

Misconceptions in the fundament of the prescribed burning paradigm

Part III of the position of the international public campaign: “Stop the Harmful Forms of Prescribed Burnings!”

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We analyze here the the erroneous concepts underlying the scientific and practical paradigm of prescribed burning. Under the *paradigm* we understand the entire sphere of prescribed burning – scientific theory, developed methods and practical implementation (i.e. the industry of vast regular controlled burning inside natural lands). Also we include here the sphere of propaganda and dissemination of the ideas of prescribed burning in different countries. By *concepts* we mean parts of the scientific platform on which the industry and the promotion of prescribed burning practice rely (statements and ideas, terms and methods).

The declared purposes of the prescribed burning practice (i.e. intentional burns approved by law) and their groups are considered in the section *1.2 About the intentional burning problem. What is the prescribed burning?* The entire position of the campaign, as well as the misconceptions of the prescribed burning paradigm discussed below, relate primarily to prescribed burning implemented inside natural territories (the first and second groups of the goals).

3.1 Misconceptions of the theory of prescribed burnings implemented for the purpose of fighting wildfires

Misconception 1

The prescribed burning paradigm states that people can regularly burn “fuel” in a natural area for the purpose of preventing wildfires on it. This means that everything included in the concept of “fuel” (living and dead vegetation) is implied as an unnecessary or even detrimental part of the ecosystem.

The concept of “Fuel” and its derivative form “Fuel load” is used in the paradigm of prescribed burning to describe natural areas from the point of view of their susceptibility to wildfires. Both terms are the **key notions** of the prescribed burning paradigm, while they are not scientific terms, such concepts do not exist in the science of Ecology. Both terms are taken from the *wildland firefighting terminology*, where the term “fuel” is defined as “any plant material that can support combustion within a wildfire environment”, and the term “fuel load” is defined as “amount of fuel present within a particular area and measured in weight per area”.¹

However in the sphere of prescribed burning, the concept of “fuel” is not used strictly identical to how it is used in the field of extinguishing wildfires, in which a classification of fuel types has been developed (more than 30 terms with the derived word “Fuel” have been introduced, including 5 fuel levels: Aerial fuels, Elevated fuels, Near surface fuels, Surface fuels, Ground fuels, based on which the term “fuel” can

¹ The definitions of "fuel" and "fuel load" terms were taken from the Wikifire (an open online collaborative dictionary of fire terms): <https://lessonsonfire.eu/en/wiki/fuel>, <https://lessonsonfire.eu/en/wiki/fuel-load>

be understood as absolutely all vegetation of the forest from the soil level to the crowns of trees, which is hardly understood in this way in the sphere of prescribed burning. How the term “fuel” is defined in the prescribed burning practice can be found mainly from video materials posted on the Youtube network, which tell and show what exactly is burned inside natural areas and for what purposes. Another source of this information is discussions with practitioners and propagandists of prescribed burning in communities of social networks dedicated to prescribed burning and wildfires. Based on these two sources, we have made a description of what exactly is included in the concept of “fuel” in the sphere of prescribed burning.

Therefore, in the prescribed burning practice the concept of “fuel” includes **plant litter**, **dead wood** (fallen trunks and branches, dried and rotting old trees), **grass cover** (last year's dry and green), often also it includes **shrubs** and **undergrowth** of tree species unsuitable for commercial logging. The listed layers of ecosystem are regularly destroyed by fire during prescribed burning operations.

The ideologists of prescribed burning believe that people can regularly and with any frequency burn “fuel” in huge areas inside natural lands, including valuable protected natural territories (national parks, reserves, wilderness areas), where all human activity should be limited or excluded in order to preserve wild nature. From this it can be concluded that they consider “fuel” to be an unnecessary and even harmful part of the natural ecosystem, which can be destroyed by burning with any frequency and in any area.

It is obvious that the apologists of prescribed burning have never been interested in the question of what happens in a natural ecosystem when “fuel” is burned in it.

Meanwhile, the burning of “fuel” should lead to significant or complete destruction of the tiers of natural ecosystems included in this concept and destroyed by fire during prescribed burning (plant litter, dead wood, grass cover and the upper soil layer). The upper soil layer with soil biota does not formally belong to the concept of “fuel”, however, as can be assumed, it is destroyed significantly during burning of plant litter and grass cover. According to an approximate estimate, more than 98% of its biodiversity can live in these tiers of the ecosystem, which performs key and irreplaceable functions in the ecosystem. All or the main part of this variety of species must inevitably die in the process of prescribed burning!

Through living organisms, these tiers of the natural ecosystem are connected to each other and to the other tiers and components of the ecosystem by numerous complex connections. The regular destruction of these tiers of ecosystems through burning can be characterized as an **ecocide**², a crime against nature and people.

Probably, because of the unscientific nature of the concept of “fuel” and the horrifying ecocide that stands behind its regular burning, this term is not defined in publications devoted to prescribed burning. Manuals, websites, official reports, scientific papers and articles in the press do not contain any clear definition of the term “fuel” (texts always contain only the word “fuel” itself and does not specify which living and dead plants are included in this notion, i.e. what exactly is burned in natural areas).

Using this one word “fuel”, this term without a clear definition, the apologists of prescribed burning have closed their eyes to what exactly is behind it, what exactly they regularly destroy with fire!

² Find more details in the section 1.5 Definition of the “harmful forms of prescribed burnings” according to the position of the campaign.

The implementation of frequent burning of tiers of ecosystems that are included in the concept of “fuel”, the use of this term, which is not related to biological sciences, reflects the lack of basic environmental knowledge among scientific experts and practitioners of prescribed burning. Only the lack of understanding of the structure of the biosphere and ecosystems, the lack of knowledge about the accelerating rate of decline in the biodiversity of the planet (including the crisis of the decline in the number and diversity of insects) can explain the stunning blindness of the entire community of apologists for prescribed burns in relation to how their actions affect biodiversity and the health of natural ecosystems.

Sources:

Wildland firefighting terminology glossaries:

Wikifire (an open online collaborative dictionary of fire terms)

<https://lessonsonfire.eu/en/wiki/fuel-layers>

Forest Fire Fighting Terms Handbook

<https://gfmcc.org/wp-content/uploads/Forest-Fire-Terms-Handbook-EU-Fire-4.pdf>

“What Is Fuels”\ Northwest Fire Science Consortium leaflet.

