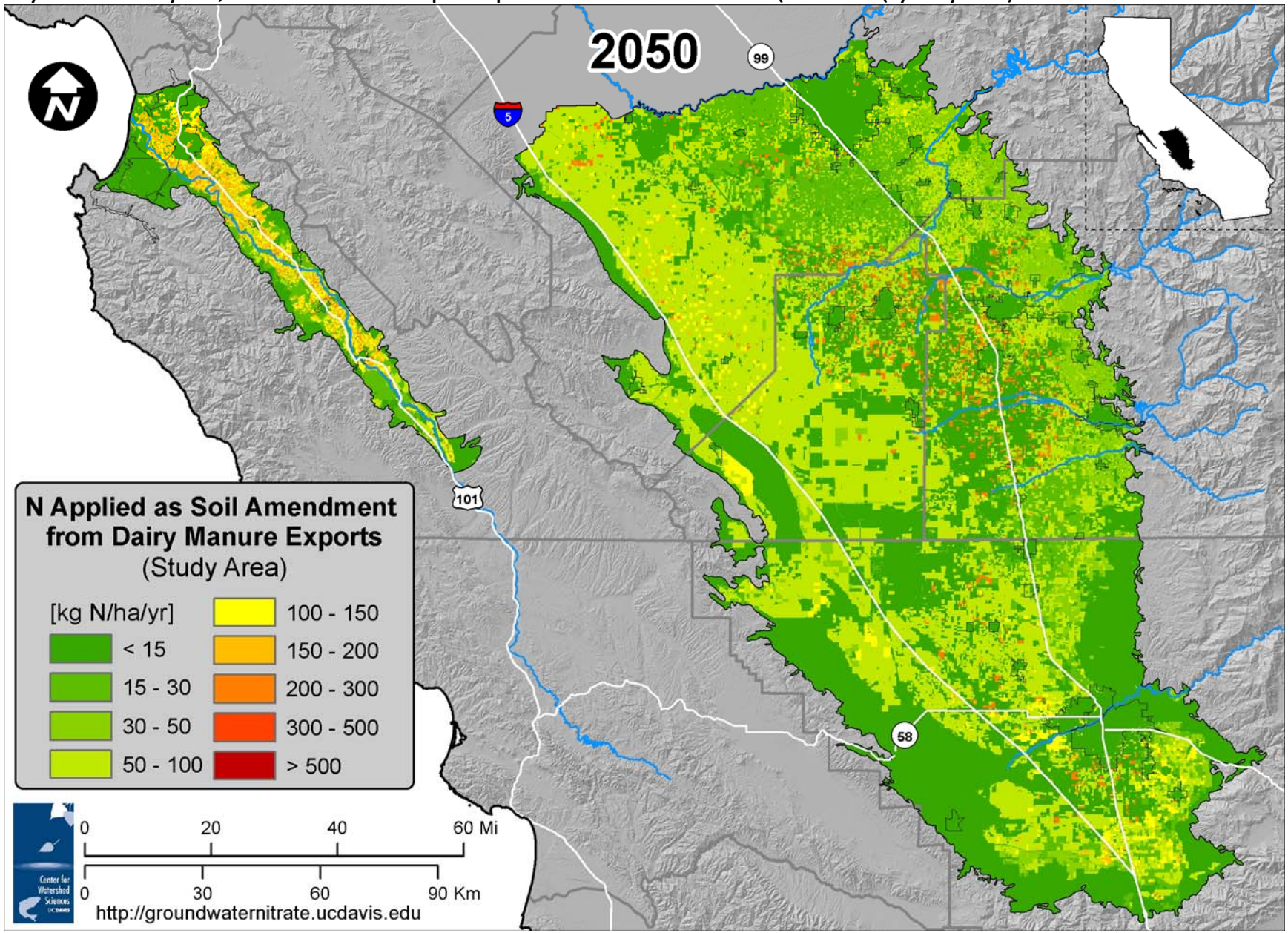
Appendix Figure 58. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the study area, in 2020. Total manure exports represent 38% of animal N excreted ("Scenario C (by study area").



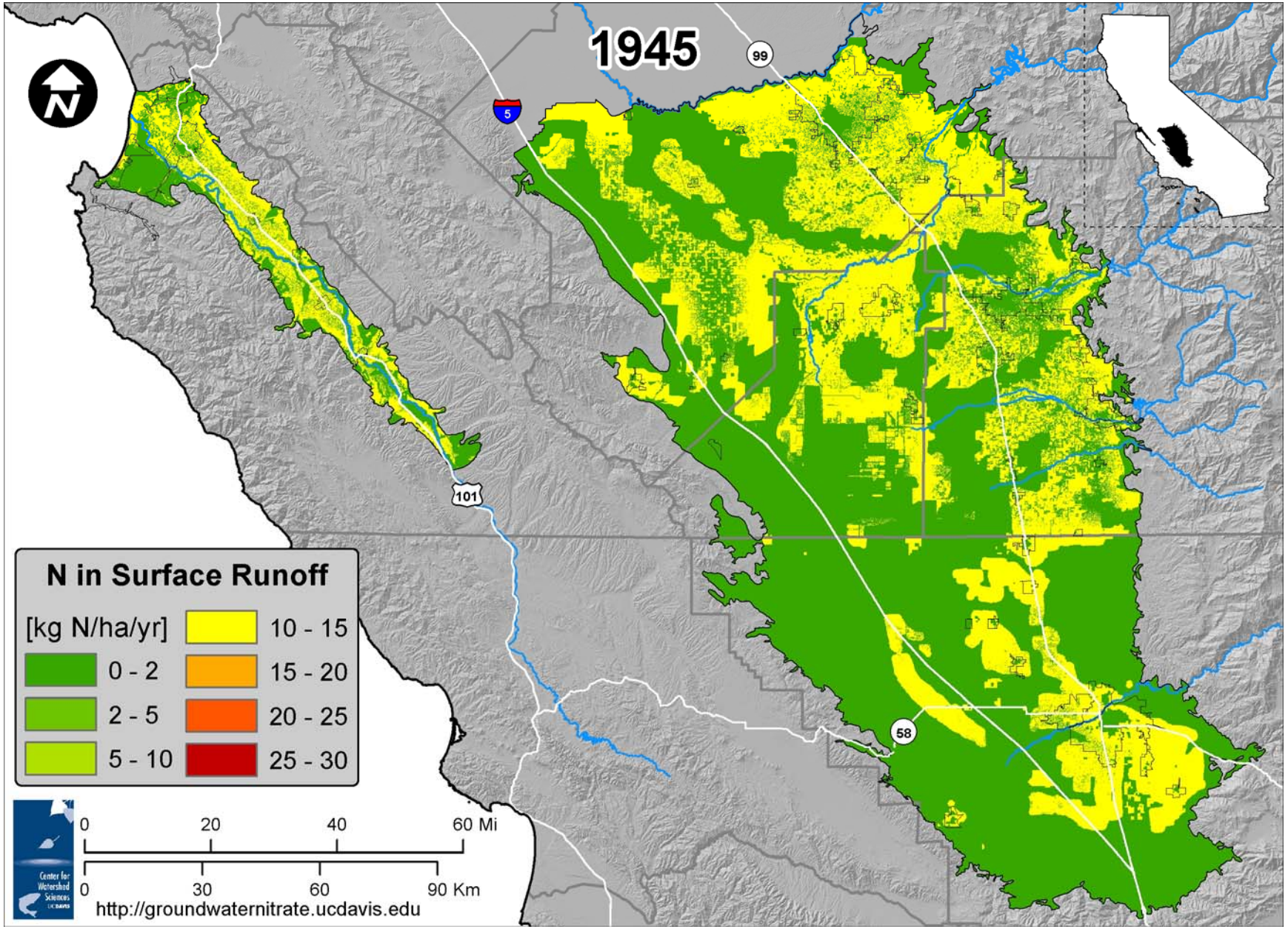
Appendix Figure 59. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the study area, in 2035. Total manure exports represent 38% of animal N excreted ("Scenario C (by study area").



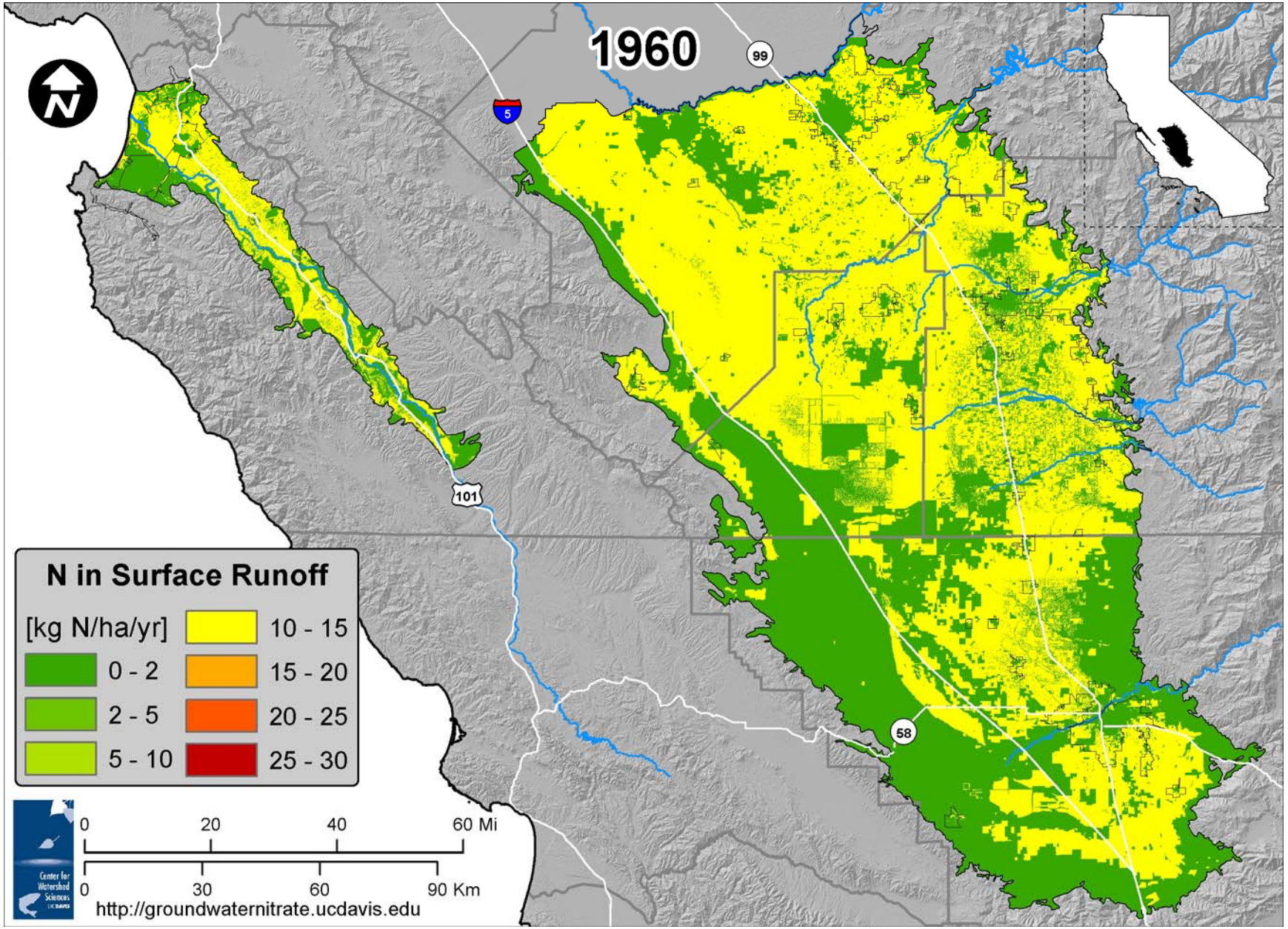
Appendix Figure 60. Land applied, exported dairy manure nitrogen used as soil amendment outside of dairy-controlled cropland, assuming that exports stay within the study area, in 2050. Total manure exports represent 38% of animal N excreted ("Scenario C (by study area").



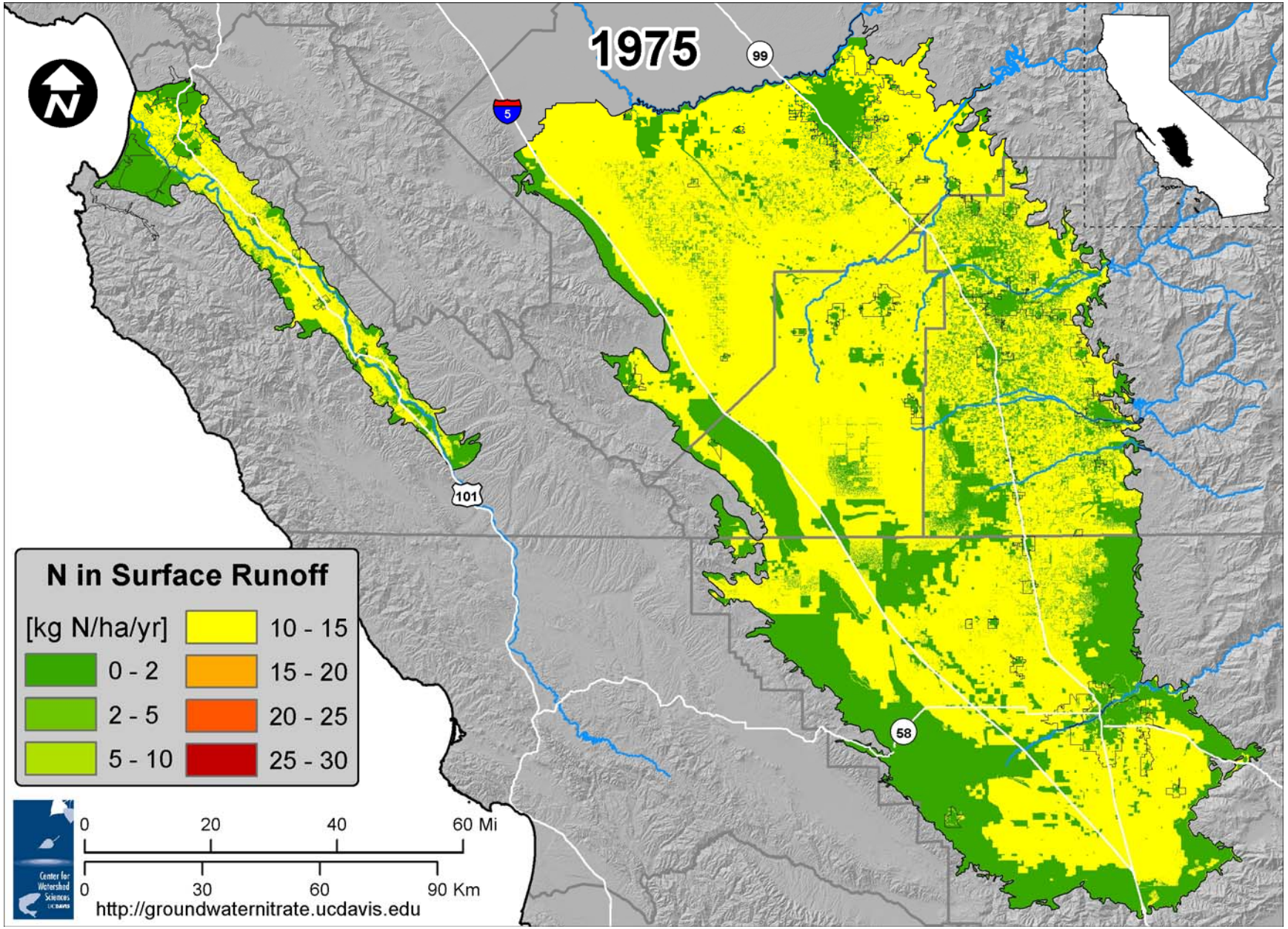
Appendix Figure 61. Nitrogen lost to surface runoff, in 1945.



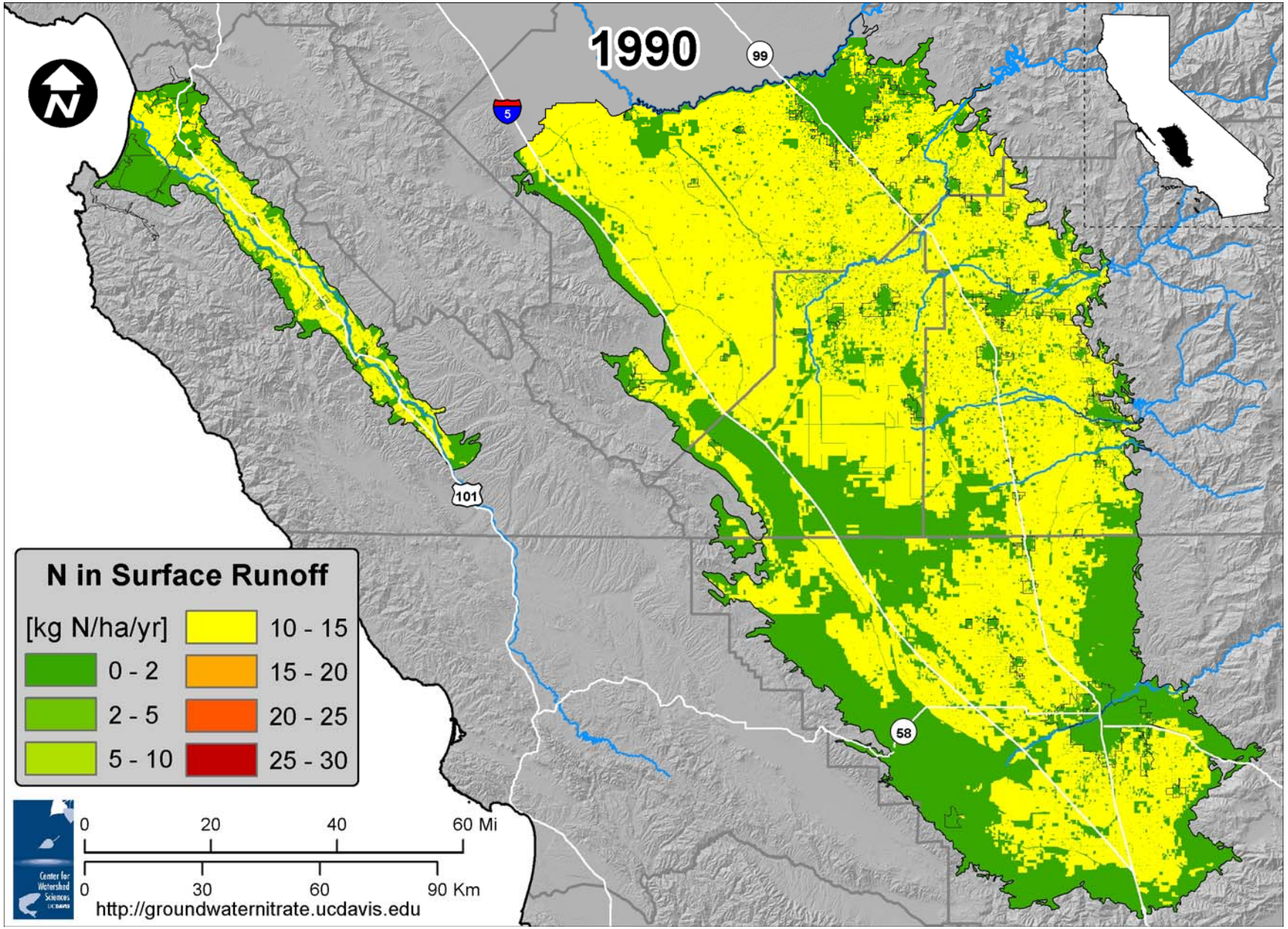
Appendix Figure 62. Nitrogen lost to surface runoff, in 1960.



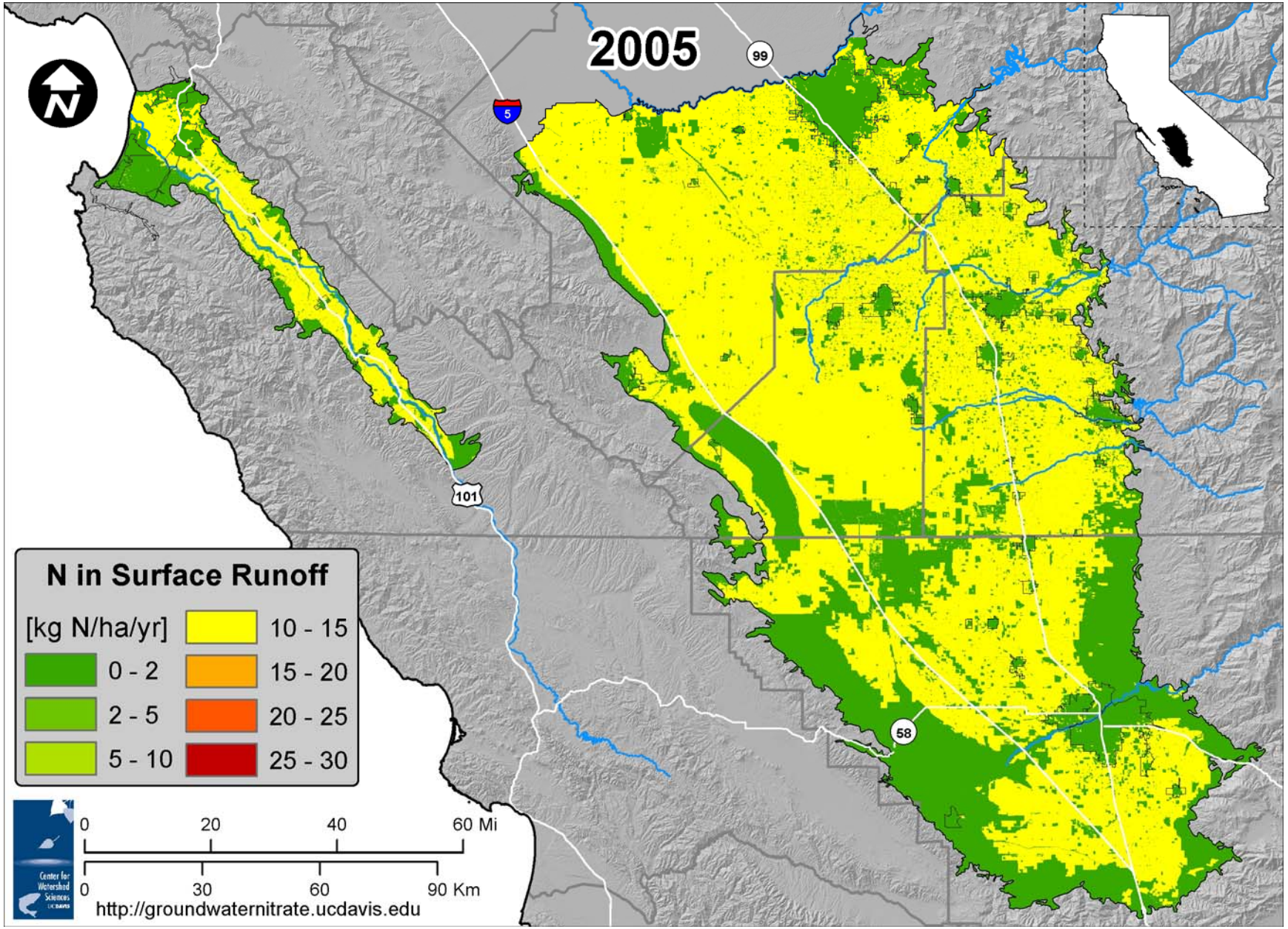
Appendix Figure 63. Nitrogen lost to surface runoff, in 1975.



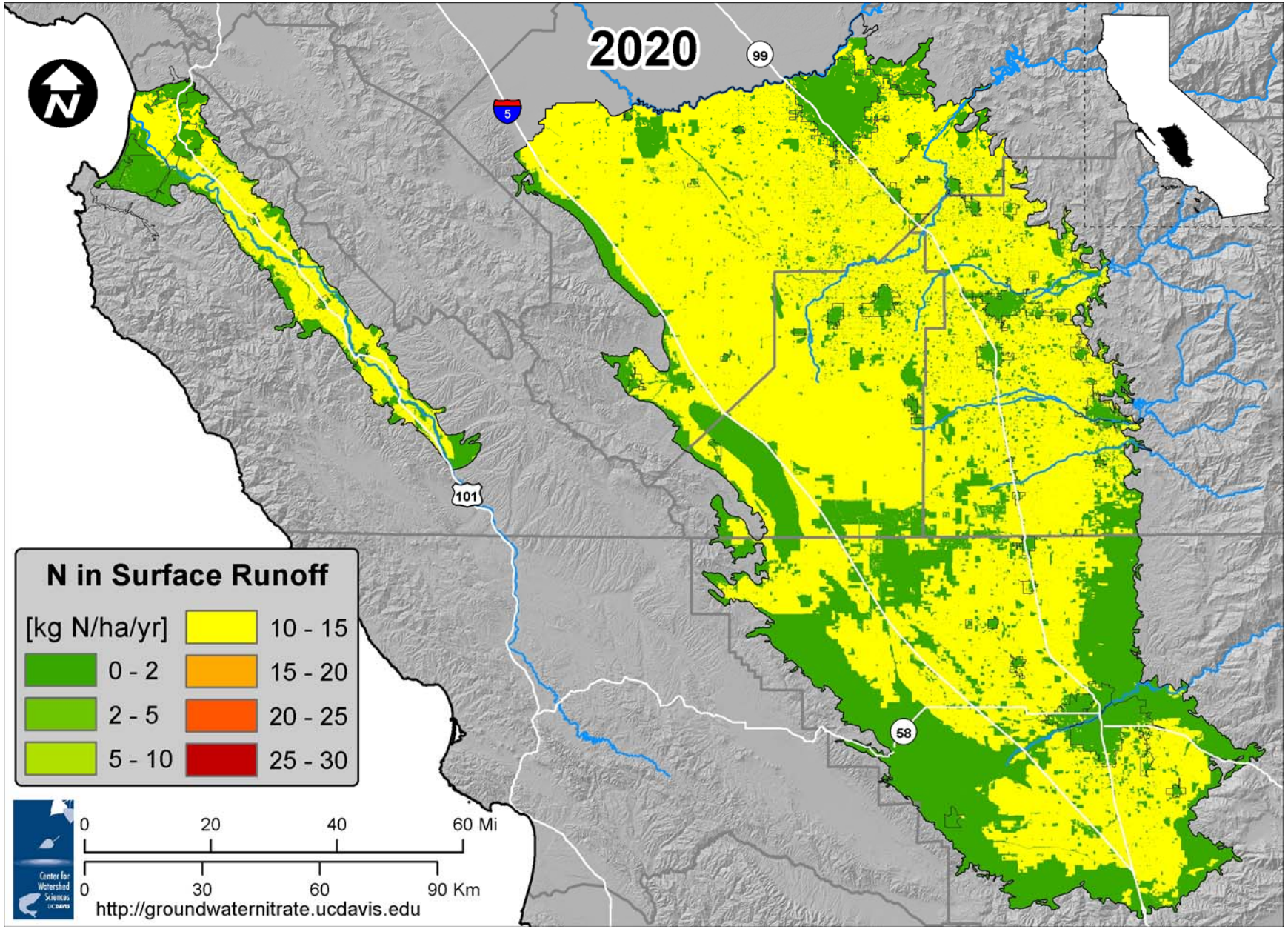
Appendix Figure 64. Nitrogen lost to surface runoff, in 1990.



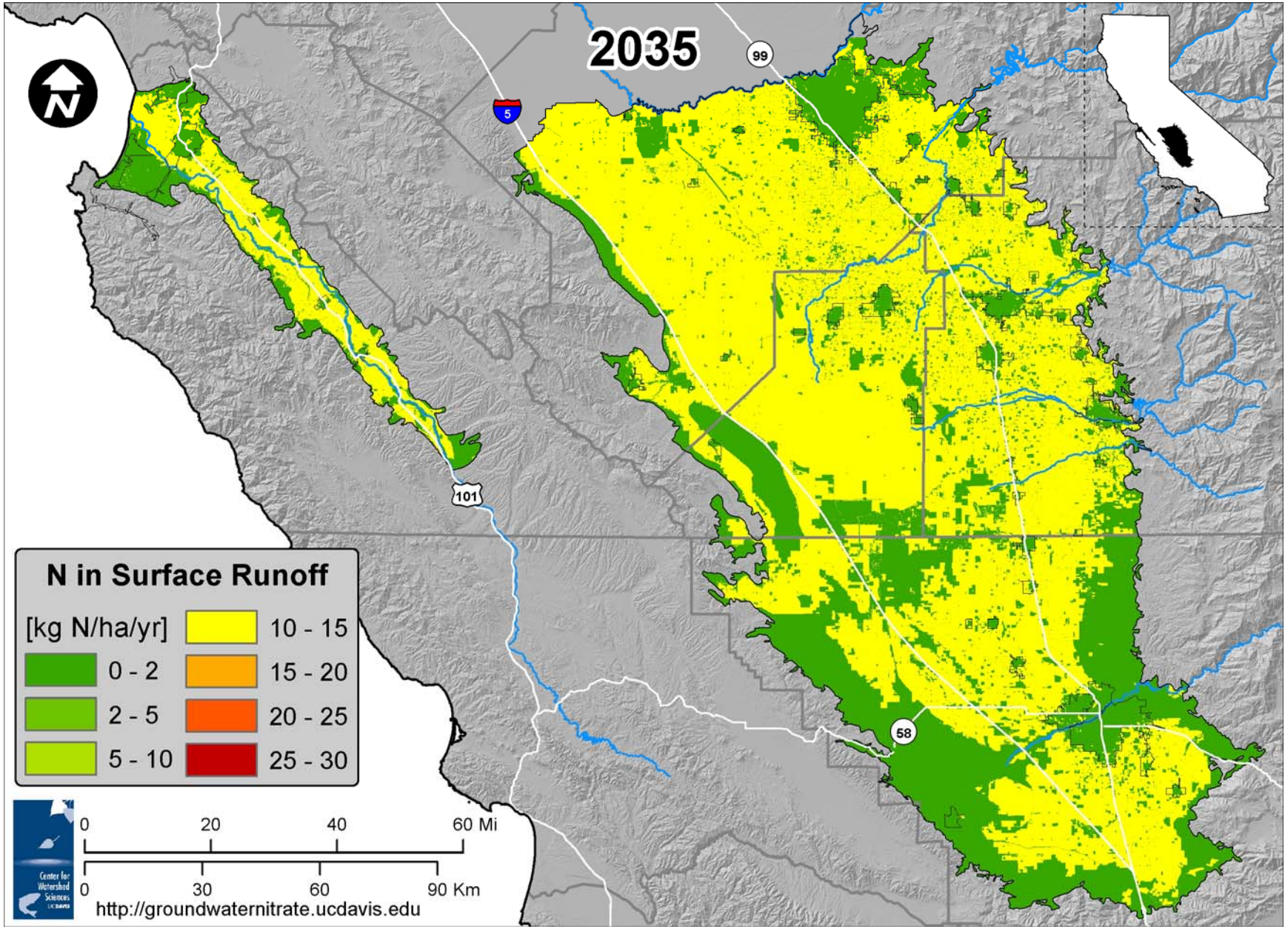
Appendix Figure 65. Nitrogen lost to surface runoff, in 2005.



