Bird surveys in wind turbine projects as a tool for studying migration routes

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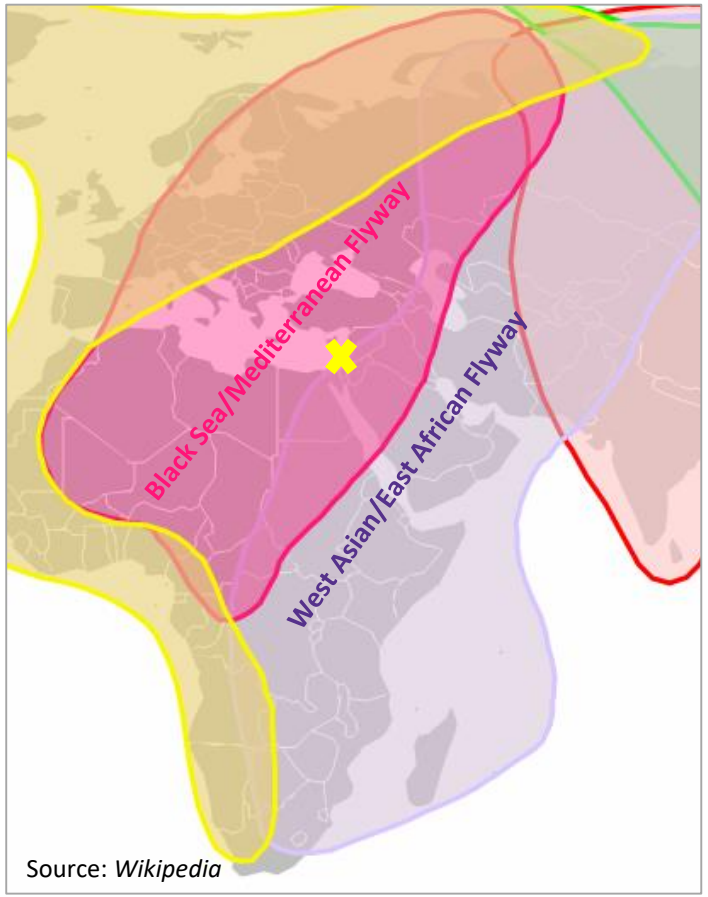
Israel

Bird migration in Israel

- Major migratory flyway above the Great Rift Valley
- Corridor between Eurasia and East Africa
- Approximately 500,000,000 birds cross Israel in each migration season



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Bird migration in Israel

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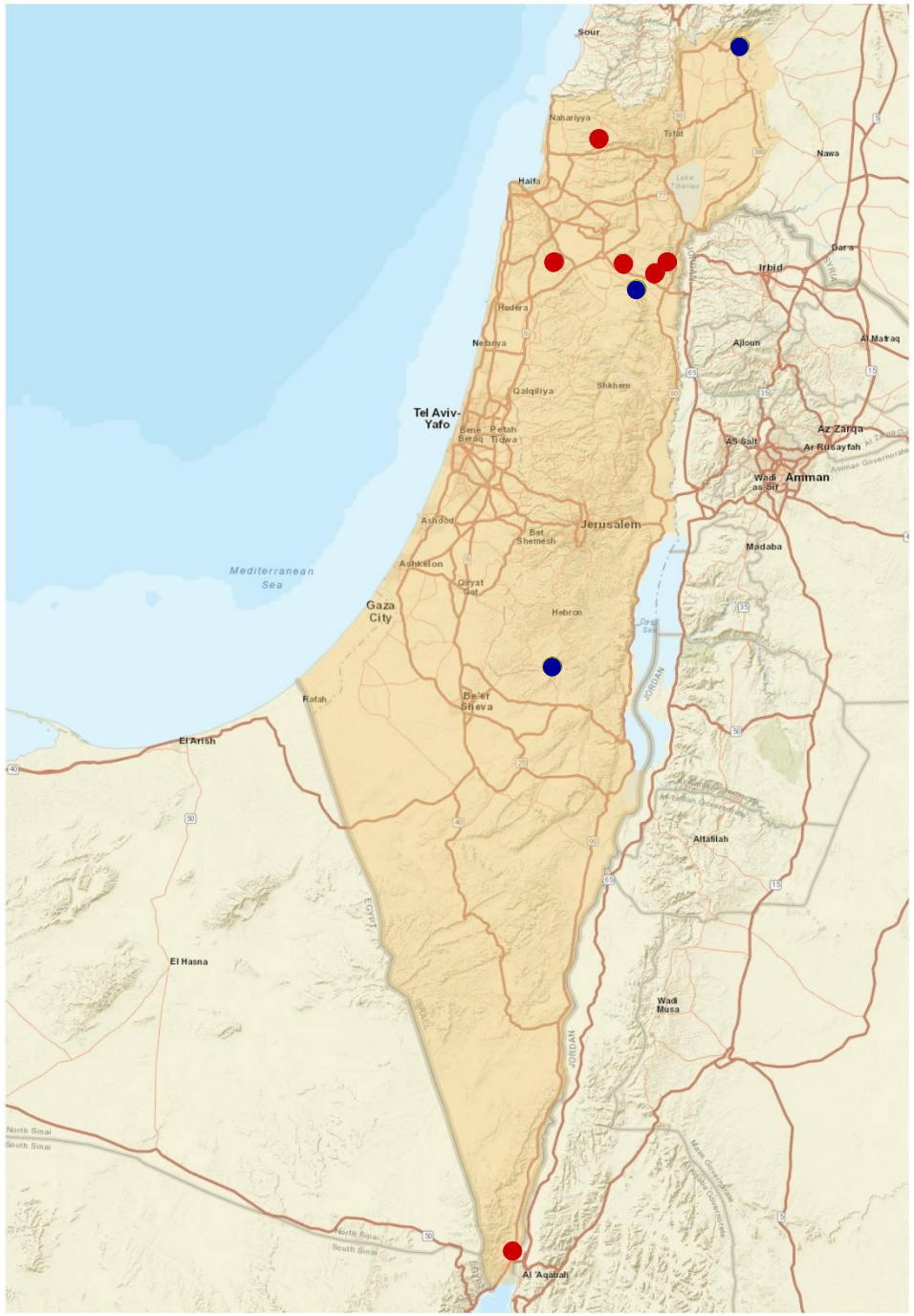
Wind energy in Israel

- Less than 30MW installed
- Maximal height of existing turbines is 80m
- Nearly zero data on their effect on birds
- Currently around 20 new wind energy projects being planned, mostly with large turbines (180m)

Bird surveys for wind energy projects

- Required for wind energy projects due to the high migration intensity
- Migration season surveys:
  March-May and August-October