<https://nwfirescience.org/biblio/nwfsc-fire-facts-what-fuel>

https://nwfirescience.org/sites/default/files/publications/FIREFACTS_FUELS_0.pdf

Glossary of the National Wildfire Coordinating Group

<https://www.nwcg.gov/glossary/a-z>

Examples of video materials showing prescribed burnout operations in the USA

Video1 "Getting Started with Prescribed Fire on Private Lands"

<https://www.youtube.com/watch?v=hFPceITic8Q>

Video2 "Fighting Fire With Fire: Using Cultural Burning Practices"

<https://www.youtube.com/watch?v=Vr5LP0UZvKg>

Video3 "Controlled Burn Techniques | Prescribed Fire"

<https://www.youtube.com/watch?v=WVygOrWCoMI>

Misconception 2

Apologists of the prescribed burning paradigm claim that burning of “fuel” on natural lands will definitely save them from the future strong wildfires

It is considered an axiom in the prescribed burning paradigm that regular burning of “fuel” inside natural areas definitely saves them from future severe wildfires. This belief is the only justification for prescribed burnings implemented for the purposes of fighting wildfires, which are the majority of burns in the natural environment. Therefore, a scientific refutation of this statement will mean deprivation of this part of the prescribed burnings of the only rational justification for their implementation.

We believe that this statement is false (or, at least, it is often not implemented). Regular burning of “fuel” in natural lands may be an **ineffective method of wildfires prevention** and may have even the opposite effect, that is, lead to an increase in the frequency of severe wildfires. This happens due to the influence of the **direct** and **indirect** factors considered below.

The regular burning of “fuel” in natural areas can be an ineffective method of preventing wildfires

The effectiveness of burning “fuel” for preventing severe wildfires is denied by some scientific studies. The number of such works is small, which can be explained by the fact that the inefficiency of burning fuel contradicts the theoretical foundation of the prescribed burning industry, which mainly finances investigations on the subject of prescribed burning and determines the topics of such studies. It is obvious that the burning industry will not finance research topics that can harm this industry, especially on such a principle issue as a complete refutation of the effectiveness of the method of burning fuel for wildfires prevention.

However, we found a few investigations that refute the effectiveness of prescribed burning as a measure to prevent wildfires. All of them were implemented regardless of the prescribed burning industry. Among them, it should be noted a study conducted by The United States Geological Survey (USGS) and published in 2012.

The United States Geological Survey (USGS) conducted a study using its own georeferenced data of the territories passed by wildfires and prescribed burning for 29 years (1979-2007) in seven counties of California state of the USA. This study revealed that **prescribed burning showed 0% efficacy in the prevention of subsequent wildfires**. The result of the study also doubts the argument that the accumulation of fuel due to the suppression of past fires increased the probability of large wildfires. These data were published in the paper [Price et al, 2012](#). In addition, the authors suggested that worldwide the effectiveness of the prescribed burning for mitigation of wildfires can be very low. They concluded that it is necessary to burn from 1 to 4 hectares of the territory in order to prevent a subsequent wildfire on 1 hectare of this territory. For this reason, it makes sense to carry out the prescribed burning only for the local protection of valuable objects (human settlements, valuable natural areas) and to conduct them in narrow bands:

“Frequent wildfire disasters in southern California highlight the need for risk reduction strategies for the region, of which fuel reduction via prescribed burning is one option. However, there is no consensus about the effectiveness of prescribed fire in reducing the area of wildfire. Here, we use 29 years of historical fire mapping to quantify the relationship between annual wildfire area and antecedent fire area in predominantly shrub and grassland fuels in seven southern California counties, controlling for annual variation in weather patterns. This method has been used elsewhere to measure leverage: the reduction in wildfire area resulting from one unit of prescribed fire treatment. We found little evidence for a leverage effect (leverage ¼ zero). Specifically our results showed no evidence that wildfire area was negatively influenced by previous fires.

The result also casts further doubt on the argument that fuel accumulation due to past fire suppression has increased the chances of large, damaging fires occurring.

Our study suggests that low encounter rates and relatively rapid fuel recovery means that fire activity is relatively insensitive to the distribution of fuel ages and so the effect of suppression is likely to be minimal.

Our study has found that regional-scale patterns of fire extent in southern coastal California are not influenced by fuel age, and hence prescribed fire treatment will not help to reduce wildfire area. However, this does not negate the inhibitory effect that individual burned patches have on subsequent fire, should one encounter a recently burned patch. Hence, fuel treatment should be focussed close to the assets that need protection”.

It is important to note that we have not found any scientific studies proving by reliable scientific methods (statistical analysis of multiyear data) the economic justification of the prescribed burning practice as a method for wildfires prevention (that is, the effectiveness of this method, the absence of economic and environmental damage from its application). Probably, such studies simply do not exist, and the prescribed burning industry does not have a scientifically confirmed basis for burning implementation.

Indirectly, this is confirmed by the fact that many specialists in fighting wildfires on the basis of prescribed burns could not cite a single scientific publication of this character when this question was asked in several facebook groups devoted to wildfires.

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Let's consider the direct and indirect factors that can lead to a significant increase in the frequency of severe wildfires due to the use of prescribed burning practices and their promotion in the society.

Direct factors of the influence of prescribed burnings on the increasing number of wildfires:

a) Change of native vegetation that is resistant to wildfires to plant communities that are less resistant to wildfires and more fire-hazardous

As a result of burning, the native vegetation of the natural territory that is resistant to wildfires changes into plant communities that are less resistant to fires and more fire-hazardous, which, at the same time, quickly restore the plant mass after each new burning.

Thus, the Australian scientist Philip Zylstra found that plant succession in different natural zones formed after prescribed burning is much more easily covered by wildfire than the mature ecosystems, i.e. those ones which do not have burning or wildfire for many years. Also, he revealed that flammability (i.e. the number and intensity of wildfires) correlates much more with the composition and structure of plants than with the fuel load in ecosystems (Zylstra P. 2011, 2013, 2016, 2018) .

b) Destroying the fauna of detritophages and destructors living in soils, plant litter and dead wood

Frequent destruction of detritophages and destructor communities living in soils, plant litter and dead wood by prescribed burnings should reduce the rate of natural decomposition of dead organic matter in the ecosystem or even completely stops this process. This should lead to a rapid accumulation of combustible organic material and increase the fire danger of the regularly burned area.

