Potential areas to target ITM distribution
A GIS-based approach

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Inception workshop

USAID ECF – ITM scaling

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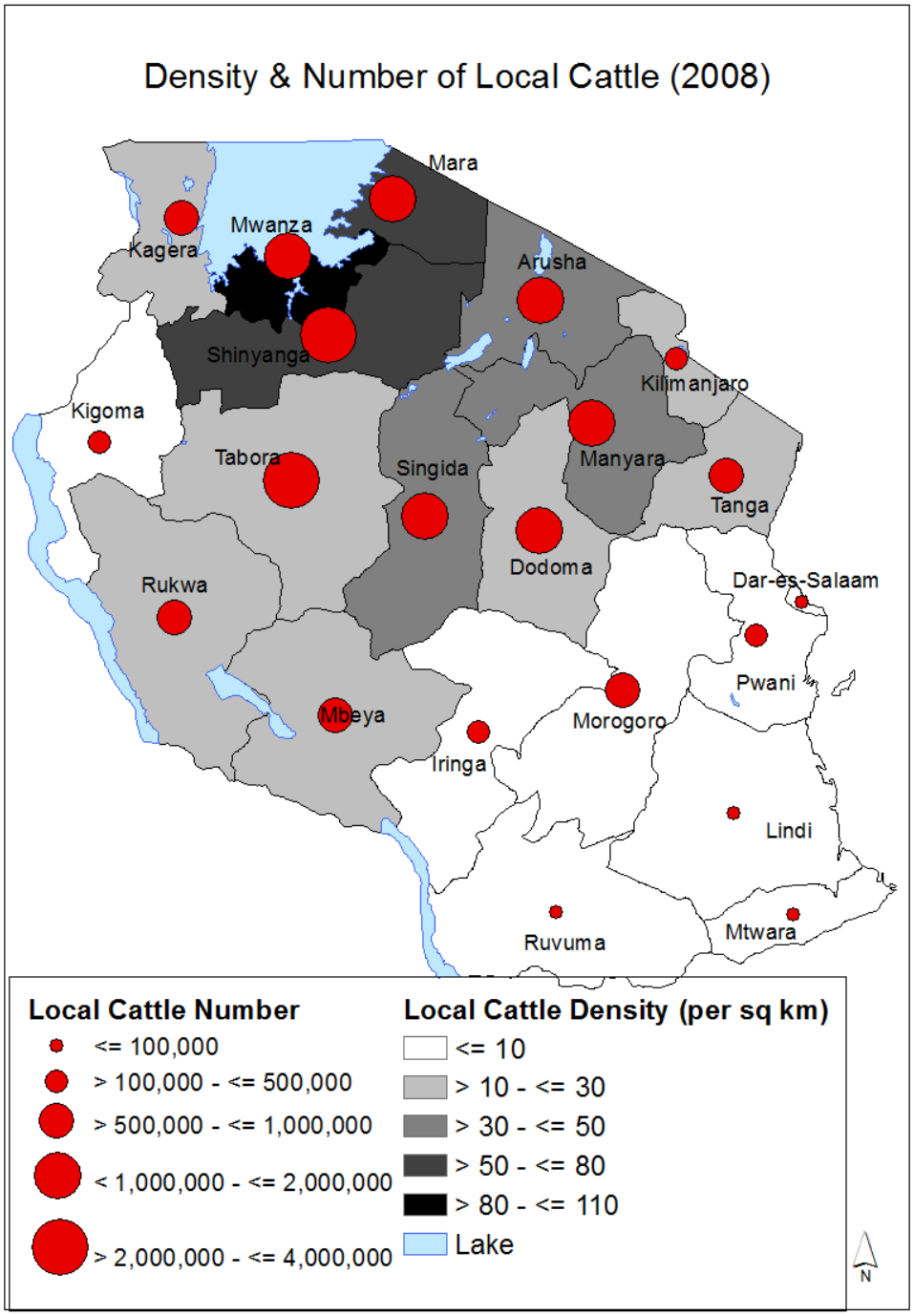
Objective & Hypotheses of this Activity

- Indicate potential market for ECF-ITM in Tanzania
- Estimate spatially the number and location of cattle in Tanzania for which vaccinating against ECF using ITM is attractive for smallholders and pastoralists.
  - Where ECF prevalence is high farmers are likely to invest in order to prevent high mortality rates.
  - Where cattle numbers are high, animal health services are in greater demand and more efficient.
  - Exotic cattle (pure or cross bred) are more valuable and susceptible; ECF prevention is more attractive.