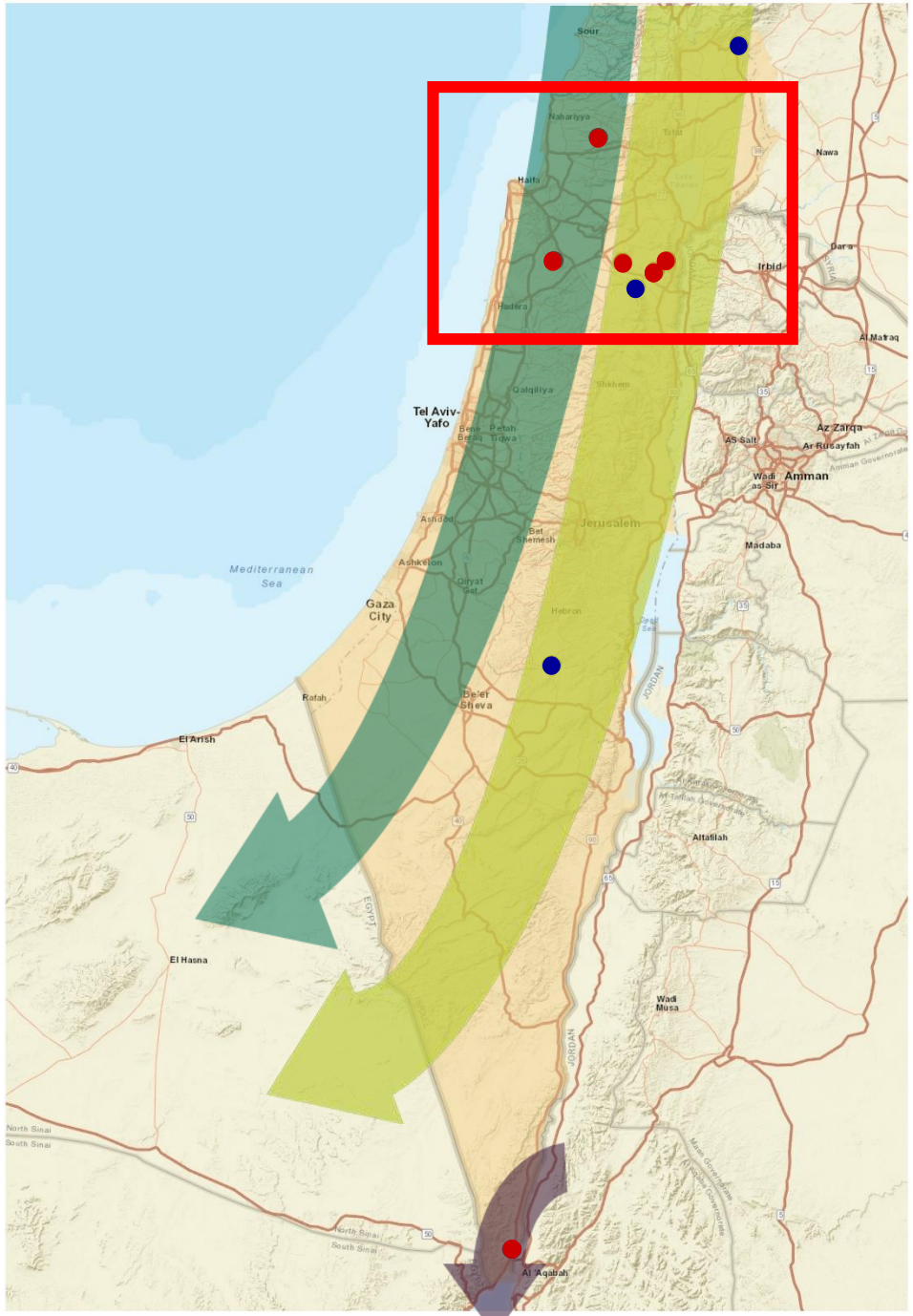
Photographs: Eldad Golan



Bird surveys for wind energy projects

Three main routes known in the autumn migration:

- Eastern – along the rift valley
- Western – along the coast
- Eilat



Adapted from: Leshem 1997

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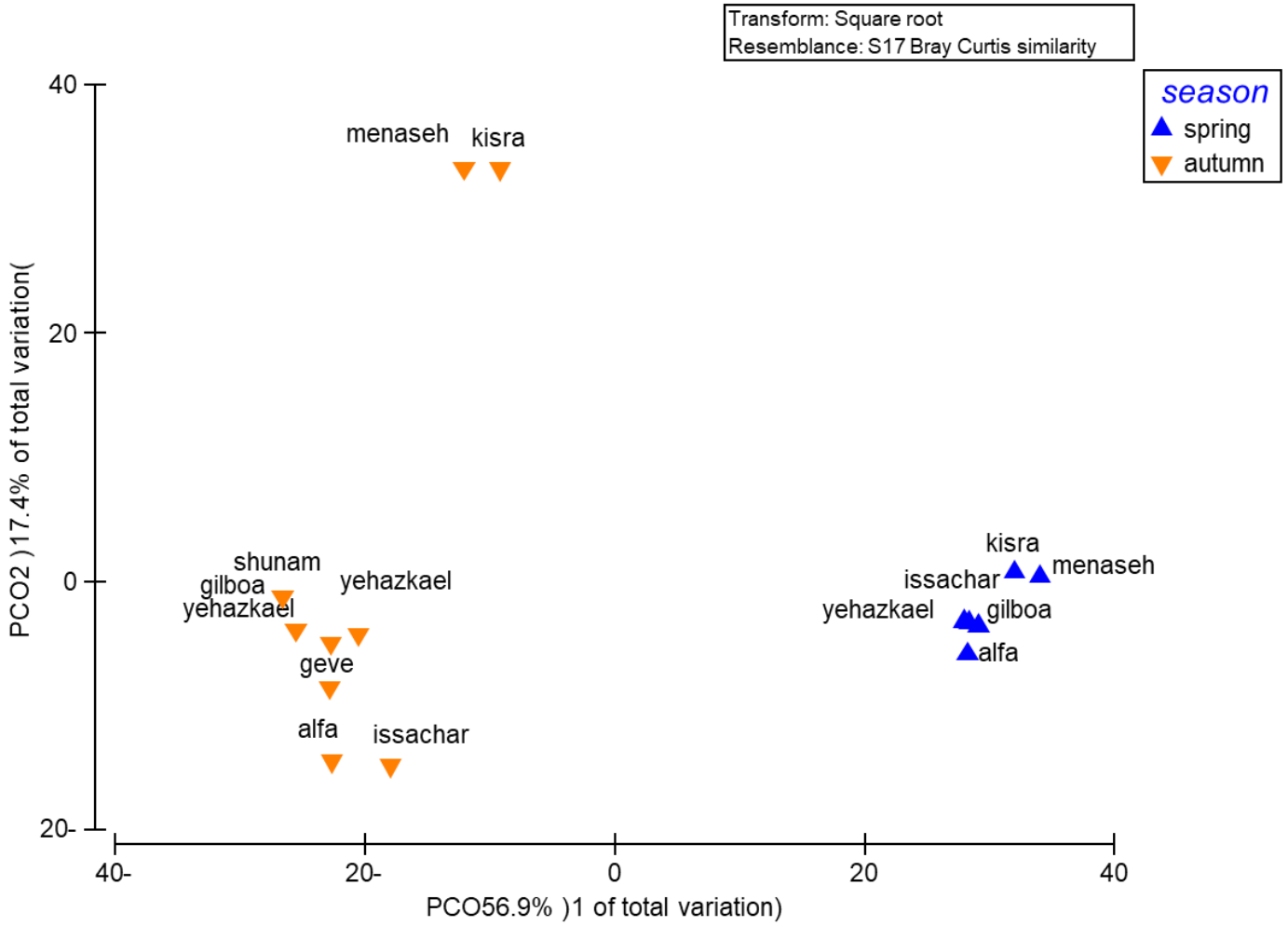
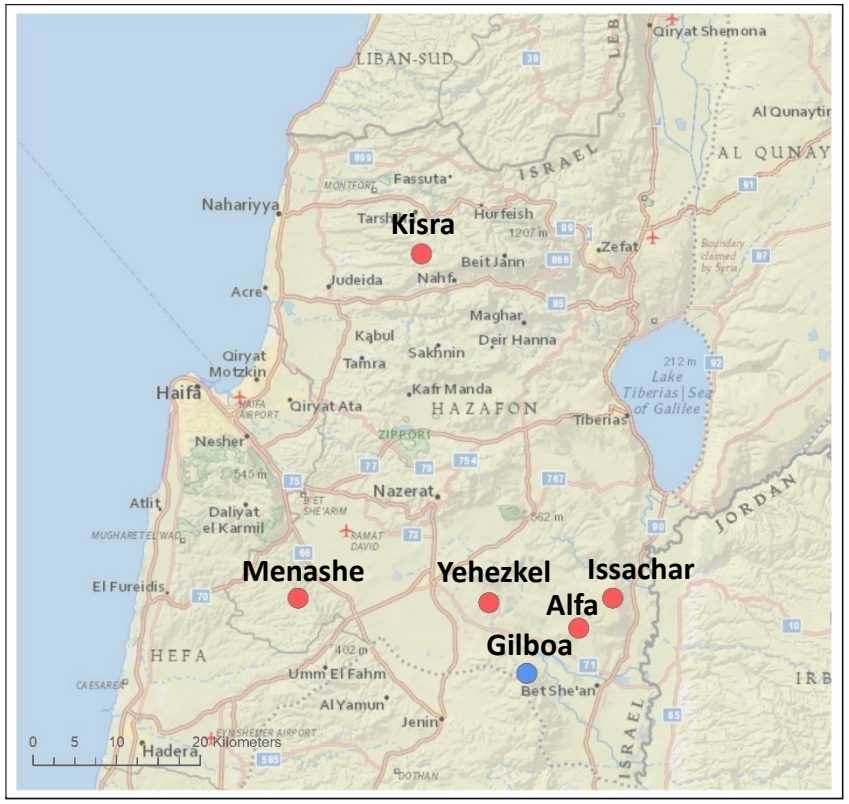
Species composition

