

Elk Hoof Disease in Southwest Washington

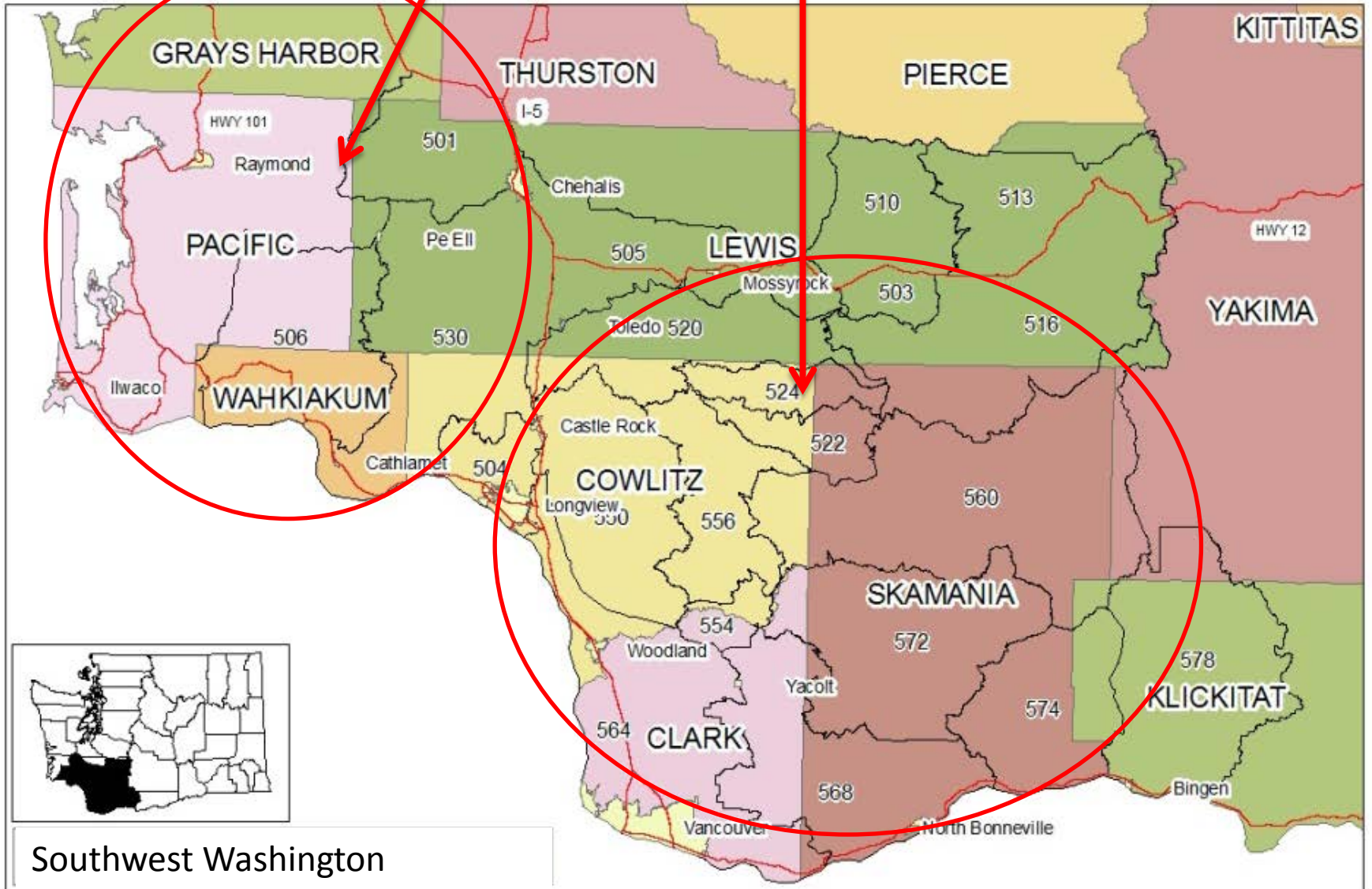


**WDFW Hoof Disease
Public Working Group Meeting
04 December 2013**

Agenda

- Welcome
- Introductions
 - New members
- WDFW Hoof Disease Investigations Update
- Continuation of Management Discussion
- Next steps
- Public Testimony