Breed type distribution – local cattle



Source: Tanzania Agricultural Census (October 2008) – 215MCP002

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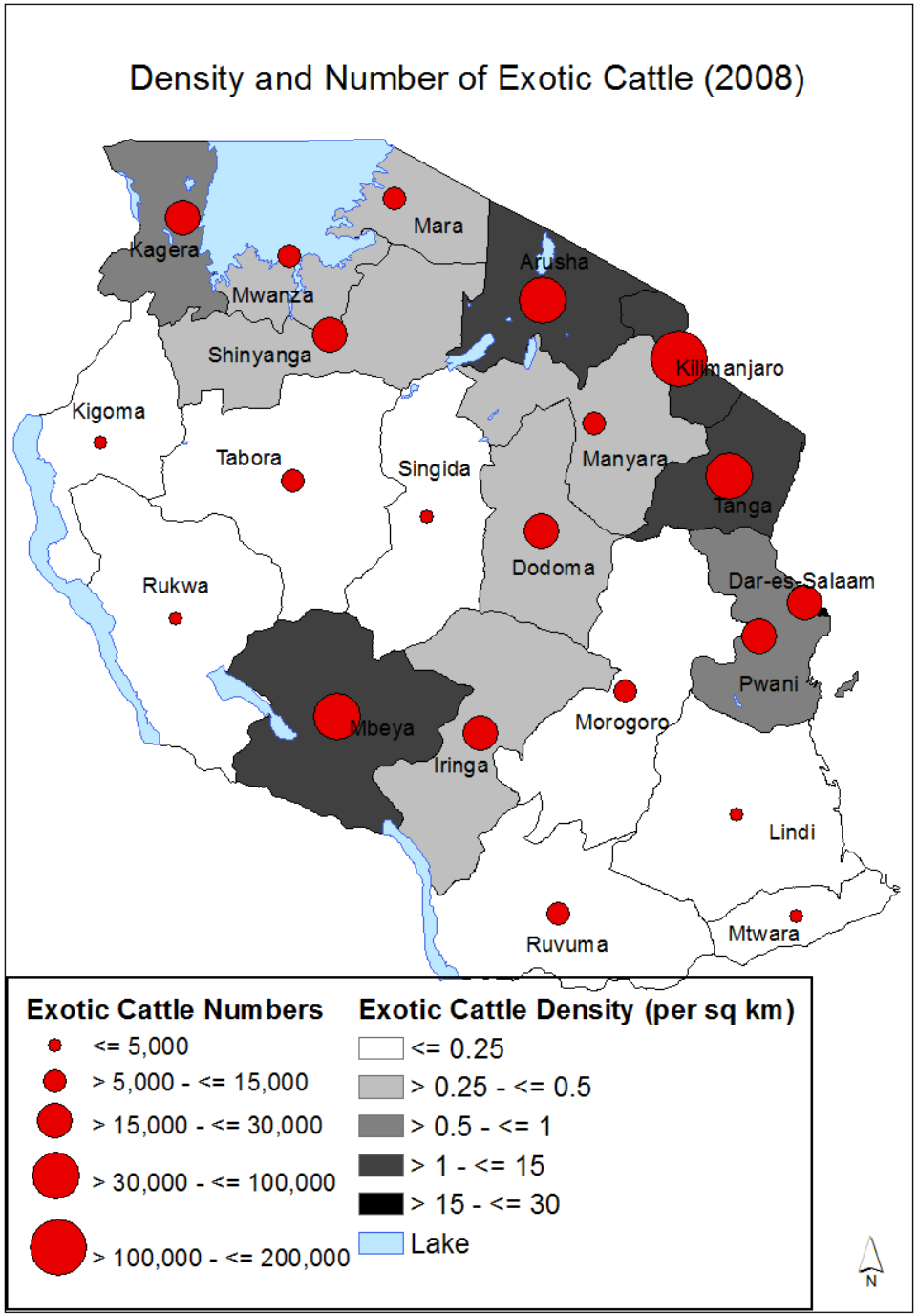
Breed type distribution – exotic cattle