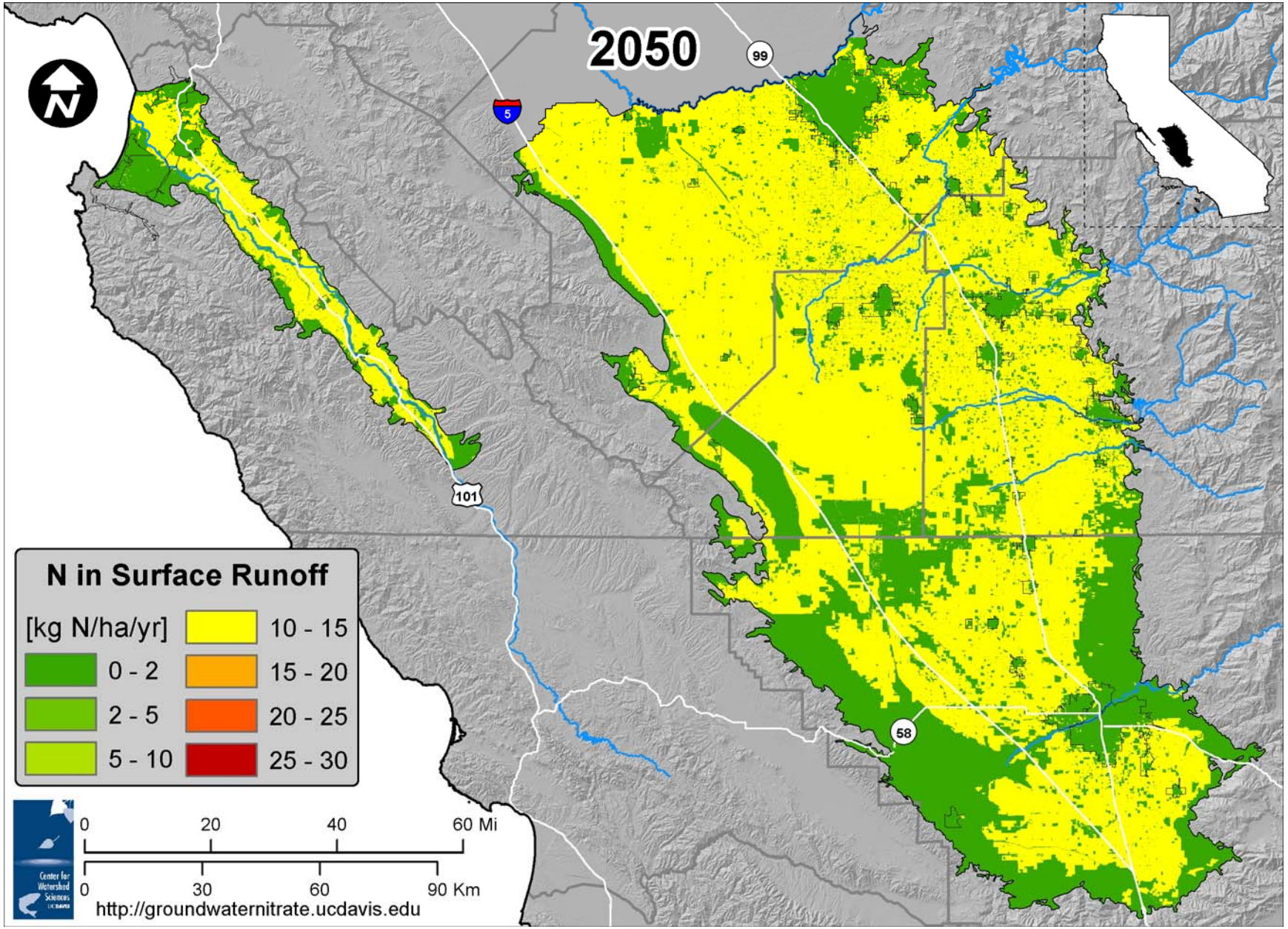
Appendix Figure 66. Nitrogen lost to surface runoff, in 2020.



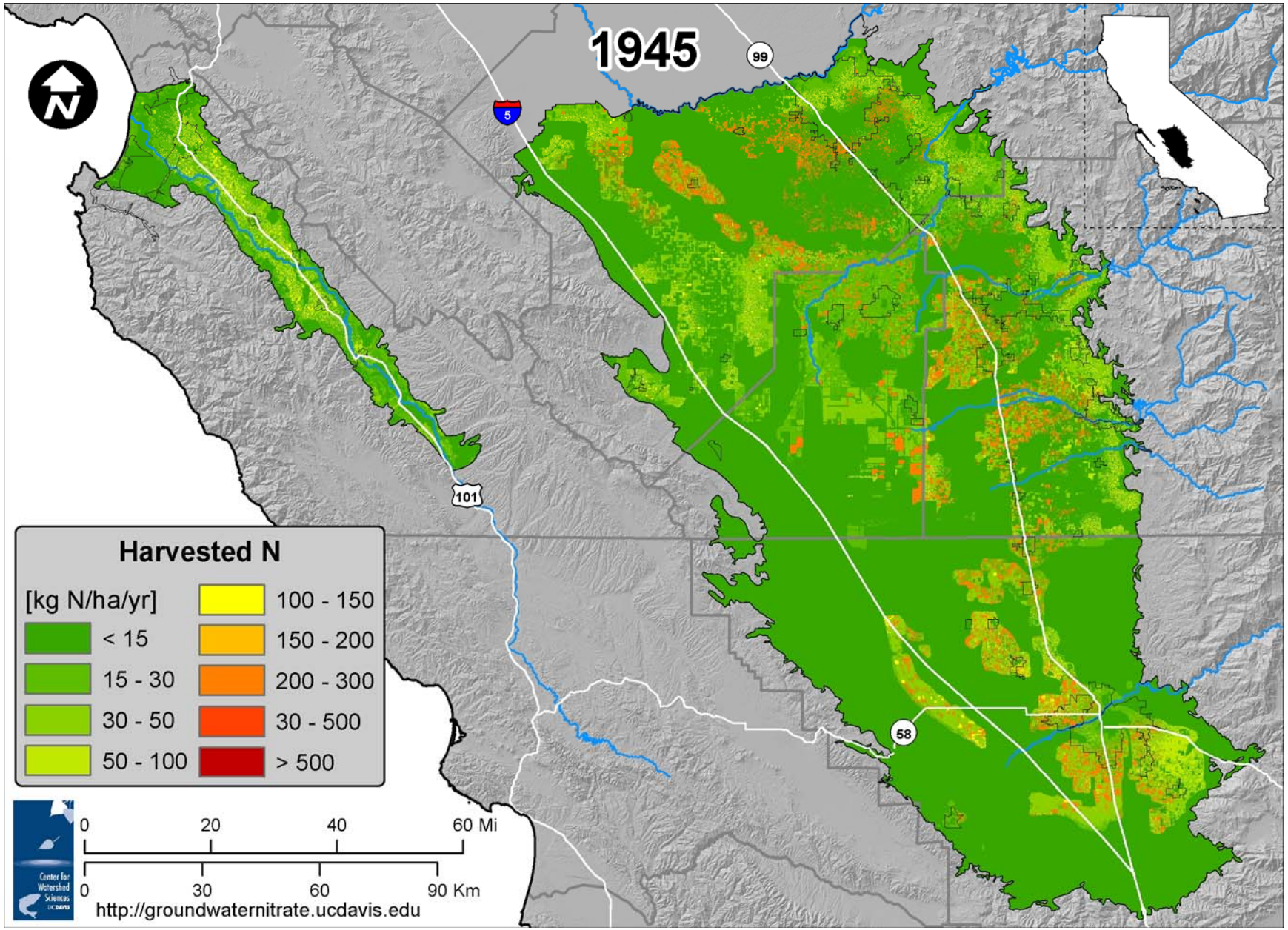
Appendix Figure 67. Nitrogen lost to surface runoff, in 2035.



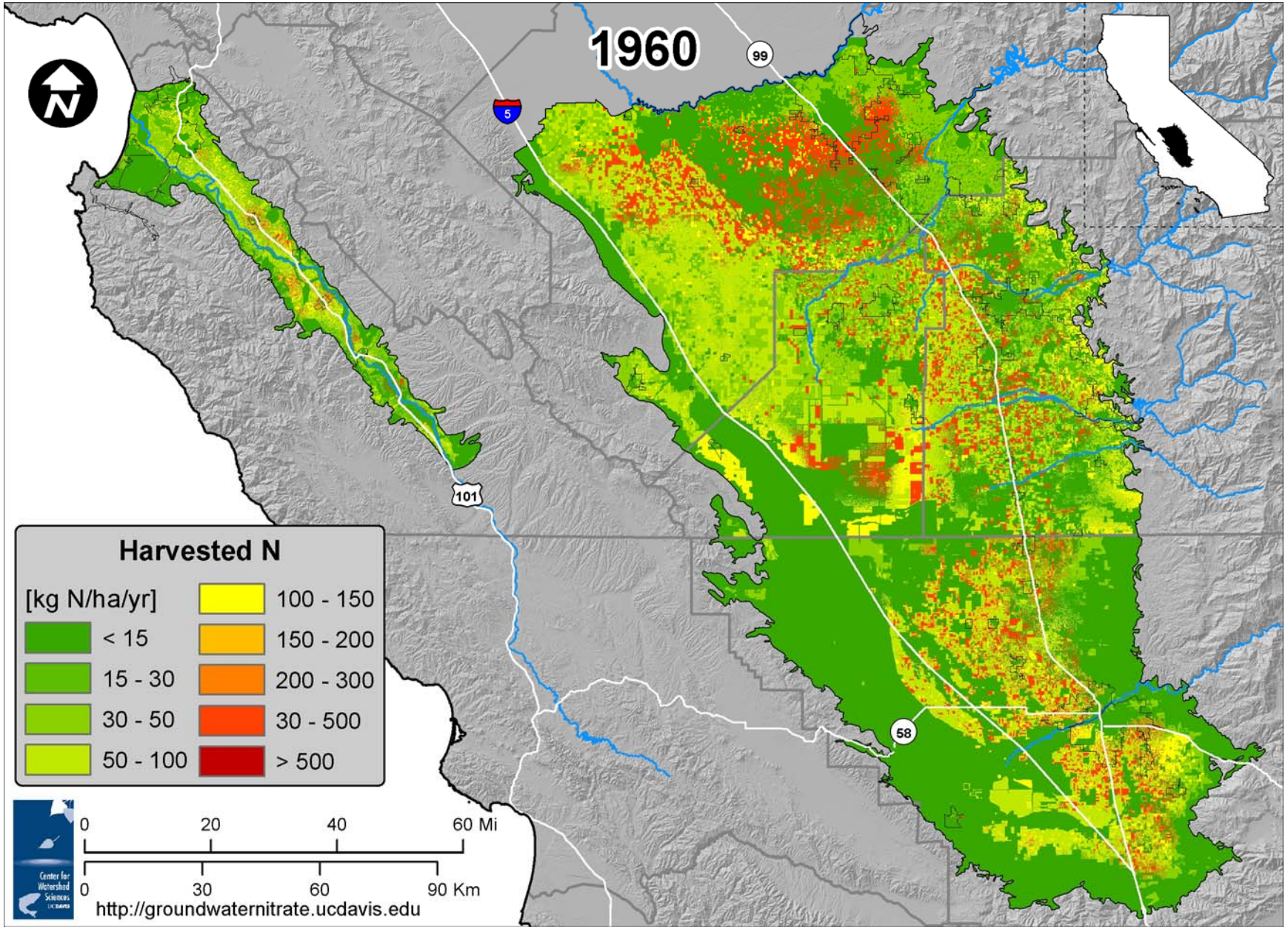
Appendix Figure 68. Nitrogen lost to surface runoff, in 2050.



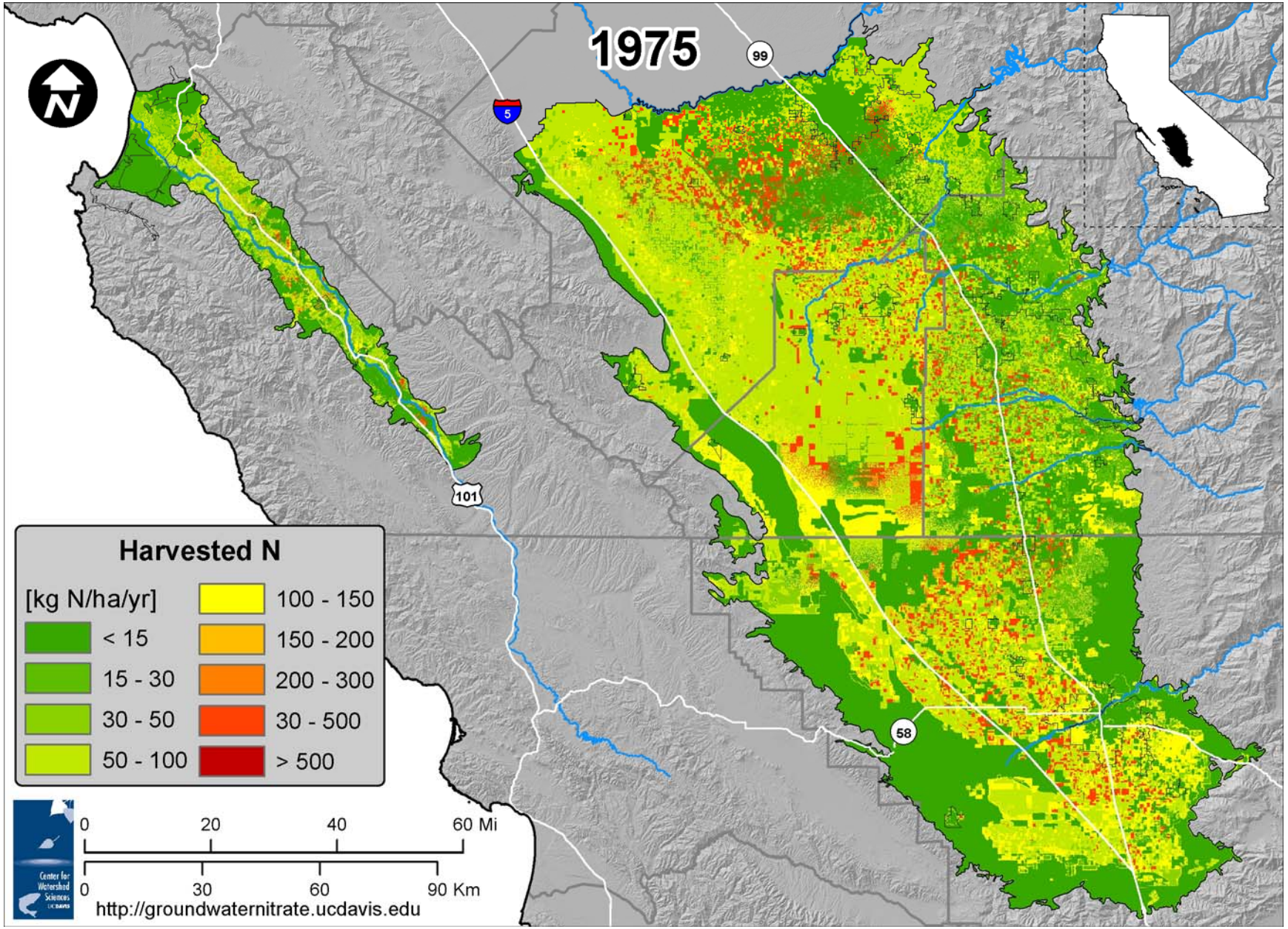
Appendix Figure 69. Nitrogen harvested, in 1945.



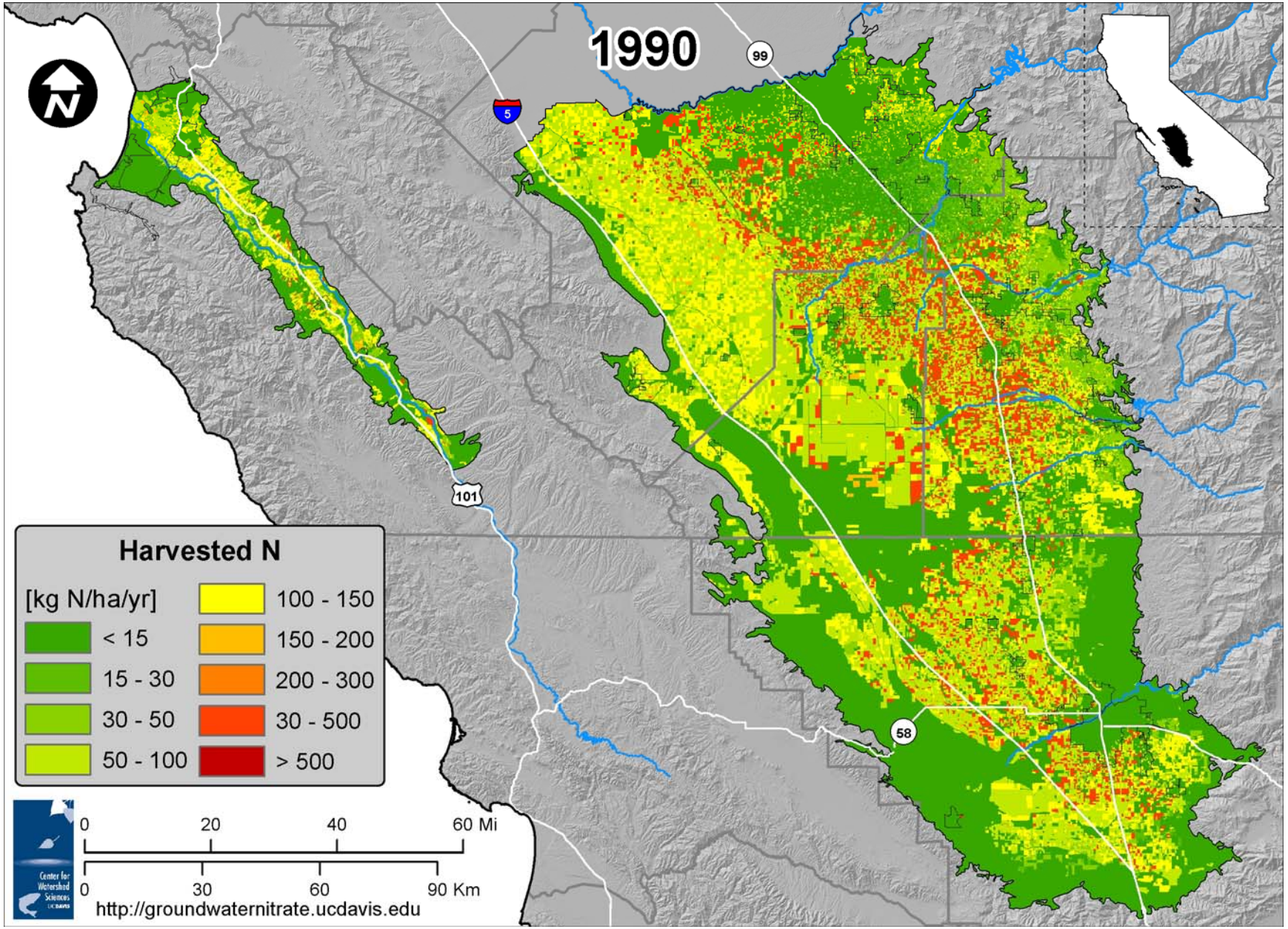
Appendix Figure 70. Nitrogen harvested, in 1960.



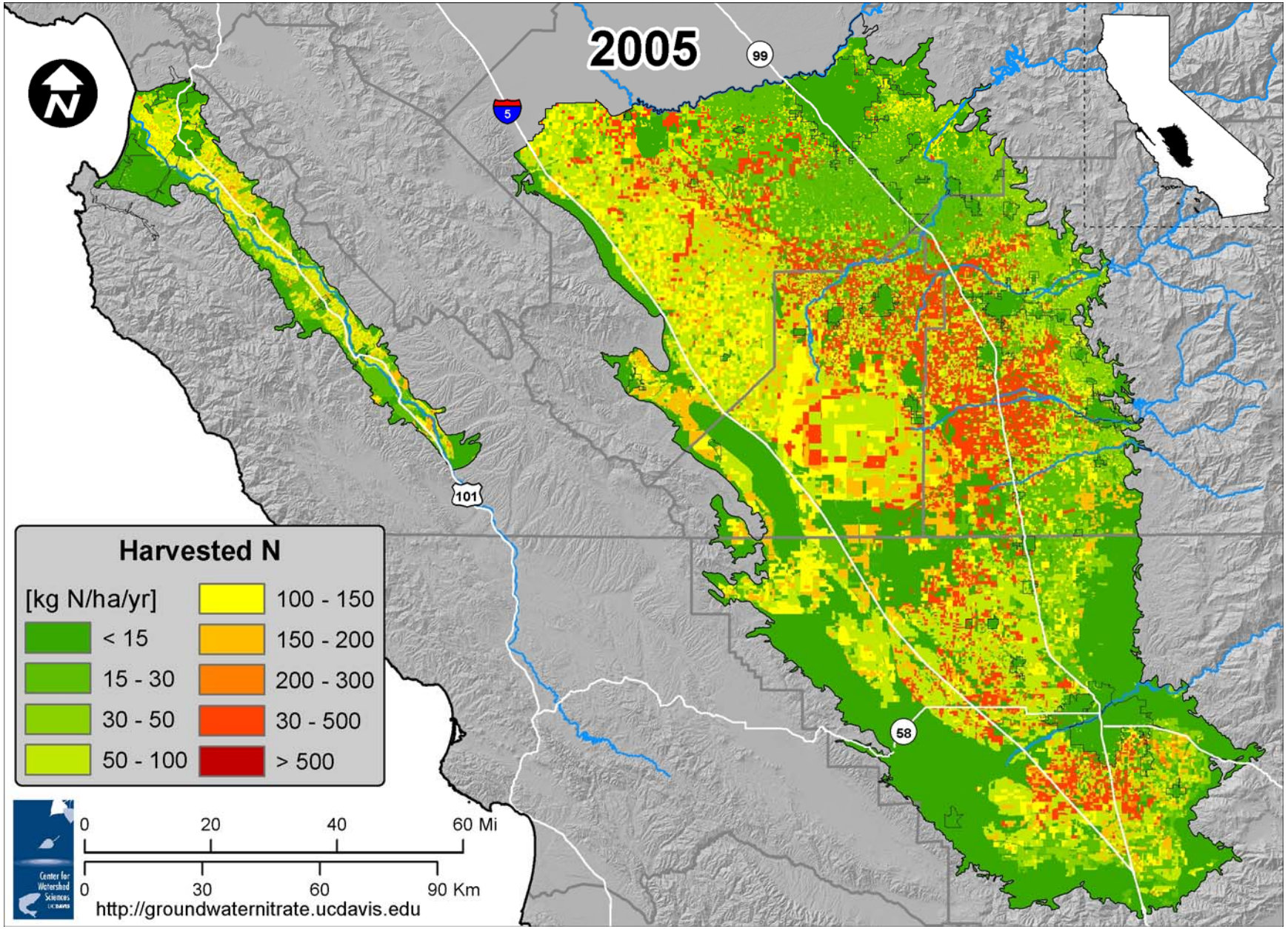
Appendix Figure 71. Nitrogen harvested, in 1975.



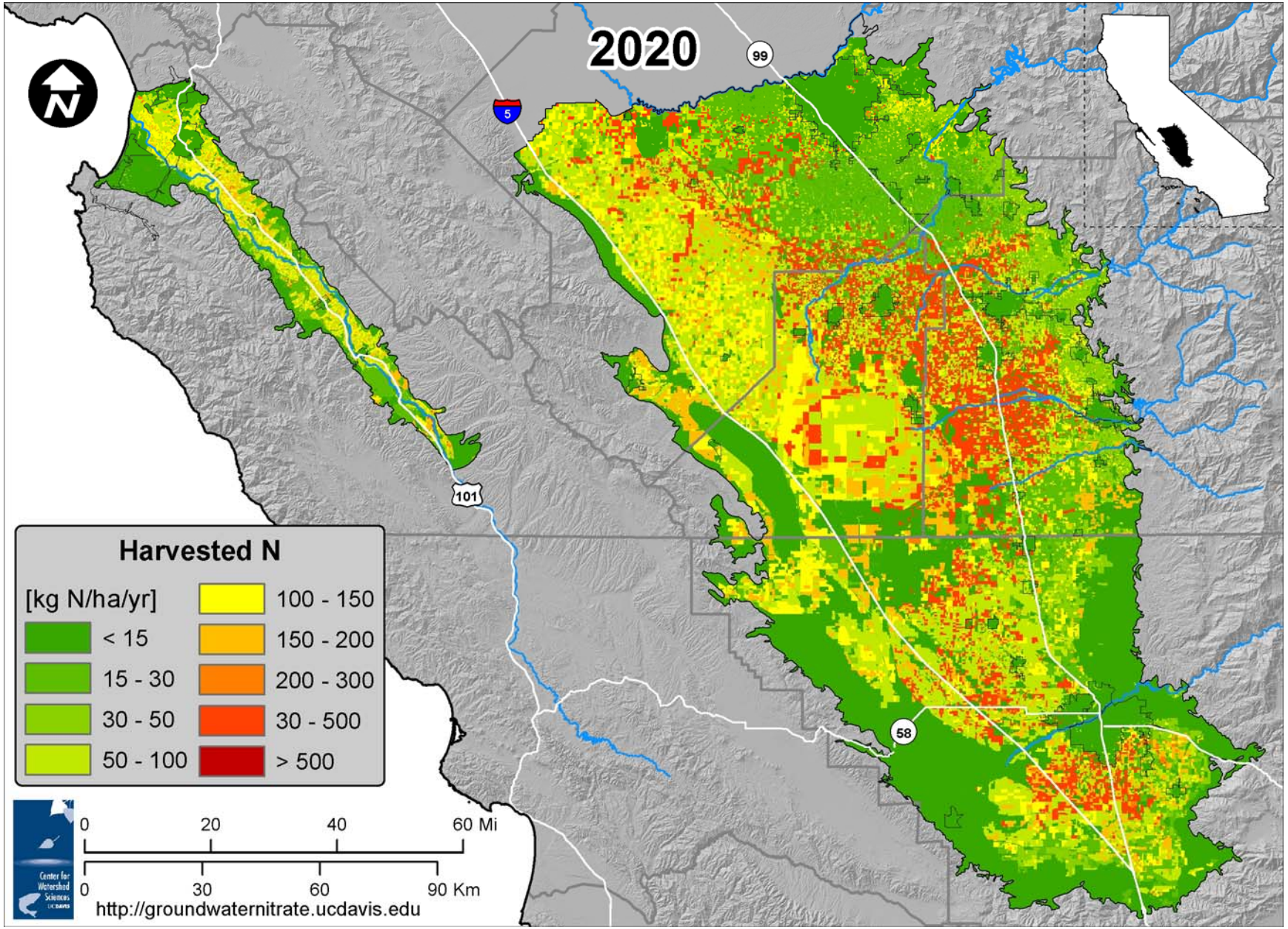
Appendix Figure 72. Nitrogen harvested, in 1990.