Willapa Hills and MSH Elk Herds



Collections

- **2009 : Adult elk with chronic lesions**
 - 3 unaffected elk -- East of I-5
 - 5 affected elk -- Cowlitz River Basin
- **2013: 9-10 month elk with acute lesions**
 - 3 unaffected elk -- Pacific County
 - 4 unaffected elk -- Yakima / Kittitas County
 - 9 affected elk -- Lewis / Cowlitz County
- **2013: 3-4 month calf elk with acute lesions**
 - 2 unaffected elk -- Grays Harbor County
 - 5 affected elk -- Lewis County

Sampling and Testing

Histology (microscopic examination) of hooves at CSU

✓ Completed

- ❖ Spirochetes are the cause of disease in cattle and CODD in sheep (recent disease in US)
- ❖ Spirochetes found deeply invasive in elk tissue
- ❖ Are they the cause of the disease or secondary invaders to an already diseased hoof?
- ❖ Need further analyses to understand if primary or secondary
- ❖ Most likely playing a role as an infectious agent

Histology of Organs and Tissues, including Muscle, at WSU

- ✓ Completed, no evidence of significant inflammation or infection above hooves, even in severely affected individuals
 - Disease limited to hooves: Other tissues, including meat, are not affected

Trace Minerals at University of Idaho

- ✓ Completed, low selenium and copper, as expected - possible impacts on general health and immunity

Pending Analyses

- **Diagnostics are still ongoing**
 - i.e., Determine primary or secondary causes
- **Specialized microbiology ongoing (University of Liverpool and USDA)**
 - Isolation attempts from August collections
 - Sequencing of any isolates for known hoof disease pathogens



Specialized Microbiology

Current diagnostic efforts are focused on specialized bacteriology testing to rule out known infectious hoof disease organisms

Including bacterium in:

- *Treponema* sp. – to date Spirochete detection associated with this species but not conclusive
- *Dichelobacter nodosus*
- *Fusobacterium necrophorum*
- *Gugenheimia bovis*

WDFW Hoof Disease Investigations Update



Hoof Disease Investigation Update

- Decision to not pursue additional collections this Fall and allow for all the analyses currently being undertaken with the existing samples to be completed by the collaborating laboratories
- Once we have all the results from these analyses, we can interpret and evaluate their meaning, and strategize on next future sampling needs and associated logistics if needed

The ongoing diagnostic challenge continues to be the detection of early lesions in affected elk

Hoof Disease Investigation Update

- Histology of what were considered possible early lesions on the calves collected last August:
 - When examined microscopically, these keratin and coronary band "defects" were superficial with no associated inflammation or other abnormalities and are likely not significant



Ongoing Investigations into the Possible Role of *Spirochetes*

- Spirochete culture and characterization is continuing at the University of Liverpool
- August calf samples will be “silver-stained” to look for the presence of spirochetes
 - The presence or absence of spirochetes, and their association or lack of association with lesions, will help us evaluate the significance of their detection via histology and/or culture

Ongoing Investigations into the Possible Role of *Spirochetes*

- Samples will be submitted to the UC Davis veterinary diagnostic lab for immuno-histochemistry tests for spirochetes known to cause hoof disease in cattle
- Polymerase chain reaction (PCR) tests will be repeated at the WSU veterinary diagnostic lab using samples that have NOT been highly processed (decalcified, dekeratinized, fixed in formalin)

Additional Ongoing Diagnostic Efforts

- Slides will be sent to one of the world's top bovine hoof disease experts in New Zealand for his opinion(s)
- PCR tests for certain **viruses** will be repeated at the WSU veterinary diagnostic lab, using samples that have NOT been highly processed (decalcified, dekeratinized, fixed in formalin)

Next Steps

- Based on experience gained this past year:
 - August is too early for the lesions to have developed in calves
 - By Feb-March, the disease is too advanced to determine the initiating cause
 - Therefore, future collections will need to take these parameters into account
 - Submitting RMEF proposal for funding of additional collections

Examples of Management Options



Examples of Management Options

- Reduce elk density
- Treatment
- Let disease run its course
- Containment areas

Need to evaluate if any of these examples of management options are likely to be effective and consider:

- Effect on population
- Cost
- Feasibility
- Sustainability
- Resources
- Priority

Examples of Management Options

Reduce Elk Density

- Reduce transmission and advancement
- Increase nutrient level of remaining animals
- Removal of elk:
 - Targeted removal and/or increase recreational permits
 - Remove animals in “newer areas”
 - Local/small areas; not landscape level

Questions/Concerns:

- How effective if pathogen (bacteria) is in soil
- Immunity in some animals/areas
- Access, public willingness