Source: Tanzania Agricultural Census (October 2008) – 215MCP002

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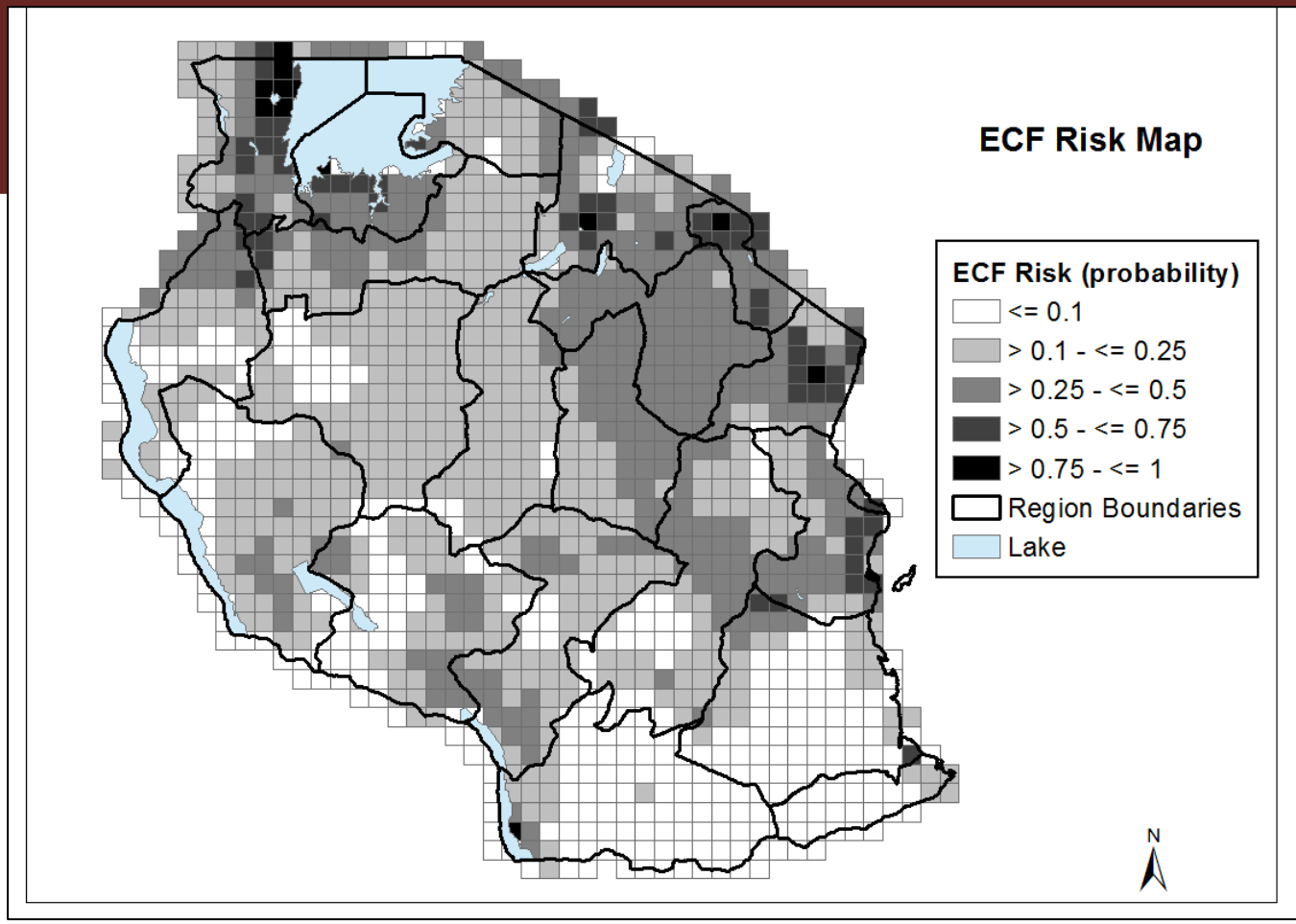
ECF risk - data

- Values are risk of disease (probability)
  - Predicted values of presence of *Rhipicephalus appendiculatus* based on habitat suitability.