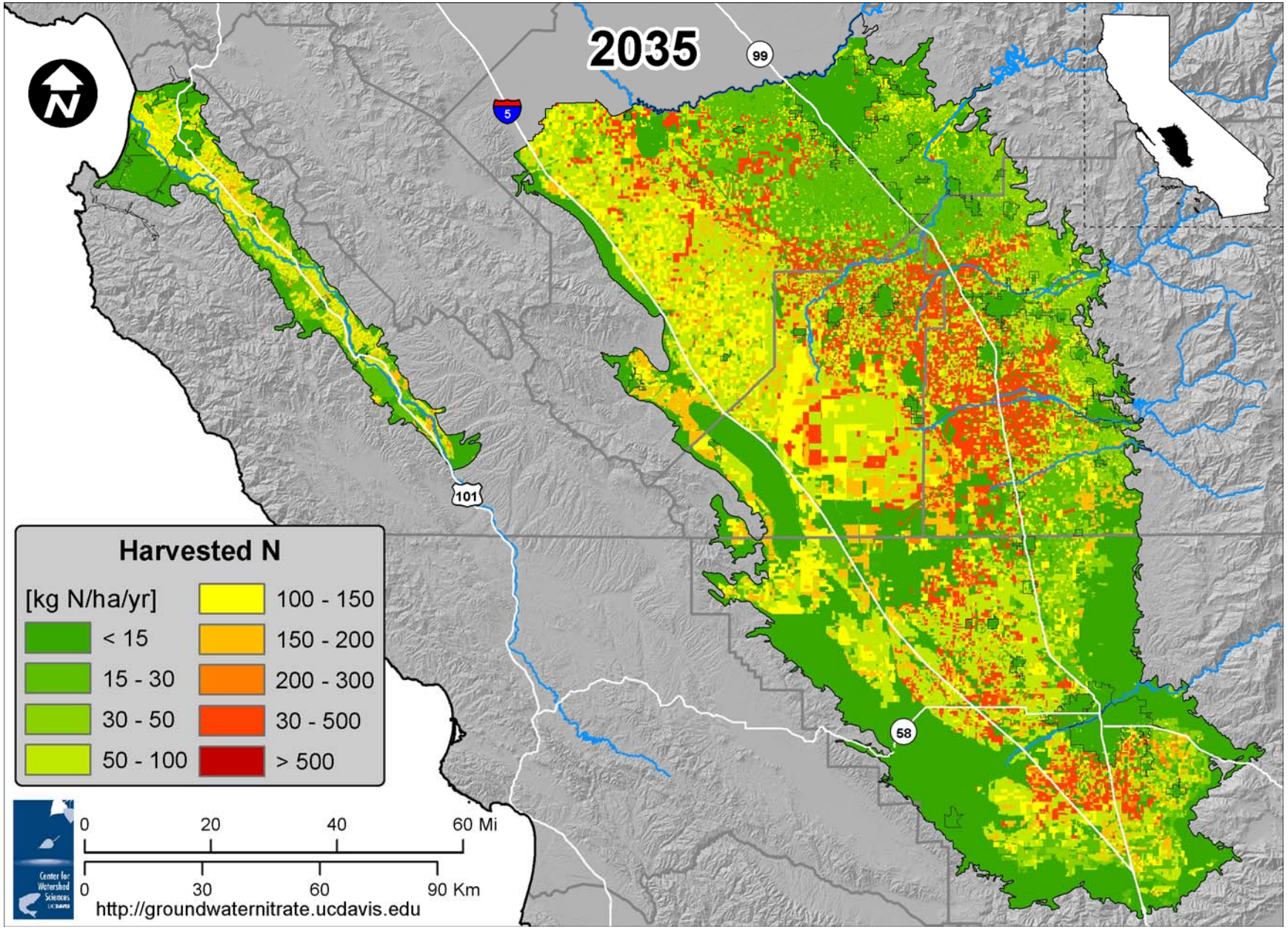
Appendix Figure 73. Nitrogen harvested, in 2005.



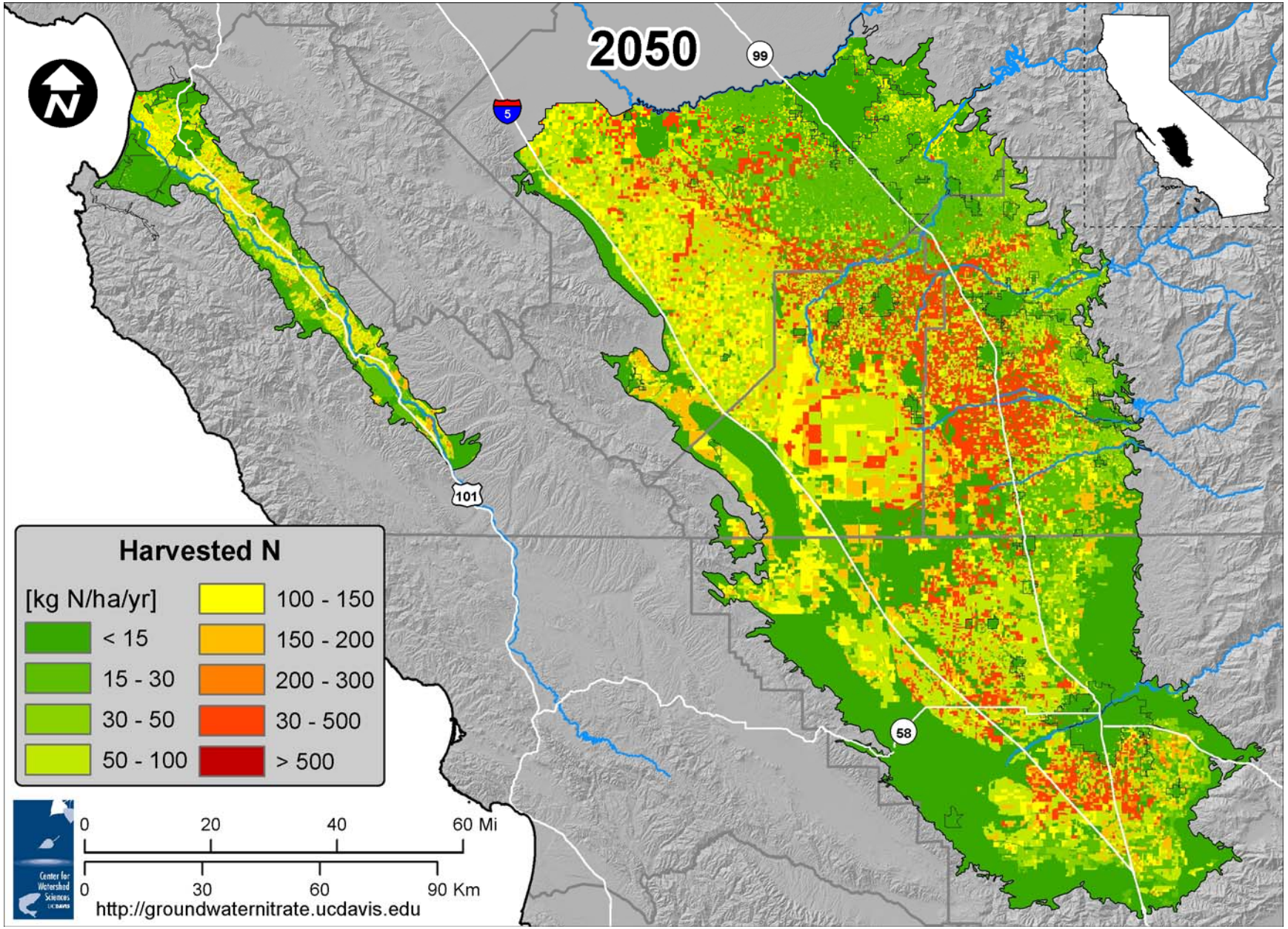
Appendix Figure 74. Nitrogen harvested, in 2020.



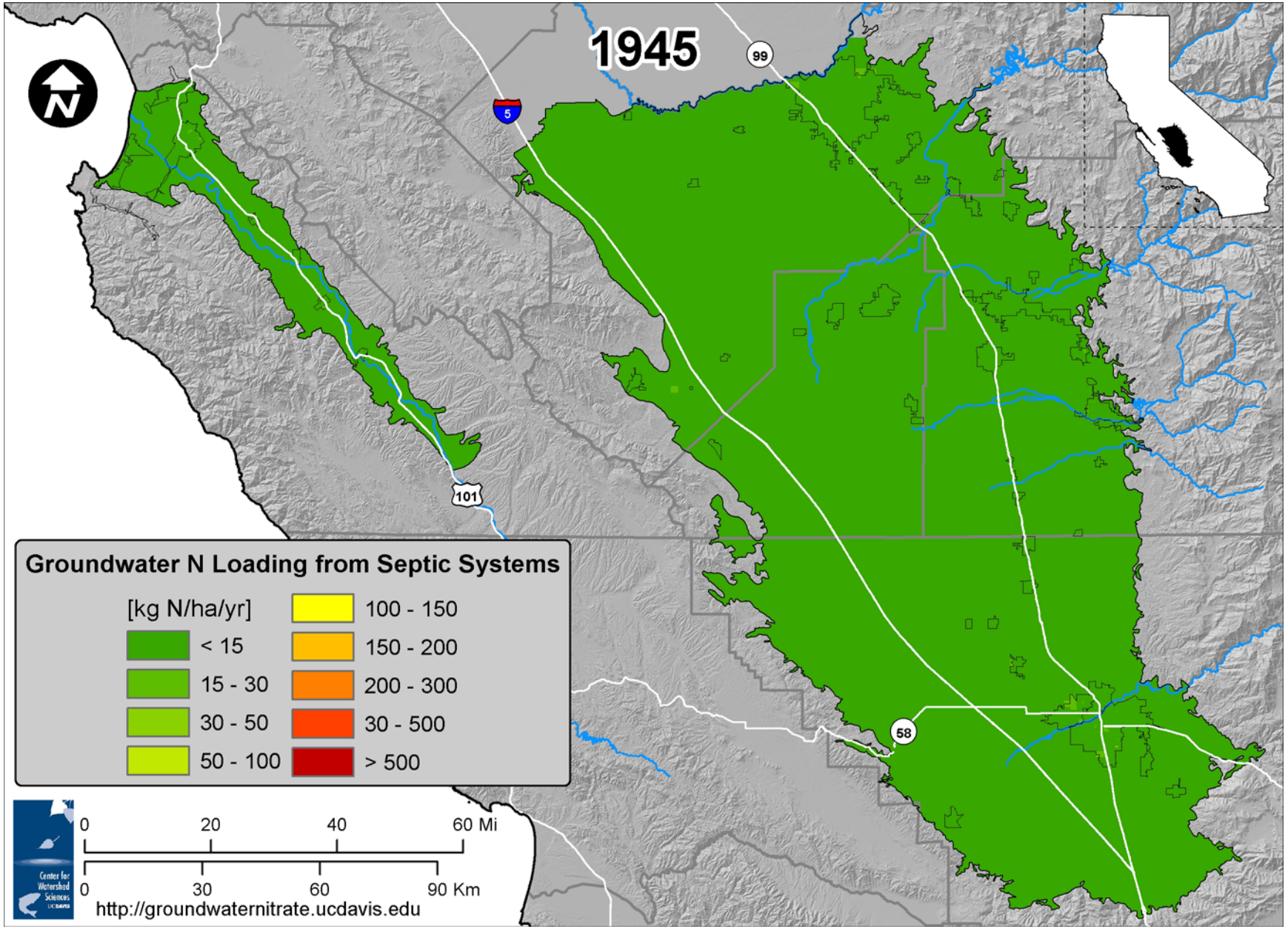
Appendix Figure 75. Nitrogen harvested, in 2035.



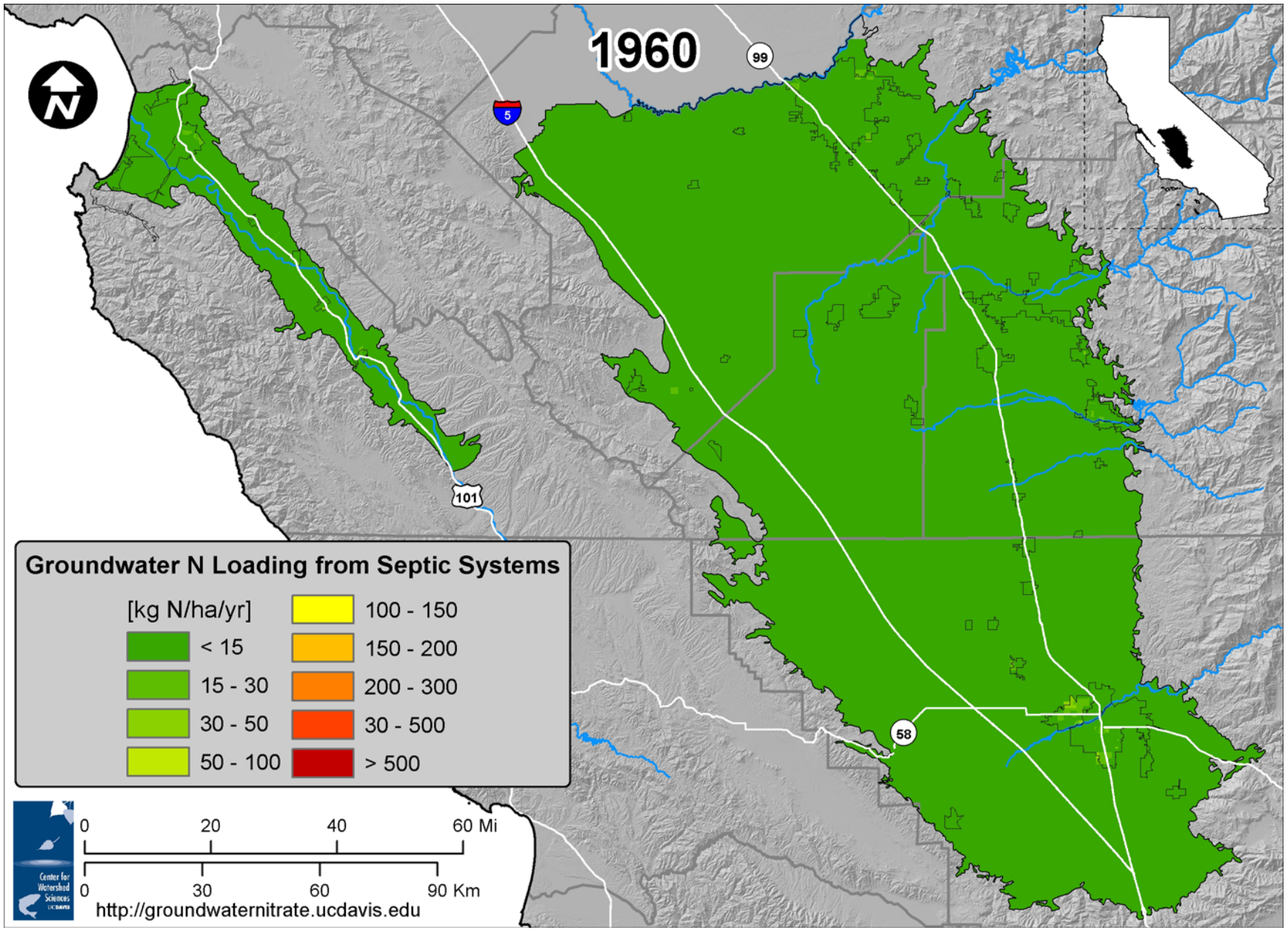
Appendix Figure 76. Nitrogen harvested, in 2050.



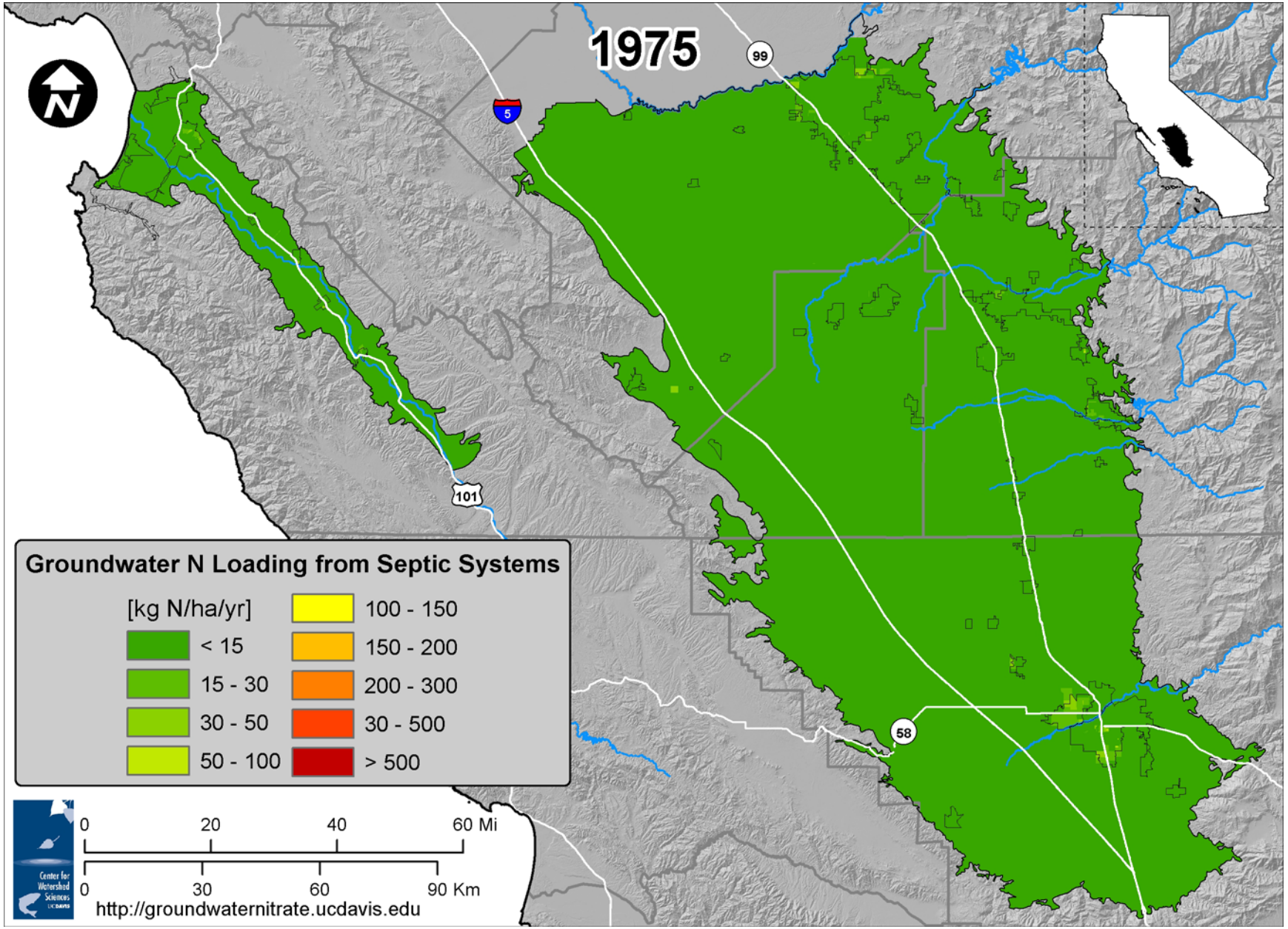
Appendix Figure 77. Nitrogen leached from septic systems, in 1945.



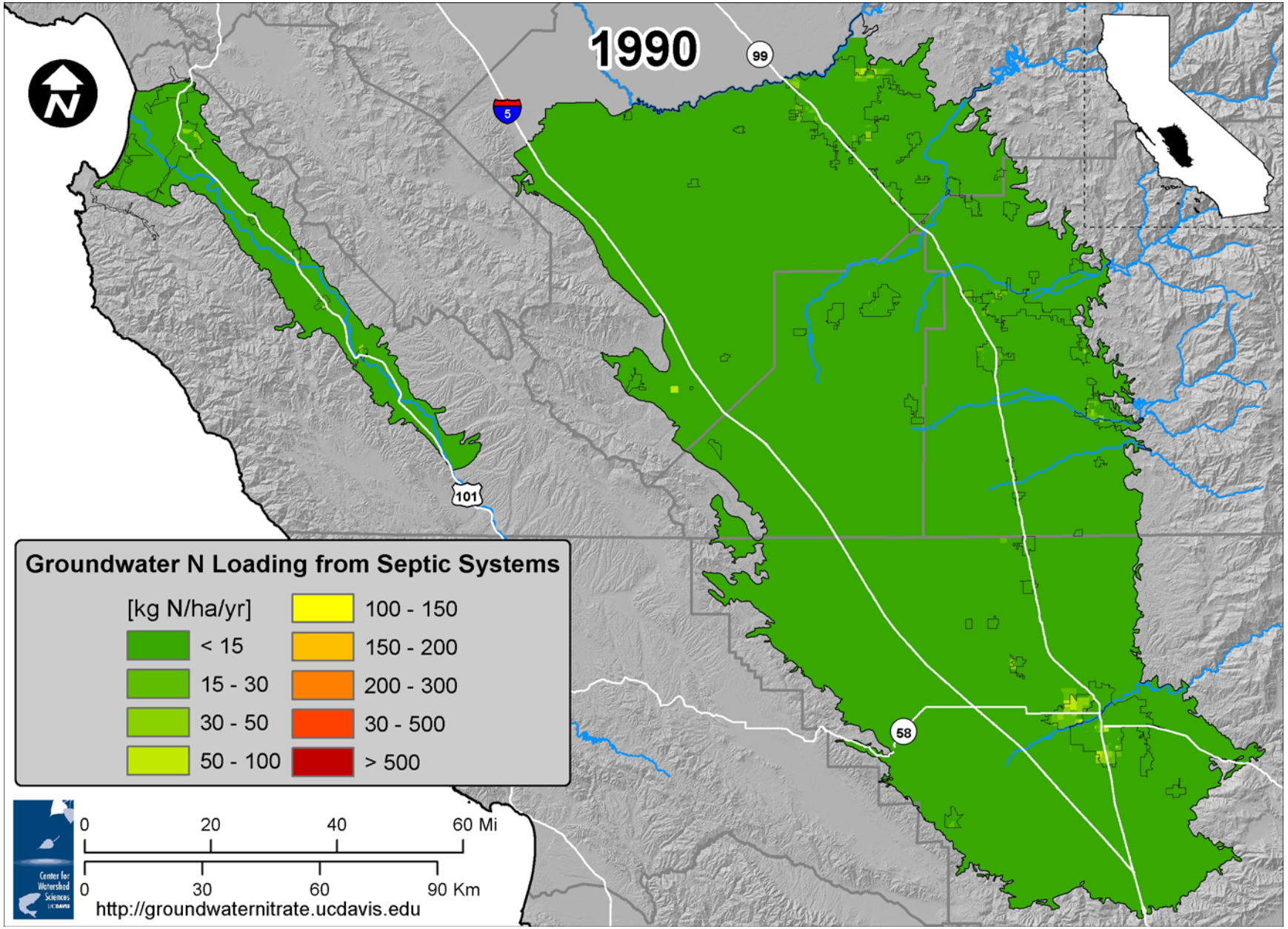
Appendix Figure 78. Nitrogen leached from septic systems, in 1960.



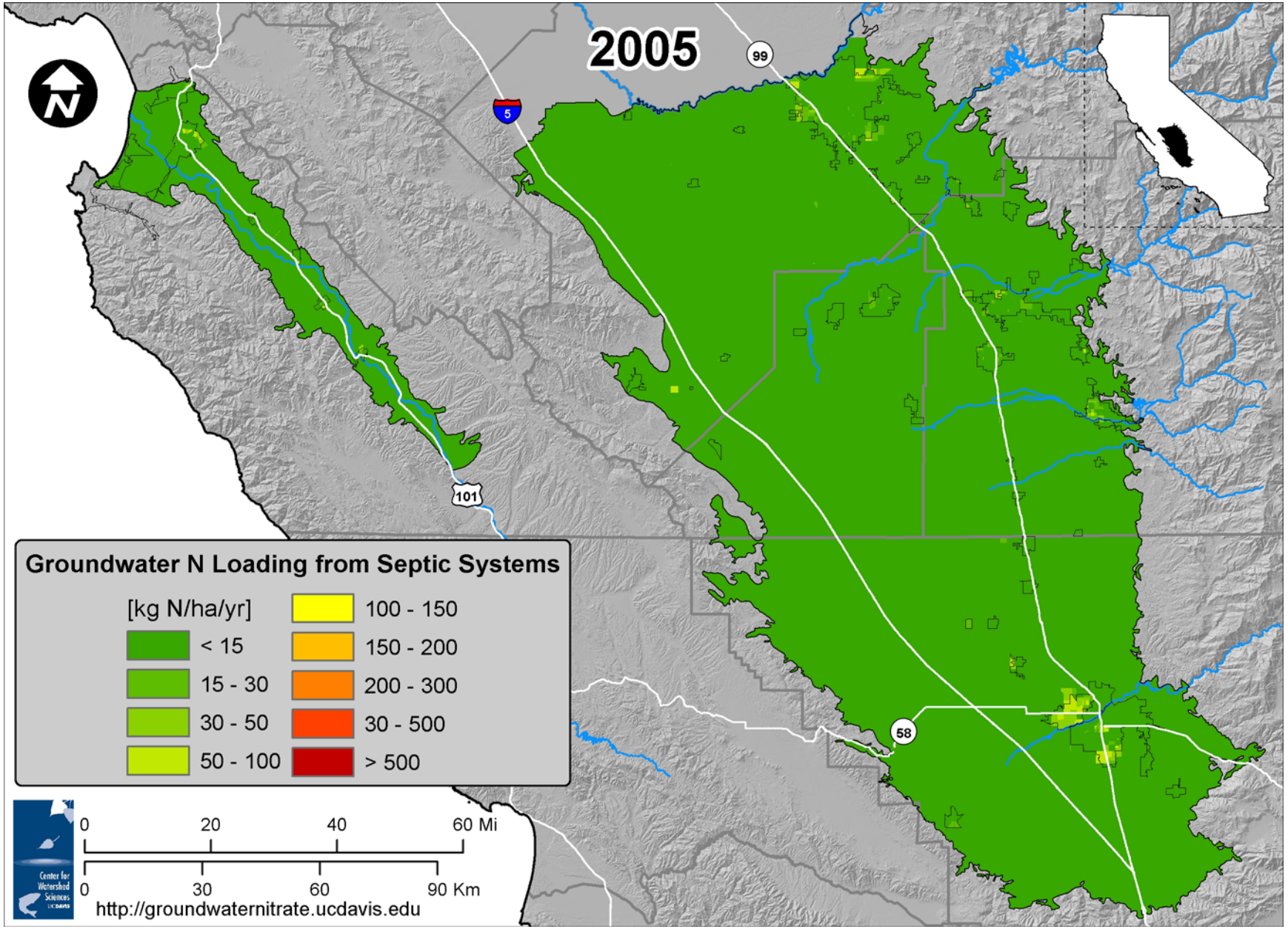
Appendix Figure 79. Nitrogen leached from septic systems, in 1975.



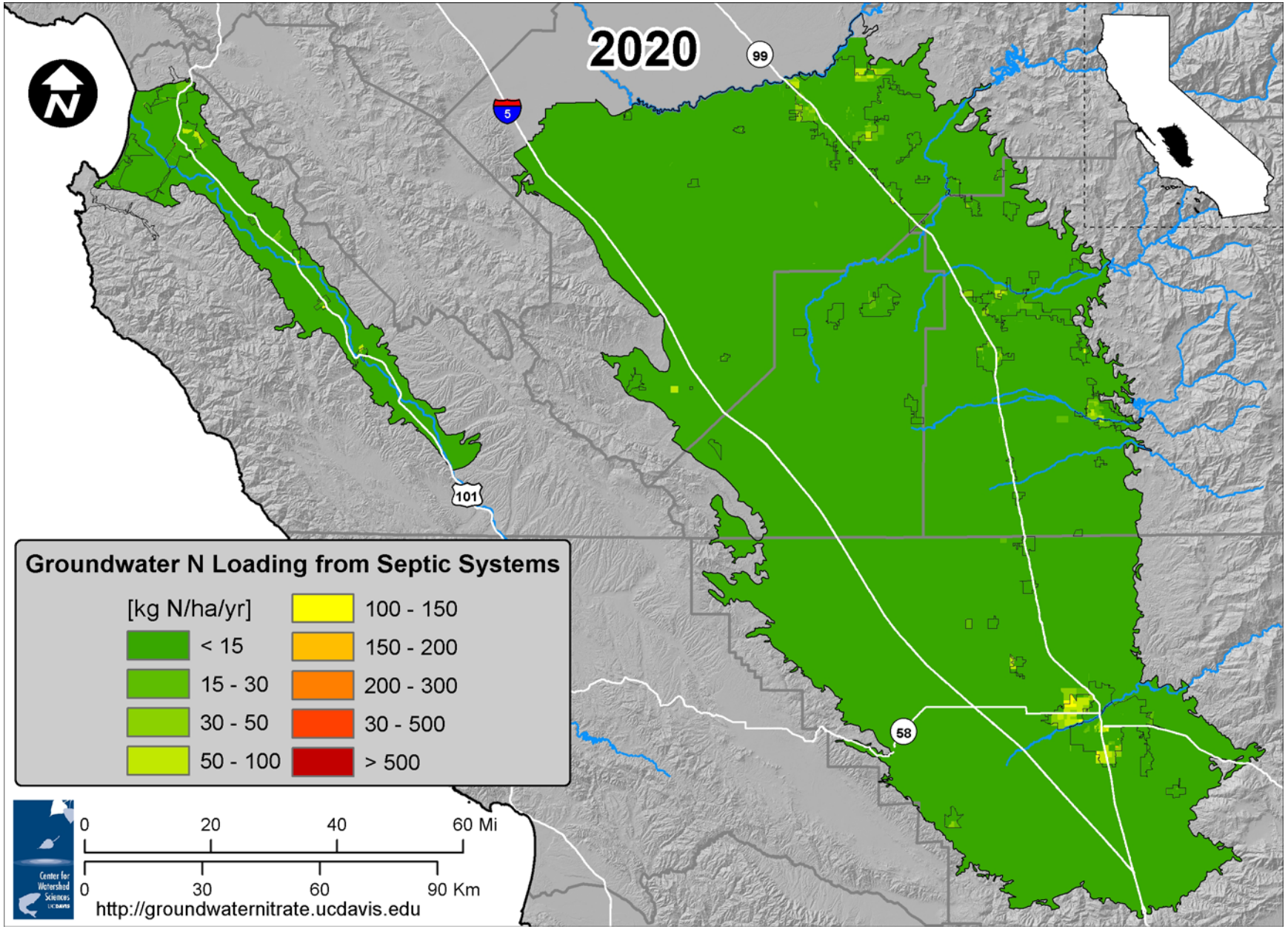
Appendix Figure 80. Nitrogen leached from septic systems, in 1990.