After the burning of natural territory only once, it becomes much more fire-hazardous for the following years than in the period before the burning. The rapid restoration of fire-hazardous plant communities and a decrease in the rate of decomposition of dead plant organic matter creates a risk of wildfires just a few months after the burning. Therefore, if people do not burn frequently on such “hooked” on burning territory, then it is very likely to be passed by a new strong wildfire. In order to burn with a frequency sufficient to prevent these fires, huge finances and a sufficient number of windless dry days (when it is safe to conduct prescribed burning) are necessary. However, due to climate changes, such windows (days favorable for burning) are becoming less and less. Consequently, the chances increase that it will not be possible to burn everything and there will be new strong wildfires on the burnt areas.

The considered above is a possible explanation for the regular catastrophic forest fires in the United States (mainly in California) and Australia. In both countries, the practice of prescribed burning has been used for a long time (several decades – if consider only the modern period of burning, and many centuries, if consider the traditional burning of the native peoples of these lands). In order to prevent wildfires on these lands, it is necessary to burn huge areas of natural territories every year. However, due to the lack of the

ability to implement such burning safely (or also due to the funding limit for these works), it is impossible to burn everything and strong wildfires occur almost every year³.

The local people, who are used to burning vegetation, can also start wildfires. It is very likely that many people carry out burning themselves without sufficient safety measures and skills, and those burnings can start wildfires (the possible contribution of the local population to the growth of wildfires is considered below in the subsection “Indirect factors”).

How to get out of this vicious cycle is one of the difficult question that need to be solved using scientific methods as part of solution of the complex of problems caused by the prescribed burning industry. But one practical conclusion can be made already. If no prescribed burning has been implemented on a territory yet, then it shouldn't be started! It is impossible to enter into this vicious circle – launch of burnings will cause the need to conduct them again and again very frequently, which will lead to complete destruction of the natural ecosystem. This is an important practical remark, because currently the method of prescribed burning is actively promoted, and many officials may have desire to use it for fighting wildfires.

c) Accidental transitions of prescribed burnings into wildfires

Cases of the transition of prescribed burning into severe wildfires are not uncommon and, most likely, not all of them get into the press. An example of a big forest fire caused by prescribed burning is the case of the [Cerro Grande Fire](#) in New Mexico in 2000. The recent example is two huge wildfires *Hermits Peak fire* and *Calf Canyon fire*, merged into [one fire](#), launched by controlled burning on April 6 and April 19, 2022 in the same state of New Mexico in the Santa Fe National Forests and on [July 3, 2022](#) have not been completely extinguished.

Indirect factors of the influence of prescribed burning on the increase in severe wildfires:

An indirect factor of the influence of prescribed burning on the increase of severe wildfires is the negative effect of widespread propaganda of prescribed burning on the people behavior.

Prescribed burning is widely promoted in the societies of the countries used in this practice. Propaganda is being implemented through the press, television, social networks, training courses and special governmental programs of influence on the people. Confirmation of the existence of such programs in the United States is given in the following articles: [Butler and Goldstein, 2010](#); [McCaffrey, 2006](#).

The intensive propaganda of prescribed burning teaches ordinary people to careless attitude to fire in natural areas and motivates them to burn for various objectives. There are many confirmations of the intentional promoting prescribe burning practices among school children, for example, [Maclay School, 2019](#).

The obvious result of such propaganda which can be assumed is **the growing number** of adults and children who **use burning practice on private and public lands without proper control, professional skills, and official permits**. This factor should significantly increase the frequency of severe wildfires. It is important to note that wildfires caused by burning of non-professional people (including children) on private lands can be difficult to detect and prevent, since in many countries control of any people's activity on private lands is limited or impossible. It can also be difficult to determine such burning as a cause of wildfire.

³ Note that the considered concerns only the question of the influence of prescribed burning on the frequency and intensity of wildfires. It is obvious that such frequent burning is catastrophically destructive to the biodiversity, soils and ecosystems of natural territories, as we write in the position of the campaign.

3.2 Misconceptions of the theory of prescribed burning implemented for the management of natural lands

Misconception 3

The prescribed burning paradigm states that wildfires caused by natural reasons (i.e. by dry thunderstorms) can be replaced by controlled burning without harming natural ecosystems. However, these burns are carried out much more often than wildfires would occur in the burnt area without human influence.

The justification of prescribed burning implemented for the management of natural lands is basing on the discovery of scientists that wildfires that start in nature for natural reasons (i.e. from dry thunderstorms⁴) and occur with natural frequency should be considered an important part of natural processes that brings the necessary landscape diversity to the natural territory.

In the scientific aspect, these ideas are quite reasonable. However, the apologists of prescribed burning have made an incorrect conclusion from them. They concluded that natural wildfires can be replaced by controlled burnings, which can be conducted much more frequently than wildfires would occur in the area by natural reasons (without human influence). This conclusion was immediately applied in practice. The frequent prescribed burning began to be implemented on a huge scale inside natural territories of different countries. This work was carried out without any scientific evidence of the absence of damage from such frequent burning for natural ecosystems, biodiversity, climate, soils and, as a result, the economy.

If the burnings were conducted with an interval greater or equal to the natural interval between wildfires, then probably such burning could be considered an equivalent replacement for natural wildfires, with an impact that does not cause excessive damage to natural ecosystems and biodiversity.

However, this does not happen. Analysis of different sources allows to conclude that almost all regular prescribed burnings in the world were implemented much more often than wildfires could take place in the burnt territory by natural reasons (without human influence). The reasons for this statement are considered in the section of the campaign's position 1.4 (subsection "The Negative Characteristic №2"). The 1.5 section explains why the regular burning with interval less than the natural interval between wildfires is an **ecocide** that causes catastrophic damage to natural ecosystems and their biodiversity. Other negative characteristics of prescribed burning are also considered in the section 1.4, which distinguish their impact from the impact of natural fires, and which, for this reason, can turn intentional burning into a factor destructive to terrestrial ecosystems, soils and biodiversity.

Misconception 4

The term "fire-adapted species" has been introduced in the prescribed burning paradigm. This term is interpreted as "animal or plant species dependent on fires". But the concept "adaptation" means something completely different in biology – not dependence, but fitness.

The term "fire-adapted species" which is widely used in the prescribed burning paradigm is interpreted as animal and plant species **dependent on wildfires**. However, in biology, the term "adaptation" means something completely different – not dependence, but fitness, adaptability.