- Predictions based on a logistic regression of reported presence/ absence of tick species against 49 remotely sensed & interpolated environmental variables

Source: Minjaw, B & Mcleod, A. (2003) Tick Borne Diseases and Poverty. The impact of ticks and tick borne diseases on the livelihood of small scale
and marginal livestock owners in India and eastern and southern Africa. Research report, DFID Animal Health Programme, Centre for Tropical Veterinary Medicine, University of Edinburgh, UK.

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ECF risk – pros & cons

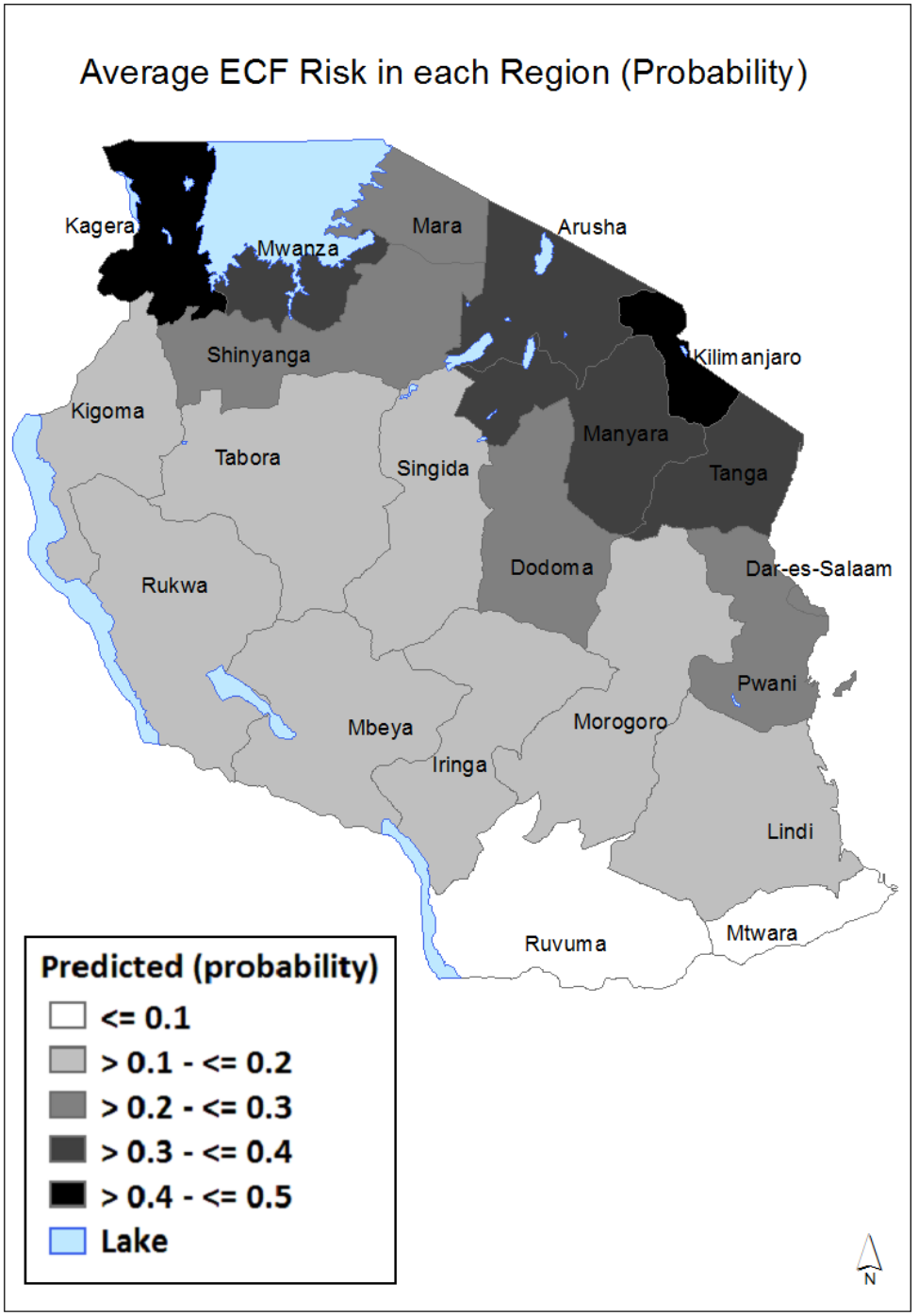
Map Pros (+)

- presents a good spatial estimate of tick prevalence, as a basis for ECF pressure

Map Cons (-)

- based on presence/ absence of tick only, abundance of vectors should also be considered
- probability of tick presence may be poorly correlated with probability of ECF risk to cattle
- probability of ECF risk may be poorly correlated with farmers perception of disease risk.