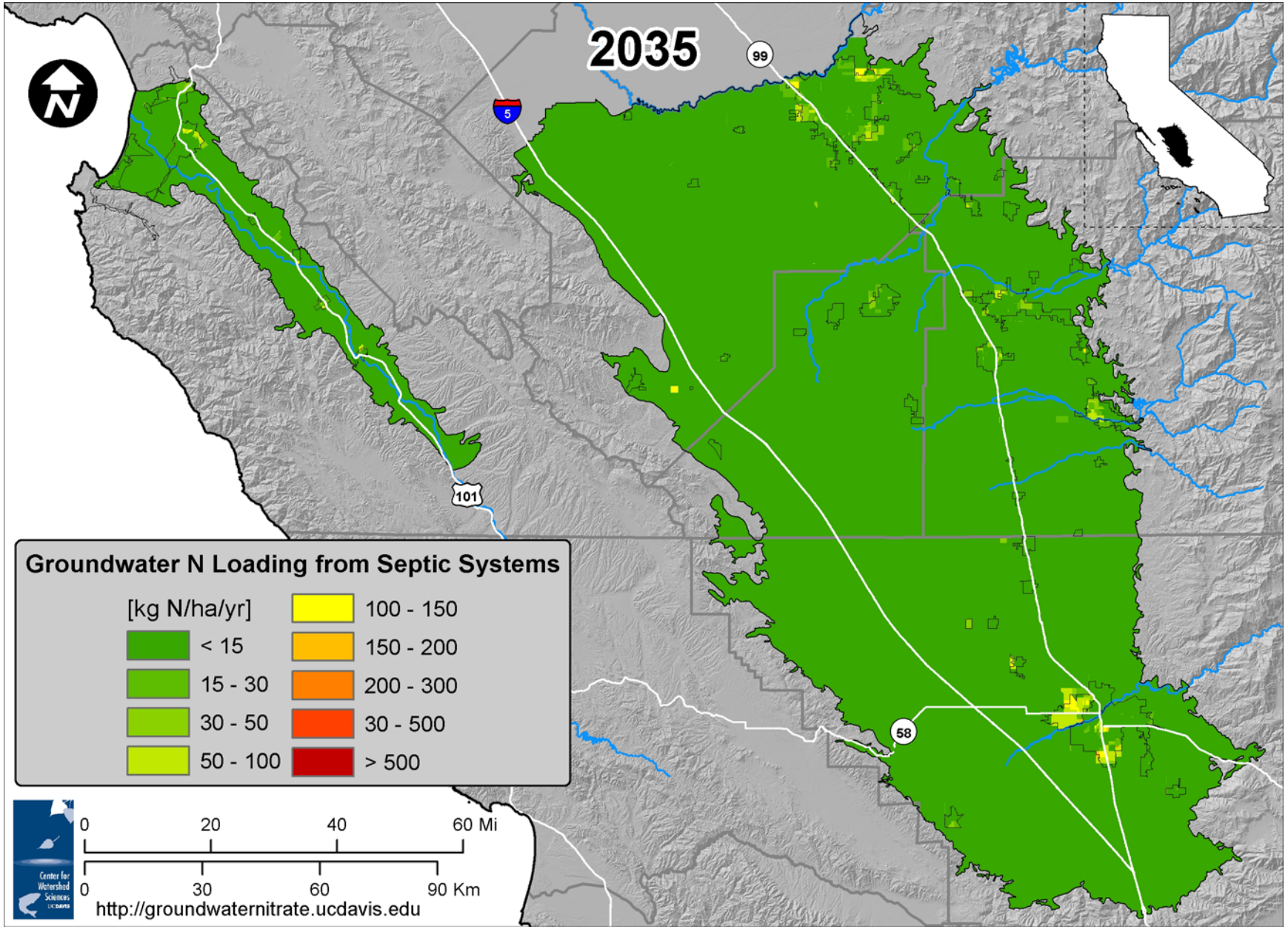
Appendix Figure 81. Nitrogen leached from septic systems, in 2005.



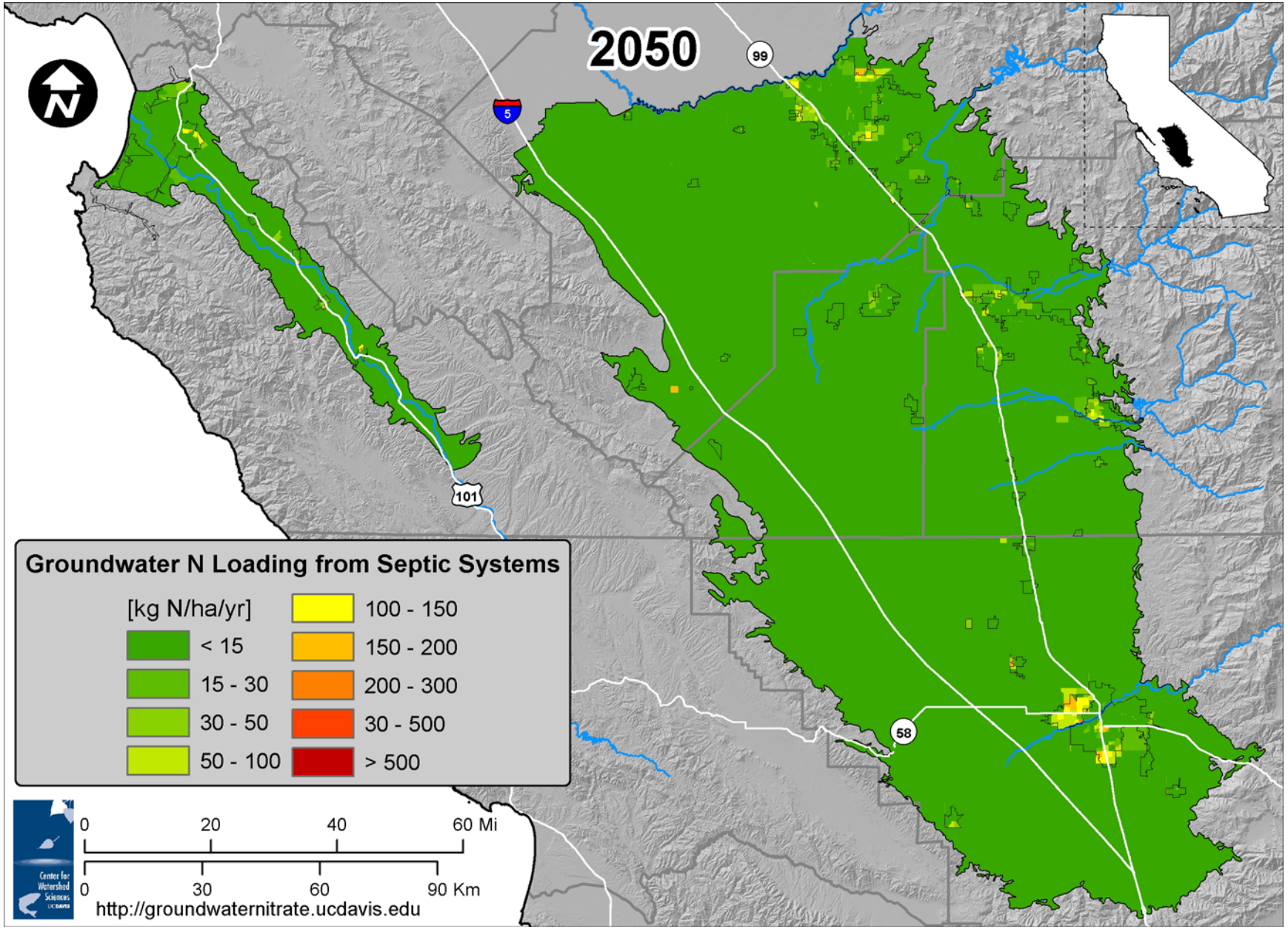
Appendix Figure 82. Nitrogen leached from septic systems, in 2020.



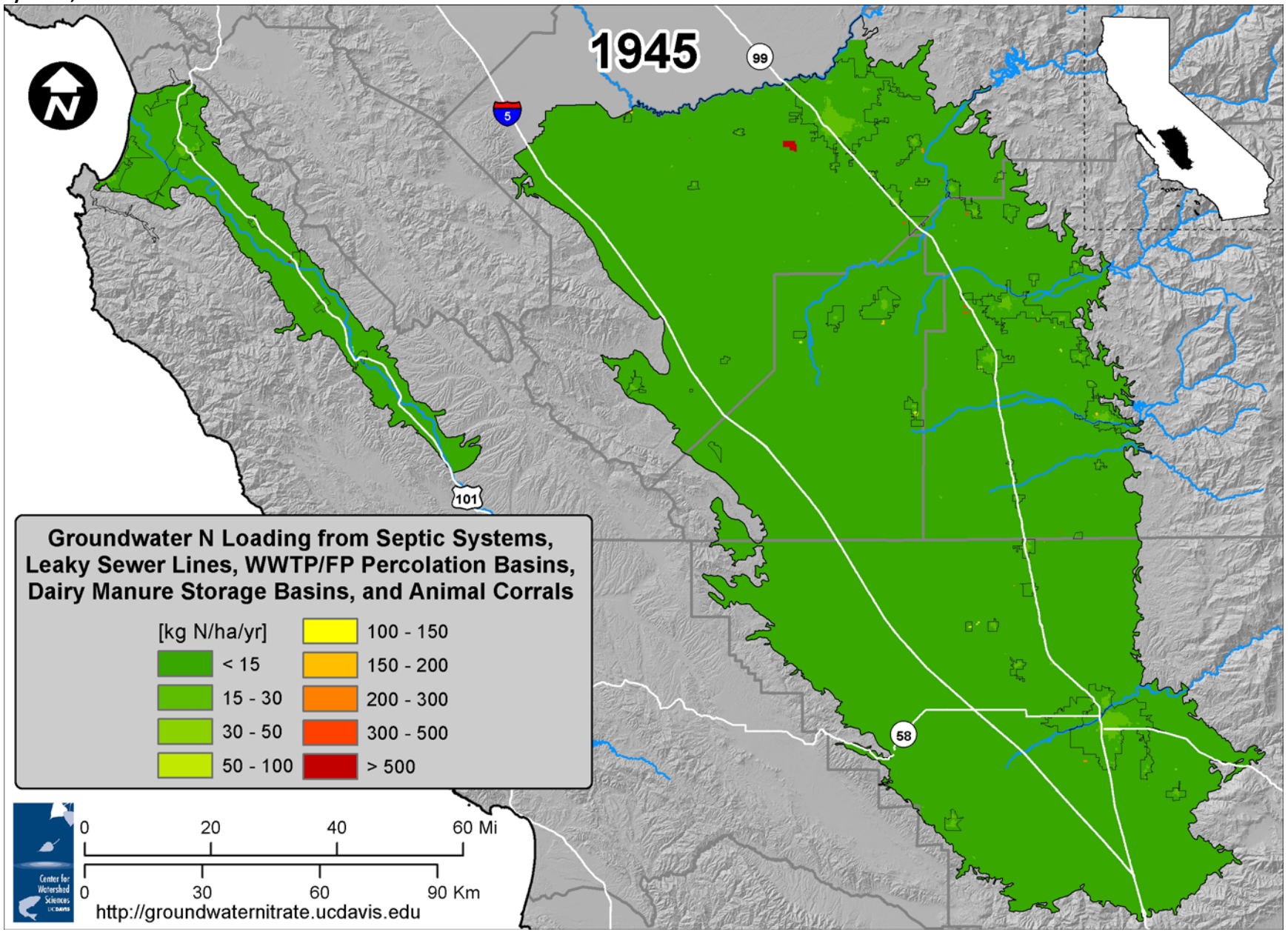
Appendix Figure 83. Nitrogen leached from septic systems, in 2035.



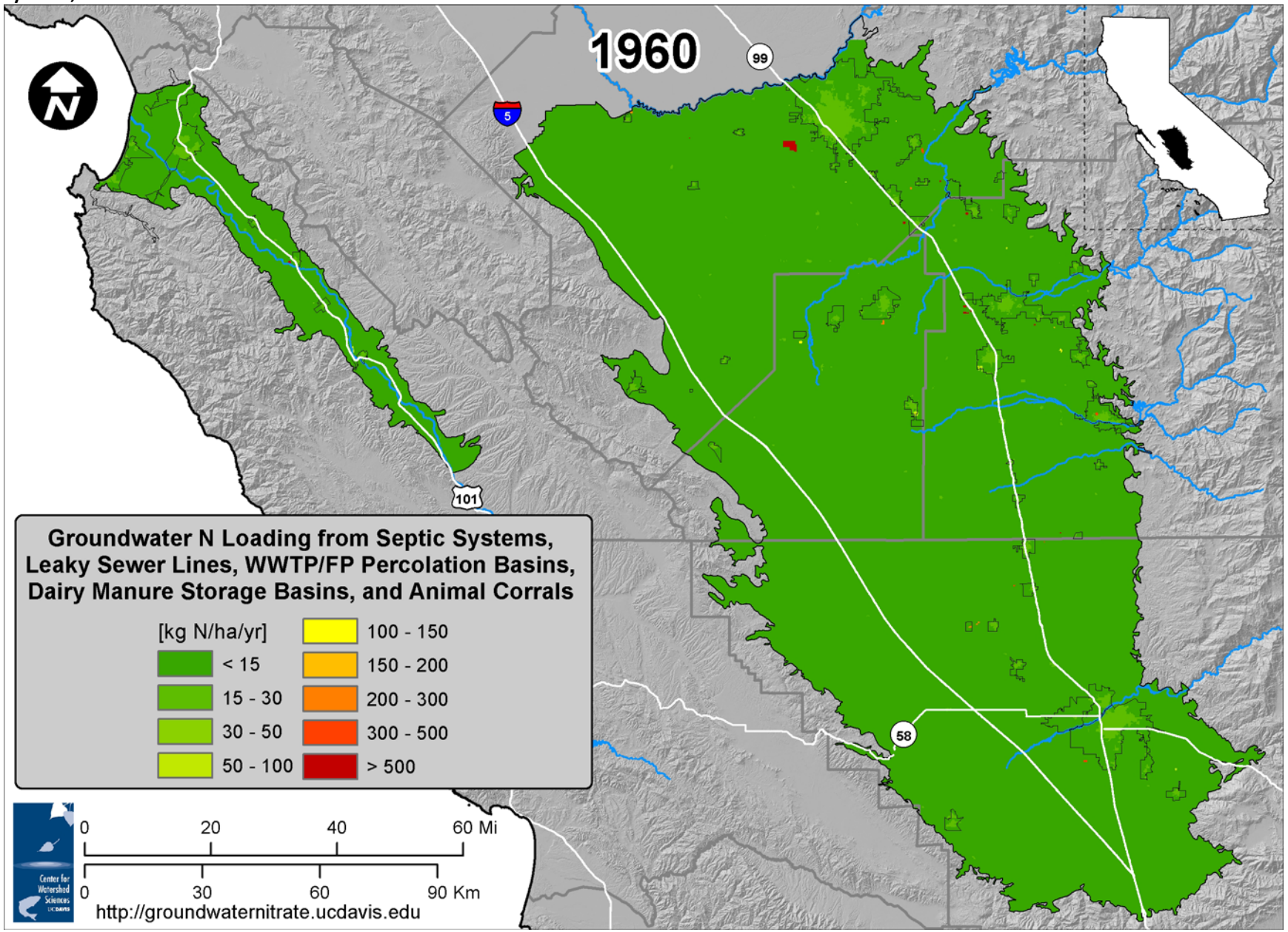
Appendix Figure 84. Nitrogen leached from septic systems, in 2050.



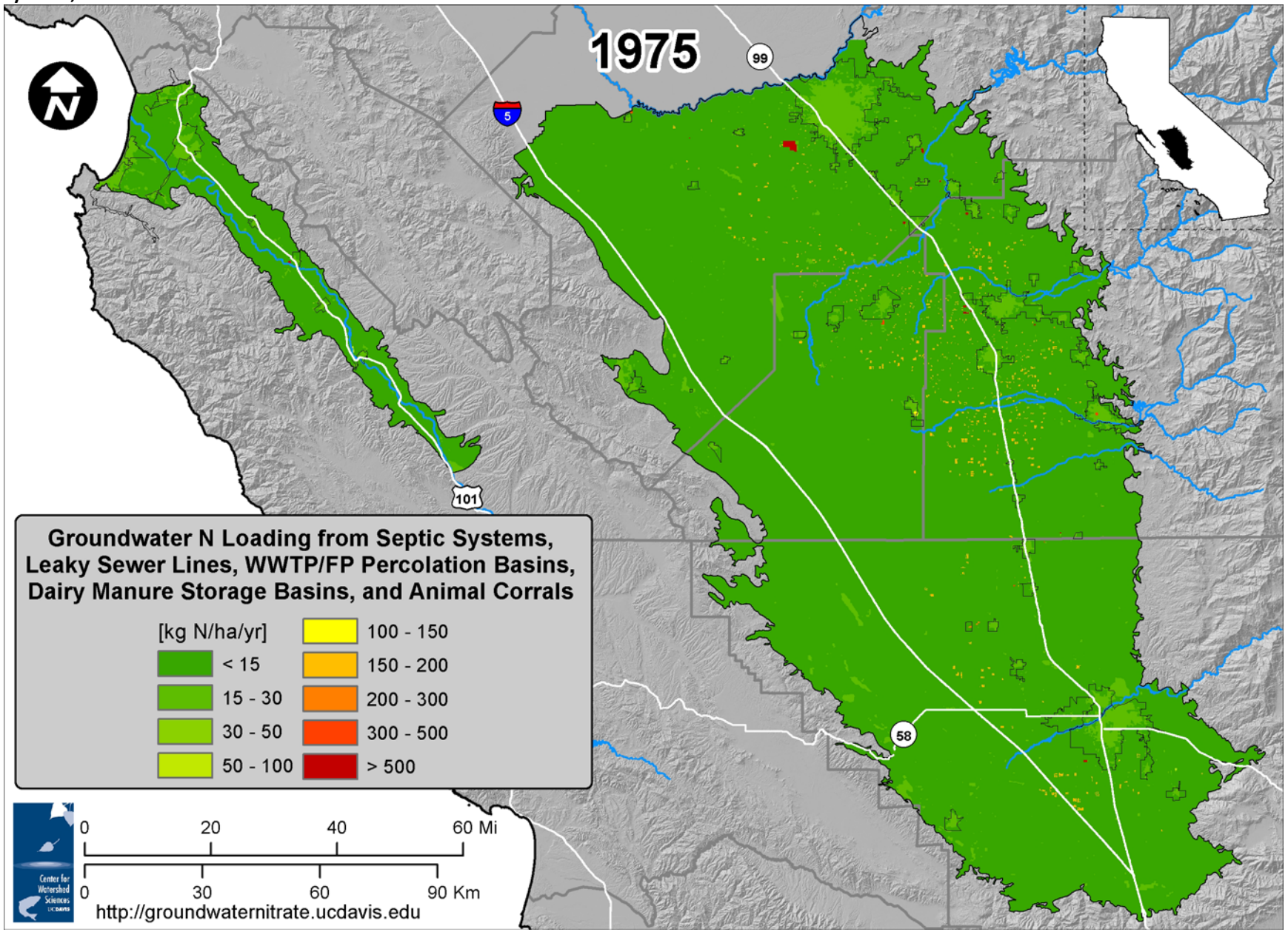
Appendix Figure 85. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 1945.



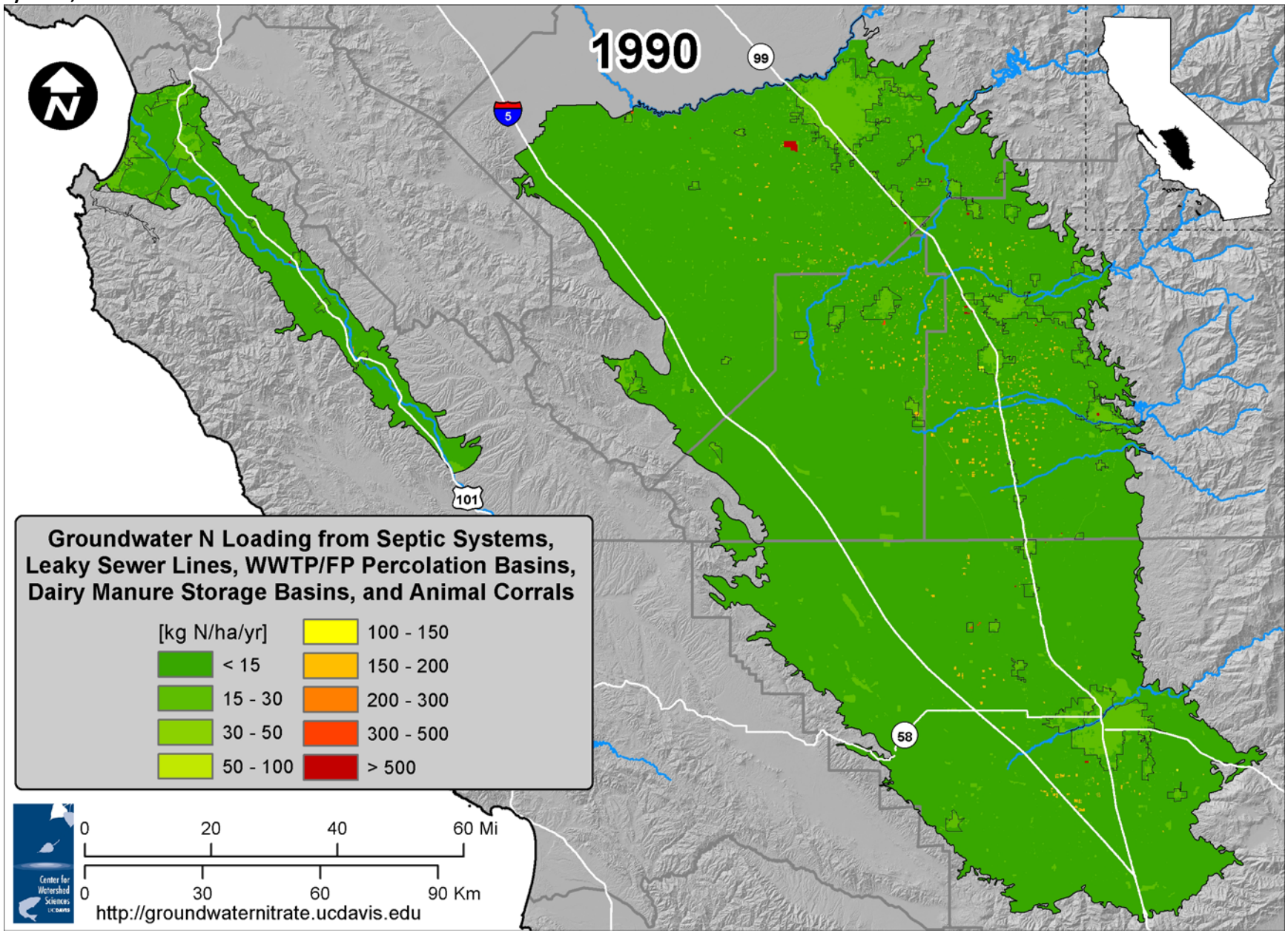
Appendix Figure 86. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 1960.



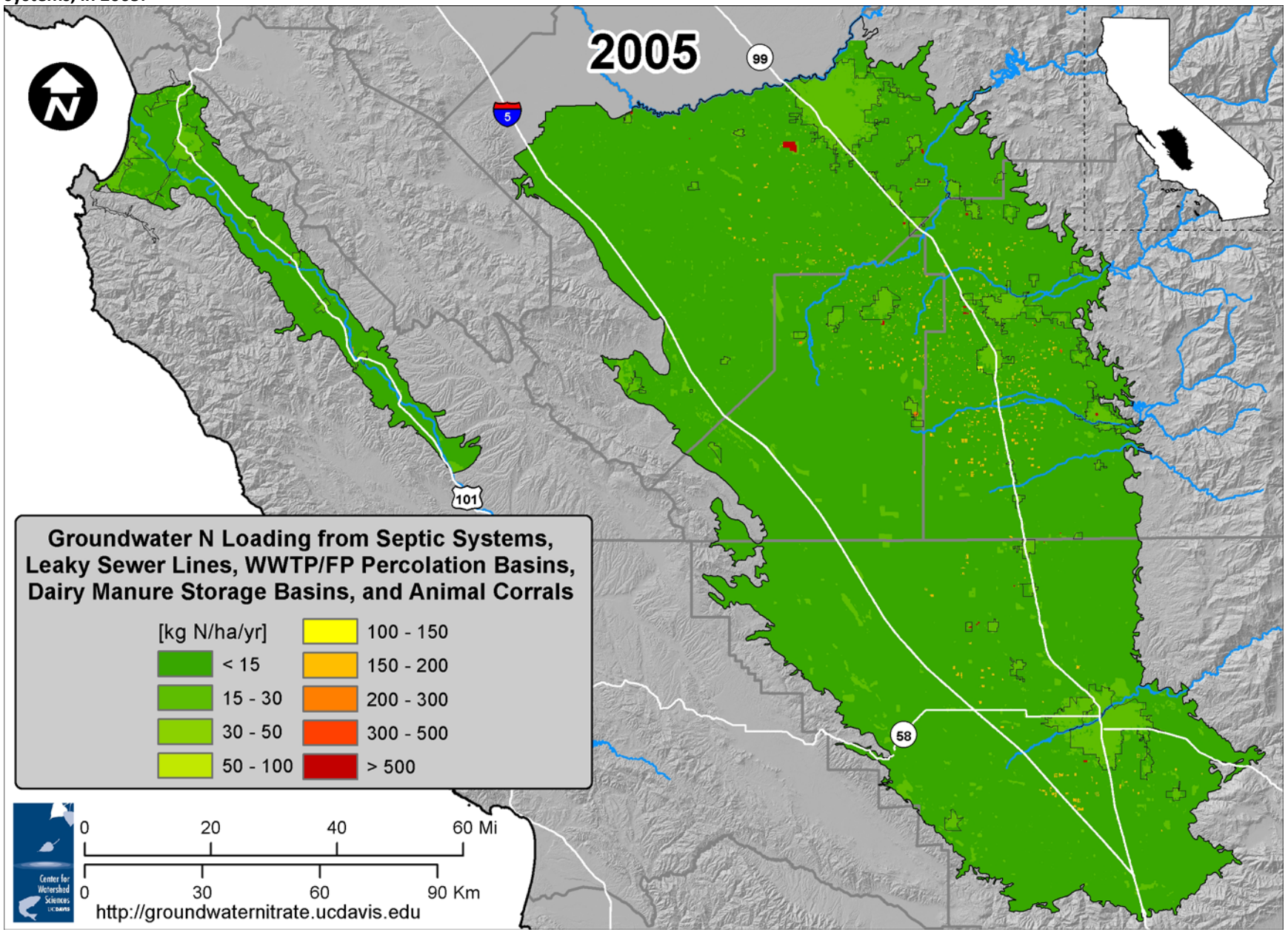
Appendix Figure 87. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 1975.