⁴ Two other natural causes of wildfires are a volcanic eruption and a meteorite fall. Due to the rarity of these phenomena, wildfires caused by them can hardly be considered fires that contribute to the usual fire dynamics and landscape diversity of the territory.

This is a big difference! If a species is dependent on wildfires, this means that it cannot survive without presence of wildfires in the environment (wildfire is a necessary factor for its survival or breeding). If a species is fitted (adapted) to wildfire, it means that it can survive DESPITE the presence of wildfire in the environment. That is, it can survive WITHOUT wildfire, but it has adaptation to survive with its presence.

It is clear from the publications on prescribed burns that the first (incorrect) understanding of the term “adaptation” is used in the paradigm of prescribed burns, since they believe that all “fire-adapted species” are dependent on wildfires and their survival in the ecosystem is impossible without these fires. This is evidenced by the declared purpose of burning within natural territories, defined by them as “fire-adapted ecosystems” (ecosystems adapted to fires). According to the scientific experts on prescribed burns, regular burns are necessary for the survival or reproduction of the “fire-adapted species” found there.

However, based on the accepted understanding of the term “adaptation” in biology science, the term “fire-adapted species” should mean – a species that fitted to wildfires, tolerates wildfires, survives despite wildfires in the environment, but DOES NOT NEED fires for survival.

The same interpretation of adaptations to fires is also indicated by the definition of pyrophytes. Pyrophytes are the plant species that have morphological and physiological adaptations allowing them to tolerate wildfires in the environment and win in a competition with plant species that do not have such adaptations. Such species are the pioneers of pyrogenic successions.

It can be noticed that “pyrophytes”, as a synonym for “fire-adapted species” in relation to plants, is very rarely used in the scientific and popular literature about prescribed burning. It is very strange, why did the apologists of prescribed burning introduce a new term in the prescribed burning paradigm, instead of using an existing one? This can be explained by the fact that the term “fire-adapted species” means both plant species and animal species. Also, if pyrophytes always mean specific plant species with known type adaptations, the number of which is limited, then the term “fire-adapted species” is often used without specifying the species to describe the general characteristics of the dependence of the flora and fauna of the region on fires. In other words, the term “fire-adapted species” serves more to promote the need for prescribed burning, to create an idea among readers that vast natural territories are dependent on fires, and without burning their flora and fauna degrade.

The question arises, for what reason the understanding of the term “fire-adapted species” was distorted in the prescribed burning paradigm? Probably at the beginning of the development of Fire ecology science (the science from which the scientific theory and practice of prescribed burning arose), the term “fire-adapted species” was used correctly (a species adapted to wildfires, that is, having the ability to survive despite wildfires). But later, in order to justify the conducting of mass prescribed burning, there was a distortion of the understanding of the term “fire-adapted species” and all such species began to be considered as species that need wildfires, that is, that cannot survive or reproduce without them. If this was this way, then this means a deliberate distortion of understanding of the scientific term to create an impression of scientific justification of conducting vast regular prescribed burnings inside wild natural lands.

Probably due to the distortion of the understanding of the biological term “adaptation”, the term “fire-adapted species” (as well as the concept of “fire-adapted ecosystem”, discussed below) does not have definitions in the literature on prescribed burns. In scientific and popular publications about prescribed burns, as well as in press articles, these terms are presented as “obvious concepts” that do not need to be defined.

Misconception 5

The term “fire-adapted ecosystems” has been introduced in the prescribed burning paradigm. The apologists of the paradigm believes that such ecosystems need regular burning.

Ideologists of the prescribed burning paradigm, in case of presence of one or more “fire-adapted species” in an ecosystem, call it “*fire-adapted ecosystem*” and claim that such area needs regular burning. They argue as follows: “If plant or animal species adapted to fires are found in ecosystem, then people should help these species to survive and reproduce by conducting regular burning within this natural area”.

Below are the arguments of why we consider these statements to be erroneous.

Argument 1

The burning which is conducted in an ecosystem in order to help species adapted to fires most likely support a stage of *pyrogenic succession* in this ecosystem – a long process of ecosystem restoration after burning or wildfire, its change from the degraded (disturbed after a fire) state to its *climax state* (the final stage of a restorative succession in which ecosystem becomes stable and restores its natural species diversity).⁵

The pyrogenic succession could have been started in this ecosystem hundreds or thousands of years ago after its first burning by ancient people, and since that time it could have been maintained in this state by regular burning of these lands.

The ability to recover after a wildfire or other disturbance during the development of succession (i.e. a series of changing plant communities in which each previous stage forms the conditions for the development of the next one and this happens until the ecosystem reaches a climax condition) is a common property of all terrestrial ecosystems and not some exceptional quality of some of them.

It can be supposed that in territories that have been regularly burnt by ancient people for hundreds or thousands of years, plant and animal species that have adaptations to survive in wildfires or living in pyrogenic succession have become **permanent inhabitants**. This could happen for the reason that regular burning of this area stopped the process of ecosystem restoration at the stages of pyrogenic succession.

The modern people, trying to create by burning a favourable environment in an ecosystem for fire-adapted species, can continue to keep it in a state of pyrogenic succession, i.e. in its damaged, simplified, degraded state. They do not allow this ecosystem to recover and come to its stable climax condition.

Argument 2

When people burn a natural area to help some local “fire-adapted species” (which they consider “dependent on fires”), they ignore the needs of all other species and components of this ecosystem that suffer from burning.

In publications and private discussions about prescribed burning, a strange trait of the apologists of prescribed burning is noticeable. They have a simplified, incorrect understanding of the entity of ecosystem, they reduce this concept to a discussion of the fire needs of the “fire-adapted species” which were found in it, and are not aware of other species and components of this ecosystem. These people do

⁵ Climax community is an ecological community in which populations of plants or animals remain stable and exist in balance with each other and their environment. A climax community is the final stage of a recovery succession, remaining relatively unchanged until destroyed by an event such as fire or human interference.

not think that by conducting burning to help species adapted to fires, they harm many other species and components of this ecosystem.

An example of this trait of the scientific expert on prescribed burning can be found in the article [Gabbert, 2019](#):

“On average, over the past five years, 11,819 acres have been burned on post annually, along with 2,388 thinned. “It creates a habitat (RCWs-- red-cockaded woodpecker) prefer,” said wildlife biologist. It allows for open park lighting”

Another example of this trait is given the article “Florida's hottest job: Fighting fire with fire” (find links in the Reference). There are a lot of similar examples of prescribed burning implementation for the benefit of one or more “fire-adapted species” in an ecosystem, with total ignorance of the negative effect of burning on all other species and components of this ecosystem. They are presented in numerous scientific papers and press articles devoted to wildfire management.