ECF risk by region



Source: Minjaw, B & Mcleod, A. (2003) Tick Borne Diseases and Poverty. The impact of ticks and tick borne diseases on the livelihood of small scale and marginal livestock owners in India and eastern and southern Africa. Research report, DFID Animal Health Programme, Centre for Tropical Veterinary Medicine, University of Edinburgh, UK.

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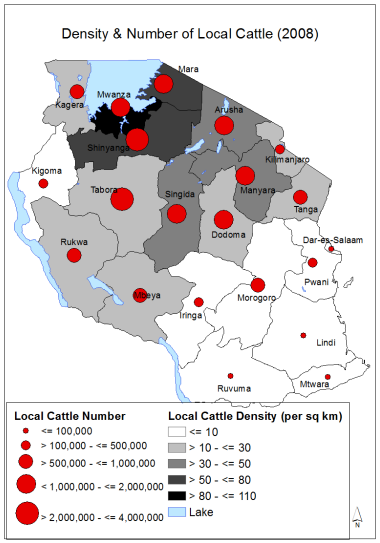
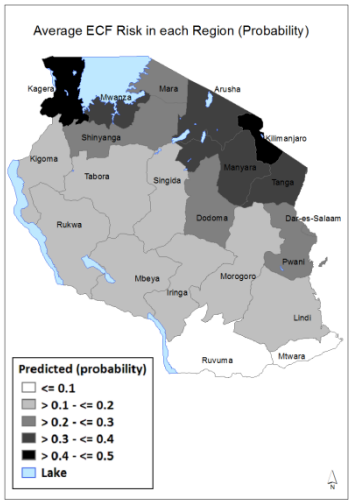
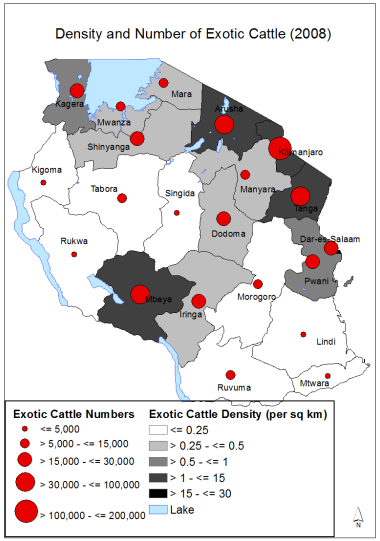
Potential number of cattle to vaccinate



Local cattle × 30% + Exotic cattle × 100%



× ECF Risk



= CattleITM

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Cattle to vaccinate (CattleITM) per region

Highest density
(> 5 cattle / km^2)

Highest number of cattle with potential for vaccination

N.B. Cattle numbers decreased by > 60% in Kigoma between 2003 & 2008 census ; Rukwa has seen a 50% increase over the same period.

Region	Number of cattle		
	Minimum ECF risk	Average ECF risk	Maximum ECF risk
Arusha	5,002	**187,799**	475,744
Dar es Salaam	1,168	7,739	14,490
Dodoma	33,715	102,771	163,677
Iringa	305	29,192	75,734
Kagera	23,438	108,749	256,495
Kigoma	21	8,378	33,495
Kilimanjaro	46,898	115,885	227,702
Lindi	64	1,476	6,381
Manyara	54,434	**180,648**	335,754
Mara	10,280	103,856	343,402
Mbeya	633	51,195	157,192
Morogoro	3,472	38,573	95,274
Mtwara	68	447	3,026
Mwanza	13,418	**190,975**	588,541
Pwani	360	27,648	61,717
Rukwa	104	31,099	91,494
Ruvuma	288	2,573	32,002
Shinyanga	84,327	**261,270**	782,649
Singida	40,776	78,061	173,051
Tabora	47,174	88,194	191,264
Tanga	927	95,008	196,892