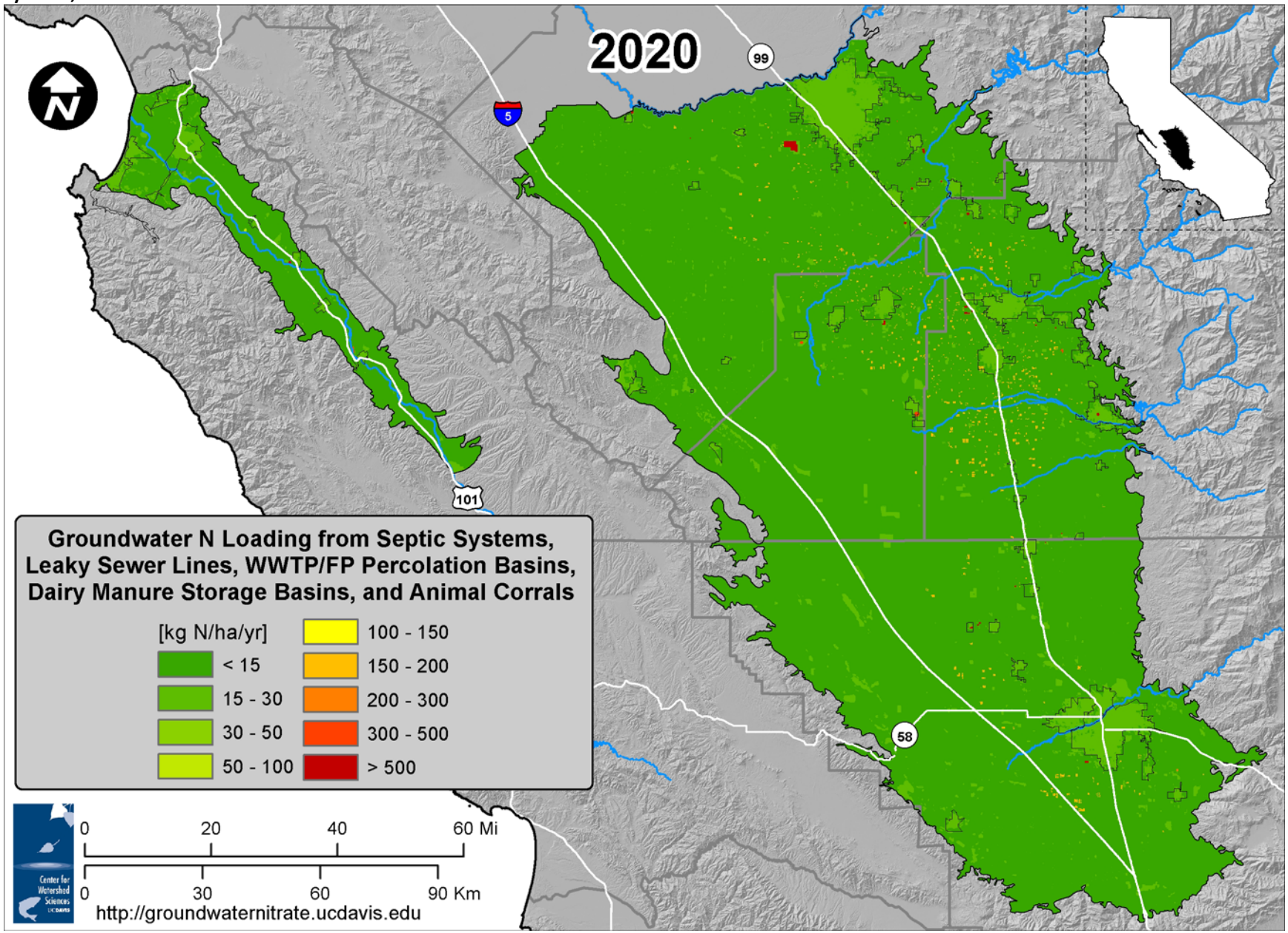
Appendix Figure 88. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 1990.



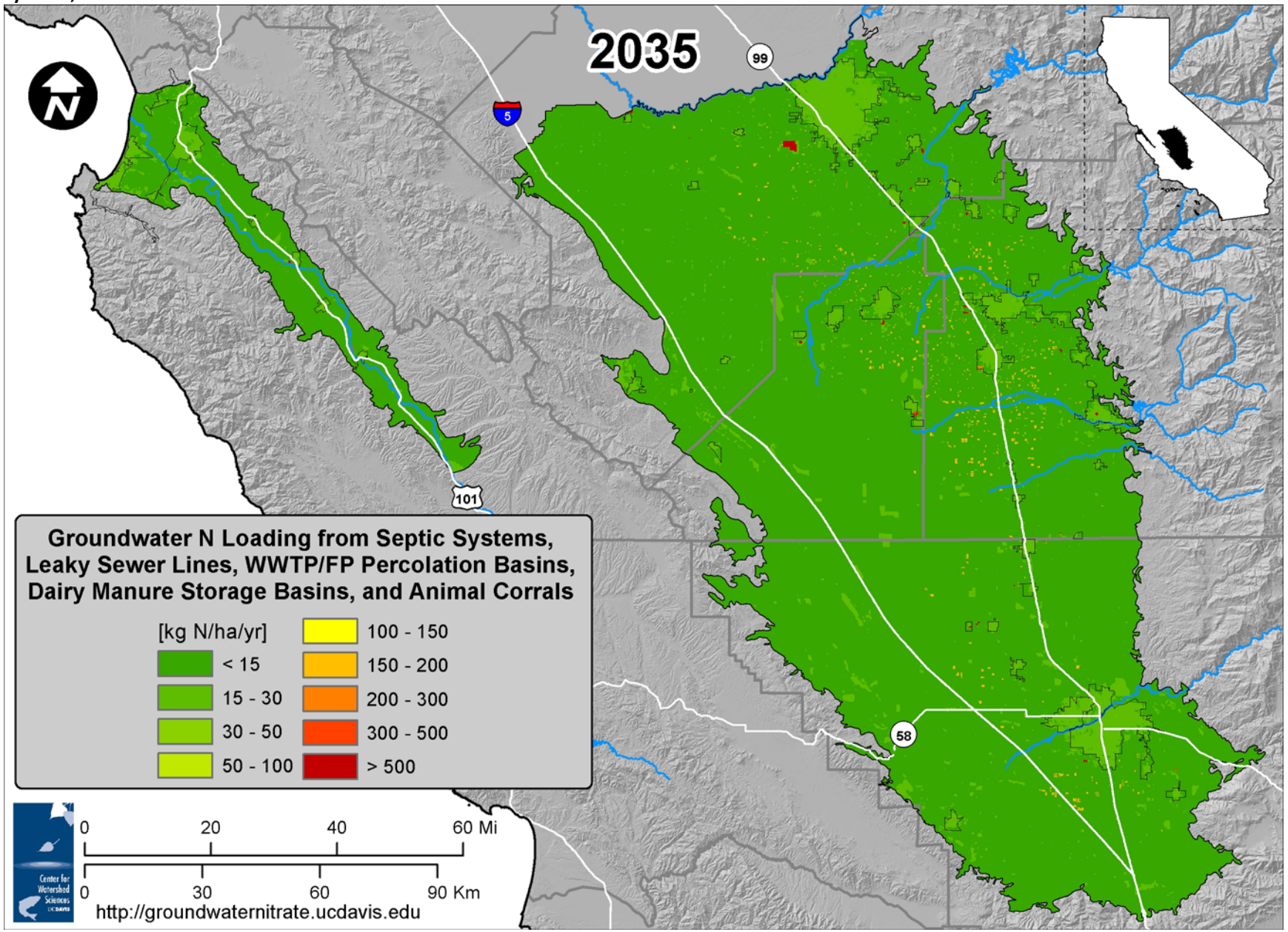
Appendix Figure 89. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 2005.



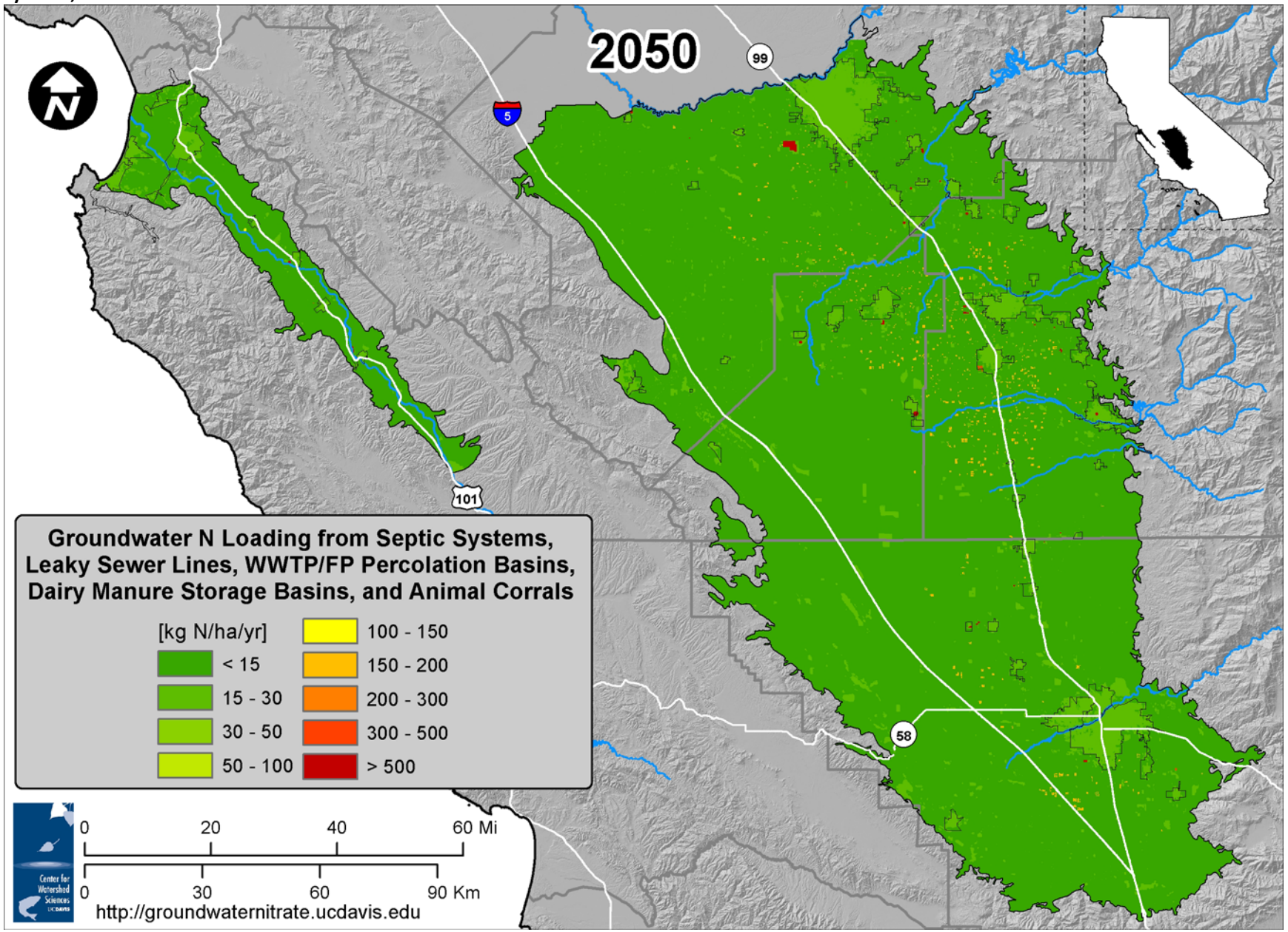
Appendix Figure 90. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 2020.



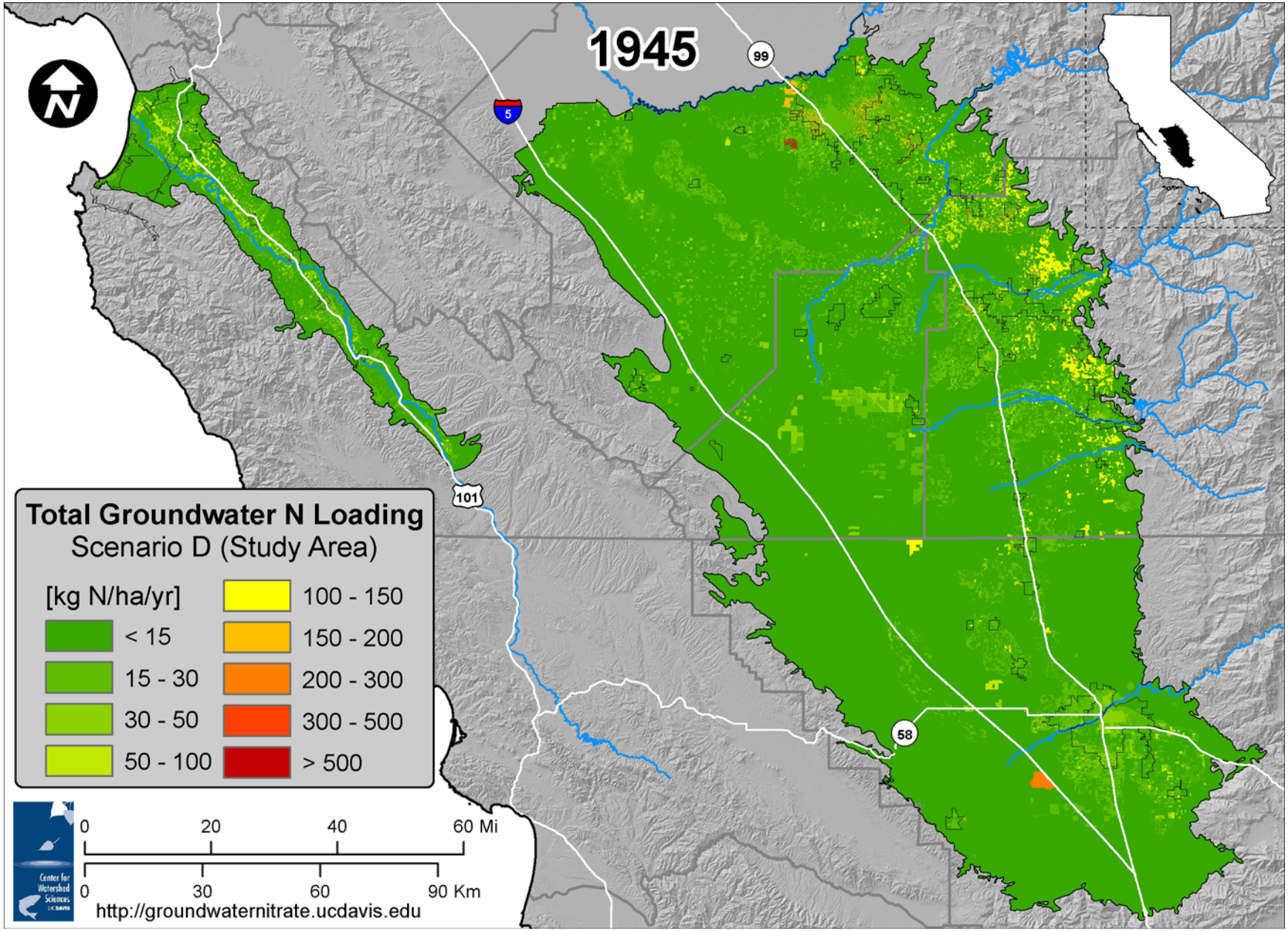
Appendix Figure 91. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 2035.



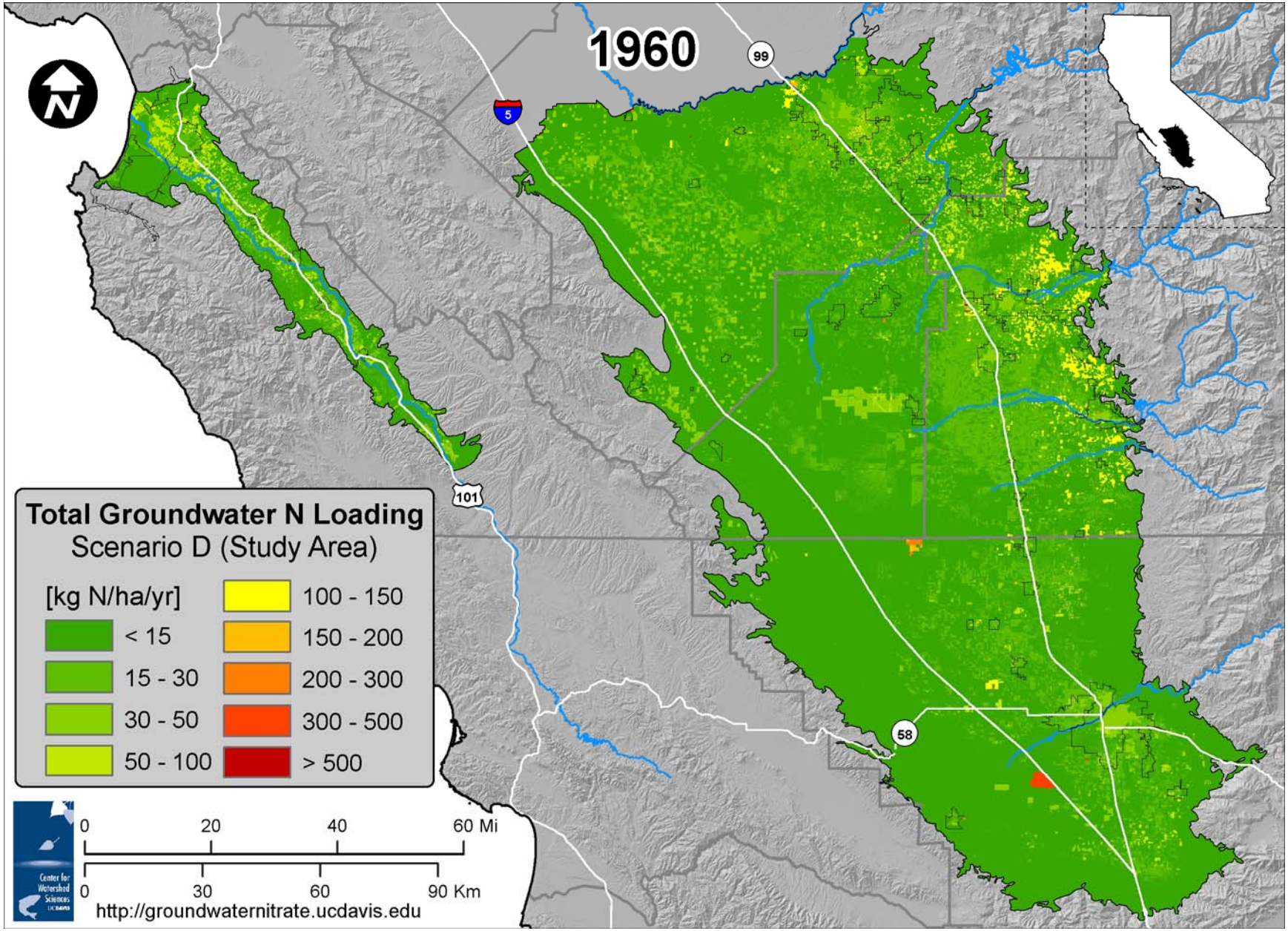
Appendix Figure 92. Direct percolation of nitrogen to groundwater from corrals, lagoons, WWTP & FP percolation ponds, golf courses, and leaky sewer systems, in 2050.



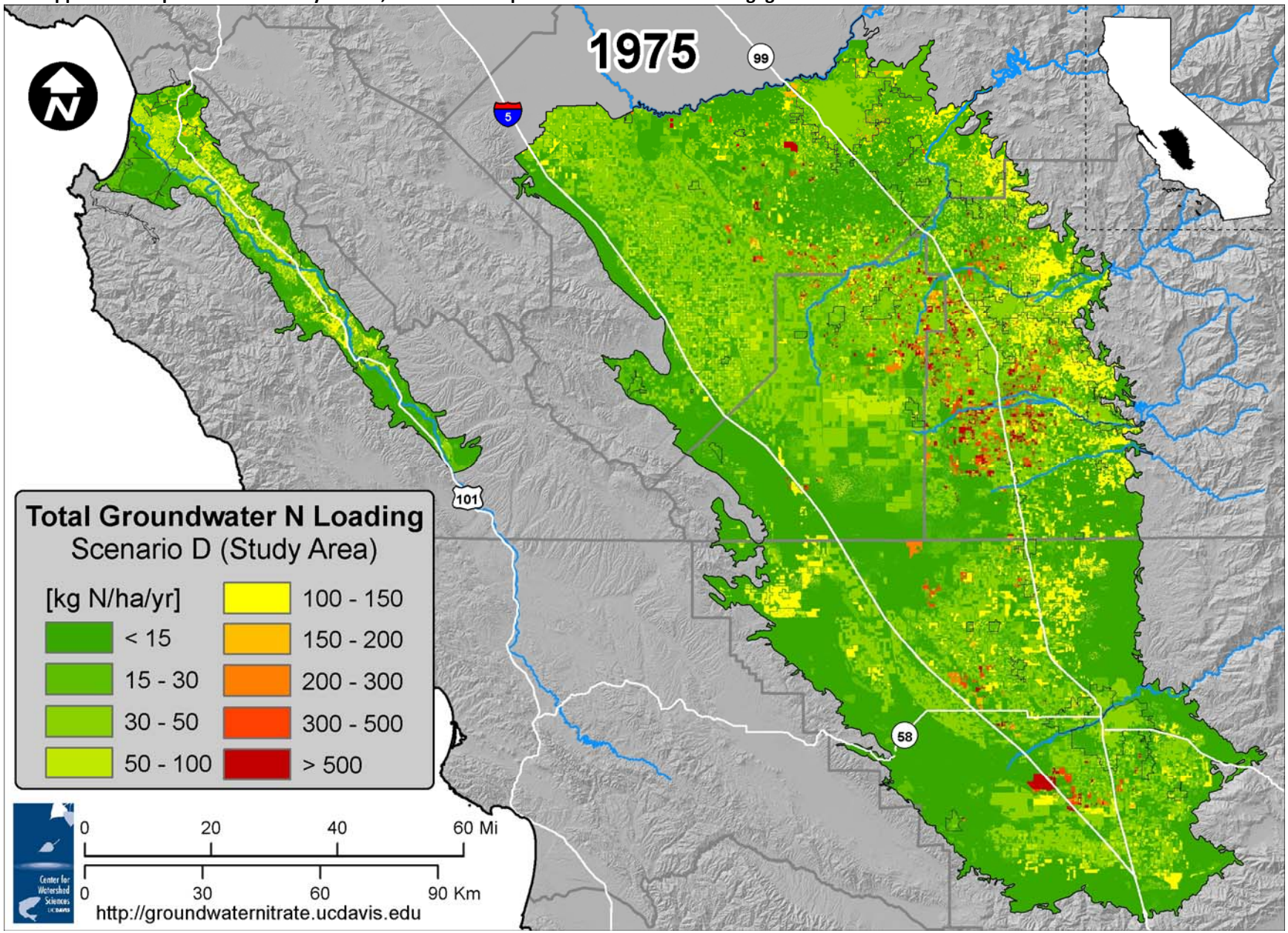
Appendix Figure 93. Total nitrogen loading to groundwater from all sources, in 1945. Dairy animals are in pasture and no manure is exported.



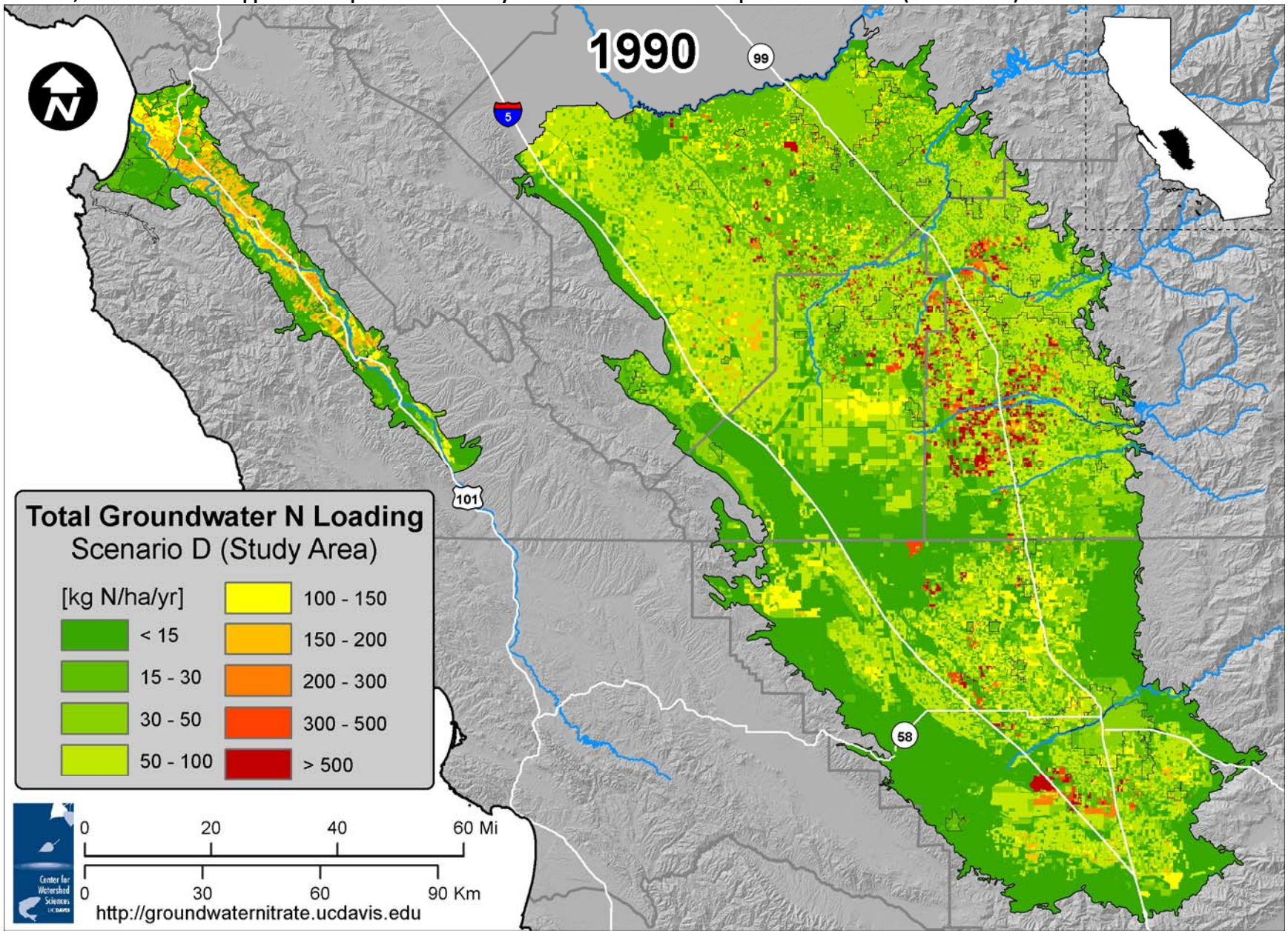
Appendix Figure 94. Total nitrogen loading to groundwater from all sources, in 1960. Dairy animals are in pasture and no manure is exported.



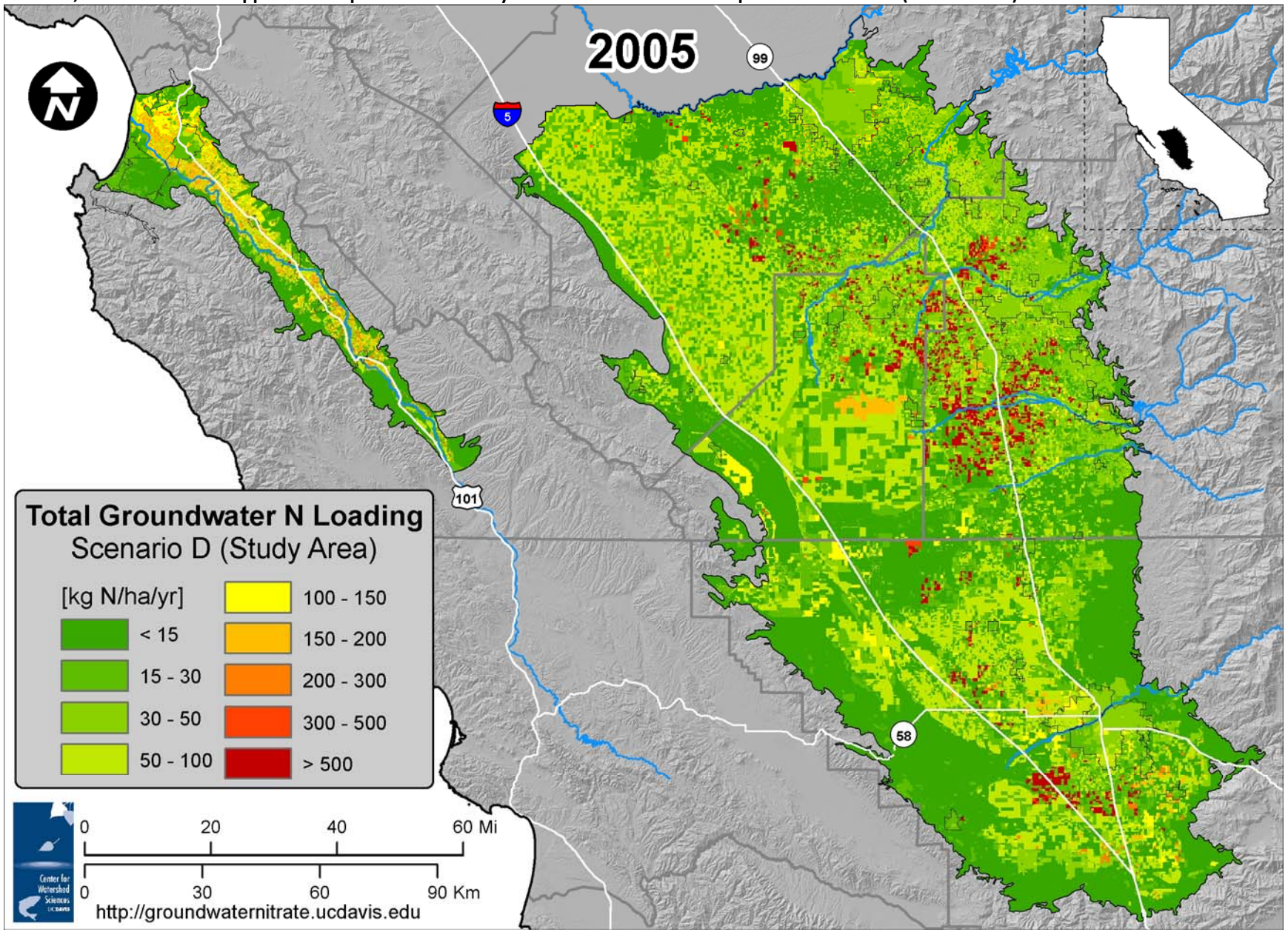
Appendix Figure 95. Total nitrogen loading to groundwater from all sources, in 1975. It is assumed that dairy animals are in corrals or freestalls, manure is land applied on cropland controlled by dairies, but manure exported from dairies is still negligible.