The conclusion from misconceptions 1,4 and 5:

The basic key notions of the prescribed burning paradigm (*fuel, fire-adapted species and fire-adapted ecosystem*) are not given scientific (and any clear) definitions in the literature on prescribed burning, probably for the reason that they do not make scientific sense.

Summing up the misconceptions 1,4 and 5 we can conclude that the key terms that form the basis of the theory of prescribed burns, on which it builds all its provisions and conclusions (*fuel, fire-adapted species u fire-adapted ecosystem*) are not scientific concepts with their well-founded and precise definitions. Probably, for this reason, a clear definition of these three terms (i.e., what the ideologists of prescribed burning mean by them) cannot be found either in scientific, methodological, or any other literature devoted to prescribed burning. In all publications, these terms are used by their authors as obvious concepts that do not need definitions!

The “*fuel*” is a technical term taken from the Wildland fire management terminology, where this term is defined as all plant material of a natural area that can burn in a wildfire. At the same time, in the sphere of prescribed burning, the concept of “fuel” is not used exactly as it is used in the field of extinguishing wildfires, but it is impossible to find an exact definition of this term for the sphere of prescribed burning. Publications about prescribed burning always use only the word “fuel” itself and do not specify which living and dead plants are included in this concept, that is, what exactly is burned in natural areas.

The term “*fire-adapted species*” contains a distorted understanding of the biological concept of “adaptation”. The authors of publications on prescribed burning understand this term as “animal and plant species dependent on wildfires”, that is, species for whose survival or reproduction periodic fires in the ecosystem are a necessity. But the term “adaptation” means something completely different in biology – not dependence, but fitness. With this definition, the term “fire-adapted species” should mean “species of animals and plants fitted to wildfires”. That is, such species that have developed the ability (behavioral, physiological, or morphological adaptations) to survive wildfires or populate natural territories during periods of pyrogenic successions, but the presence of fires is NOT necessary for their survival or reproduction. Probably this understanding of the term was at the beginning of the development of Fire ecology science, but later it was deliberately distorted by the authors of publications on prescribed burning, who promoted by this way the idea of the need for vast regular burning inside natural lands.

The strangest is the term “*fire-adapted ecosystem*”. Adaptation, as in the case of the term “fire-adapted species” is interpreted here as the dependence on fires. The ideologists of prescribed burning claim that all such ecosystems need either regular wildfires or regular burning.

We believe that the notion of “fire-adapted ecosystem” either cannot exist in principle, or this term does not make sense, since it can be assigned to absolutely all terrestrial ecosystems of the planet.

If use the correct meaning of the biological concept of “*adaptation*”, that is, to consider adaptation to wildfires - the organism’s fitness to wildfires, its ability to survive wildfires, then the notion “fire-adapted ecosystem” cannot exist in principle. Any natural ecosystem is a synthesis of a huge number of species of flora, fauna and microorganisms, most of which undoubtedly die in a wildfire or burning. If most of the species and individuals of an ecosystem die from a phenomenon, it is impossible to say that this ecosystem is “adapted” (fitted) to this phenomenon, even if there are some species or individuals in it that can survive during this phenomenon.

However, apparently, by introducing the concept “fire-adapted ecosystem” the ideologists of burning wanted to reflect the phenomenon that, despite the fact that many natural ecosystems of the planet were repeatedly passed by wildfires in ancient times, they, as ecosystems, still exist on the planet. Since they exist, they are “adapted to fires”. This logic is visible in the literature and discussions about prescribed burns. Thus, the ideologists of prescribed burning sometimes claim that the fire-adapted ecosystem can include all terrestrial ecosystems or most of them. This belief is one of the reasons why some of them believe that it is necessary to implement prescribed burning inside natural territories everywhere, in all countries and landscapes.

It can be assumed that by introduction the term of “fire-adapted ecosystem” the scientific ideologists of prescribed burning reflected the well-known biological phenomenon of *pyrogenic succession*, or a process of gradual restoration of a natural ecosystem after a wildfire from the stage of complete destruction to the *climax stage* (the stable natural state of the ecosystem, the most complete in terms of diversity of species and their relationships). All terrestrial ecosystems of the planet should have the ability to recover after a wildfire, so they all can be called “fire-adapted ecosystem”. However, the fact that all terrestrial ecosystems have this ability makes the introduction of the term “fire-adapted ecosystem” meaningless. It should be noted that this well-known concept in biology (pyrogenic succession) is not mentioned in publications on prescribed burning.

Note that we have to talk about the interpretation options of the terms “fire-adapted ecosystem”, “fire-adapted species” and “fuel” in the prescribed burning paradigm, because of their exact definitions (that is, what the ideologists of burning themselves understand by these concepts), we could not find in any source of literature about prescribed burning.

Despite the absence of published scientific (or simply accurate and clear) definitions of these three terms and the contradiction between the understanding of these terms used by the ideologists of burning to the basics of the science of Ecology, all three terms are used in the paradigm of prescribed burning as strict scientific concepts. Based on these concepts, conclusions are made and practical actions (mass regular burning) are implemented with significant interference in the natural ecosystems of vast territories. The forecasts of catastrophic consequences of these actions for biodiversity, state of natural ecosystems, climate, soils, and people’s health are described in the campaign position in division 1.4 *The negative characteristics of prescribed burning and their destructive consequences for nature and people*.

Misconception 6.

Ideologists of prescribed burning believe that there is a lack of wildfires around the world for the healthy state of many natural areas, as a result of which they need regular burning.

The statement that **there are not enough natural fires in the world** due to their successful extinguishing by fire services is an axiom in the paradigm of prescribed burning (i.e., a statement that is taken on faith without any scientific evidence). This statement is used both to justify prescribed burns implemented for the purpose of mitigating severe wildfires, and for burns carried out to assist “fire-adapted” ecosystems and species.

In the first case, the ideologists of the paradigm claim that due to the insufficient number of wildfires, a lot of fuel accumulates in the forests, which must be burned to prevent severe wildfires. In the second case they argue that due to the insufficient number of wildfires, the “fire-adapted species” suffer, so it is necessary to burn the territories where such species live (which they call “fire-adapted ecosystems”) to help such species survive.