HD Public Working Group

Input to Management Options

- Reduce Elk Density
 - Concern about shooting healthy elk (left with diseased animals e.g., Wahkiakum Co)
 - Alter hunting season structure – to allow for resting period
 - Cull diseased animals – as soon as reported, destroy
 - Work with landowners
 - Can do this despite if know the cause of HD
 - May help with understanding genetics?
 - Premature to cull until know cause
 - Consider alternatives such as treatment on “terminally ill” elk
 - Balance of letting survive or culling

HD Public Working Group

Input to Management Options

- Reduce Elk Density
- Reality – HD is in SW WA and will likely stay in herds – can't eliminate – but can control
- Response needs to be a prolonged sustained effort that needs to be feasible
- Find cause and effect; then manage
 - Long term goal: Hoof Disease needs to be limited in the herd
- Containing the disease should be first priority if we can before it spreads more to other areas of NW
 - Implement while still figuring out the cause – not wait to know the cause

HD Public Working Group Input to Management Options

- Reduce Elk Density
- Define perimeter to contain hoof disease
 - Develop criteria and policy to implement
 - Can this be established?
 - Sustain hunting removal
 - What about elk that slip by?
 - How to achieve this goal?
 - Need public acceptance of a “no elk zone”

Examples of Management Options

Treatment

- Treat elk - increase elk immunity and nutritious status
 - Test on captive elk
- Treat soil

Questions/Concerns:

- Challenge of achieving treatment on a landscape level
 - Difficult to treat animals
 - Difficult to treat soil on landscape level
 - Bacteria can develop resistance
- Life cycle of bacteria
 - In different conditions (dry/wet, elevation, etc.)
 - Difference of hoof disease between wet and dry land
- Permanence/prevalence of bacteria in environment & elk
 - Different elevations have different prevalence rate
 - Soil composition/Density in soil

HD Public Working Group

Input to Management Options

- Treatment
- Captive elk – treat and monitor (small study sample to see effectiveness)
- Before culling: how long do animals live with it?
 - Understand which treatment works, to help understand the cause
 - Selecting animals for treatment might be difficult
 - Advanced cases can not be treated successfully
- Food supplements as treatment?
 - Change in diet?
 - Feeding stations?
 - Concerns about habituation, concentration of disease, etc.
 - Difficult to isolate variable that makes the difference (so many variables at play)
 - Challenge at population level
 - Find animal btw 3-9 months old and treat to see if treatment is effective
 - Looking to find cause – not a solution to population scale HD
 - » Would answer Q, might not be feasible to move out to larger scale
 - Need to develop Qs before figuring out process to get to “answer”
 - Q about habitat

HD Public Working Group Input to Management Options

- Treatment
- Is effect of chemicals on hooves being looked at?
 - To date no evidence of toxins in hoof samples
- Non-infectious options that lead to inflammations, etc. – careful systematic approach essential to determine what is actually going on
- Need results from early cases before moving forward
- What else can we do while waiting for diagnosis?

HD Public Working Group Input to Management Options

- Treatment

Examples of Management Options

Let Disease Run Its Course

Questions/Concerns:

- How to determine if effective
- Public concern
- Sustainable overall population health



HD Public Working Group Input to Management Options

- Let Disease Run Its Course
- Did that for hairloss syndrome – don't believe deer have recovered, don't do again
- Premature decision – don't know effect on herd yet
 - Decisions about continuing hunting, etc. need to be made while “running its course”
- Set a timeline for analyses and if don't receive results, move forward with management options
- Narrowed window down to winter of first year for testing
- Ask hunters to bring hooves in from hunter killed animals
- Cull elk at epicenter and get samples from there
- No, at this time – keep looking into disease, etc., and monitor results.
- Culling has failed at reducing transmission of CWD

HD Public Working Group Input to Management Options

- Let Disease Run Its Course

HD Public Working Group Input to Management Options

- Let Disease Run Its Course

Examples of Management Options

Containment Areas

- Keep elk off/out of core area
- Fencing of affected areas
- Removal of animals

Questions/Concerns:

- Feasibility
- Private property
- Maintenance
- Wildlife corridors

HD Public Working Group

Input to Management Options

- Containment Areas
- Define perimeter to contain hoof disease
 - Develop criteria and policy to implement
 - Can this be established?
 - Sustain hunting removal
 - What about elk that slip by?
 - How to achieve this goal?
 - Need public acceptance of a “no elk zone”
- Economically difficult to do
- Could work in certain situations
- Can't isolate areas
- At this time given don't know cause, if can recover – maybe contain in areas where has not occurred before “newer areas”
- Barriers to prevent movement between areas?
- Look at movement patterns of elk, funnel areas, etc., if containment is to be considered

HD Public Working Group Input to Management Options

- Containment Areas

HD Public Working Group Input to Management Options

- Containment Areas

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HD Public Working Group Input to Management Options

Management Questions



Management Questions

- What is the prevalence of hoof disease in elk?
 - Observable, subclinical
- Is there a genetic link:
 - Propensity?
 - Resistance?
- How often do elk die with hoof disease?
- What is the effect of hoof disease on productivity?
 - Does hoof disease reduce breeding or likelihood to carry a calf to term?
- What is the effect of hoof disease on population?
 - Monitor population growth/decline, survival
- How will/can diagnosis help to be preventative in the future?