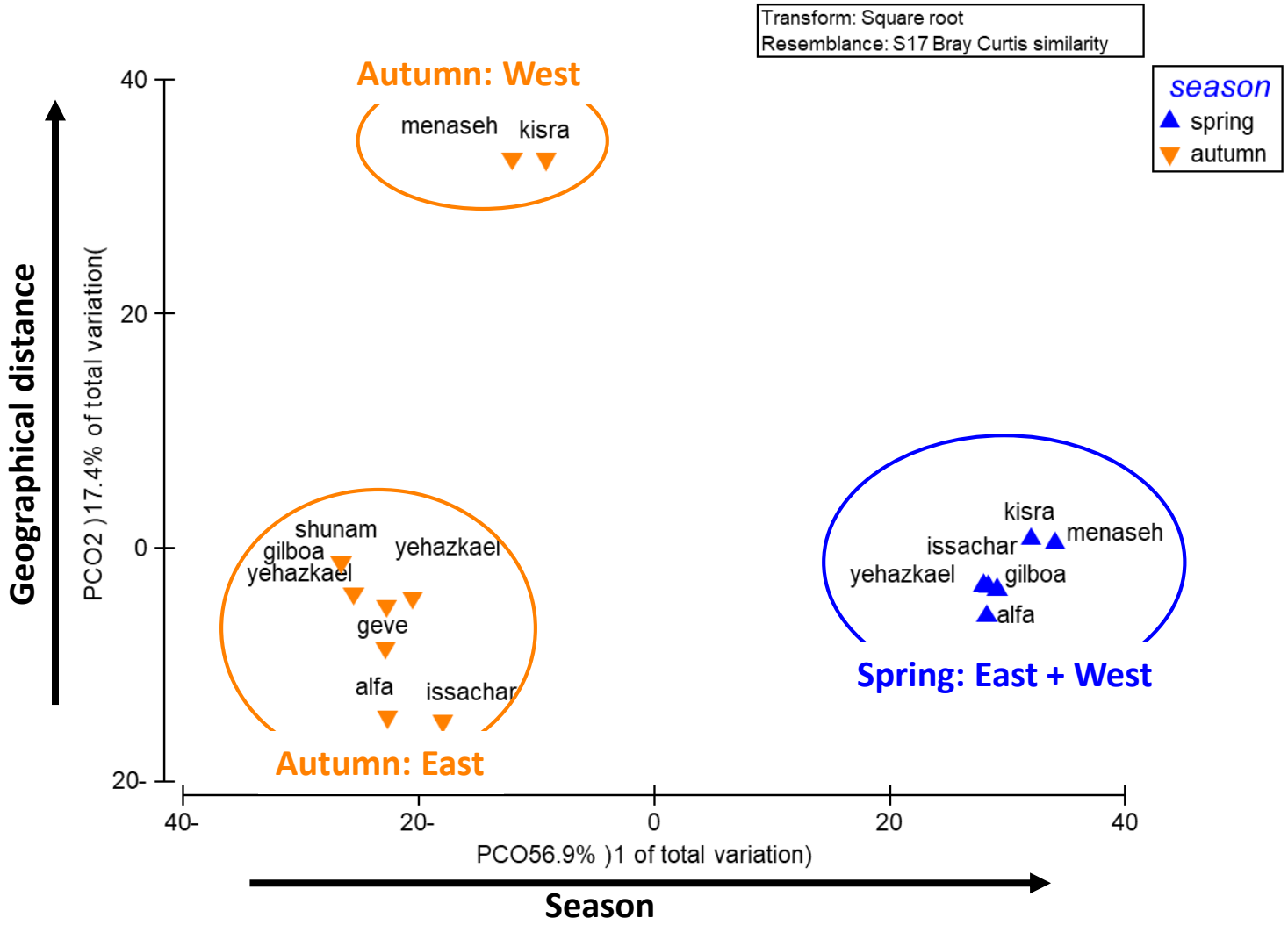
Ordination (PCoA)

- Order samples along continuous gradients of the descriptor variables
- The closer two samples are on the plot, the more similar they are in their species composition



Species composition





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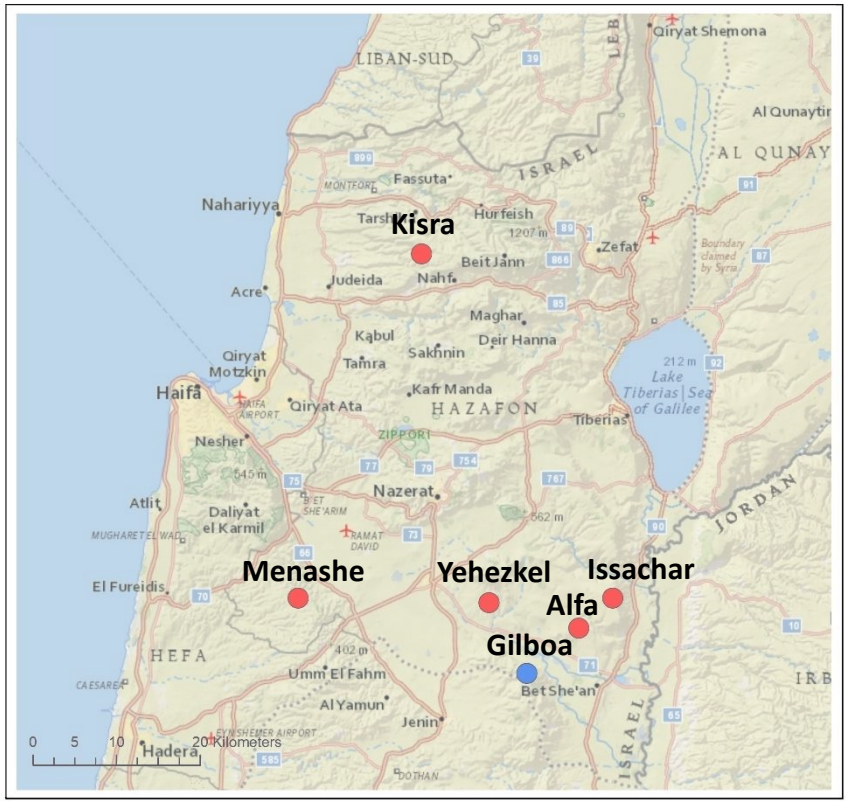
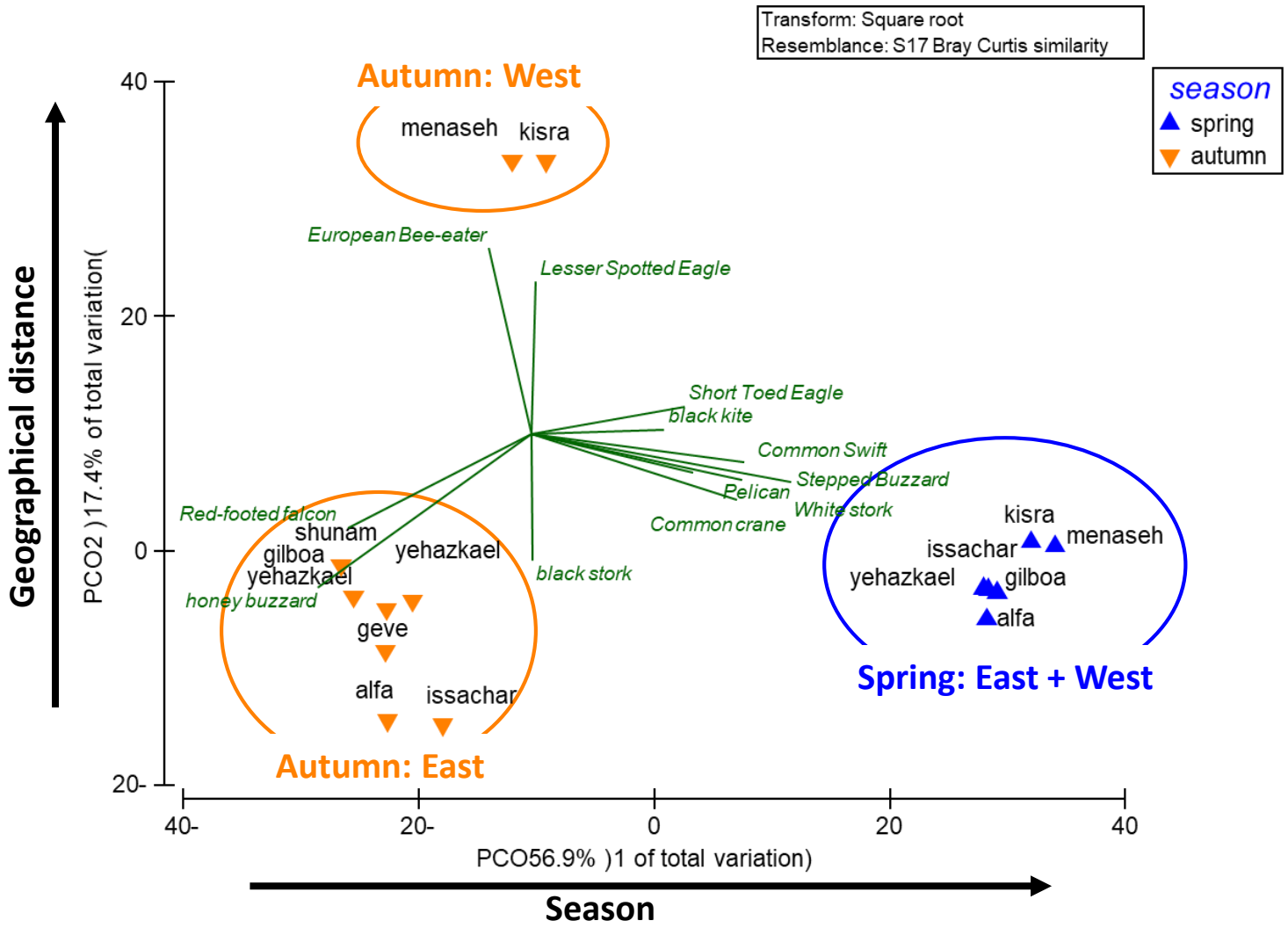
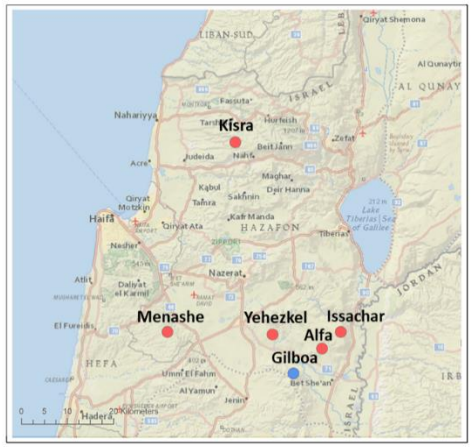
Species composition