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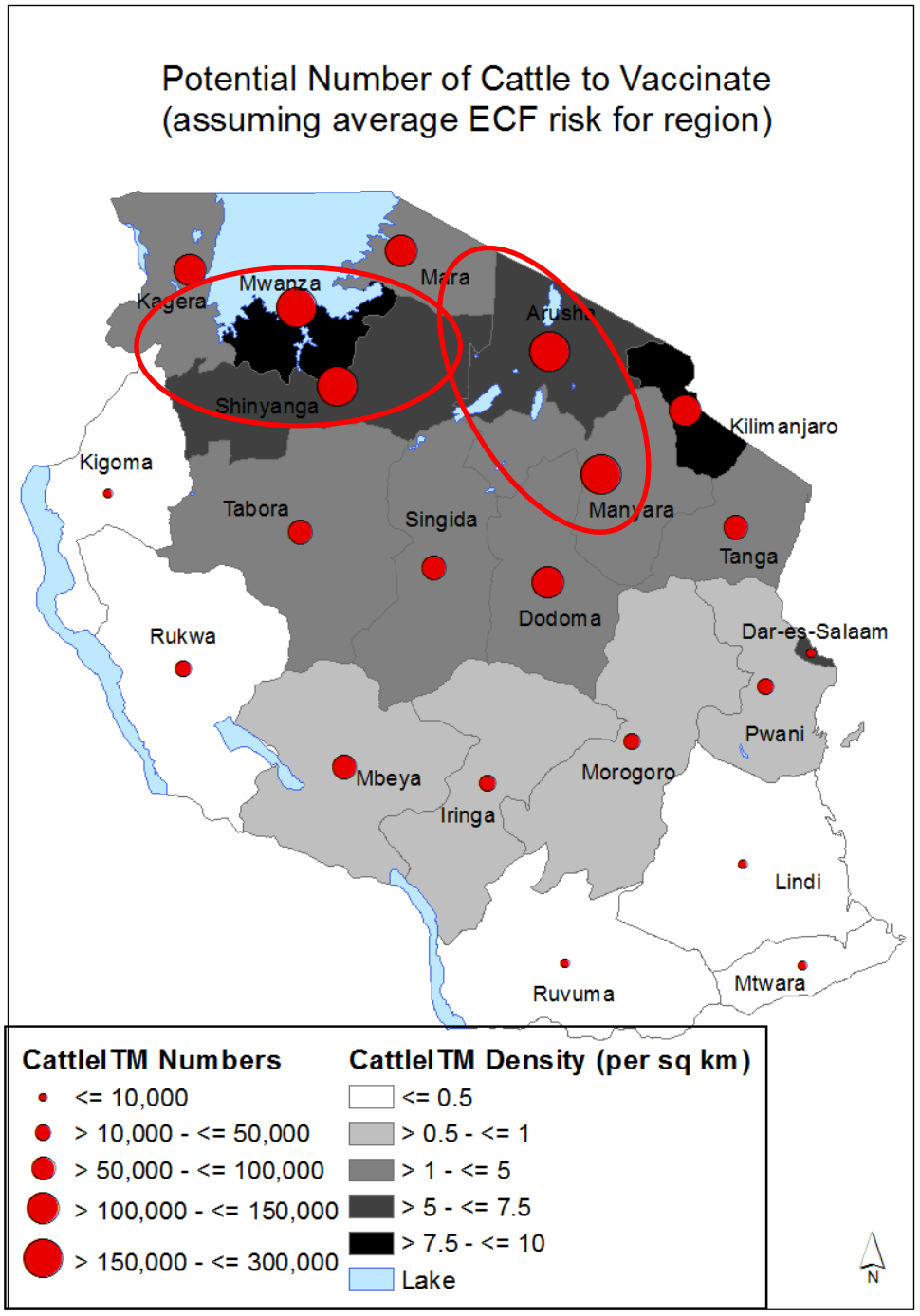
Location of CattleITM

- Larger red circles means highest absolute numbers of cattle with potential to vaccinate