Management Questions

- Technical Team reviewed results to date:
 - Appears consistent with an infectious pathogen
 - Questions:
 - Is it environmental, parasitic, etc.?
 - Oregon has similar habitat and forest practices, but does not appear to be present in elk
 - Genetic factor?
 - Once HD in herd – stays – how to respond?
 - Are the elk & pathogen obligate to each other?
 - Deer do not seem to exhibit, use same area
 - Elk are robust and generalists/long-lived & social
 - Additional collections to further understand?

HD Public Working Group Input

- Comments/Questions:
- Urgency depends on the cause
 - Infectious and non-infectious have very different management approaches
 - Need to find early lesions.....finish this investigation to get there
 - Between 3-9 months of age – evaluate
 - Prevalence and range – Question if still expanding? (as we look harder we will find more)
 - If not changing – might not have the urgency
- Management interventions might interfere with understanding prevalence and range
- Difficult to reproduce DD in cattle
- Captive scenario might be difficult to reproduce as well
- Find out the prevalence
- Test on captive elk (e.g., pregnant female and watch)

HD Public Working Group Input

- Comments/Questions:
- Effect of Selenium and Copper on foot/h hoof growth/health
 - Immunity and keratin
- Mineral blocks?
 - Let people try and watch
- Elk on Eco park – study?
- Dual strategy
 - Management
 - Analyses
- Legislative – funding request
 - Develop as we move forward

HD Public Working Group Input

- Comments/Questions:
- Watch Pacific County – not seeing HD right now
- What can be done at the same time while waiting?
 - Other/additional testing
- Is HD natural, normal baseline occurrence?
- Link to something that came into situation/environment that is contagious?
 - E.g., fungal?
- “Disaster Recovery Plan” on how to proceed
- Ask public for cooperation in Counties that don't see HD to report elk with deformities
- Sample 3-9 month old calves

Thank you
....any questions....



**Hoof Disease Public Working Group
4 December 2013**

Discussion: Examples of Management Options

During discussion, evaluate if any of these examples of management options are likely to be effective and consider:

- Effect on population
- Cost
- Feasibility
- Sustainability
- Resources
- Priority

A. MANAGEMENT OPTIONS

1) REDUCE ELK DENSITY

- Reduce transmission and advancement
- Increase nutrient level of remaining animals
- Removal of elk:
 - Targeted removal and/or increase recreational permits
 - Remove animals in “newer areas”
 - Local/small areas; not landscape level

Questions/Concerns:

- How effective if pathogen (bacteria) is in soil
- Immunity in some animals/areas
- Access, public willingness

HD Public Working Group Input

- a) Concern about shooting healthy elk (left with diseased animals e.g., Wahkiakum Co)
- b) Alter hunting season structure – to allow for resting period
- c) Cull diseased animals – as soon as reported, destroy
 - i. Work with landowners
 - ii. Can do this despite if know the cause of HD
 - iii. May help with understanding genetics?
 - iv. Premature to cull until know cause
 - v. Consider alternatives such as treatment on “terminally ill” elk
- d) Balance of letting survive or culling

- e) Reality – Hoof Disease is in SW WA and will likely stay in herds – can't eliminate – but can control
- f) Response needs to be a prolonged sustained effort that needs to be feasible
- g) Find cause and effect; then manage
 - i. Long term goal: Hoof Disease needs to be limited in the herd
- h) Containing the disease should be first priority if we can before it spreads more to other areas of NW
 - i. Implement while still figuring out the cause – not wait to know the cause
- i) Define perimeter to contain HD
- j) Develop criteria and policy to implement
- k) Can this be established
- l) Sustain hunting removal
- m) What about elk that slip by?
- n) How to achieve this goal?
- o) Need public acceptance of a “no elk zone”

2) TREATMENT

- Treat elk - increase elk immunity and nutritious status
 - Test on captive elk
- Treat soil

Questions/Concerns:

- Challenge of achieving treatment on a landscape level
 - Difficult to treat animals
 - Difficult to treat soil on landscape level
 - Bacteria can develop resistance
- Life cycle of bacteria
 - In different conditions (dry/wet, elevation, etc.)
 - Difference of hoof disease between wet and dry land
- Permanence/prevalence of bacteria in environment & elk
 - Different elevations have different prevalence rate
 - Soil composition/Density in soil

3) LET DISEASE RUN ITS COURSE

Questions/Concerns:

- How to determine if effective
- Public concern
- Sustainable overall population health

4) CONTAINMENT AREAS

- Keep elk off/out of core area
- Fencing of affected areas
- Removal of animals

Questions/Concerns:

- Feasibility
- Private property
- Maintenance
- Wildlife corridors

B. MANAGEMENT/RESEARCH QUESTIONS

- 1) What is the prevalence of hoof disease in elk?
 - a. Observable, subclinical
 - 2) Is there a genetic link:
 - a. Propensity?
 - b. Resistance?
 - 3) How often do elk die with hoof disease?
 - 4) What is the effect of hoof disease on productivity?
 - a. Does hoof disease reduce breeding or likelihood to carry a calf to term?
 - 5) What is the effect of hoof disease on population?
 - a. Monitor population growth/decline, survival
 - 6) How will/can diagnosis help to be preventative in the future?
 - 7) Technical Team reviewed results to date: Appears consistent with an infectious pathogen
- Questions:
- a. Is it environmental, parasitic, etc.?
 - i. Oregon has similar habitat and forest practices, but does not appear to be present in elk
 - b. Genetic factor?

- c. Once HD in herd – stays – how to respond?
- d. Are the elk & pathogen obligate to each other?
 - i. Deer do not seem to exhibit, use same area
 - ii. Elk are robust and generalists/long-lived & social
- e. Additional collections to further understand?

Meeting Discussion/Comments/Questions from HD Public Working Group Input:

- Urgency depends on the cause
 - Infectious and non-infectious have very different management approaches
 - Need to find early lesions.....finish this investigation to get there
 - Between 3-9 months of age – evaluate
 - Prevalence and range – Question if still expanding? (as we look harder we will find more)
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- Mineral blocks?
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- Elk on Eco Park – study?
- Dual strategy
 - Management and Analyses
- Legislative – funding request
 - Develop as we move forward
- Watch Pacific County – not seeing Hoof Disease right now
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- Is Hoof Disease natural, normal baseline occurrence?
- Link to something that came into situation/environment that is contagious?
 - E.g., fungal?
- “Disaster Recovery Plan” on how to proceed
- Ask public for cooperation in Counties that don't see HD to report elk with deformities
- Sample 3-9 month old calves

Examples of Hoof Disease Management Options

| Management Options | Effect on population | Cost | | | Sustainability | | | Feasibility | Public Input/Support | Priority |
|---|----------------------|--------|--------|---------|----------------|--------|---------|-------------|----------------------|----------|
| | | 1 year | 5 year | 20 year | 1 year | 5 year | 20 year | | | |
| <p><i>Reduce elk density</i></p> <p>Cull (targeted removal) Increased recreational permits Remove animals from agricultural areas Remove animals in outlying/newer areas Implement removals by? (e.g., WDFW, hunters, Wildlife Services, etc.)</p> | | | | | | | | | | |
| <p><i>Containment Areas</i></p> <p>Exclude elk Keep elk off/out of core area Fencing agricultural areas Removal of animals</p> | | | | | | | | | | |
| <p><i>Treatment</i></p> <p>Treat elk - increase elk immunity and nutritious status Test on captive elk Treat soil (permanence in soil?)</p> | | | | | | | | | | |
| <p><i>Let Disease Run its Course</i></p> | | | | | | | | | | |

Examples of Hoof Disease Management Options

| Research Questions | Effect on population | Cost | | | Sustainability | | | Feasibility | Public Input/Support | Priority |
|--|----------------------|--------|--------|---------|----------------|--------|---------|-------------|----------------------|----------|
| | | 1 year | 5 year | 20 year | 1 year | 5 year | 20 year | | | |
| <p><i>Identify and characterize the primary cause of hoof disease</i></p> <p><i>What is the prevalence of hoof disease in elk?</i> <i>Observable</i> <i>Subclinical</i></p> <p><i>What is the affect of hoof disease on population?</i> <i>Monitor population growth/decline, survival, productivity</i></p> <p><i>Is there a genetic link?</i> <i>Resistance?</i> <i>Propensity?</i></p> | | | | | | | | | | |
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DRAFT