*In green: species that significantly contribute to the ordination



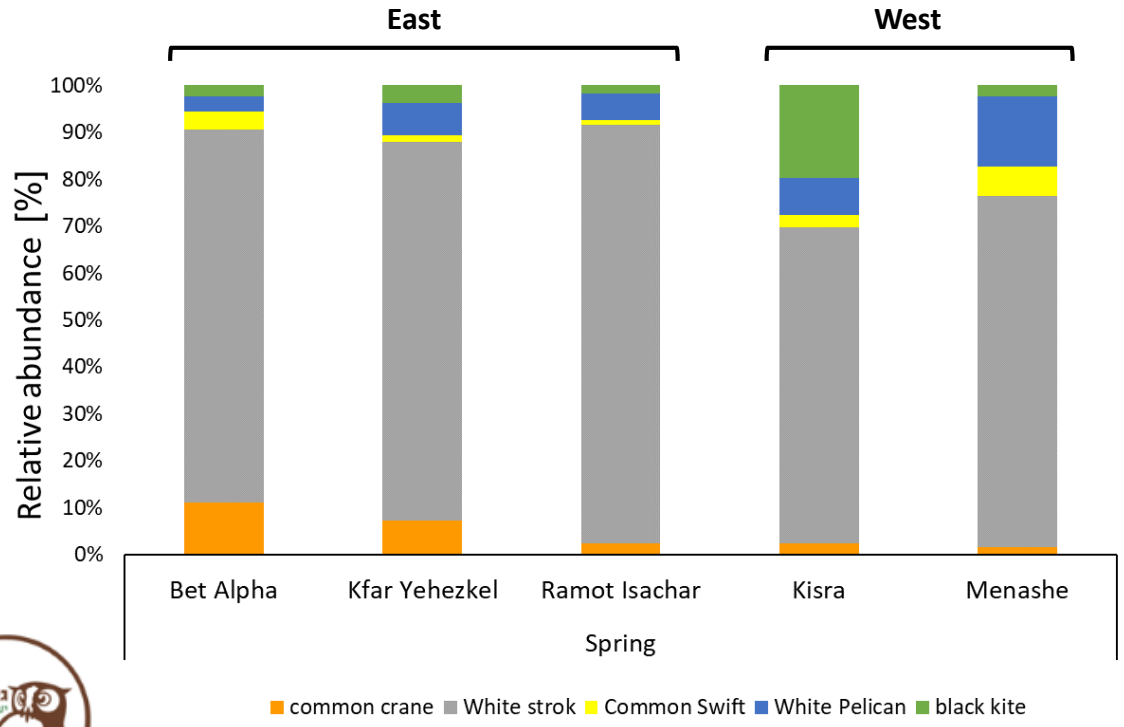




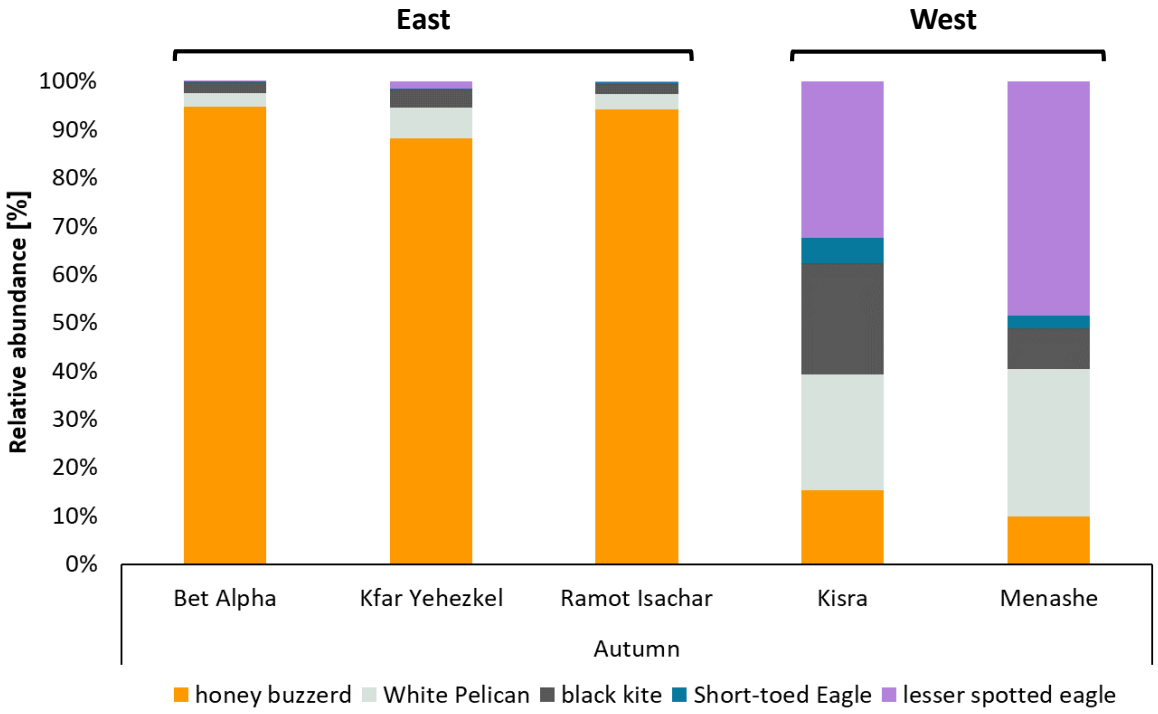
Species composition

Relative abundance of common species

Spring



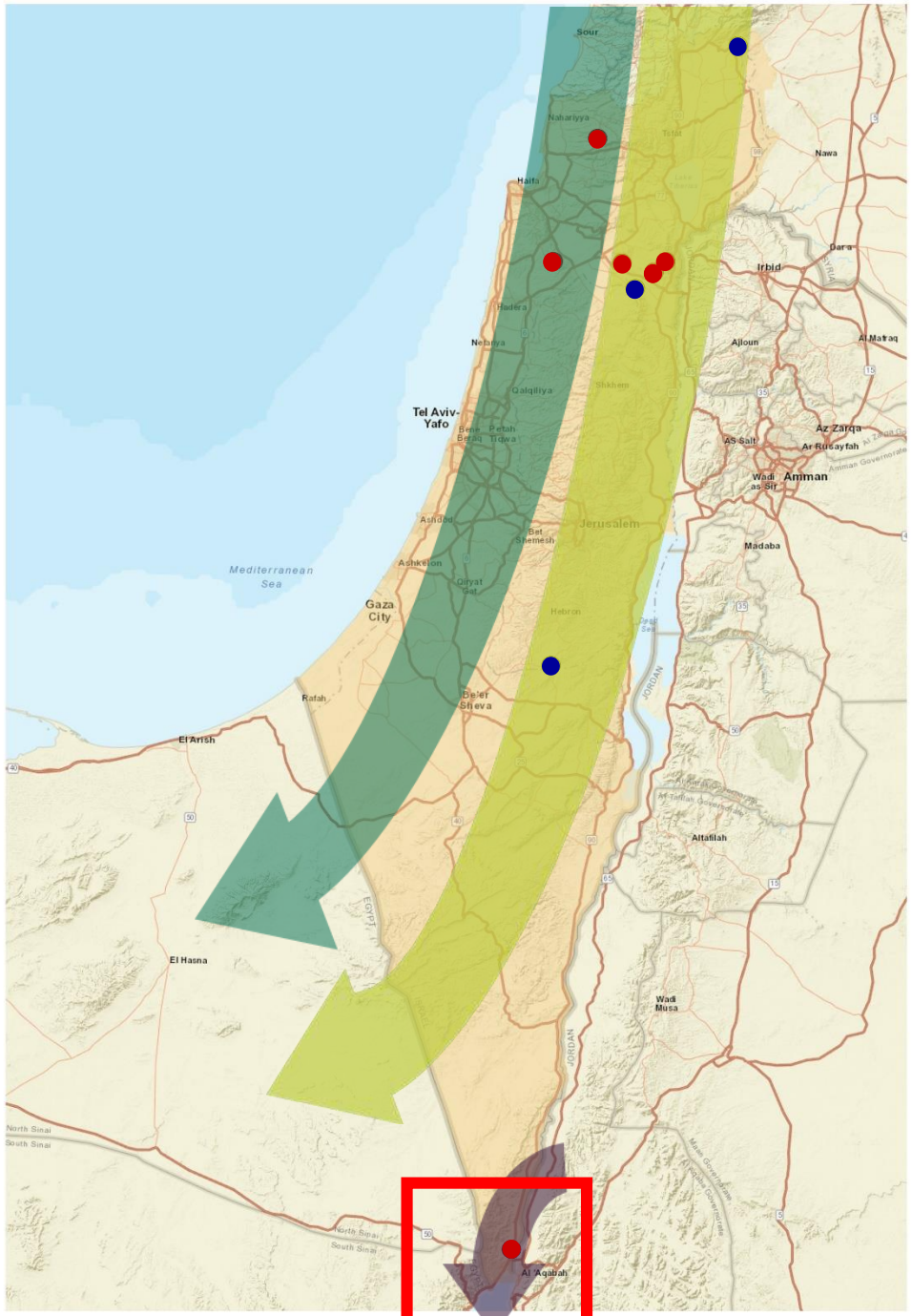
Autumn



Eilat

- Eilat is located in Israel's most southern region
- It lies along the Great Rift Valley, between two mountain ranges to its east and west
- Important overland corridor between Eurasia and Africa