The widespread propaganda of the prescribed burning practice in different countries (for example, via facebook groups) gives the impression that the many apologists of prescribed burning believe that burning is needed absolutely everywhere, in any country of the world. It can be concluded that they think that in many countries of the world wildfires are extinguished successfully and their number is not enough for natural areas.

This statement shows a clear contradiction with the reality, that is, with what is happening in the world regarding wildfires: environmentalists, politicians, and scientists are sounding the alarm, because the **number, area and intensity of wildfires in the world are significantly increasing**. The MODIS images of all continents, except Antarctica, which are red from thermal points, also inform about this. The press of different countries often writes about the ongoing wildfire disasters, about the population of cities suffering from the smoke of wildfires.

Maybe the apologists of prescribed burning are referring to the insufficient number of wildfires in nature only in some countries? Then, it is logical to assume that all countries where the practice of prescribed burning is actively used should be included in the list of the countries that lack natural fires, which for this reason are “replaced” by prescribed burning. There is a contradiction with reality again. Because, the countries that annually burn huge areas of natural land have annual catastrophic wildfires (USA, Australia, Portugal, Canada, Russia). Thus, in the United States and Australia catastrophic wildfires occur every year, and fires occur in those regions that are regularly burned.

Therefore, the statement of the apologists of the prescribed burning paradigm that burns are necessary for many countries, because there are not enough wildfires in nature is another obvious contradiction to common sense, logic, and reality.

It is important to note that the statement about the lack of wildfires in nature is used as an axiom in the prescribed burning paradigm. Apologists of burning do not give any scientific proof for this statement. Also, it is impossible to get this proof now. After all, in order to scientifically prove for any region that it does not have enough wildfires, it would be necessary to have data on the frequency of wildfires in this region in the pre-anthropogenic period (when there was no increase in the frequency of wildfires due to the influence of the burning of ancient people). As we have already written, there have been no clear studies of the natural frequency of wildfires in the world. There were only a few studies of the approximate estimation of the frequency of wildfires in the pre-anthropogenic epoch for a few areas on

the planet. Therefore, there can be no researches that would be aimed at studying the natural frequency of wildfires and comparing them with the current frequency of wildfires. That is, it is simply impossible to conclude on a scientific basis that “there are not enough wildfires anywhere”. Thus, this statement is absolutely unfounded. It is another pseudoscientific statement that underlies the practice of mass prescribed burning inside natural lands.

Apparently, the conclusion about the lack of wildfires is made on the basis of a visual analysis of plant litter and wood rags accumulated in forests. Of course, visual analysis cannot say anything about the normal state of ecosystems and the lack of wildfires in them. However, in territories that have been frequently burnt for a long time, communities of **detritophages** and **decomposers** that decompose dead organic matter can be significantly reduced or completely destroyed. For this reason, it is not a lack of wildfires for healthy natural ecosystems, it is lack of the press of anthropogenic burning, which people have been carrying out for centuries in the natural areas to remove plant litter.

Slowing down or stopping the decomposition of plant litter due to the destruction of detritophages and decomposers communities is an obvious negative consequence of prescribed burning practice considered in the 1.4 The negative characteristics of prescribed burning and their destructive consequences for nature and people (The First Consequence).

Misconception 7

Ideologists of prescribed burning believe that most of the terrestrial natural areas of the planet are “fire-adapted ecosystems” that need regular controlled burning.

Argumentation of the apologists of prescribed burning, which they use to promote the practice of burning in different countries, allows us to conclude that, in their opinion, most of the terrestrial regions of the planet are “fire-adapted ecosystems” that need regular prescribed burning. They say approximately the following in this regard:

They claim that (1) most of the terrestrial regions of the planet are fire-adapted ecosystems that are inhabited by fire-adapted species of flora and fauna. Further, they claim that (2) there are not enough wildfires around the world (a thesis whose pseudoscientific sense we have analyzed above). And further, from the first and second, they conclude that (3) **all those fire-adapted ecosystems, which are most of the terrestrial ecosystems of the world need regular controlled burning.**

Often they add another argument to this logical construction, which gives them a justification to burn absolutely everywhere, even where it is not possible to find a single fire-adapted species. They claim that accumulated “fuel” in the forests will burn anyway, from lightning or from people, only without prescribed burning it can burn out later for several years. People, by controlled burning, only regulate the process of fuel accumulation.

Thus, the prescribed burning industry receives the **final conclusion that it is possible and necessary to burn with any frequency absolutely everywhere.** Any natural area is either an “ecosystem adapted to fire”, which a priori needs regular burning. Or it should be burned, because “there is a plant litter that will burn anyway, sooner or later, the burning does the same thing, but under control”.

This final conclusion is the basis of the belief of the apologists of burning that the practice of prescribed burning should be spread and used around the world. They actively use this chain of reasoning and its final conclusion, conducting propaganda of prescribed burns in different countries, mainly among people who are unable to see for themselves the false nature of this information.

Let's analyze this chain in detail.

The first part of the statement (that most terrestrial regions of the planet are ecosystems adapted to fires) is literally true, because, as we said above, the ability to recover after a wildfire during the process of *pyrogenic succession* is a common property of all terrestrial ecosystems, that is, all terrestrial natural areas are ecosystems adapted to fires in this sense. However, the entire subsequent interpretation of this fact by the followers of prescribed burns is incorrect.

The pseudoscientific character of the thesis that there are not enough wildfires around the world for the healthy state of many natural areas we discussed above in Misconception 6. In short, there is currently no scientific data that would allow us to conclude about any region of the planet whether there are enough wildfires or not. Therefore, **the final conclusion that “all those fire-adapted ecosystems, which are the most of the terrestrial ecosystems of the world, need frequent regular burning” is also false.**

If it is possible to prove for some natural region of the planet that there are not enough wildfires in it, and its ecosystems really suffer because of this, then controlled burning there can be carried out at an interval no less than the essential interval between wildfires in this area, that is, on average once every tens or hundreds of years. However, as we have already said, most apologists of prescribed burning do not attach any importance to the issue of the interval between burns. In their opinion, natural territories can be burned with any frequency.

We have analyzed why it is impossible to burn “fuel” in natural areas with any desirable frequency in sections *1.4 The negative characteristics of prescribed burning and their destructive consequences for nature and people* (The Negative Characteristic №2) and *1.5 Definition of the “harmful forms of prescribed burnings according to the position of the campaign* (Why is the burning interval so important?)