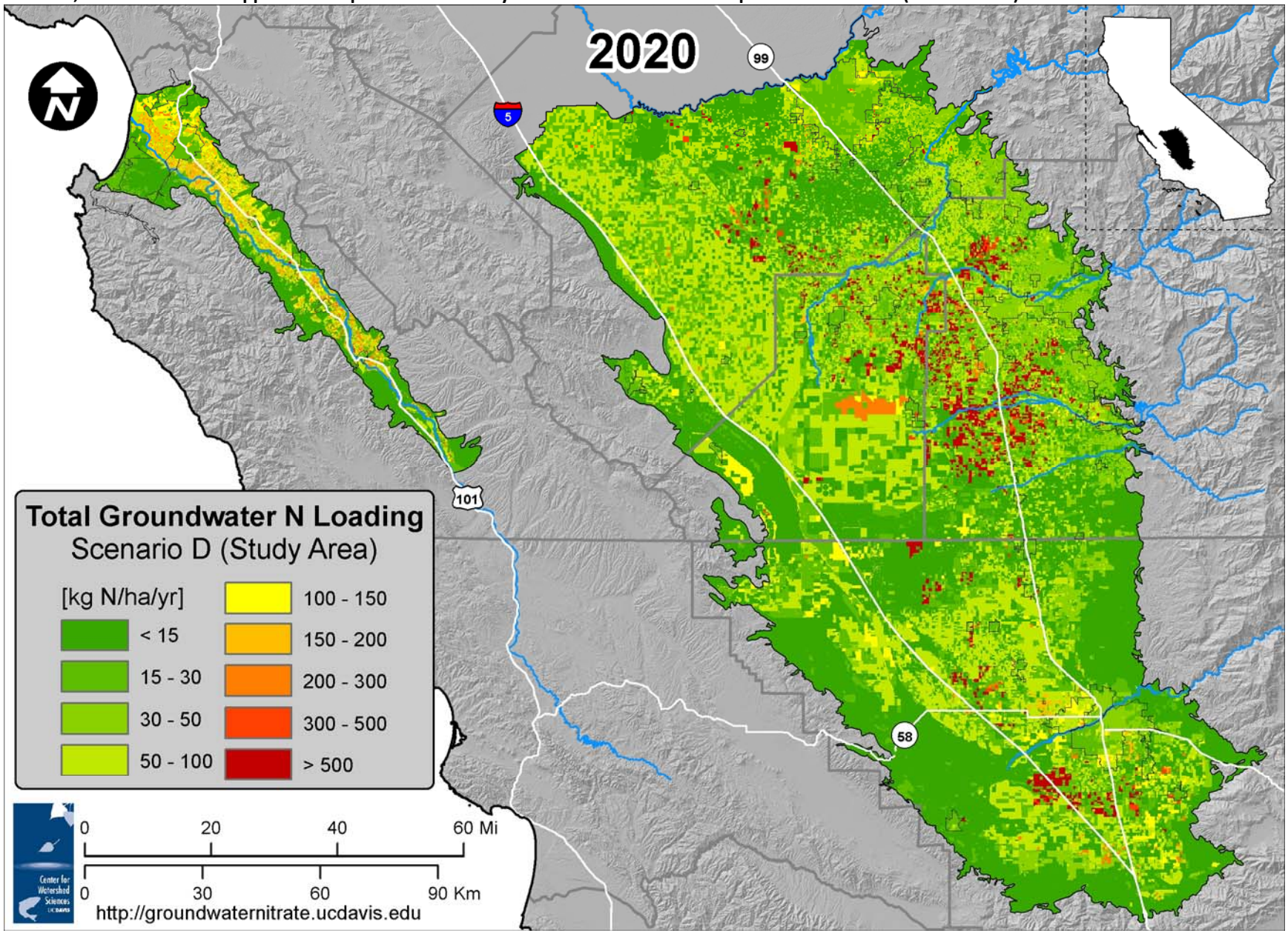
Appendix Figure 96. Total nitrogen loading to groundwater from all sources, in 1990. It is assumed that dairy animals are in corrals or freestalls. In this scenario, all manure is land applied on cropland controlled by dairies and no manure is exported from dairies ("Scenario D").



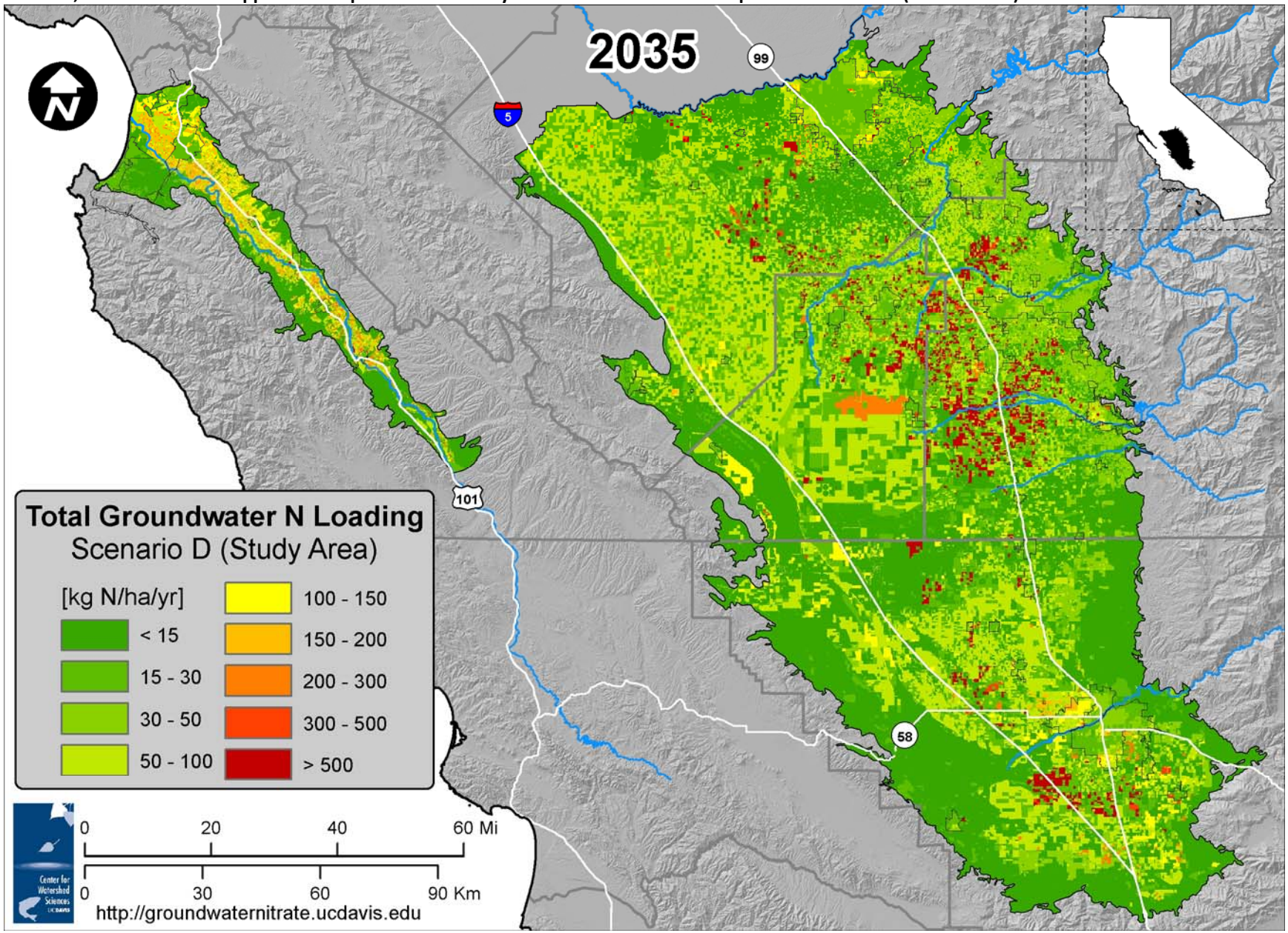
Appendix Figure 97. Total nitrogen loading to groundwater from all sources, in 2005. It is assumed that dairy animals are in corrals or freestalls. In this scenario, all manure is land applied on cropland controlled by dairies and no manure is exported from dairies ("Scenario D").



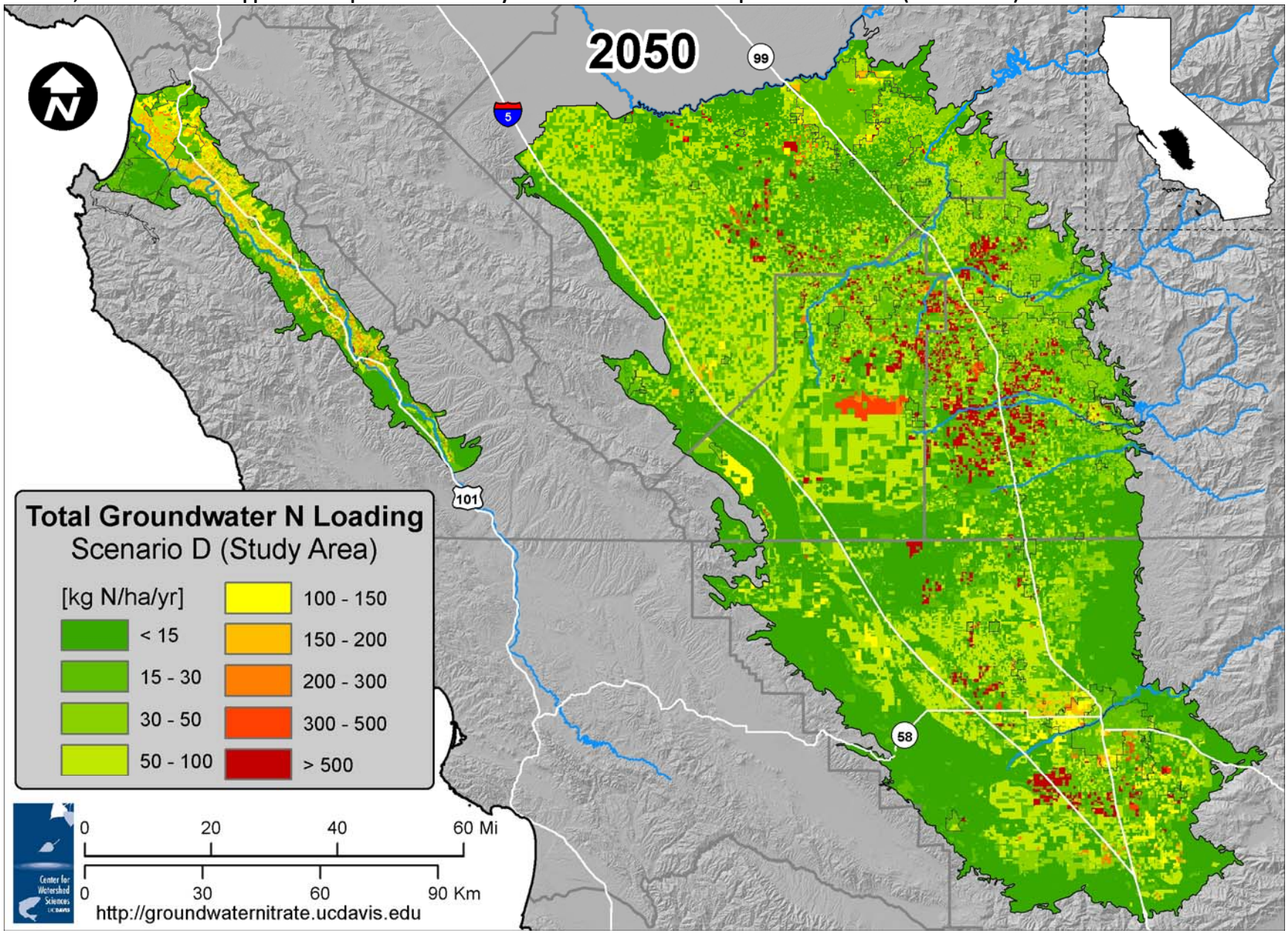
Appendix Figure 98. Total nitrogen loading to groundwater from all sources, in 2020. It is assumed that dairy animals are in corrals or freestalls. In this scenario, all manure is land applied on cropland controlled by dairies and no manure is exported from dairies ("Scenario D").



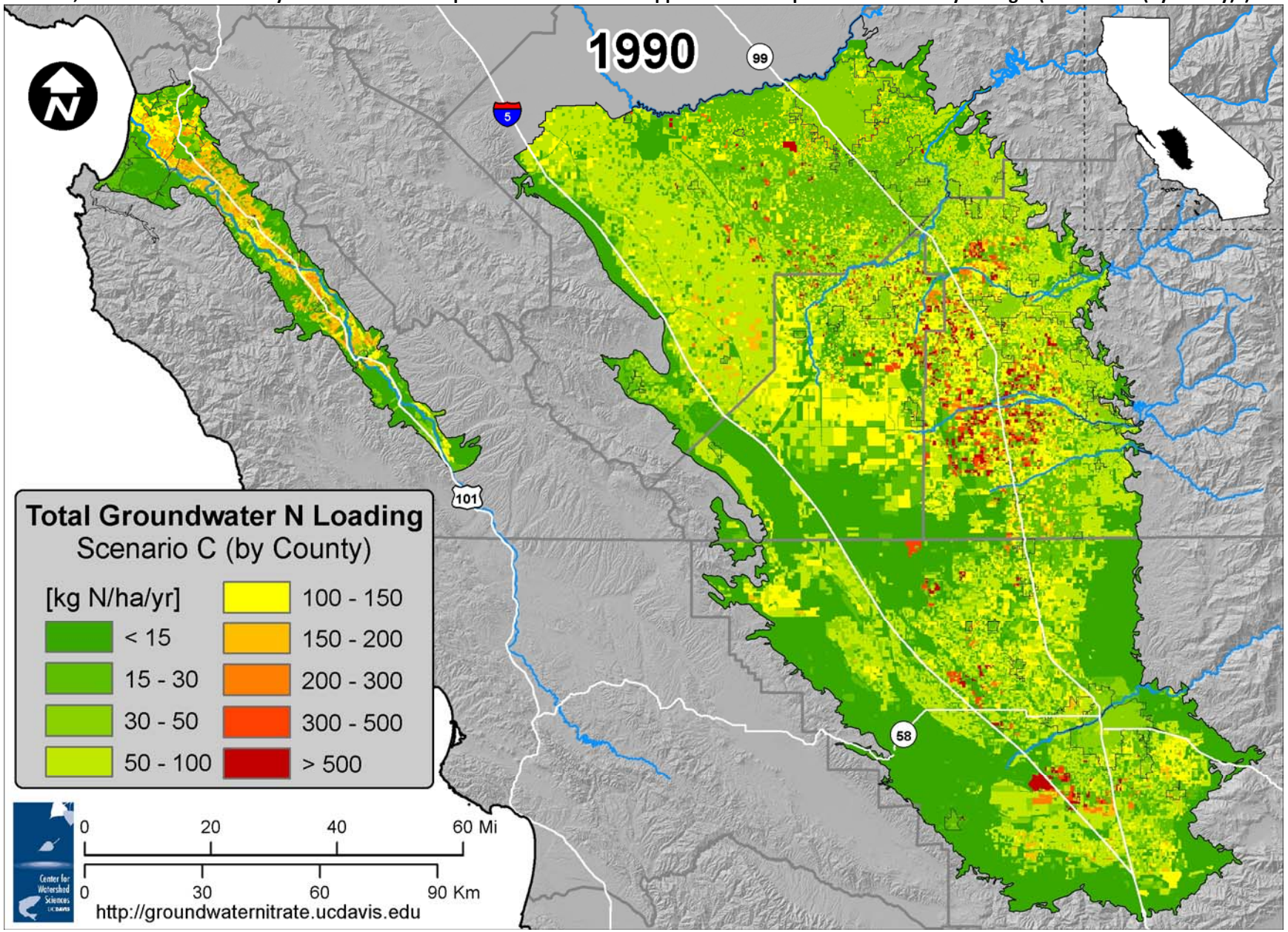
Appendix Figure 99. Total nitrogen loading to groundwater from all sources, in 2035. It is assumed that dairy animals are in corrals or freestalls. In this scenario, all manure is land applied on cropland controlled by dairies and no manure is exported from dairies ("Scenario D").



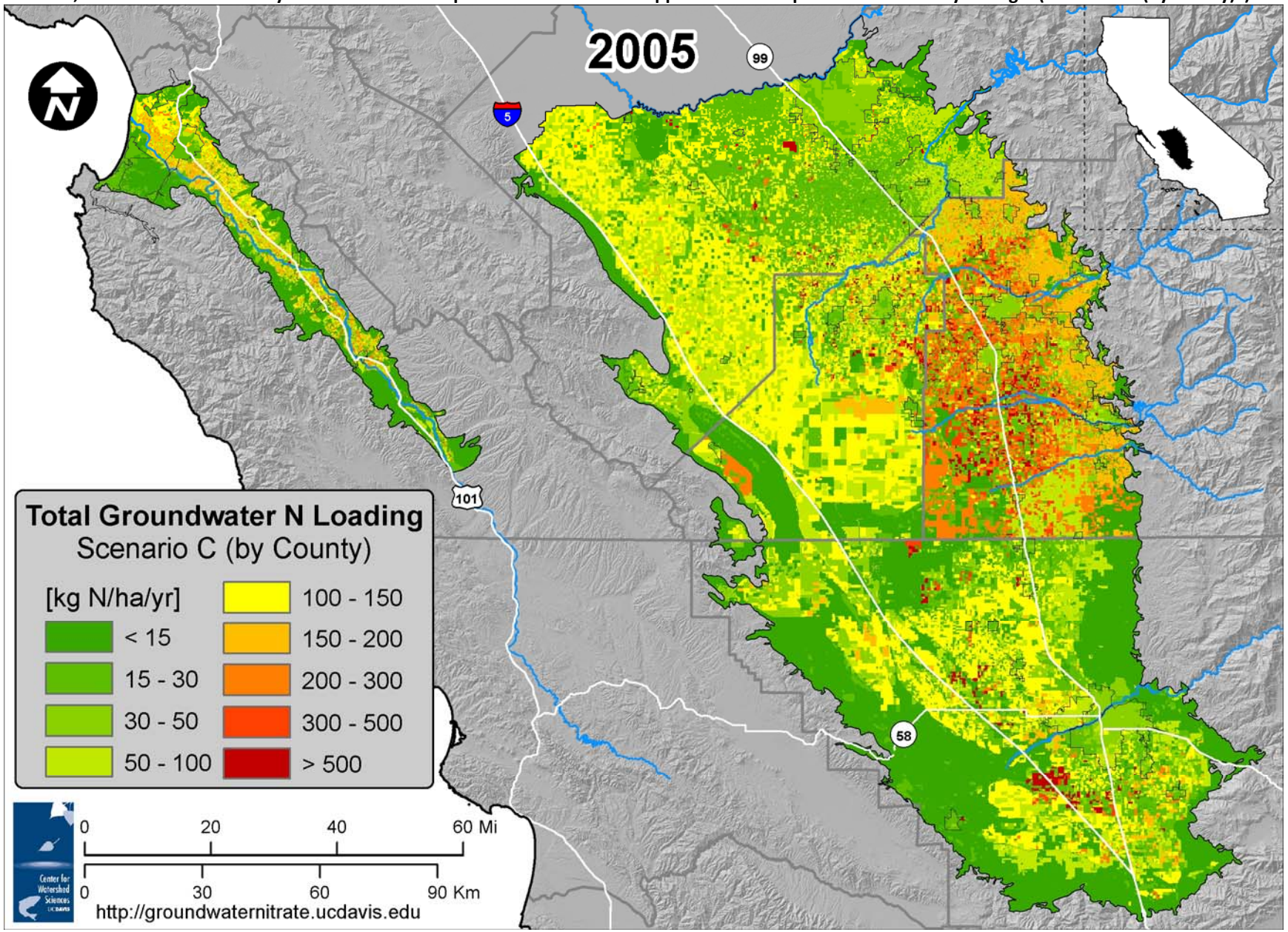
Appendix Figure 100. Total nitrogen loading to groundwater from all sources, in 2050. It is assumed that dairy animals are in corrals or freestalls. In this scenario, all manure is land applied on cropland controlled by dairies and no manure is exported from dairies ("Scenario D").



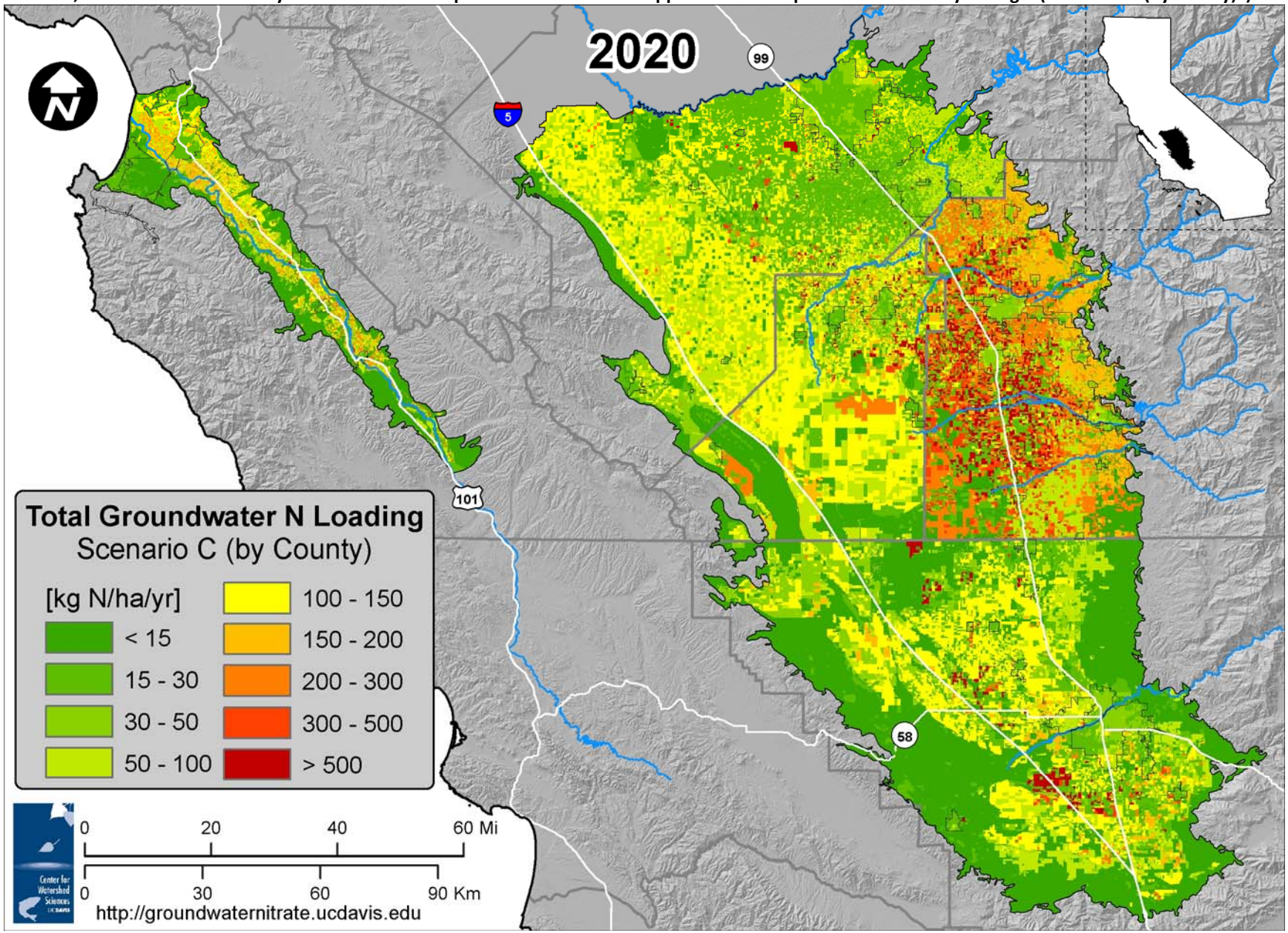
Appendix Figure 101. Total nitrogen loading to groundwater from all sources, in 1990. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the county of origin ("Scenario C (by county)").



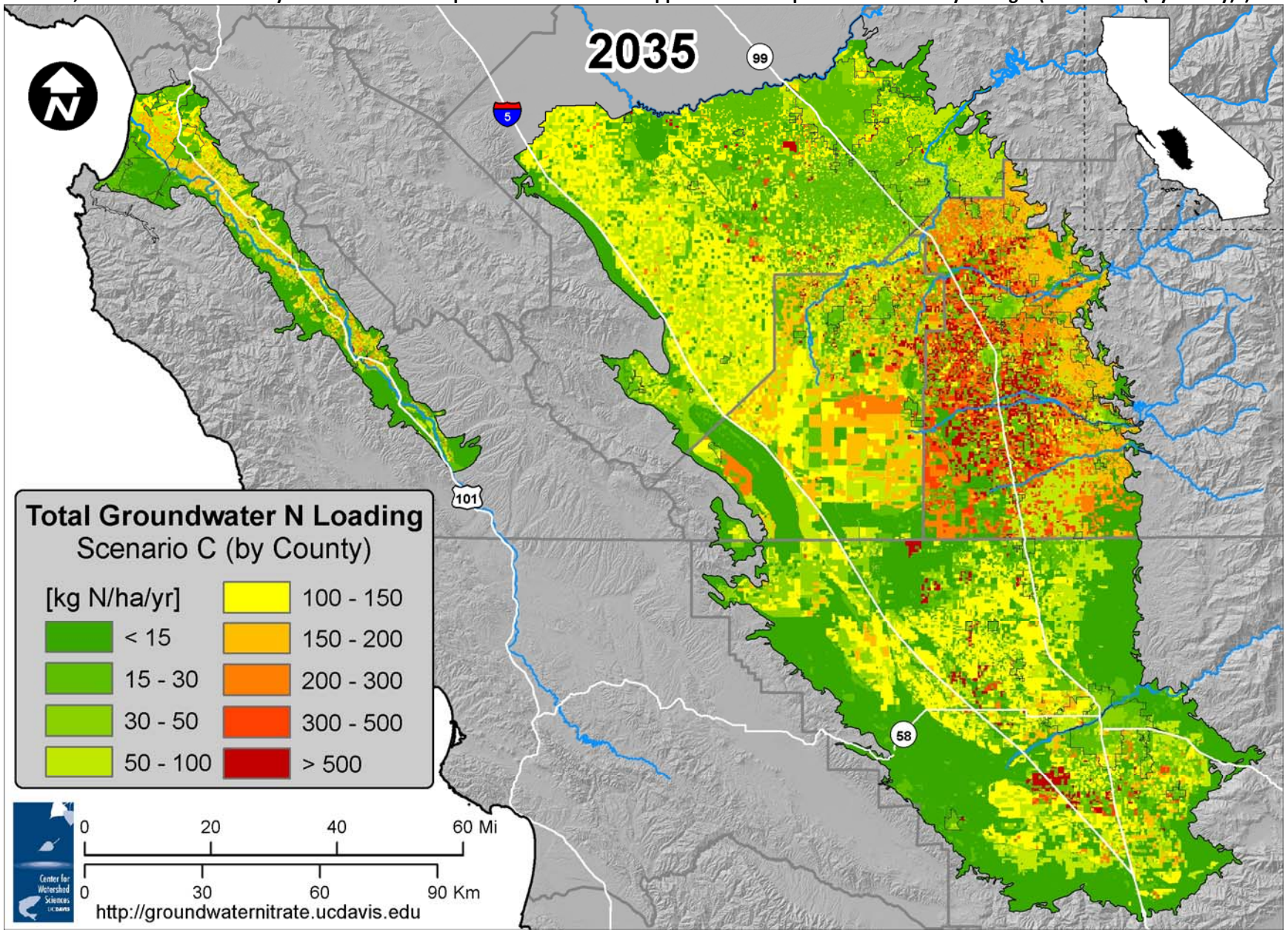
Appendix Figure 102. Total nitrogen loading to groundwater from all sources, in 2005. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the county of origin ("Scenario C (by county)").