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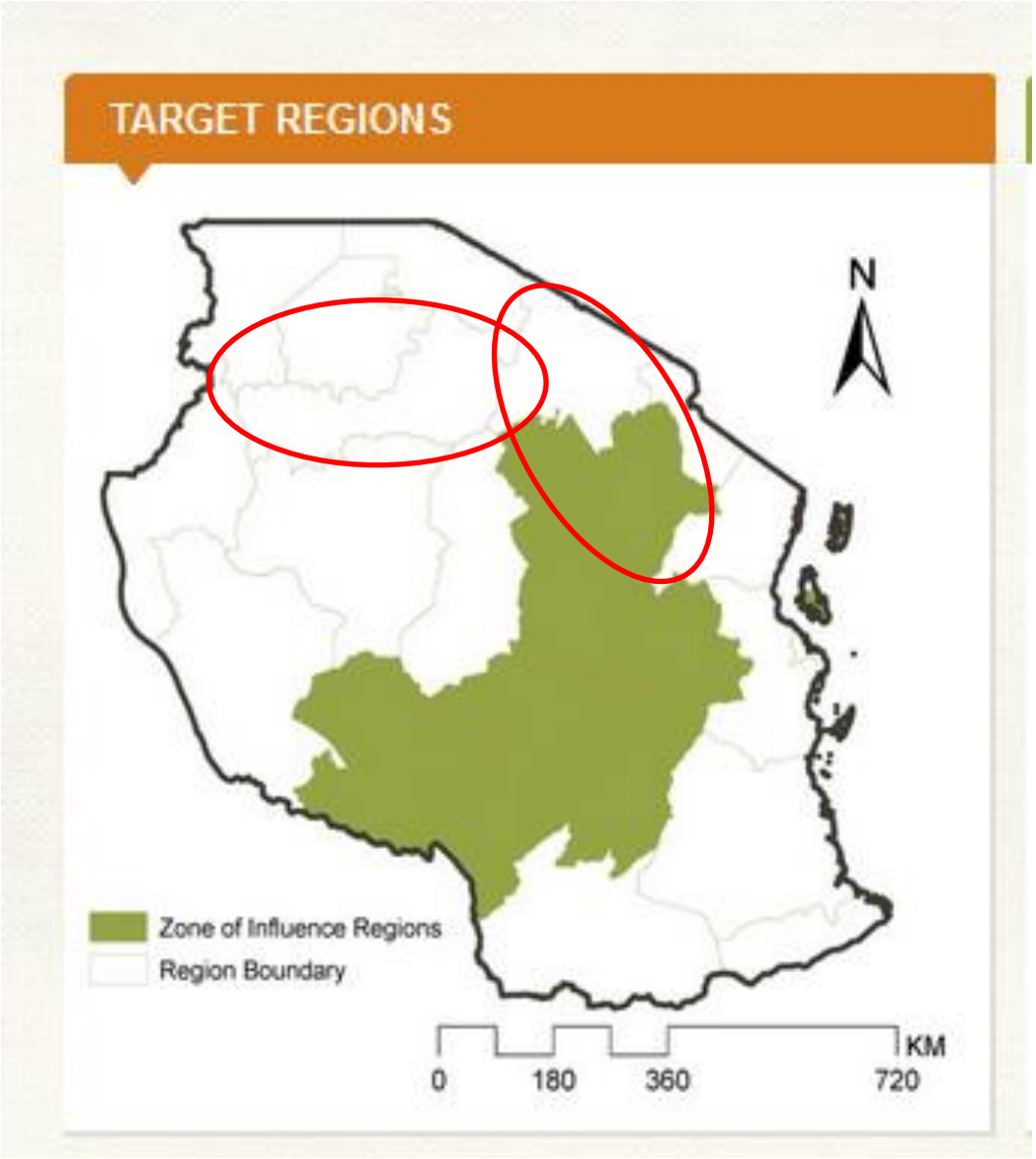
USAID Zones of Influence



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Conclusions and way forward

- Largest potential demand is in Northern, Lake, Central and Southern Highland areas although the potential demand is relatively dispersed - > complex distribution networks.
- As more reliable spatially distributed data become available, these results will be modified.
- Feeding system not considered (open grazing / stall feeding affecting exposure to ticks); lack of data for all systems and regions.
- Despite limitations, results combined with expert opinion and stakeholder input may help to guide the targeting of d ITM vaccine distribution networks in Tanzania.