Misconception 8

Apologists of the prescribed burning paradigm have a simplified and incorrect understanding of what is good for the species and the ecosystem. They are aimed at forcible and large-scale imposition of these “benefits” to natural territories.

Apologists of prescribed burning use a simplified and incorrect understanding of what is a benefit for a species and an ecosystem and have an obsession that people should carry out this “benefit”, because without his management actions, the wild nature will not manage to implement its function. This erroneous conception is used to justify and conduct vast, frequent prescribed burning within natural lands.

In general, this position is a part of the **concept of total control and management of wild natural territories**, which now dominates in some countries of the world, including countries where the practice of prescribed burning is actively used (for more information, see Misconception 9).

The position of the campaign examines arguments that allow considering false the idea that regular prescribed burning brings some benefit to ecosystems called “adapted to fires” by the ideologists of prescribed burning. Burning may probably bring some benefits to some species of such ecosystems (the so-called “fire-adapted species”), but cause enormous damage to other species of these ecosystems (who do not have adaptations to fires and do not receive any benefits from burning) and the normal functioning of the ecosystem, hinder its natural recovery after centuries of pressure from anthropogenic burning.

It is obvious that no one result of an impact on nature that people interpret as a “benefit” for one or more species in an ecosystem cannot be considered as a benefit for the entire natural ecosystem. People should always take into account the consequences of human impact on the entire natural ecosystem, i.e. on the

entire list of its components and species, including **biological evolution**, as an independent significant factor inherent in wildlife. We must not forget that the main (and, most often, the only necessary) help to nature is to remove from it all human activity, including all managing actions.

Misconception 9

A dangerous strategy of total interference in natural processes is being implemented in the paradigm of prescribed burning. Apologists of prescribed burning believe that people can control natural processes, and do it not only on agricultural and forestry lands, but also inside wild and protected natural areas, created to the purposes of nature conservation

The belief that people can control natural processes, that it is their right and duty, is another false, destructive statement that lies at the foundation of the prescribed burning paradigm. The whole strategy of prescribed burning, which arises from this statement, contradicts the concept of absolute conservation, which has shown its effectiveness in preserving and restoring intact natural lands in those countries where it is used (reserves of Russia, wilderness areas in the USA, etc.). According to this concept, the most effective protection of wild natural territories is the maximum removal of any human activity from it.

The conviction that people can manage natural territories is especially inherent to countries where the practice of prescribed burning is widely used (USA, Australia, Canada, South Africa, some European countries). We noticed that in discussions devoted to the catastrophic negative consequences of prescribed burning, many practitioners and scientific experts of prescribed burning from these countries recognize these problems, but believe that people simply need to learn how to “burn better” in order not to create such consequences. The idea that people should not burn and interfere with natural processes with management (at least on protected natural areas and intact ecosystems) seems absurd to them. At the subconscious level, they have the idea that a person should control nature everywhere. Such an attitude of society is fundamentally destructive, since nature in its natural state may come to an end.

Misconception 10

The paradigm of prescribed burning is based on a dangerous belief about the necessity to continue the tactics of burning natural territories of ancient native people.

Many apologists of prescribed burning believe, that in current times people should continue the burning tactics of ancient native peoples (American Indians, Australian, and African Aborigines), who for thousands of years burned natural territories for hunting and agriculture. The confidence that the ancient burnings were great wisdom that brought benefits to nature is one of the **cornerstones** of a philosophical system of prescribed burning paradigm in North America and Australia. Also, it is one of the principal arguments used in the propaganda of prescribed burning practices around the world. These arguments are often found in the press, scientific papers, websites, and social network groups devoted to prescribed burnings and wildfire fighting (some examples of such sources can be found in the Reference, Additional list – 3.2 Sources which promote the traditional burning of ancient native people).

However, the authors of the texts about the wisdom of the ancient traditions of burning and the need for their continuation in our days, do not explain the reasons for these beliefs. They do not explain why they think that the burning of ancient people did not harm wild nature, and why they think that modern people need to continue this practice. They do not try to analyze the ancient burning and comprehensively assess their impact on wild nature. The ancient practices of burning are called “wisdom and benefit for nature”, only because the ancient native peoples implemented them for a very long time, several thousand years.

Thus, these beliefs have the character of propaganda, the only purpose of which is to justify the modern methods and scale of the prescribed burning industry and convince society to burn more and more.

The book blog “Fire in Nature” authored by Ed Komarek (American enthusiast and propagandist of prescribed burning practice, founder of several Facebook groups dedicated to prescribed burning propaganda in the world)⁶ is a clear example of the exaltation of the ancient American Indian's burning practice, and justification of the mass prescribed burnings implemented in the USA by this ancient experience. Even the science that accompanies the modern practice of prescribed burning, Ed Komarek describes as a transfer of the experience of the ancients to modern realities. The same author very fiercely criticizes the academic opposition to prescribed burning (that is, those scientists who reject the usefulness of prescribed burning practice) without giving rational arguments for his criticism.

Meanwhile, it is known that the impact of ancient people was a real **catastrophe** for the biological diversity and natural ecosystems of the planet on all continents and on most of the islands where people settled.

According to archaeological data (Harari Y. N, 2011- 18, 19, 20), since the separation of humans (Homo sapiens) from other animals about 70-100 thousand years ago – it has become **the most destructive species for ecosystems on the planet**. As soon as people arrive at a new continent or an island – they quickly (for hundreds or thousands of years) lost about 60-90% of the species diversity of large animals (mammals, reptiles, and birds). Ancient people were the direct or indirect cause of the death of hundreds of species of insects and mollusks. The whole megafauna of mammal and bird species disappeared on all continents and islands because of ancient humans which spread there. In particular, it is known that human colonization of Australia (45 thousand years ago) and both Americas (16 thousand years ago) caused there an environmental catastrophe, the disappearance of the majority of large animal species, and significant change of natural ecosystems. For example, the fossils of plants confirm that 45 thousand years ago eucalyptus trees grew in a small area in Australia. But after the arrival of Homo sapiens on this continent, the eucalyptus trees suddenly spread everywhere, displacing all other trees and bushes. This change in the vegetation composition affected significantly the animals of Australia. Many species of animals of all sizes could disappear in Australia because of changes in their habitat, caused by ancient people. Similar processes can be supposed on all continents and islands inhabited by people (Harari Y. N, 2011 – 20). The main instruments of this influence of ancient people on natural ecosystems and biodiversity were the burning of forests and hunting, and later – the cutting of trees. Some huge deserts of the planet probably were made by such activities of ancient people (Saharan desert, the deserts of central Australia, and others).