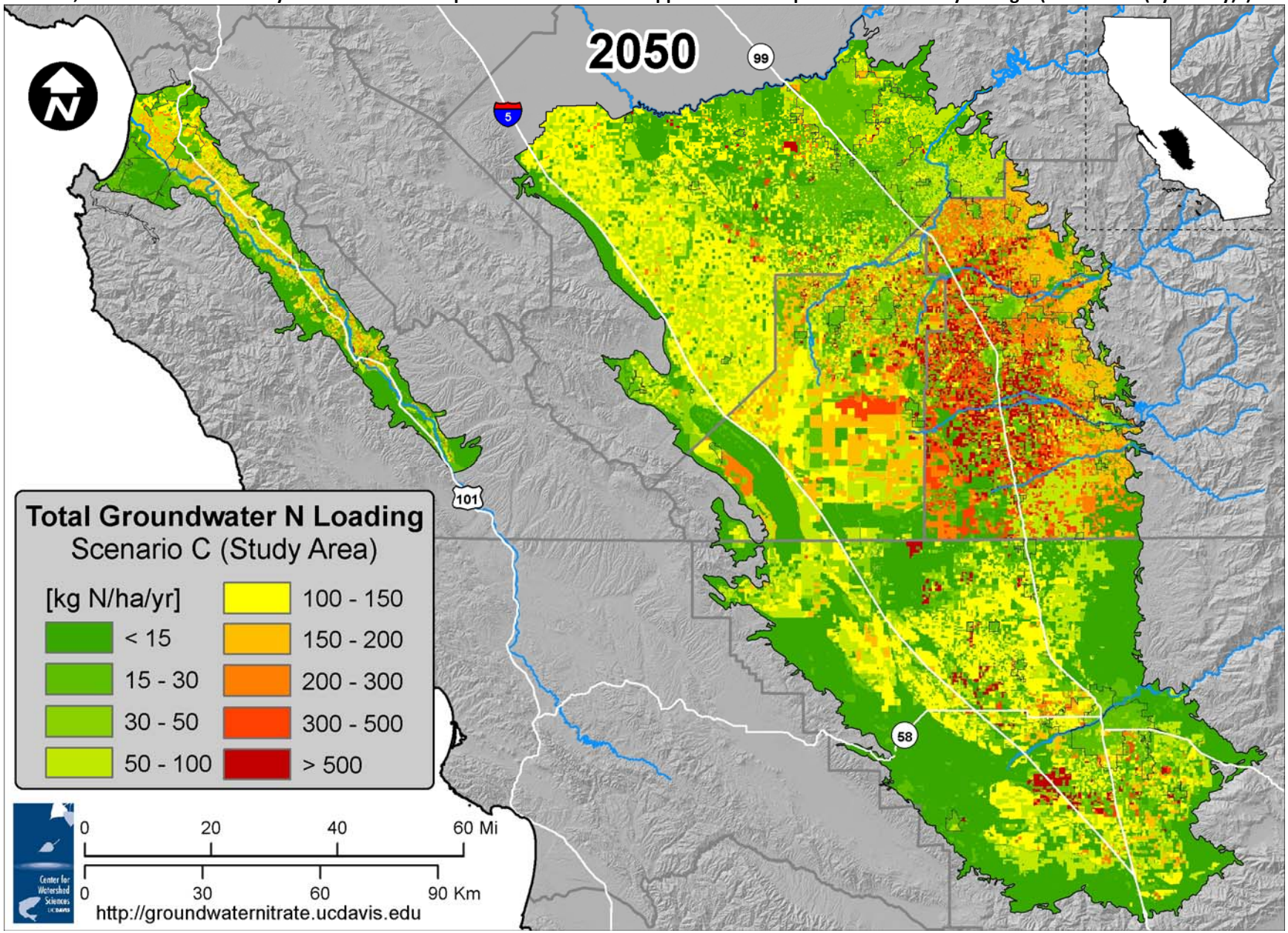
Appendix Figure 103. Total nitrogen loading to groundwater from all sources, in 2020. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the county of origin ("Scenario C (by county)").



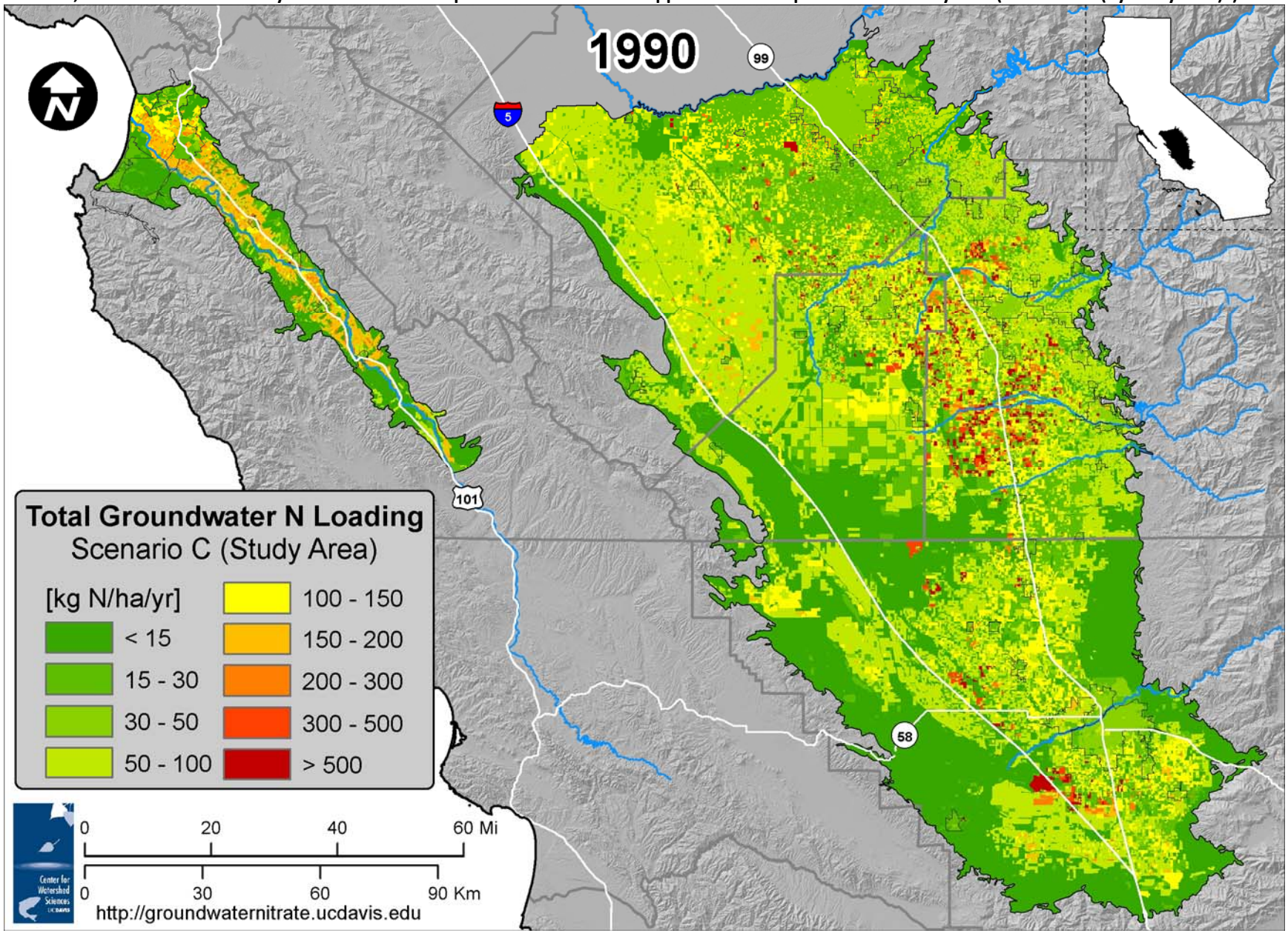
Appendix Figure 104. Total nitrogen loading to groundwater from all sources, in 2035. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the county of origin ("Scenario C (by county)").



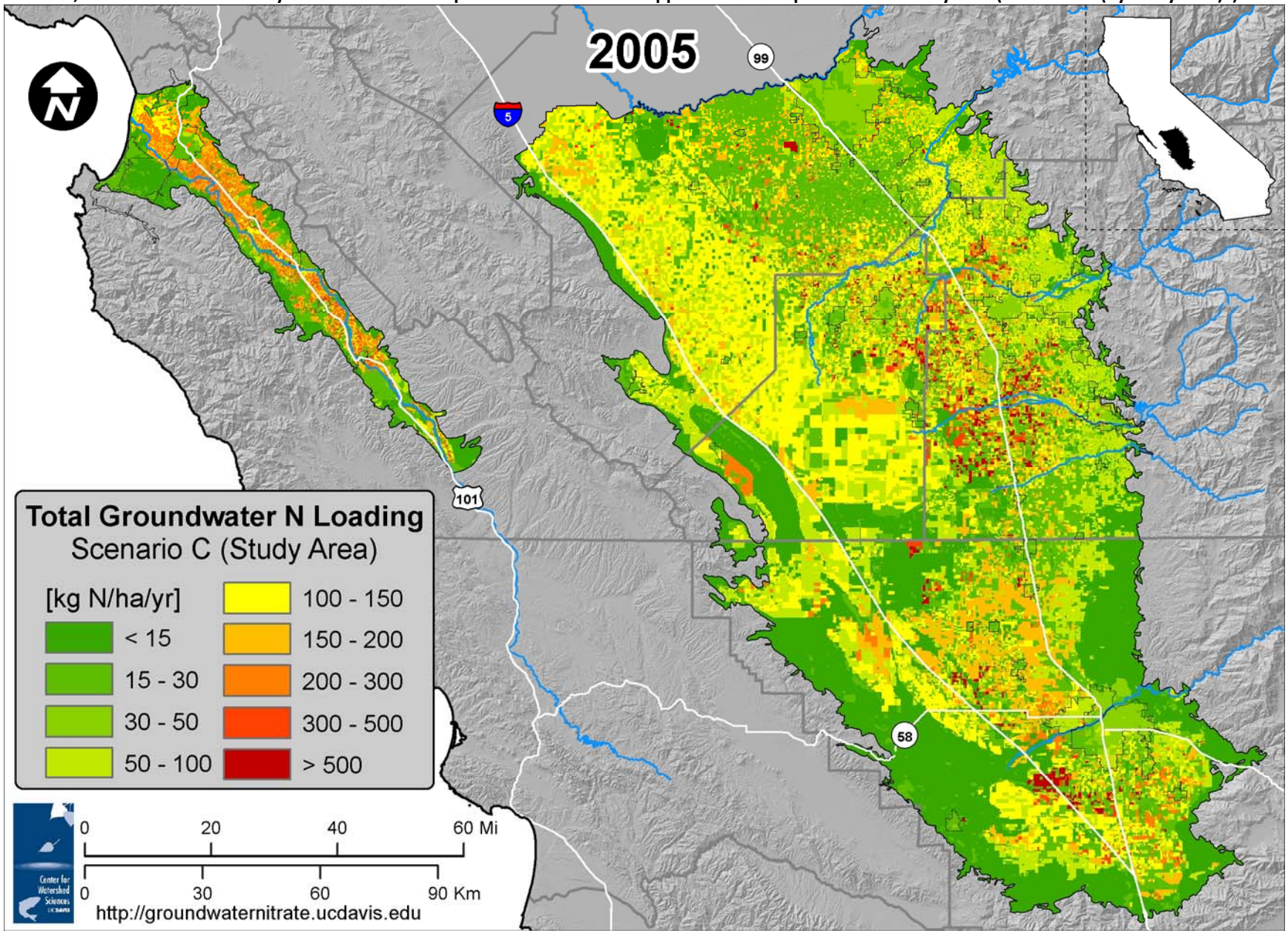
Appendix Figure 105. Total nitrogen loading to groundwater from all sources, in 2050. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the county of origin ("Scenario C (by county)").



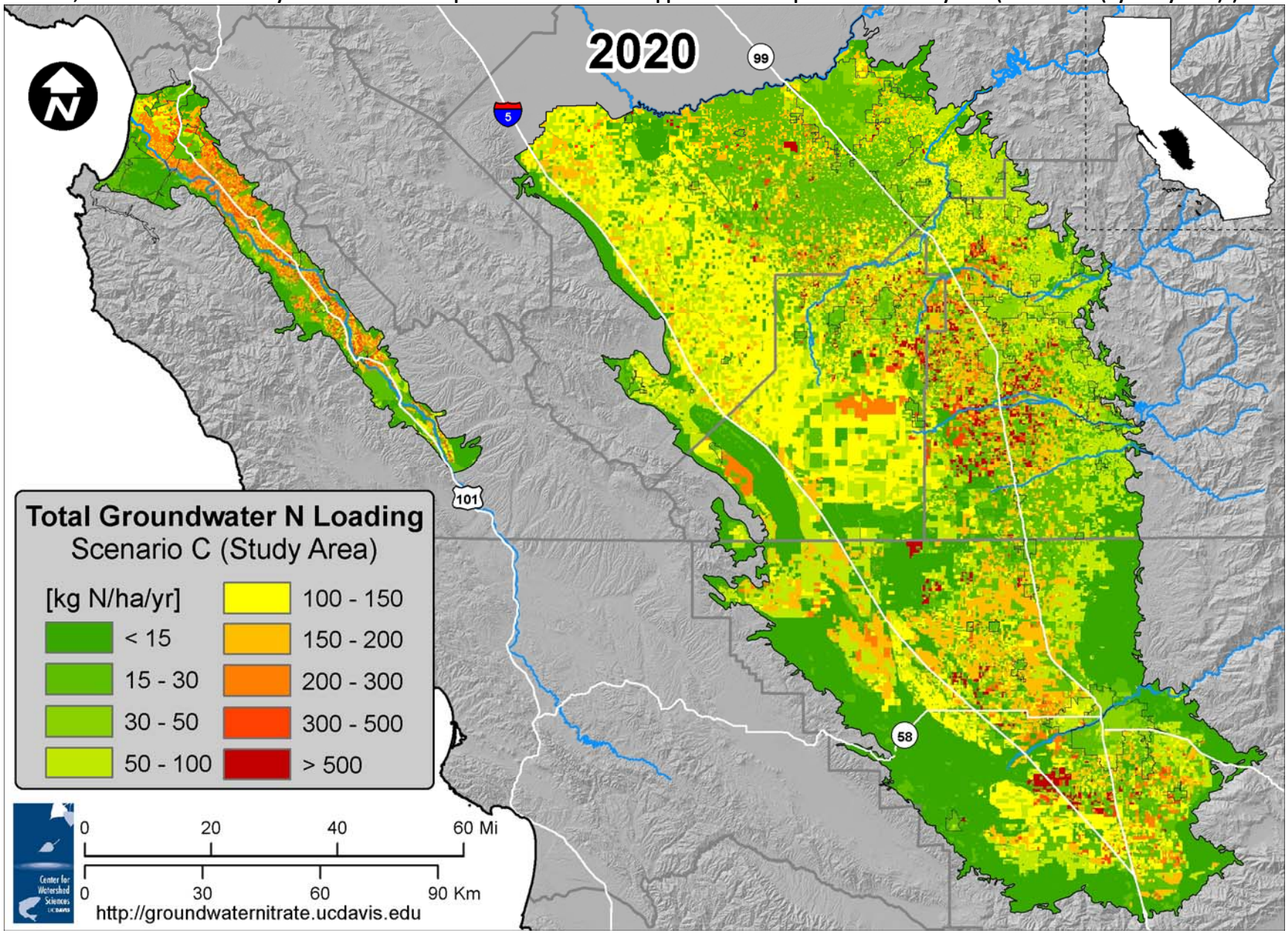
Appendix Figure 106. Total nitrogen loading to groundwater from all sources, in 1990. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the study area ("Scenario C (by study area)").



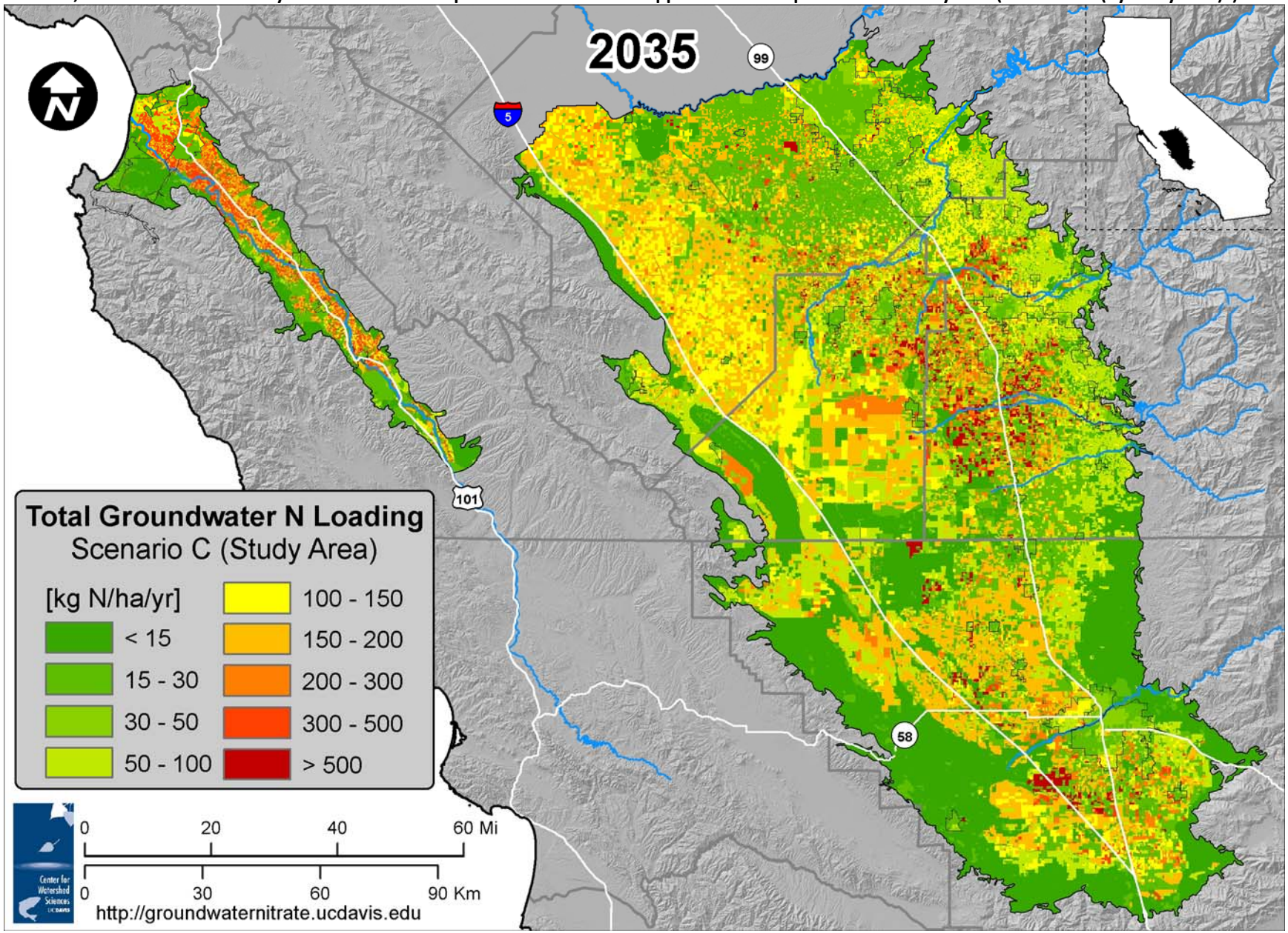
Appendix Figure 107. Total nitrogen loading to groundwater from all sources, in 2005. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the study area ("Scenario C (by study area)").



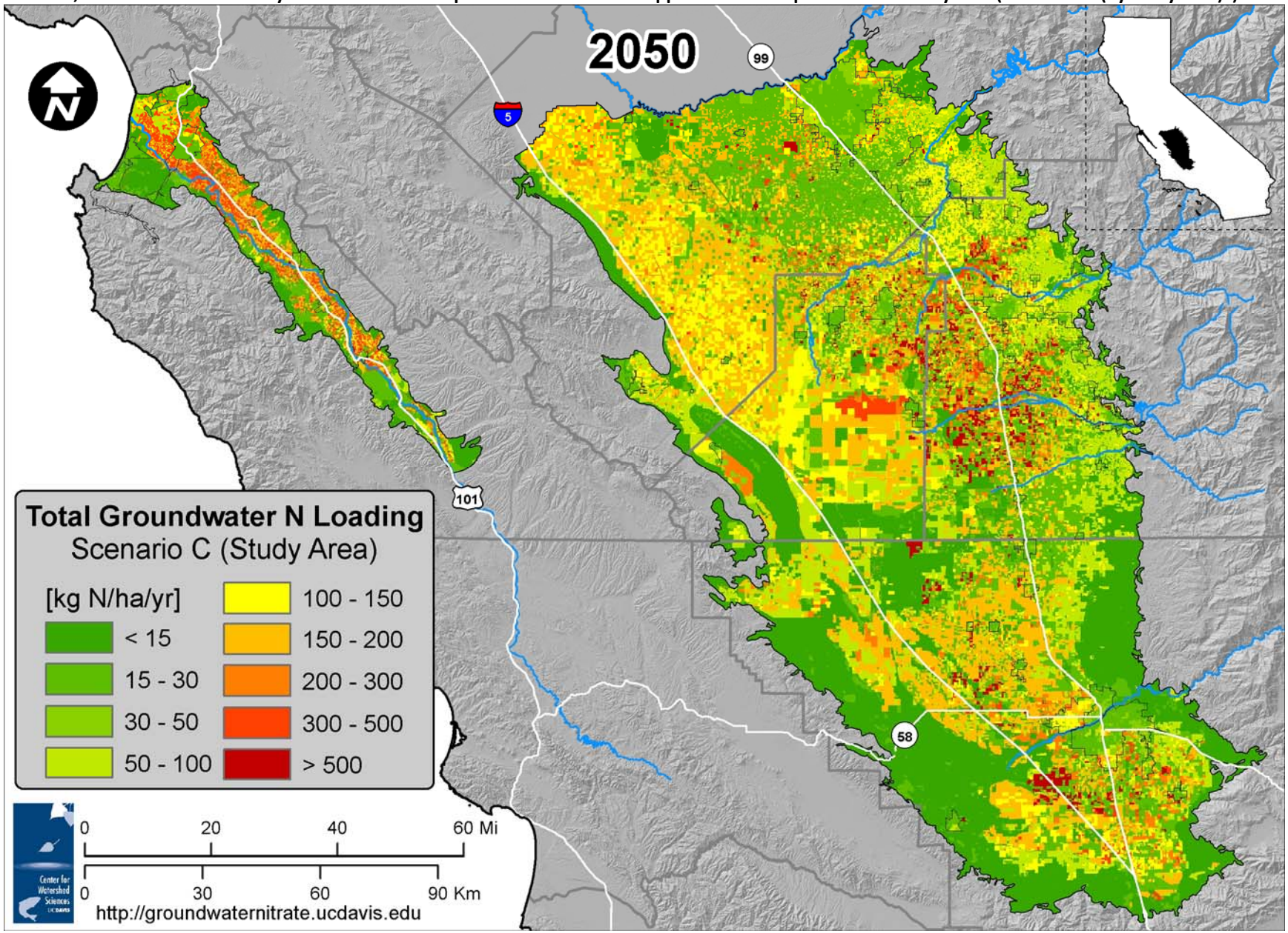
Appendix Figure 108. Total nitrogen loading to groundwater from all sources, in 2020. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the study area ("Scenario C (by study area)").



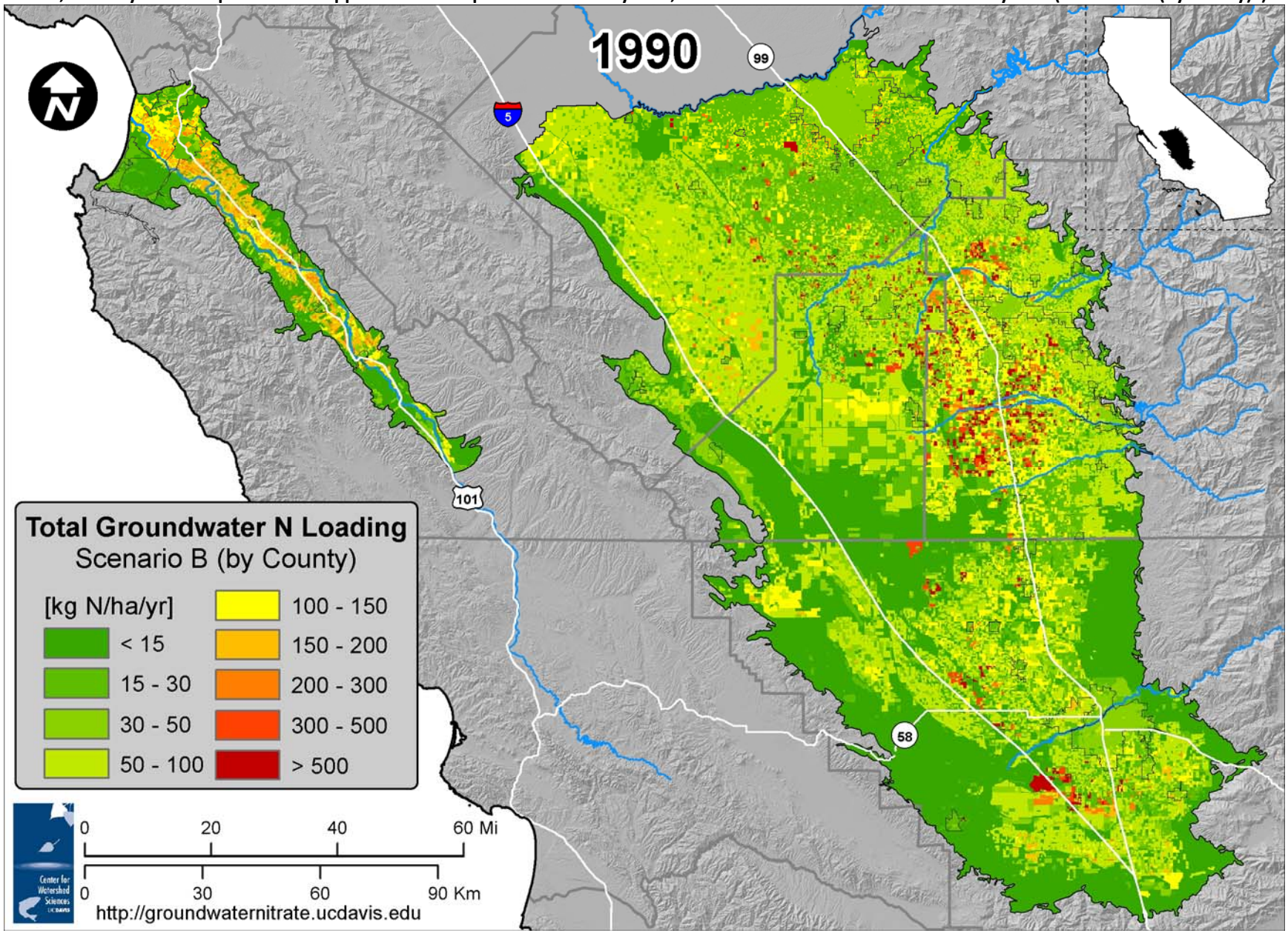
Appendix Figure 109. Total nitrogen loading to groundwater from all sources, in 2035. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the study area ("Scenario C (by study area)").



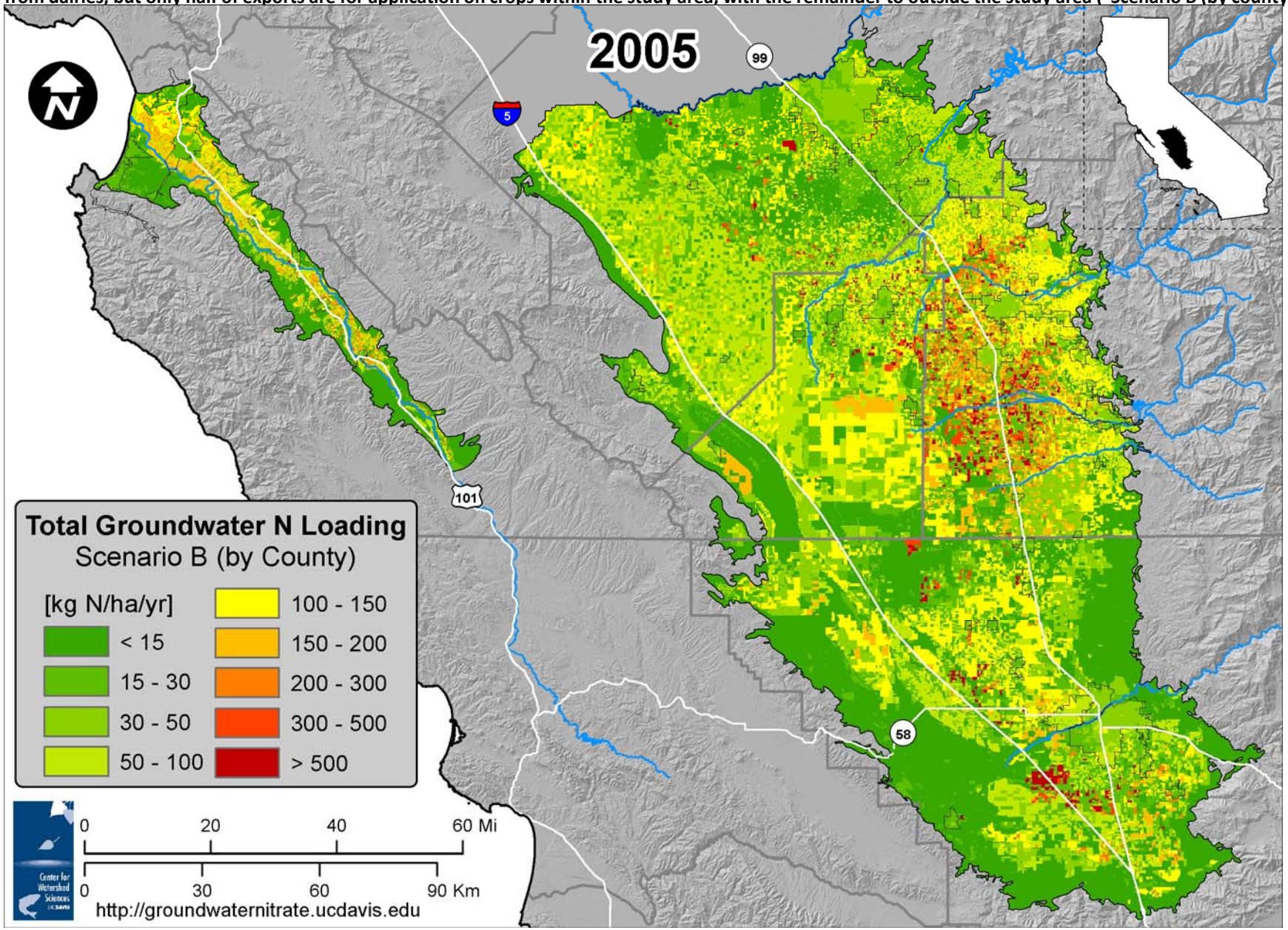
Appendix Figure 110. Total nitrogen loading to groundwater from all sources, in 2050. It is assumed that dairy animals are in corrals or freestalls. In this scenario, 38% of all excreted dairy animal manure is exported from dairies for application on crops within the study area ("Scenario C (by study area)").