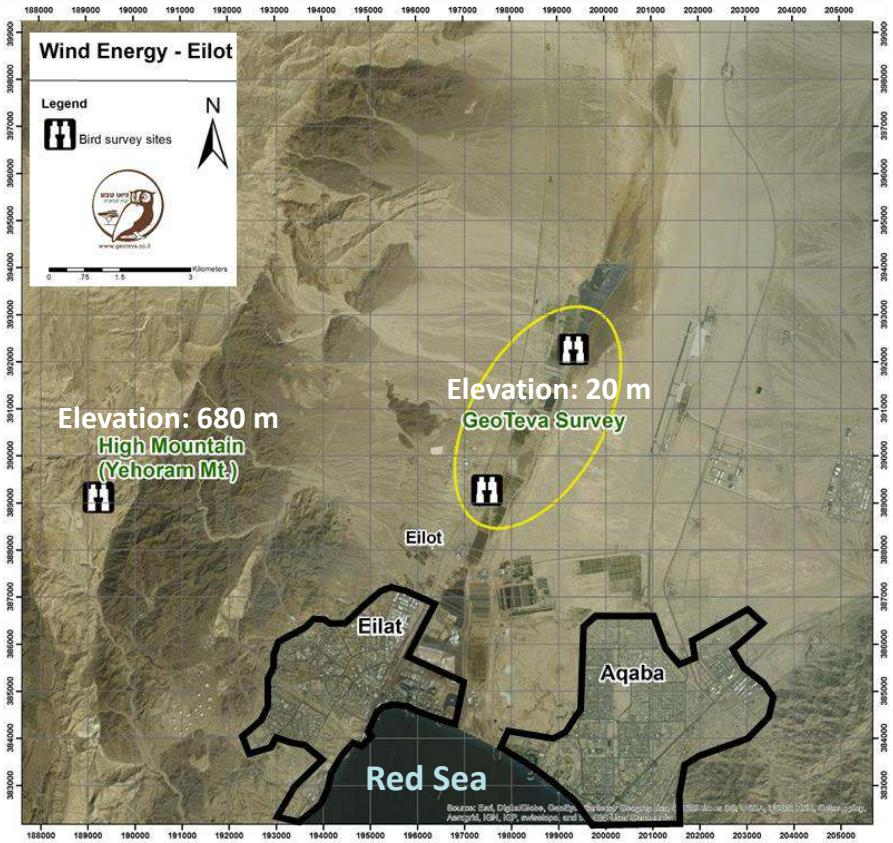
Photographs: Eldad Golan

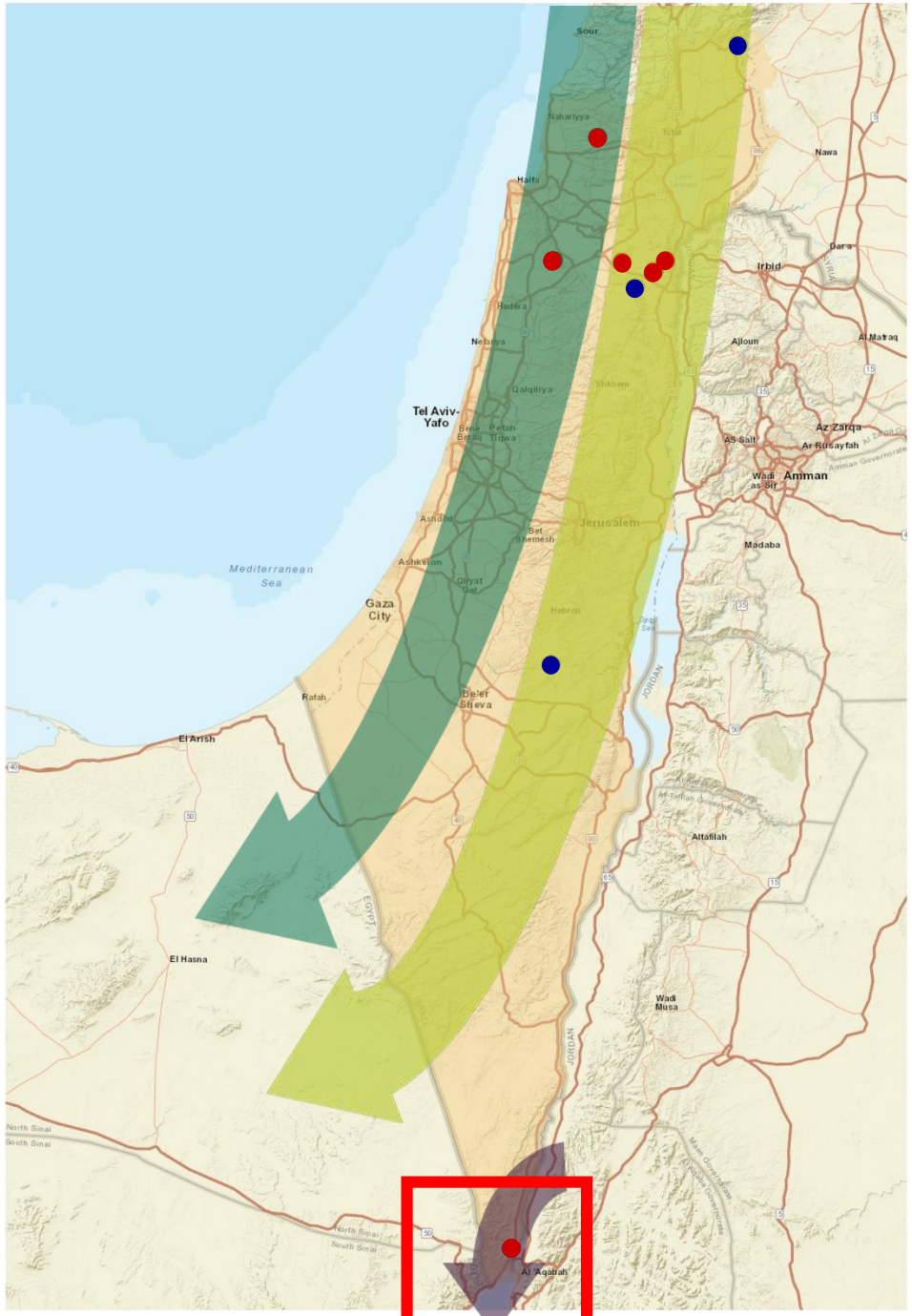


Adapted from: Leshem 1997

Eilat

- Annual spring migration survey by the Society of Nature Protection at Mt. Yehoram (~680 m ASL)
- Wind project bird survey in the valley (~20 m ASL)





Adapted from: Leshem 1997