It can be concluded that the ancient human practices of burning on all continents and islands were **catastrophically destructive** to natural ecosystems and the biological diversity of the planet. The ancient people caused the extinction of a huge number of animal species of all sizes and quasi entire megafauna of the planet. **In our time, there are no rational reasons to continue the destructive practices of ancient people – the burning of natural lands and hunting.** Therefore, the confidence that currently people should continue the burning tradition of ancient people - is another **false postulate** or **misconception** at the base of the prescribed burning paradigm, which contradicts common sense and worldwide objectives of nature conservation.

⁶ These groups are listed in the Appendix (“Facebook groups that promote prescribed burning in different countries and block criticism of prescribed burning practice within themselves”).

It is important to say that ancient people burned natural areas for survival; it was their way of life and the method of food production. At first times, the burning of wild forests were implemented for hunting purposes. Later, the burns were conducted for primitive slash-and-burn agriculture. These actions caused catastrophic destruction in the nature of all territories, where people lived. Since burning was necessary for the survival of ancient people, we (modern people) can “forgive” them for the damage they caused to the natural ecosystems and biodiversity of the planet. But, obviously, it is impossible to idealize these burns and consider them as a useful practice that should be continued in our time! But this is exactly what the apologists of prescribed burning do, who have made the ancient practice of burning the cornerstone of their philosophy.

Also, the pyrophytic ecosystems formed as a result of the burning of ancient people (natural territories with a predominance of flora and fauna adapted to frequent fires and a state of constant pyrogenic succession) cannot be considered a benefit. Maybe some of these artificial natural landscapes can be preserved by special measures, but the main territories should be free from the anthropogenic pressure of burning because modern people do not need to burn natural lands for their survival. Modern society is organized according to another principle (than it was in ancient times), and modern people do not need to get their food and clothes by hunting and slash-and-burn farming. Therefore, there is no rational reason to continue the destructive practice of burning, which was used in ancient times.. On the contrary, now there is an opportunity to finally free wild nature from this long destructive anthropogenic press – artificial burning and hunting.

Conclusions

The burning of natural territories is one of the most ancient, long-lasting, and catastrophic impacts of people on nature and biodiversity. This practice arose tens of thousands of years ago in primitive society along with the practice of hunting wild animals, that is, almost immediately after ancient people obtained the ability to make fire. And all the subsequent centuries of the development of human society, people with different goals implemented intentional burnings, introducing the factor of anthropogenic fire into natural ecosystems.

It is possible that burnings were not implemented everywhere, and natural territories that escaped a burning impact in past eras can be found. But the territory passed by intentional burnings was huge on all continents and many islands occupied by people.

The practice of burning has been passed down in the form of teaching and tradition from the older generation to the younger, from father to children, for many thousands of years. All this time, this area has been deprived of scientific analysis of what exactly is happening as a result of burning with ecosystems, soils, and biodiversity of the burnt lands. The modern apologists and scientific experts of prescribed burning also do not investigate these questions. Meanwhile, in some countries, the scale of burning has increased significantly compared to the scale of the burning of past eras. Instead of a thorough scientific study of all the consequences of burning for soils, biodiversity, natural ecosystems, climate, and public health, the modern burning industry has begun to idealize this burning legacy of the past. Without rational reasons (i.e., scientific analysis), the apologists of burning began to exalt the “wisdom” of the ancient peoples who burned natural areas and propagandize to continue this ancient tradition.

In fact, the practice of burning of ancient people began to be considered “correct and wise” only for the reason that it was implemented for a very long time, for hundreds or thousands of years. The long time of burning is the only argument on which the apologists of burning rely, arguing about the wisdom of this practice of the ancients. Probably, this is due to the psychology of people, who consider wise and correct those things which are happening for a very long time. However, stupidity and harm, repeated even a thousand times, do not become wisdom and benefit but continue to be stupidity and harmful.

As a result of the burning and hunting of ancient peoples, 60-90% of the species diversity of large animals (including the entire megafauna of mammals and birds) disappeared from the continents and islands; natural territories changed their appearance; ecosystems were disturbed and populated by pioneer species (species of flora and fauna adapted to wildfires, which, therefore, are the first who inhabit the territories passed by fire). In our time, these disturbed ecosystems have been called by supporters of the prescribed burning paradigm as “fire-adapted” ecosystems”. Apologists of burning insist on the need to maintain those natural lands in this “fire-adapted” condition by the implementation of regular prescribed burning there. They justify this measure, in fact, only by the same argument – the duration of the years of existence of these disturbed ecosystems, because of which this disturbing state has become perceived as the natural appearance of the ecosystem. Apologists of burning are not confused by the fact that in order to maintain this “fire-adapted” condition of an ecosystem (that is, providing assistance in the survival of several fire-adapted species living there), regular prescribed burning must be carried out on the territory. That is, at least, it is necessary to spend financial resources on this action, create harm to health of the local people and constant threats of wildfires. Without burning, these ecosystems most likely will change their appearance and species composition, since they will go further in the process of pyrogenic

succession - the natural restoration process of an ecosystem disturbed by wildfires or burning to its climax (stable, full-fledged) condition.

Current time is the time of the dominance of rational, complex, and objective scientific knowledge, development of environmental values, transition from an anthropocentric worldview to biocentric one, awareness of the independent value of wild nature and understanding of the harm that human intervention causes it, understanding of the historical special (negative) role of the Homo Sapiens species for the wild nature and the formation of international aspirations to limit human activity in order to preserve wild nature on the planet. Therefore, now humanity has the opportunity to properly rethink the practice of burning and stop all its destructive forms on the planet!

Links:

Campaign's position in English (PDF):

https://drive.google.com/file/d/1YvYZ7VXyVd-Shl2tpvof1aCJ_LaO0hXM/view?usp=sharing

Campaign's position in Russian (PDF):

https://drive.google.com/file/d/1jfUjrzpOEqZIMLkoY7-gnomaVB_qeG5t/view?usp=sharing

Website: <http://www.green-forums.info/stop-burnings/>

Facebook group of the campaign “Prescribed Burning Watch”:

<https://www.facebook.com/groups/333909630609223>