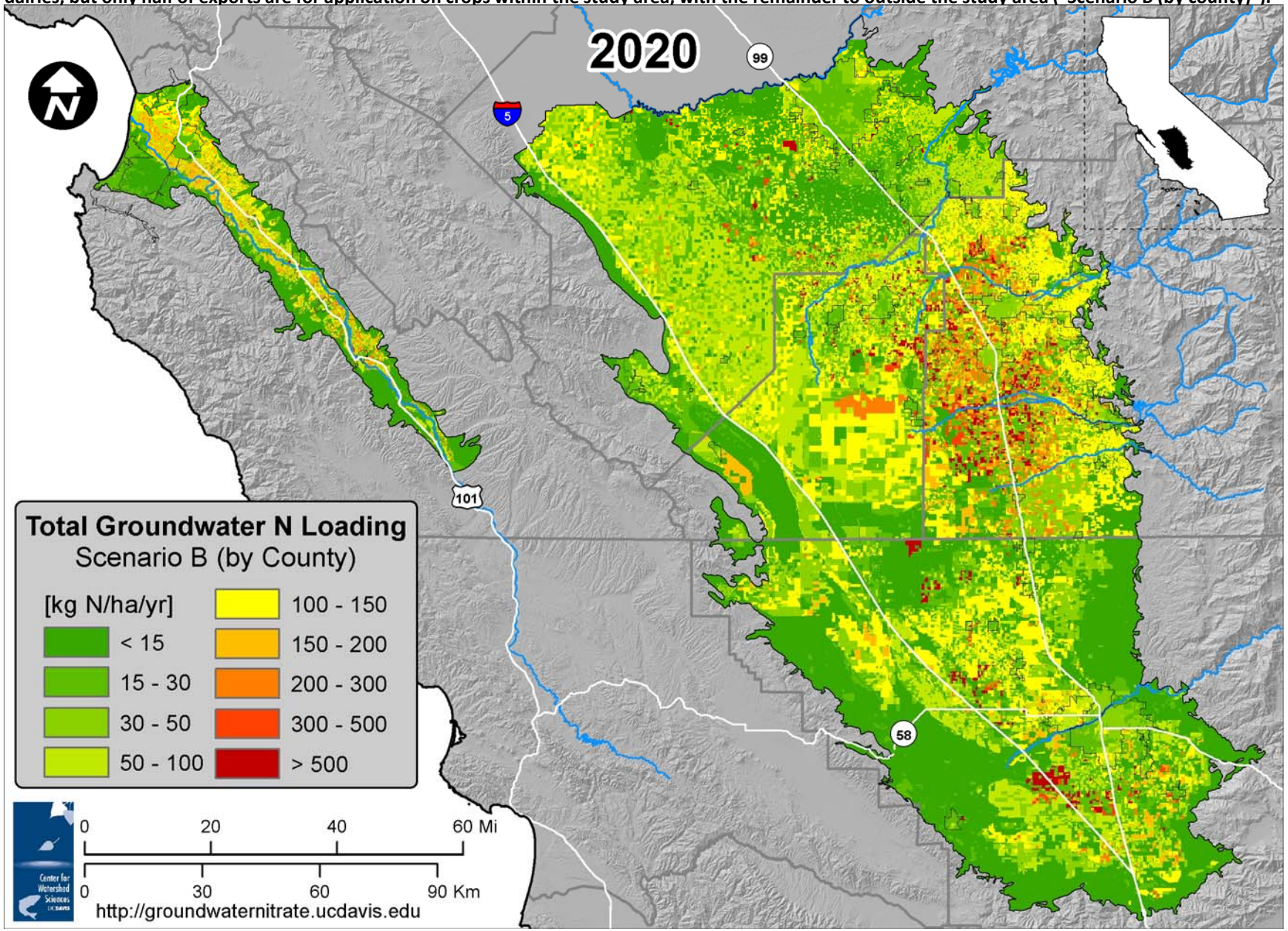
Appendix Figure 111. Total nitrogen loading to groundwater from all sources, in 1990. In this scenario, 38% of all excreted dairy animal manure is exported from dairies, but only half of exports are for application on crops within the study area, with the remainder to outside the study area ("Scenario B (by county)").



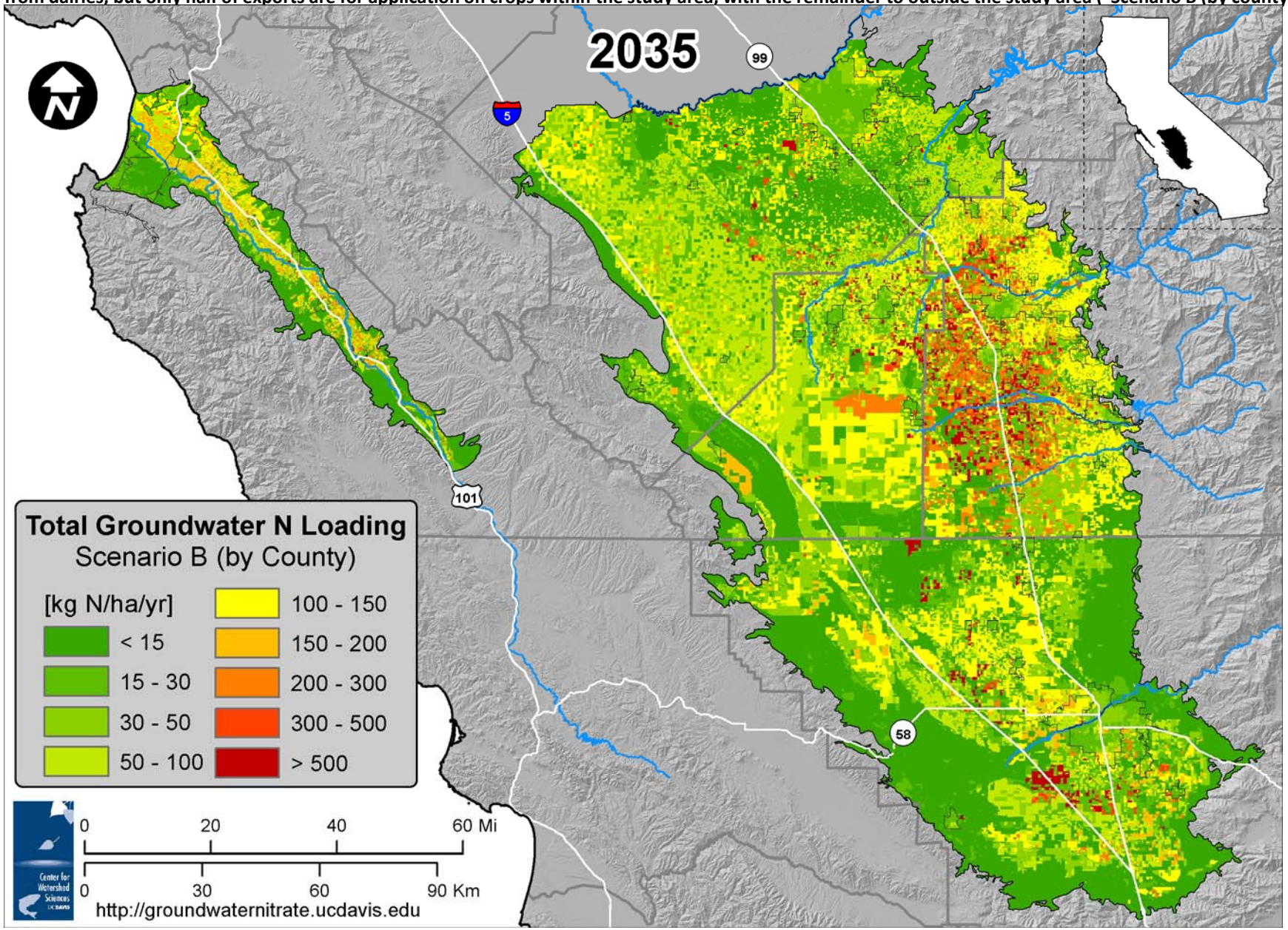
Appendix Figure 112. Total nitrogen loading to groundwater from all sources, in 2005. In this scenario, 38% of all excreted dairy animal manure is exported from dairies, but only half of exports are for application on crops within the study area, with the remainder to outside the study area ("Scenario B (by county)").



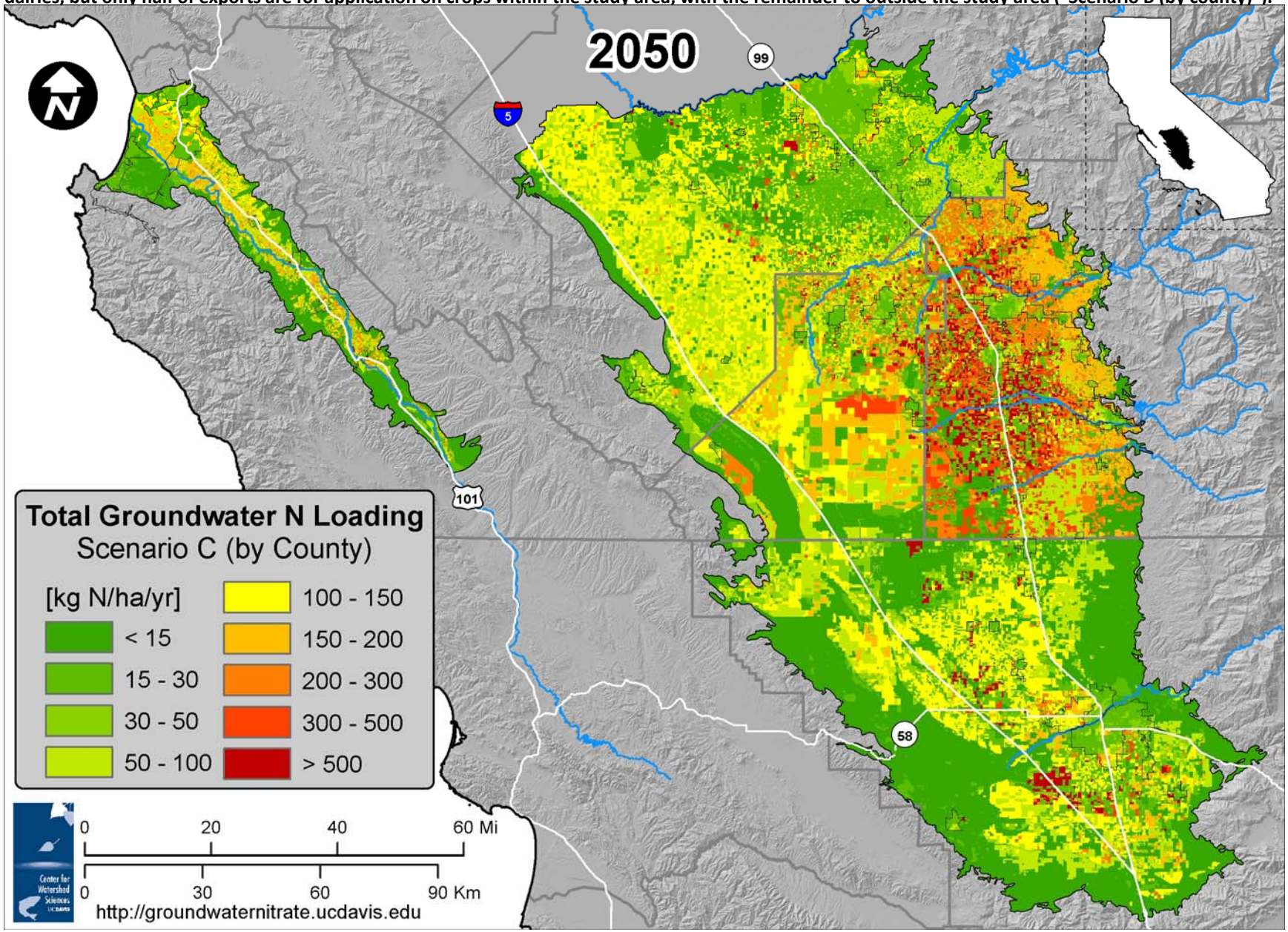
Appendix Figure 113. Total nitrogen loading to groundwater from all sources, in 2020. In this scenario, 38% of all excreted dairy animal manure is exported from dairies, but only half of exports are for application on crops within the study area, with the remainder to outside the study area ("Scenario B (by county)").



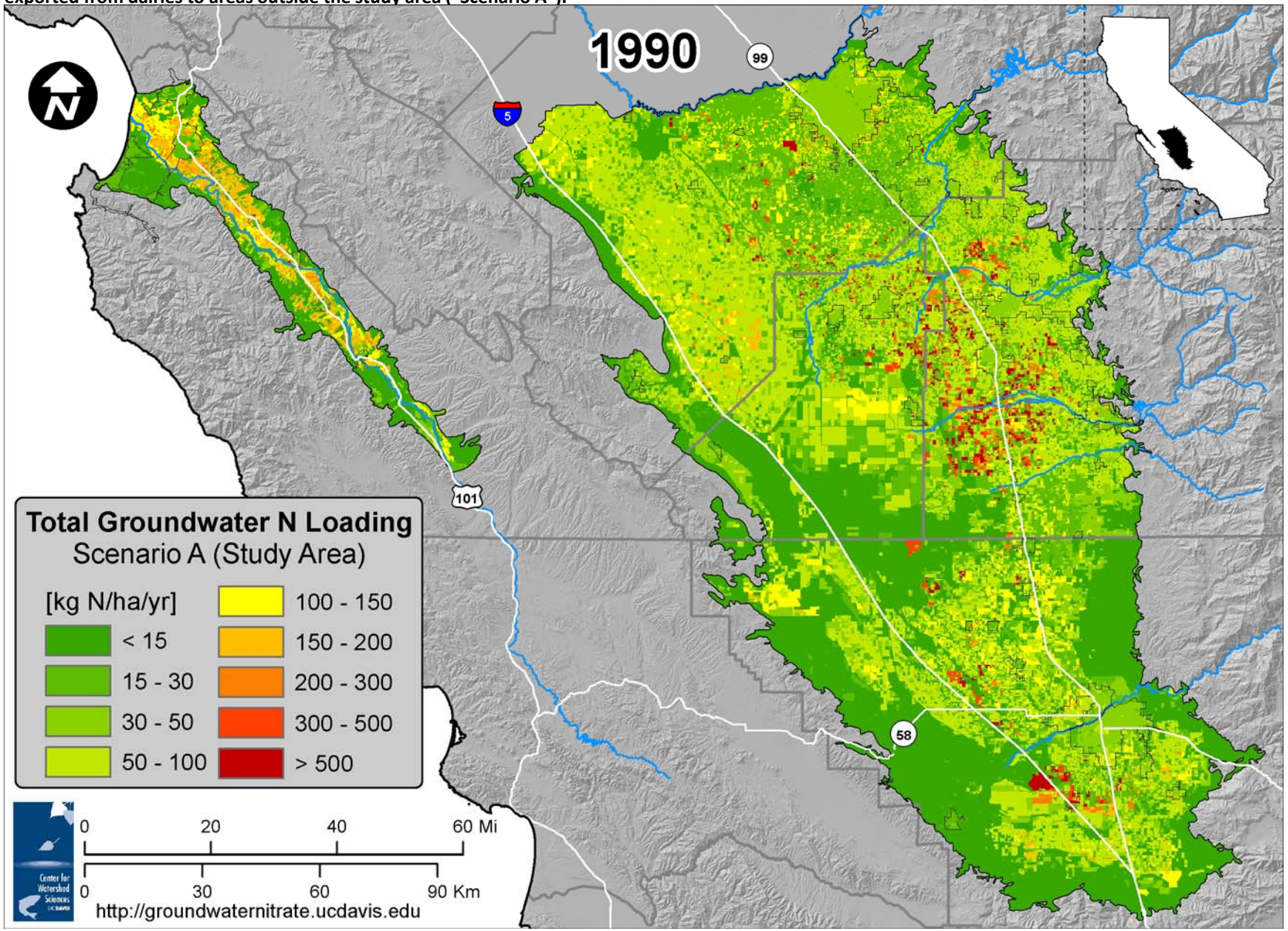
Appendix Figure 114. Total nitrogen loading to groundwater from all sources, in 2035. In this scenario, 38% of all excreted dairy animal manure is exported from dairies, but only half of exports are for application on crops within the study area, with the remainder to outside the study area ("Scenario B (by county)").



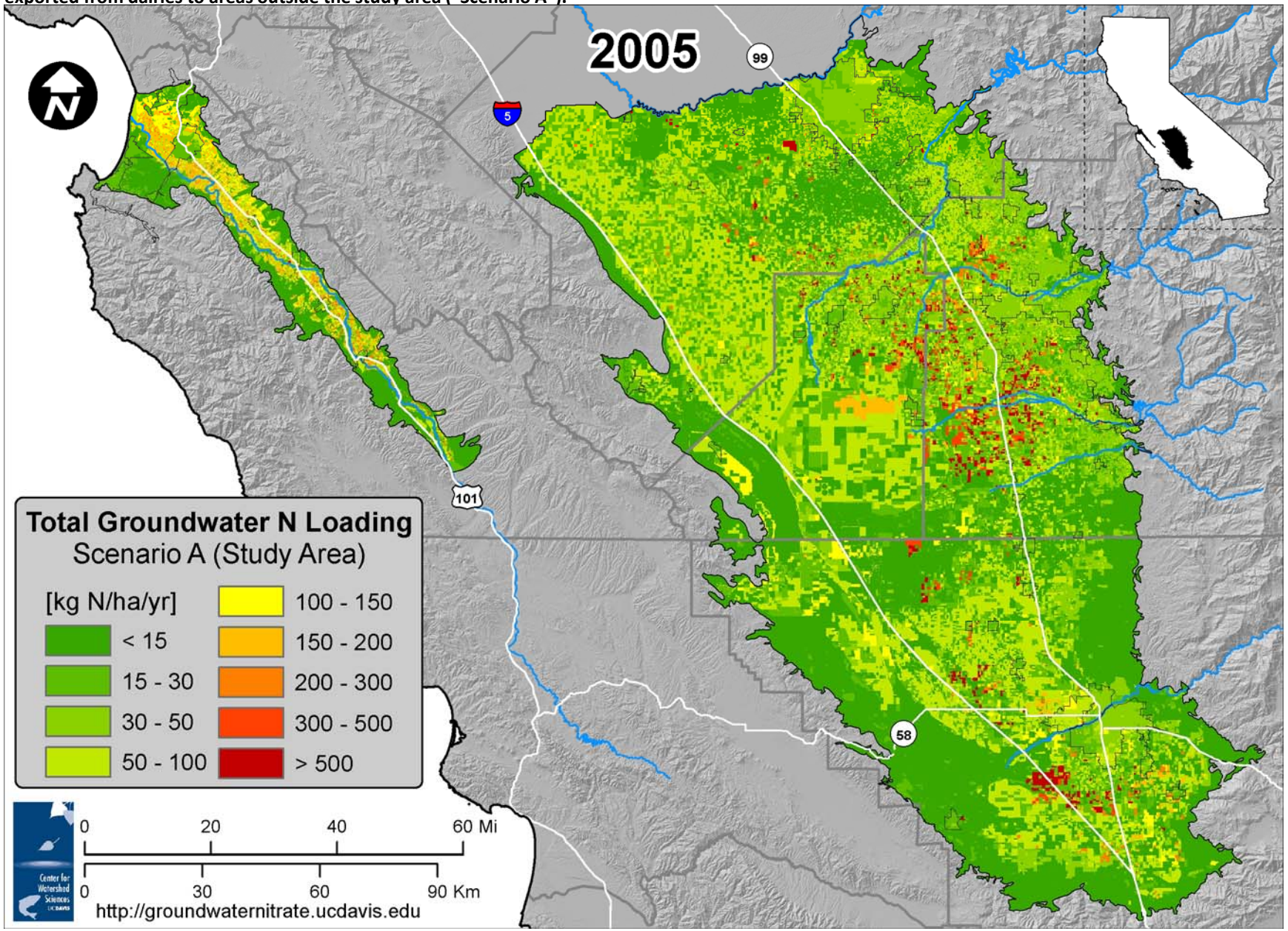
Appendix Figure 115. Total nitrogen loading to groundwater from all sources, in 2050. In this scenario, 38% of all excreted dairy animal manure is exported from dairies, but only half of exports are for application on crops within the study area, with the remainder to outside the study area ("Scenario B (by county)").



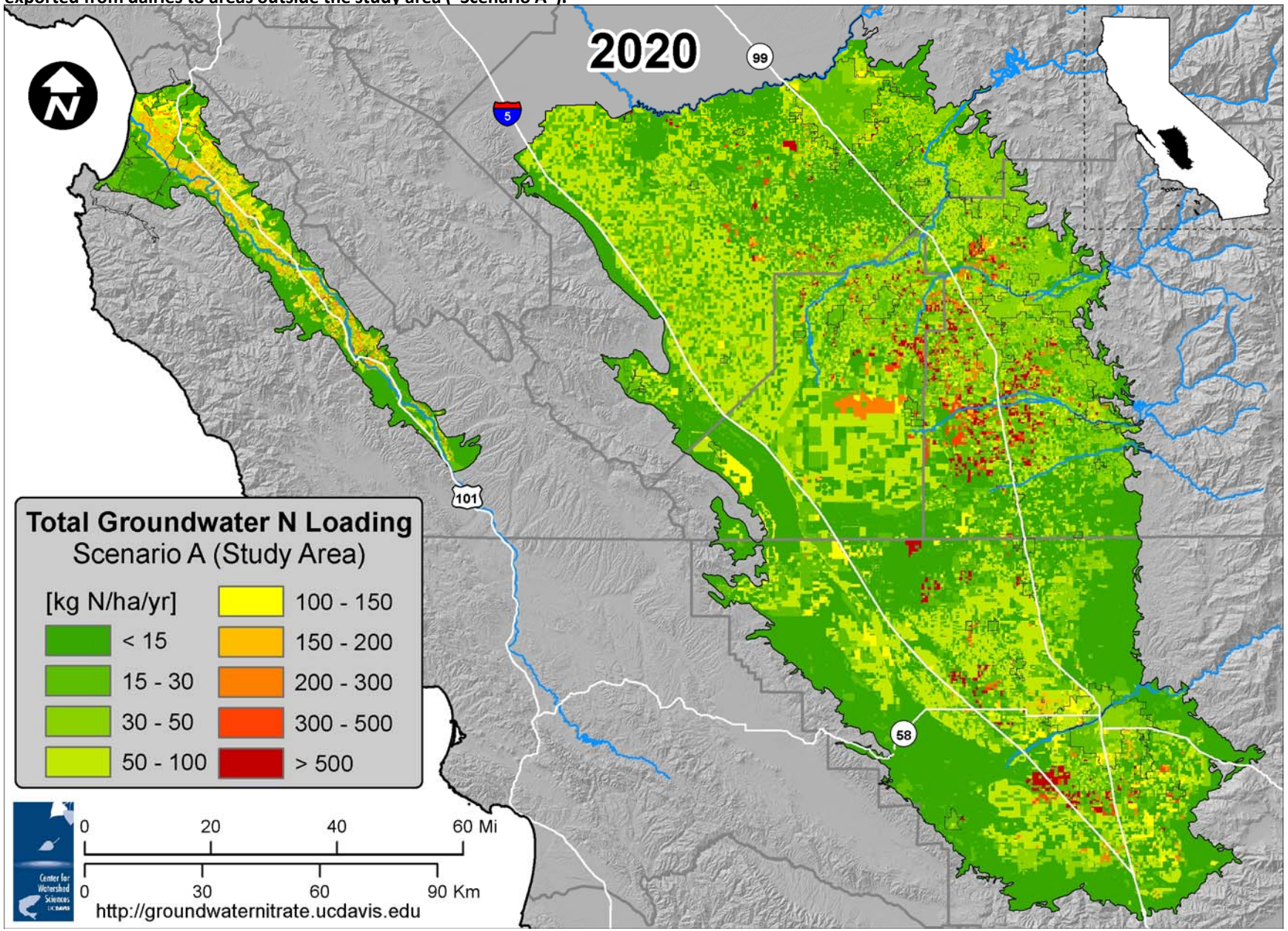
Appendix Figure 116. Total nitrogen loading to groundwater from all sources, in 1990. In this scenario, 15.2% of all excreted dairy animal manure is exported from dairies to areas outside the study area ("Scenario A").



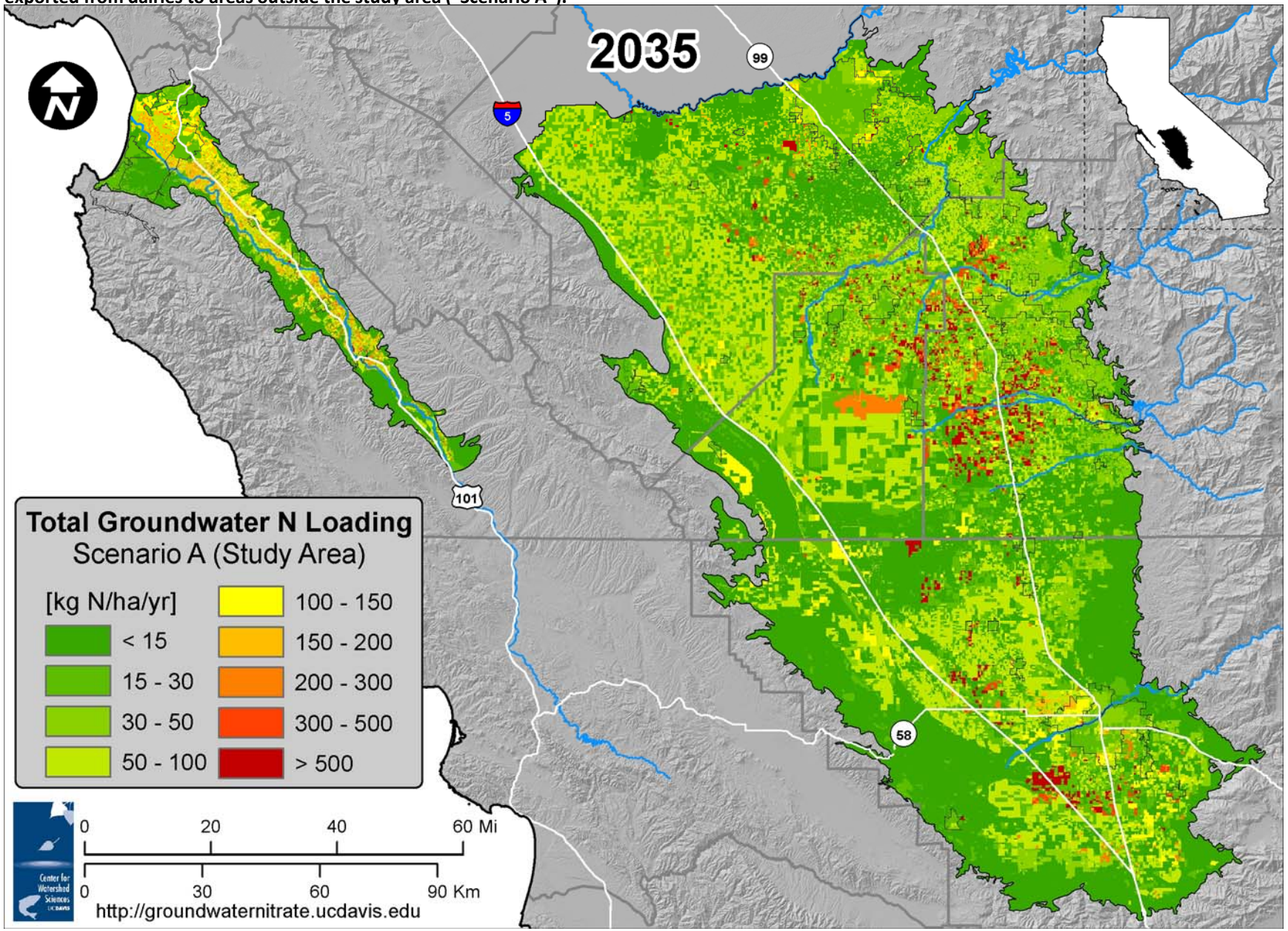
Appendix Figure 117. Total nitrogen loading to groundwater from all sources, in 2005. In this scenario, 38% of all excreted dairy animal manure is exported from dairies to areas outside the study area ("Scenario A").



Appendix Figure 118. Total nitrogen loading to groundwater from all sources, in 2020. In this scenario, 38% of all excreted dairy animal manure is exported from dairies to areas outside the study area ("Scenario A").



Appendix Figure 119. Total nitrogen loading to groundwater from all sources, in 2035. In this scenario, 38% of all excreted dairy animal manure is exported from dairies to areas outside the study area ("Scenario A").



Appendix Figure 120. Total nitrogen loading to groundwater from all sources, in 2050. In this scenario, 38% of all excreted dairy animal manure is exported from dairies to areas outside the study area ("Scenario A").