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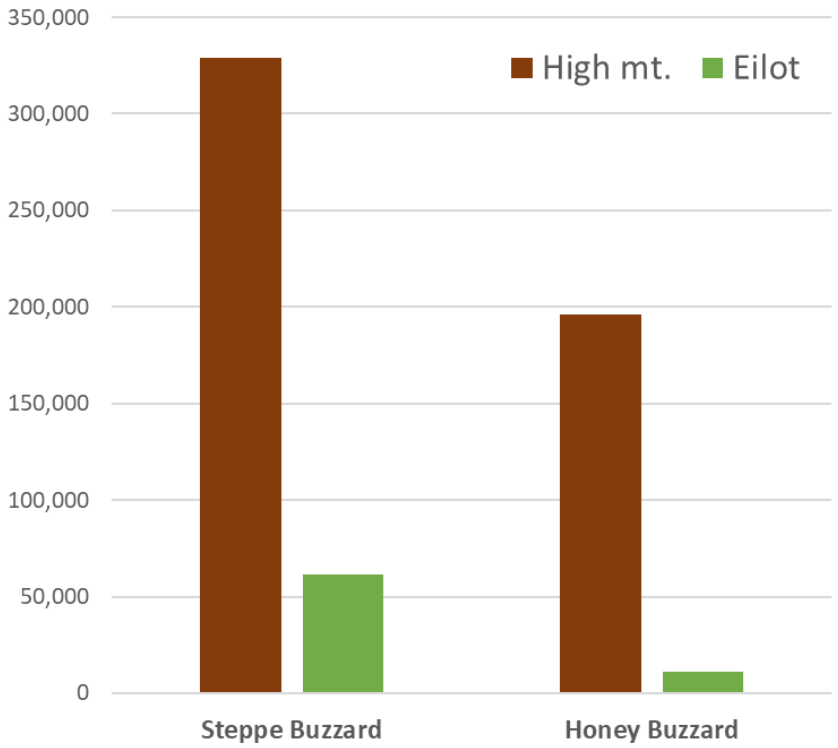
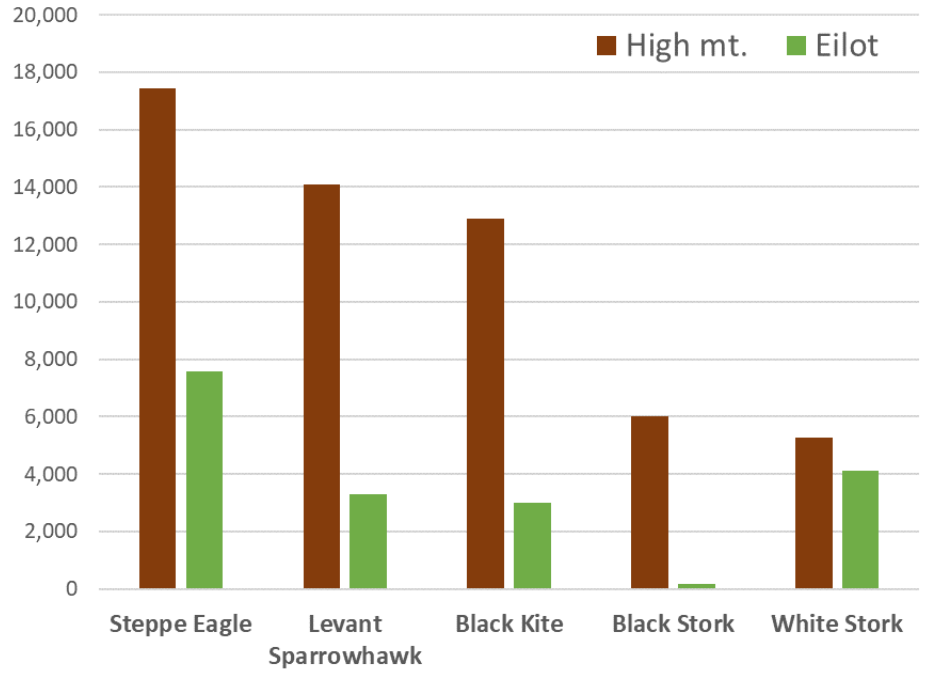
Eilat: migration volume

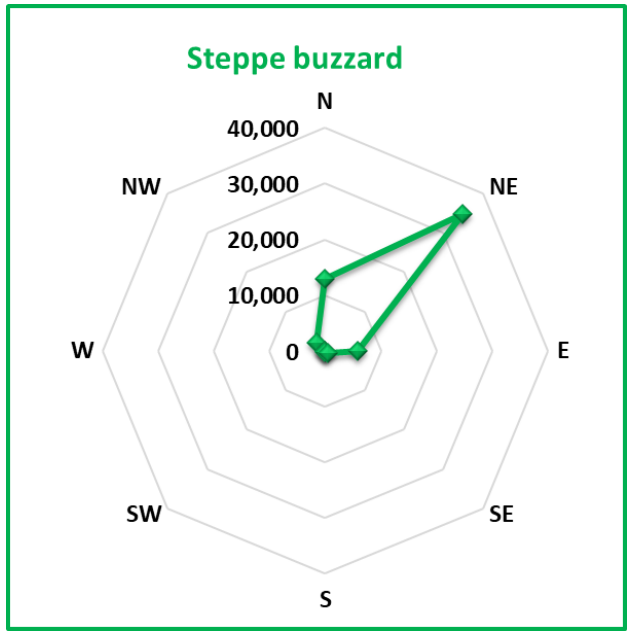
Migration volume at the valley highly differs from the mountain, in most abundant soaring migrants

