legend: position: 1 or 2; s: seen before; e: can eat

(2 1 1 1)  (2 2 1 1)  (2 1 2 1)  (2 1 1 2)  go from 1 to 2
  e        e        e
  X        X        X

(1 1 2 1)  (1 1 1 1)  X
 s  X

(2 1 2 1)  (2 2 2 1)  X  (2 1 2 2)  go from 1 to 2
  s        X
  X

(1 2 2 1)  (1 1 2 1)  (1 2 1 1)  X  (1 1 2 2)  X  (1 1 1 2)  (1 1 2 1)
  e  s  e   X
  X  X  X

(2 2 1 1)  X  (2 2 2 1)  (2 2 1 2)  (2 1 1 2)  (2 2 1 2)  (2 2 1 2)  X
  e  s  e  s  s  s
  X  X  X  X  X  X

(1 2 1 2)  (1 1 1 2)  X  (1 2 1 1)
  s  s
  X  X

(2 2 1 2)  X  (2 2 2 2)  X
  s  X
  GOAL!