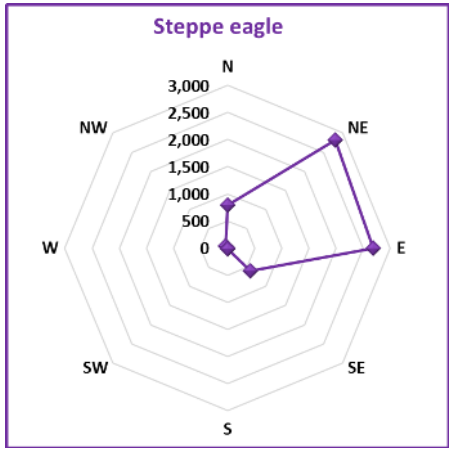


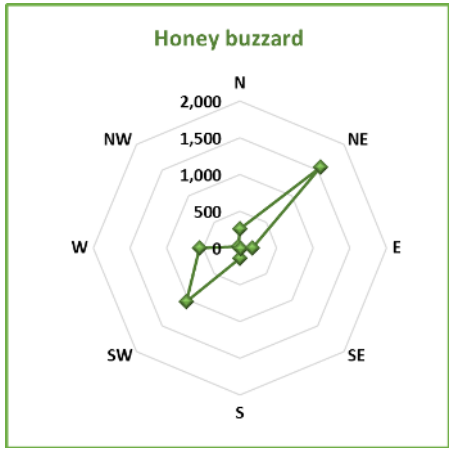


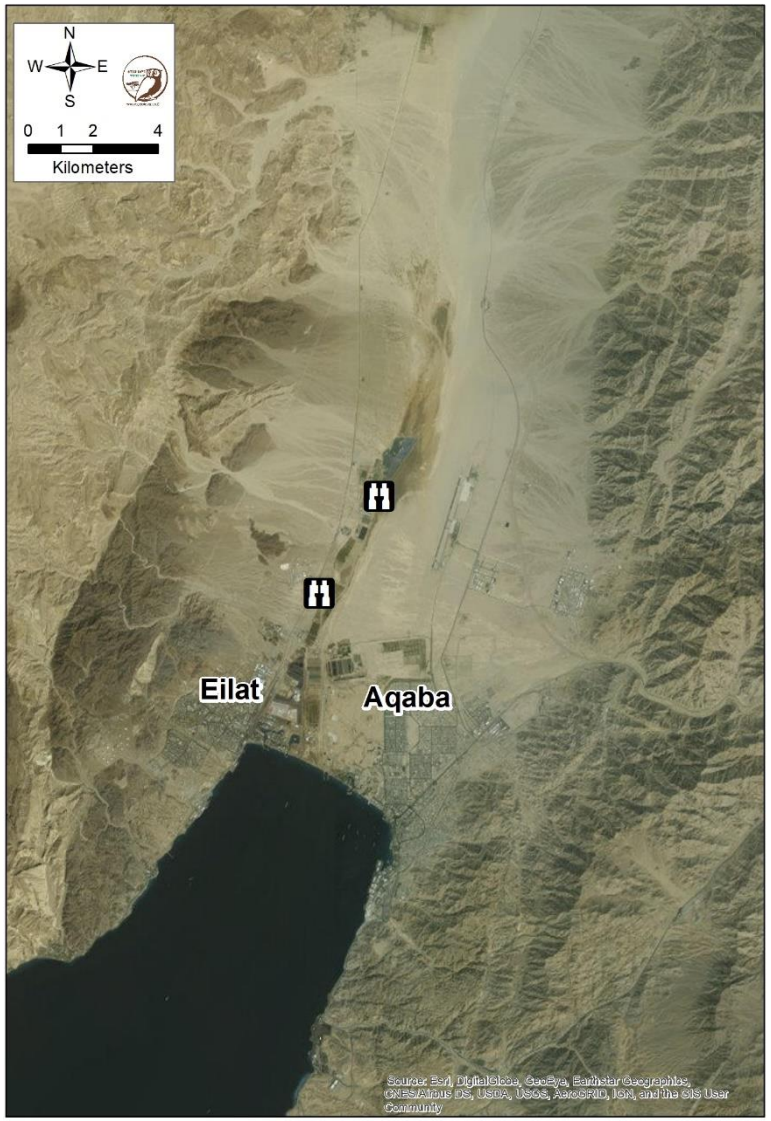
Eilat: migration directions

- Common raptors fly mainly north-east (spring)









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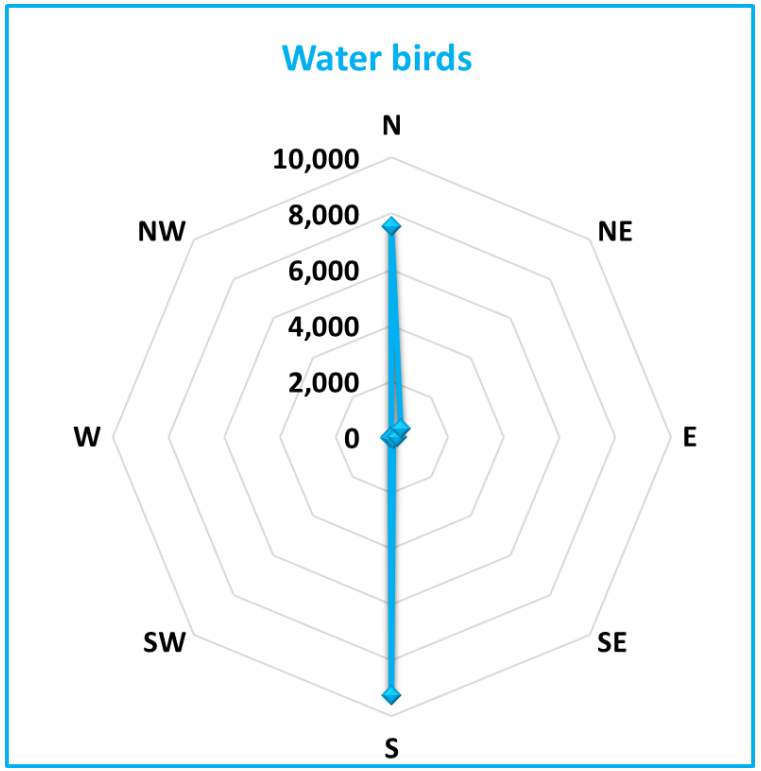
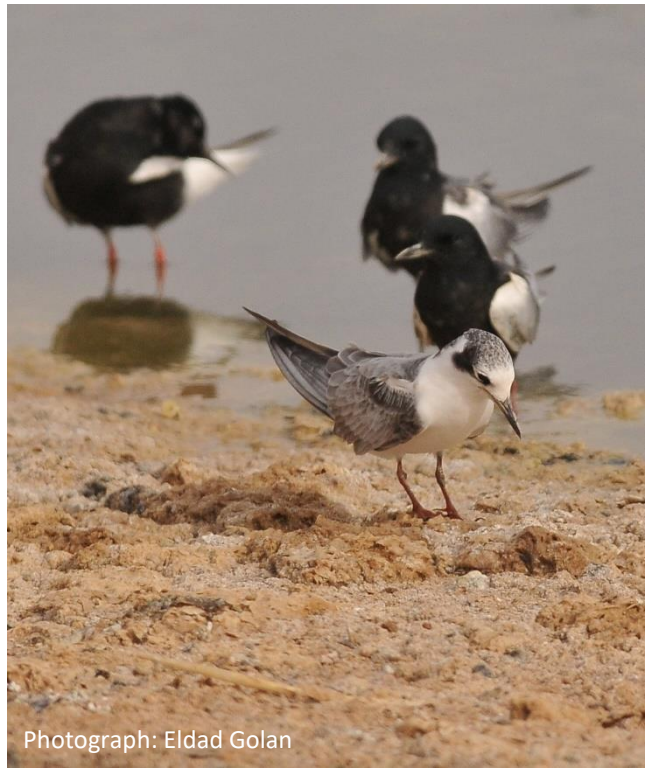
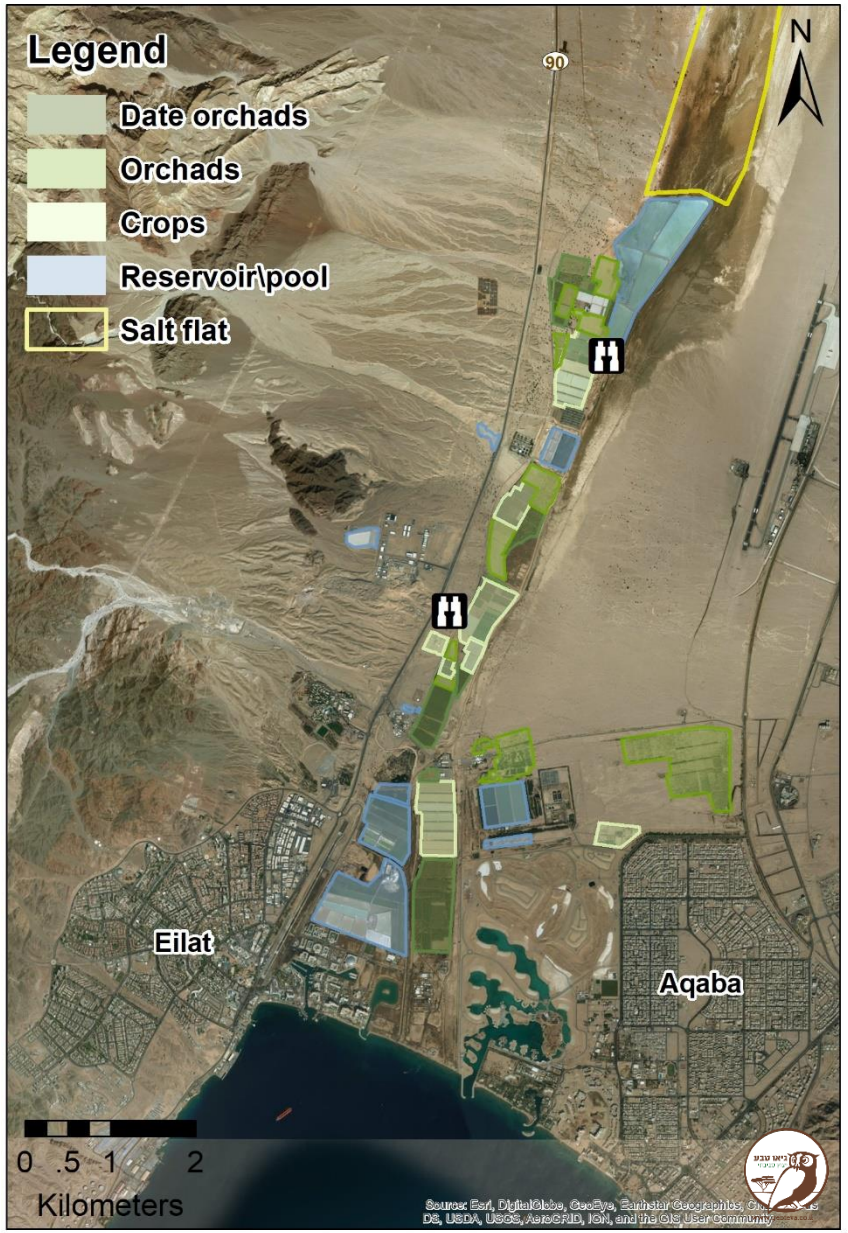
Eilat: migration directions

- Water birds fly mainly North and South – between the sea and the salt pools, as they use Eilat as a stopover




Photograph: Eldad Golan

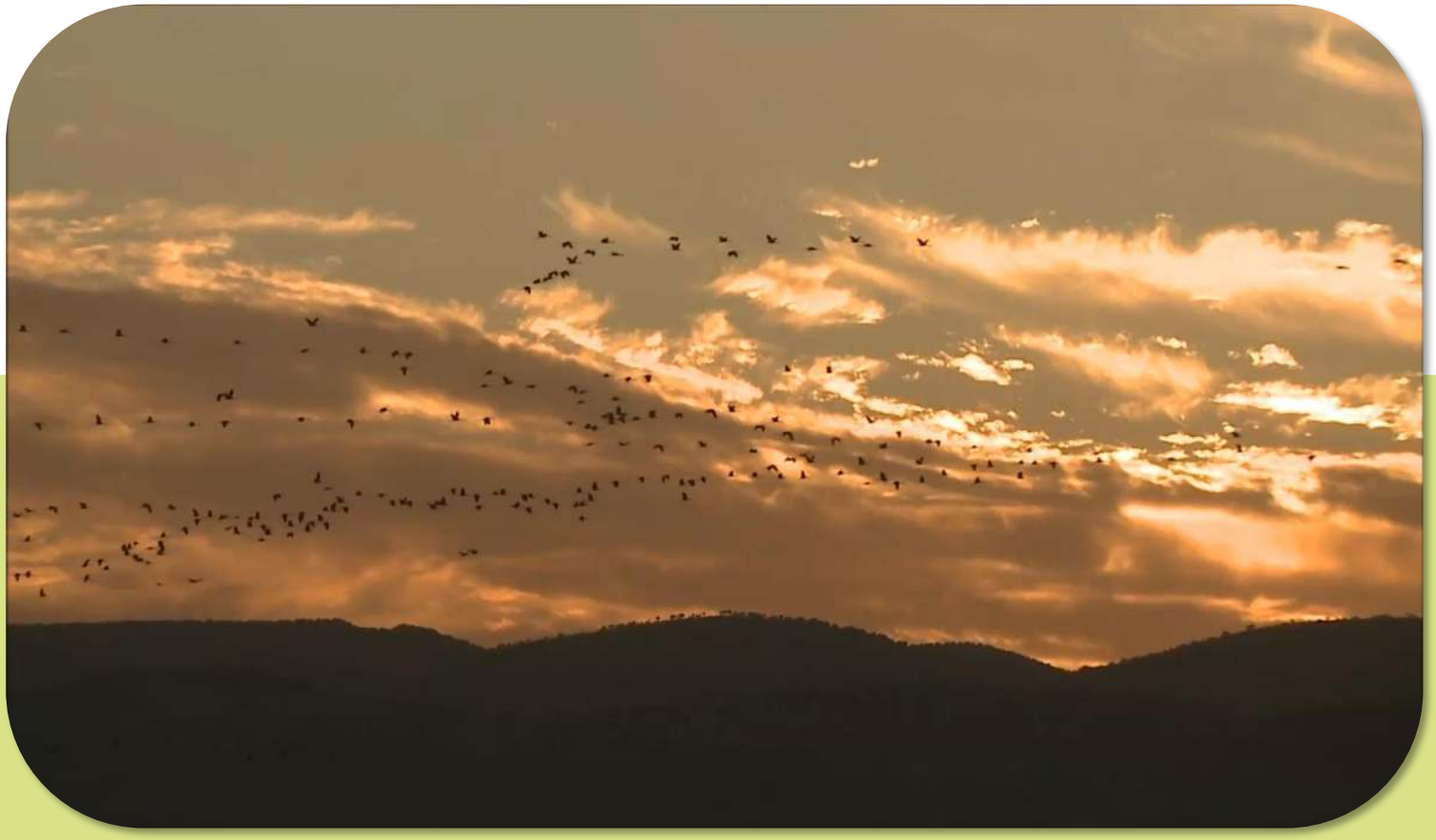


Conclusions and future research

- Migration surveys at wind turbine sites may help understand migration patterns
- Eastern and western migration routes in northern Israel are distinctive at autumn but not in spring
- Migration routes can affect species abundances within a few kilometers
- Topography and land use are extremely important in understanding bird movement patterns and therefore should receive more attention in wind energy surveys

Importance of land use analysis

Thank you!



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